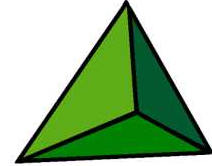




**ECONOMIC &
WORKFORCE
DEVELOPMENT**
through the
CALIFORNIA
COMMUNITY
COLLEGES

**BUSINESS AND WORKFORCE
PERFORMANCE IMPROVEMENT INITIATIVE**



Information Technology In the State Government Sector

The Greater Sacramento Region
Sacramento, El Dorado, Placer, Sutter, Yolo, & Yuba Counties

October 2007



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IN THE SACRAMENTO REGION, ANNUAL DEMAND FOR THE INFORMATION TECHNOLOGY (IT) OCCUPATION CLUSTER IS EXPECTED TO OUTPACE SUPPLY BY 50 PERCENT OVER THE NEXT 10 YEARS, CREATING A SHORTAGE OF ABOUT 700 WORKERS ANNUALLY. STATE OF CALIFORNIA AGENCIES ARE ALREADY FEELING THE PINCH WITH IT VACANCY RATES AS HIGH AS 20 PERCENT.

– SOURCE: ECONOMIC MODELING SPECIALISTS, INC., CALIFORNIA POSTSECONDARY EDUCATION COMMISSION, AND DEPARTMENT OF TECHNOLOGY SERVICES

Executive Summary

Training has not kept pace with the regional demand for Information Technology workers in the Sacramento region. With employment growth faster than the regional economy, the estimated annual demand for the IT occupation cluster is 1,409, including growth and replacement needs.¹ On the supply side, only 418 students received Bachelor's or Master's degrees in 2005 and even fewer earned Associate degrees from the community college system.² If this trend continues, the Sacramento region will be forced to recruit from outside of the region to meet the annual shortfall of about 700 IT workers.

California State government agencies are the single largest employer of Information Technology (IT) workers, employing 7,225 people or approximately 17 percent of the IT workforce in the greater Sacramento region.¹ Recently, the State's IT vacancy rates jumped from 5 to 20 percent, with no relief in sight for two main reasons:

- The demand for IT workers is growing in both the public and private sector, creating fierce competition for qualified IT workers,¹ and;
- The “baby boom” population is beginning to leave the workforce at an increasing rate.³

The State classifies IT occupations into six categories: (1) Information Systems Analyst, (2) Programmer Analyst, (3) System Software Specialist, (4) Data Processing Manager, (5) Information Systems Technician and (6) Computer Operator. The occupational series, Information Systems Analyst, represents 53 percent of the need, followed by Program Analyst with 19 percent and System Software Specialist with 14 percent.⁴

A recent survey by the State of California revealed a future workforce gap in 14 functional skill areas with the two largest areas of need being Information Systems Support, which aligns most closely with the Information Systems Analyst occupation category, and Application Development, which crosses several occupation categories.⁵ While some modification may be necessary,

¹ Economic Modeling Specialists, Inc. - 6/07

² California Postsecondary Education Commission Data

³ BW Research – Public Administration Survey – 03/07

⁴ Department of Personnel Services, Filled Positions Database – 8/07

⁵ Bringing the Future of State IT Into Focus: A Skills Survey and Gap Report – 06/06

many of the 115 IT training programs offered by community colleges in the Sacramento region match the state's skill and knowledge needs.

Thus, since the minimum education requirement for two thirds of the State's entry level IT positions is 60 college units or less, community colleges in the Sacramento region can play a critical role in meeting the State's IT needs. By working together, State agencies and regional community colleges can promote IT as a viable career option to students by launching a marketing campaign that demystifies the hiring process and promotes the benefits of government employment. This will help change the current perception that few career opportunities exist in IT as well as encourage students to apply for State government IT jobs.

Lastly, because the State prefers applicants with a Bachelor's degree or higher, strengthening articulation agreements with four year universities is another important strategy that will help meet the State's IT hiring needs.

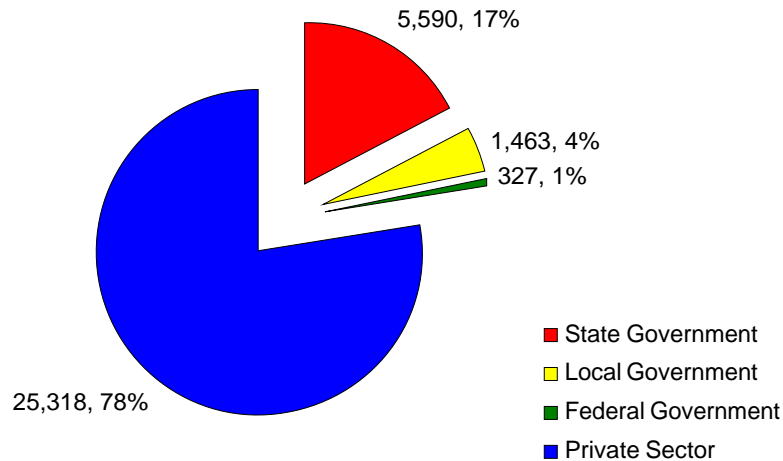
Introduction

The purpose of this report is to determine if the workforce needs of the IT occupation cluster, specifically within State government, warrant an organized response from community colleges within the greater Sacramento region – Sacramento, El Dorado, Placer, Sutter, Yolo, and Yuba counties. This report includes a review of the industry, occupational cluster, employer needs and challenges, community support and resources, and recommended college response and issues.

Industry Overview

Because most employers utilize IT to perform daily operations and meet organizational goals, almost every industry sector staffs IT professionals. As shown in Table 1, State government is the single largest employer and second largest industry sector with IT workforce needs.

Table 1: IT Employment by Industry Sector in the Sacramento Region⁶



Within the private sector, the Computer systems design and related services industry staffs 25 percent of the IT cluster, followed by Computer and peripheral equipment manufacturing industry at 6 percent, Telecommunications resellers industry at 3.7 percent and many other industries with less than 3.5 percent of the total employment. With more than 30 industry sectors hiring IT workers, negative industry fluctuations have a minimal impact on the growth of the IT occupation cluster.

Overall, the IT occupation cluster is growing at a slightly faster rate than the State or national level – 31 percent between 2006 and 2016 compared to 23 percent at the State level and 24 percent at the national level. Additionally, the IT cluster in

⁶ Economic Modeling Specialists, Inc. - 6/07

the Sacramento region is outperforming the projected national growth trends for both this industry and the overall economy, indicating a unique regional advantage.⁷

Not every industry employing IT professionals is expected to grow. The Computer and peripheral equipment manufacturing industry is projected to decline by 10 percent between 2006 and 2016, a loss of about 200 IT jobs. Staff reductions, even small ones, are often publicized in the media, resulting in a general perception that limited opportunities exist in the field of Information Technology.⁷

Occupation Overview

As of June 2007, the Department of Personnel Services (DPS) reported 7,225 IT professionals staffed at various State departments in the Sacramento region,⁸ which is somewhat larger than originally calculated by the Economic Modeling Specialists, Inc (EMSI). Unlike many public labor market information sources, EMSI includes occupation and industry data from proprietary businesses, which provides a more complete review of the IT occupation cluster.⁷

Within the last few years IT vacancy rates at the State level jumped from 5 to 20 percent due to growth in the occupation cluster across all industry sectors, as well as an increase in retirements.⁹ According to a recent survey by BW Research, 12 percent of the State's workforce is expected to retire by 2010. If this rate is accurate for the IT sector, the State will need to replace 289 workers annually for the next three years. Further, this trend is expected to continue through 2030 as the baby boom population retires from the workforce, taking with them institutional knowledge and years of management and supervisory experience.¹⁰

The State classifies IT positions into six occupational categories. Within each series, the occupations are classified by knowledge, skills, minimum education and pay scale. As of August 2007, the total employment, excluding vacancies, for each occupational series included:⁸

- Information Systems Analyst– 3,841 Positions
- Programmer Analyst – 1,385 Positions
- System Software Specialist – 1,040 Positions
- Data Processing Manager– 656 Positions
- Information Systems Technician Series – 186 Positions
- Computer Operator Series – 117 Positions

While four of the six occupational series require between 4 and 60 college semester units to qualify for an entry level position, most State departments

⁷ Economic Modeling Specialists, Inc. - 6/07

⁸ Department of Personnel Services, Filled Positions Database – 8/07

⁹ Interviews with Department of Technology Services Administrators– 6/07 and 10/07

¹⁰ BW Research – Public Administration Survey – 03/07

prefer applicants with a bachelor’s degree.¹¹ Further, opportunities for upward advancement to management or supervisory positions are typically better for candidates with a bachelor’s degree.¹²

On average, IT workers in the private sector earn between \$21 and \$37 per hour or approximately 10 to 15 percent more than the State sector. However, when comparing the overall compensation package, the State provides long-term pension plans, improving its earning competitiveness.¹¹

Appendix B provides an overview of the six occupation categories, including the educational requirements, skills and knowledge, and the typical entry level pathway.

Employer Needs and Challenges

The Information Technology Managers Academy XIII recently completed a survey of 53 State Departments to determine the current and future demands for IT positions. With results accounting for approximately 80 percent of the State’s IT workforce, the study identified the top functional skill areas that will require the greatest recruitment and training efforts. Over the next three years, the State anticipates a shortage of workers in every functional skill area.

Table 2: State of California IT Skills Survey Gap Results, 2006-2010 Projections¹³

Projected Gap by Functional Area			
Functional Area	Anticipated PYs	Projected Gap	Projected Percent Gap
Application Administration	687	-113	-16%
Application Development	1,222	-354	-29%
Database Development/Administration	384	-79	-21%
Enterprise System Support – Hardware	404	-102	-25%
Enterprise System Support - Operating Systems	307	-70	-23%
Enterprise System Support - Customer Technical Support	980	-238	-24%
Enterprise System Support - Network/Server/Messaging Administration	399	-46	-12%
Information Systems (IS) Analysis	1,410	-424	-30%
IT Architect	131	-49	-37%
Management/Supervision	643	-184	-29%
Network Infrastructure Administration	415	-104	-25%
Security Administration	188	-37	-19%

As shown in Table 2, positions related to Application Development and Information Systems (IS) Analysis have the largest calculated gap with a projected shortage of nearly one in every three workers by 2010 – 29% and 30%,

¹¹ Interviews with Department of Technology Services Administrators– 6/07 and 10/07

¹² Department of Technology, State of California IT Workforce Overview – 8/06

¹³ Bringing the Future of State IT Into Focus: A Skills Survey and Gap Report – 06/06

respectively. The projected gap is determined by subtracting anticipated separations, created by retirement or other factors, from the projected total employment needs in 2010 (i.e. Personnel Years - PYs). Basically, the projected gap is the difference between supply and demand for information technology positions within State government.¹³

The largest projected gap, Information Systems (IS) Analysis, includes business-oriented technical positions, typically performing a broad array of “quality, control, training, planning, and procurement functions.”¹⁴ Closely aligned with the Information Systems Analyst occupational series, the essential skills of this functional area include:

- Quality Assurance
- Project Management
- Technical Writing
- Data Administration
- Business Requirements
- IT Training

The California State Information Technology Strategic Plan has identified migration to modern platforms as one of the primary objectives to address by 2009. Accordingly, the essential skills within the second largest projected gap, Application Development, include both outdated and new technology platforms:¹⁴

- Assembly
- Java, J2EE, JavaScript
- VB.NET
- ASP.NET
- PL1

The IT study also revealed skill sets with the highest projected attrition. Not surprisingly, IT management and IT supervisory skills are among the top five, accompanied by desktop computer support, business requirements, and help desk/call center support. With slightly less expected attrition, COBOL and Natural placed among the top ten; both of which are considered legacy programming languages. Appendix C details the skill sets by the 14 functional areas, including specific application and system requirements.

The State’s Strategic Plan also emphasizes the need to develop service-oriented architecture systems and common business applications to “make government services more accessible” to California’s employers and residents. Several emerging skill sets necessary to support this objective include: project management, IT Infrastructure Library (ITIL), knowledge of Systems Development Life Cycle (SDLC), and strong communication and customer service skills. It’s clear that understanding the connection between efficient business practices, customer solutions, and technology is essential to the State’s IT infrastructure transformation.¹⁵

¹⁴ Bringing the Future of State IT Into Focus: A Skills Survey and Gap Report – 06/06

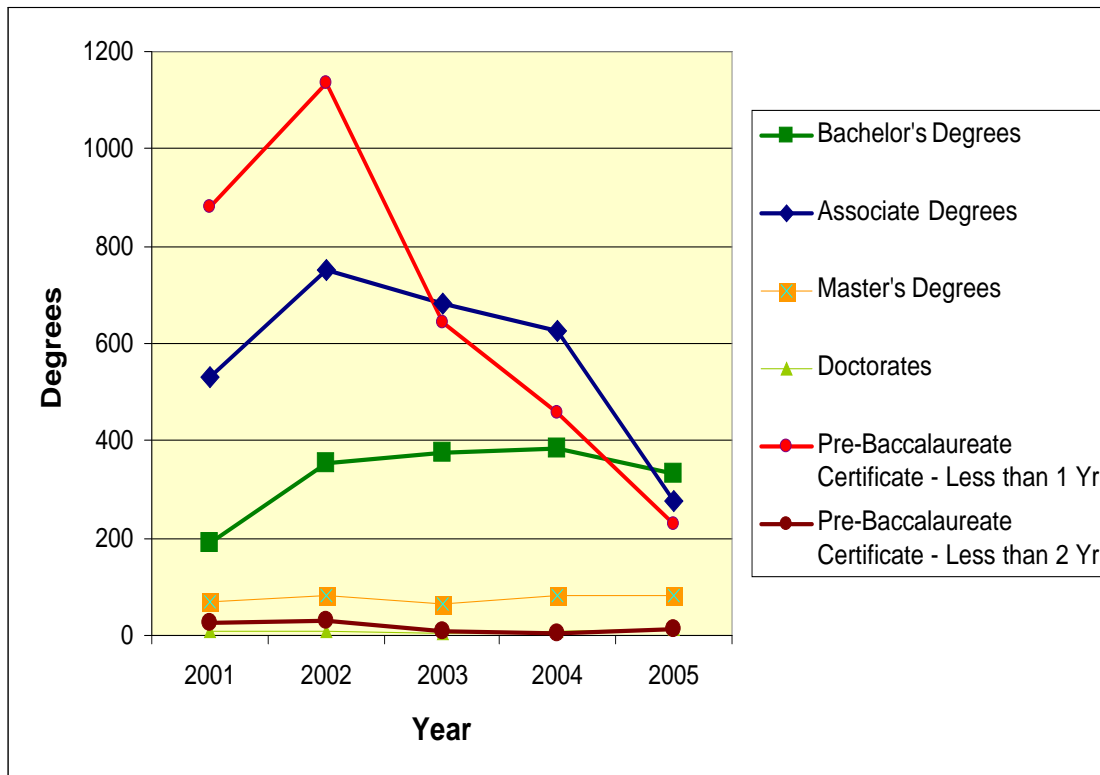
¹⁵ IT Panel, California State Government Workforce Solutions Board Meeting – 8/06

College Response and Issues

Student enrollment in IT courses has significantly declined since 2001. Enrollment in the Los Rios Community College District dropped from 3,525 students in 2001 to 1,893 students in 2006. The number of degrees conferred also declined from 471 awards in 2002 – 2003 to only 156 awards in 2005 – 2006.¹⁶ In fact, IT degree conferment has declined at all six community colleges in the Sacramento region as shown on Chart 1.¹⁷ The number of degrees conferred at the Bachelor's and Master's levels has slightly increased between 2001 and 2002 and has remained relatively constant since.

CIS and MIS community college instructors within the Sacramento region have identified “perception” as the critical factor impacting enrollment. While the demand is not as large as it was in the late 1990's, many students believe that there are few employment opportunities in the IT sector.¹⁸ This perception has been reinforced by layoffs at a few large corporations, even though these organizations represent an industry sector that holds less than six percent of the total IT workforce demand in the region.¹⁹

Chart 1: Computer Science, CIS, and MIS Degrees Conferred in the Sacramento Region¹⁴



¹⁶ Los Rios Community College District, Institutional Research Data

¹⁷ California Postsecondary Education Commission Data

¹⁸ Interviews with IT Deans & Instructors, Sacramento Region Community Colleges – 6/07

¹⁹ Economic Modeling Specialists, Inc. - 6/07

There are 120 Computer Science, CIS, and MIS degree programs offered within the Sacramento Region and many of these programs match the State's IT hiring needs.²⁰ For example, several colleges offer application development and network systems administration certificates and degree programs – which could support the second and third largest projected skill gaps determined by the IT survey. Programs with a good fit to the State's IT workforce needs include (but are not limited to):

- Administrative Technical Support, Sierra College
- Application Analyst, FLC, CRC
- Application Technician, FLC, CRC
- Computer Support, Sierra College
- Database Management, SCC
- Network Administration, CRC
- Network Design, SCC
- Network Helpdesk Technician, CRC
- Network Security, Yuba College
- Network Systems Administrator, CRC
- Network Systems Analyst, CRC
- Software Development with JAVA, CRC
- Technical Communications, ARC
- Unix, Yuba College

Appendix D provides a comprehensive list of computer related degree programs offered in the Sacramento region.

Community Support and Resources

In early 2007 the Government Training Academy, hosted at the Los Rios Community College District, formed the California State Government Workforce Solutions Board to explore and address California government workforce needs. At the first meeting, the board members – forward thinking administrators from a variety of State departments – identified IT as a critical workforce need.

According to the board, it is difficult to recruit and retain IT staff for two main reasons: (1) State IT salaries are not competitive with the private sector and (2) the hiring process typically takes between 9 and 12 months. These two factors make it difficult to compete with the private sector for talent. It is not unusual for IT staff to leave State employment after just a couple of years for a higher paying private sector job, even though the State sector provides better benefits, including insurance and a long-term pension plan. State employment also offers more opportunity to move among departments, changing jobs without losing employee benefits.

To address this workforce shortage issue, the Board has formed an IT subcommittee to develop and implement solutions. The committee has defined marketing as the primary objective and is currently developing a training/marketing module on how to get an IT job with the State of California.

²⁰ 2007-2008 Catalogs for American River College, Cosumnes River College, Folsom Lake College, Sacramento City College, Sierra College, Yuba College, and 2006-2008 Catalogs for UC Davis, & CSU Sacramento.

Additionally, the committee is exploring the idea of developing a mentoring program at the community college level to assist students with the hiring process.

Additionally, the IT Managers Academy, a State government initiative, developed an Internship program for college juniors and seniors as a recruitment and grooming mechanism. One of the main benefits of the program is that student interns upon graduation do not have to take an examination to become a full time employee, eliminating a major barrier of employment. While the program is designed for four-year university students, there is potential of expanding the program to the community college system.²¹

Conclusion and Recommendations

In the last few years, competition for qualified IT candidates has significantly increased due to industry growth and a leveling supply of graduates with Associate and Bachelor's degrees in Information Technology. It is estimated that 1,409 new IT workers will be needed annually over the next ten years to keep up with growth and replacements. However, on the supply side, regional community colleges and four year public universities are only graduating about 700 students with IT degrees. If left unaddressed, the Sacramento region will be forced to recruit from outside of the region to meet the annual shortfall of about 700 IT workers.

With heightened competition, a slow hiring process, and salaries slightly below the private sector's average, the State's IT vacancy rates have already increased from 5 to 20 percent. In response to the need to fill current IT vacancies as well as address future demand, the State conducted a skills survey and gap analysis of their IT workforce. The study revealed that two functional skill sets represent about 43 percent of the projected gap for IT workers, including (1) Information Systems Analysis and (2) Application Development.

The community college system provides several certificate and degree programs in Network Administration, Programming, and Database Development. However, many State systems are considered legacy or older technologies (e.g. COBOL, Adabas, & Natural) and are no longer offered by the community college system. While transitioning to modern platforms is slated as a major objective in the State's Strategic Plan, the process will take several years. In the meantime, community college contract education units could develop customized training programs to help smooth the transition from mature to modern technologies.

Additionally, with an emphasis to become more customer-driven, the State is utilizing business concepts and IT management methodologies such as IT Infrastructure Library (ITIL) and Systems Development Life Cycle (SDLC) to improve the efficiency of IT systems. Candidates with these skills, along with technical writing ability and a solid understanding of business operations, are

²¹ California State Government Workforce Solutions Board Meetings – 4/07 & 6/07

needed to help meet the projected skill gap in Information Systems Analysis. Advance knowledge of ITIL and SDLC is highly desirable in candidates applying for management and supervisory positions, indicating another possible opportunity to provide upgrade training to incumbent workers.

To align IT programs to the State's IT training needs, community colleges in the Sacramento region need to modify several application courses to include VB.NET and ASP.Net as well as integrate technical writing, business communications, project management and business methodologies into existing curriculum. These modifications would help address the State's IT workforce crisis, but with a limited impact since program capacity is not the main challenge.

With the perception that few career opportunities exist in IT, enrollment has declined, creating competition for qualified applicants across all industry sectors. As the majority of positions and career advancement opportunities exist for candidates with a bachelor's degree, the community colleges can play a key role in solving this regional workforce issue by partnering with the State of California to market IT career options to community college students as well as focus on strengthening articulation agreements with CSU, Sacramento and UC, Davis. As more students become aware of the career fast-track options in IT, enrollment will grow, ultimately helping meet the workforce needs of the State of California.

Data Limitations

Economic Modeling Specialists, Inc., the California Employment Development Department Labor Market Information Division, and U.S. Bureau of Labor Statistics classify the IT cluster by 10 occupations. These occupations do not match the State's classification system for IT positions, which groups the occupations into six categories. Consequently, projections by occupation within the State classification system are not available.

References

American River College, 2007-2008 Catalog

Bringing the Future of State IT Into Focus: A Skills Survey and Gap Report, 2006

BW Research – Public Administration Survey, 2007

California Postsecondary Education Commission Data, 2007

Cosumnes River College, 2007-2008 Catalog

CSU Sacramento, 2006-2008 Catalog

Department of Personnel Services, Filled Positions Database, 2007

Department of Technology Services: State of California IT Workforce Overview PowerPoint Presentation, 2007

Economic Modeling Specialists, Inc.

- California State Employment Development Department, Labor Market Information Division
- U.S. Bureau of Economic Analysis
- U.S. Census Bureau, County Business Patterns
- U.S. Census Bureau, Non-employer Statistics
- U.S. Dept. of Labor, Quarterly Census of Employment and Wages
- US. Bureau of Labor, Occupation Employment Statistics

Folsom Lake College, 2007-2008 Catalog

Los Rios Community College District, Institutional Research Data, 2007

Sacramento City College, 2007-2008 Catalog

Sierra College, 2007-2008 Catalog

UC Davis, 2006-2008 Catalog

Yuba College, 2007-2008 Catalog

Appendix A: How to Utilize this Report

About Us - Description of BWPI

The Business and Workforce Performance Improvement (BWPI) initiative is focused on building the capacity of the colleges in the area of economic and workforce development to enhance their ability to deliver education and training services to businesses and workers in high growth industries, new technologies, and other clusters of opportunities.

The Centers of Excellence (COE) within BWPI provide information regarding workforce trends, increasing awareness and visibility about the colleges economic and workforce development programs and services, and building partnerships with business and industry.

The difference this will make to the colleges is that it will position them as THE workforce partners of choice to business and industry and ensure that college programs are current and responsive. This will contribute to the overall economic vitality of the communities in which they serve.

How to Use This Environmental Scan Report

The Centers of Excellence within the Business and Workforce Performance Improvement Initiative of the California Community College Economic and Workforce Development Program have undertaken Environmental Scanning to provide targeted and valuable information to community colleges on high growth industries and occupations.

This report is intended to assist the decision-making process of California community college administrators and planners in addressing local and regional workforce needs and emerging job opportunities in the workplace as they relate to college programs. The information contained in this report can be used to guide program offerings, strengthen grant applications, and support other economic and workforce development efforts. This report is designed to provide current industry data that will:

- Define potential strategic opportunities relative to an industry's emerging trends and workforce needs;
- Influence and inform local college program planning and resource development; and
- Promote a future-oriented and market responsive way of thinking among stakeholders.

This Environmental Scan included a review of the California Regional Economies Project reports and Employment Development Department (EDD) Labor Market Information (LMID) projections that cover the communities in this region, as well as many other sources as referenced.

Important Disclaimer

All representations included in this Environmental Scan product/study have been produced from a secondary review of publicly and/or privately available data and/or research reports. Efforts have been made to qualify and validate the accuracy of the data and the reported findings. The purpose of the Environmental Scan is to assist the California Community Colleges to respond to emerging market needs for workforce performance improvement. However, neither the Business and Workforce Performance Improvement Centers of Excellence, COE host college or California Community Colleges Chancellor's Office are responsible for applications or decisions made by recipient community colleges or their representatives based upon this study including components or recommendations.

Additional Information

The Business and Workforce Performance Improvement Initiative is funded in part by the Chancellor's Office, California Community Colleges, Economic and Workforce Development Program. The total grant amount (grant number 06-305-017 for \$205,000) represents compensation for multiple documents or written reports through the Centers of Excellence.

Our mission is to strengthen California's workforce and advance economic growth through education, training and job development.

Appendix B – State of California IT Occupation Series^{22 & 23}

Computer Operator Series – 117 Positions

- Education - Large Range beginning with 4 IT related Units to 60
- Knowledge - Classes in this series operate the main information technology systems console, multiple on-line teleprocessing systems, etc.
- Entry Levels - Entry into this series is typically from outside State service or from other State classes performing duties in support of information technology systems.

Information Systems Technician Series – 186 Positions

- Education - Large Range beginning with 4 IT related Units to 60
- Knowledge - The classes in this series are used to perform a variety of technical duties in support of the operation of information technology systems.
- Entry Levels - Entry into this series is typically from outside State service or from other State classes performing duties in support of information technology systems.

Programmer Analyst Series – 1,385 Positions

- Education - 30 - 40 College Units
- Knowledge - This class typically combines the most programming duties with systems analysis responsibilities and/or supervisory duties.
- Entry Levels - Entry into this series is typically through the Programmer classification series, or through open hiring.

Information Systems Analyst Series – 3,841 Positions

- Education - 30 - 40 College Units
- Knowledge - Variety information technology and telecommunications concepts and understanding.
- Entry Levels - Entry into this series is typically through the Programmer, Information Systems Technician, or Computer Operator classification series, or through open hiring.

System Software Specialist Series – 1,040 Positions

- Education - BS with 24 units in IT technology-related coursework.
- Knowledge - Classes in this series are used to analyze, design, consult, code, implement, maintain, and evaluate computer software.
- Entry Levels - Entry into this series is typically through the Programmer II classification or open hiring.

Data Processing Manager Series – 656 Positions

- Education - BS/BA
- Knowledge - Principles, practices, and trends of public administration, including management into the IT industry
- Entry Levels - Entry into the series is typically from the IT related Associate and Analyst levels.

²² Department of Technology Services: State of California IT Workforce Overview PowerPoint Presentation – 07/07

²³ Department of Personnel Services, Filled Positions Database – 8/07

Appendix C - Functional Areas and Associated Skill Sets²⁴

Application Administration	
Asset Management	Geographical Information System (GIS)
Change Management	Help Desk Management
Contract Management	Human Resource Management
Customer Relationship Management	Imaging
Document Management	Project Management System
Enterprise Resource Planning (ERP)	Web Content Management
Facility Management	Workflow Management
Financial Management	Other
Application Development	
4th Dimension	Natural
Active Server Pages (ASP)	Pascal
Advance Function Presentation (AFP)	PERL
ASP.Net	PHP
Assembly	PL/SQL
C/C+/C++	PL1
C#.Net	Power Builder
Clipper	Powerhouse
COBOL	Prolog
ColdFusion	Rexx
Delphi	Silverstream
Eiffel	Small Talk/Squeak
Flash	TSQL
Forte'	VB/VB script
Fortran	VB.Net
HTML	xBase
Java, Javascript, J2EE tools	XML/ebXML/Web Services Software
Lisp	Other
M/MUMPS	
Database Development/Administration	
Access	IDMS
Adabas	Informix
Cache'	Microsoft SQL Server
Clipper	MySQL
DB2	Oracle
dBase	Sybase
FoxPro	Other
Enterprise System Support - Hardware	
Blade Servers	Network Attached Servers (NAS)
Centralized Uninterrupted Power Supplies	Tape Libraries
Mainframe Printers	Unix/RISC Servers
Mainframes/Large Scale Computers	Windows/Novell/PC Servers
Mini/Midrange Computers	Other
Enterprise System Support - Operating Systems	
Linux	Sun OS/Solaris

²⁴ Bringing the Future of State IT Into Focus: A Skills Survey and Gap Report – 06/06

Mac OS (Macintosh)	Unix (e.g., AIX, HPUX)
MVS, MVS/ESA, VM	Windows
Netware	ZOS
OS 390/OS 400	Other
Enterprise System Support - Customer Technical Support	
Desktop/Mobile Computing Technical Support	O+B112ther
Help Desk/Call Center Support	Production Control
Enterprise System Support - Network/Server/Messaging Administration	
Active Directory	Lotus Notes
Apache	Microsoft IIS
Blackberry Enterprise Server (BES)	Microsoft Network Servers
Domain Name Service (DNS)	Novell Network and Servers
Dynamic Host Control Protocol (DHCP)	Other
Enterprise Faxing	VMMail/Profs
Exchange	Web Conferencing
File/Print	Other
GroupWise	
Information Systems (IS) Analysis	
Business Requirements	IT Training
Business Resumption/Disaster Recovery	Project Management
Data Administration	Quality Assurance
Graphic Design	Technical Writing
IT Policy	Testing
IT Procurement	Other
IT Strategic Plan	
IT Architect	
Application Architect	Integration Architect
Data Architect	Security Architect
Infrastructure Architect	Other
Management/Supervision	
IT Management	Other
IT Supervisory	
Network Infrastructure Administration	
Banyan Vines	Storage Area Network (SAN)
Dynamic Virtual Private Network (DMVPN)	Switches
Firewalls	Teleconferencing
Hubs	Video Conferencing
Local Area Network (LAN)	Virtual Private Network (VPN)
Private Branch Exchange (PBX)	Voice over IP
Radio	Wide Area Network (WAN)
Remote Access Service (RAS)	Wireless Networking
Repeaters	Other
Satellite	
Security Administration	
Anti-spam	Intrusion Detection System (IDS)
Antivirus	Intrusion Prevention System (IPS)
Application Security Administration	RACF
Encryption	Security Patch Management
Event Correlation	Other

Appendix D - Computer Related Degree Programs in the Sacramento Region²⁵

School	Program Title	AA	AS	BS	Cert.	MS	Total
American River College	Computer Information Security Essentials				1		1
	Computer Networking Management		1		1		2
	Computer Programming		1				1
	Computer Science		1				1
	Database Management		1		1		2
	Information Systems Security		1		1		2
	Microcomputer Applications	1			1		2
	Network Administration Essentials - Windows				1		1
	PC Support Management		1		1		2
	Programming				1		1
	Technical Communications	1			1		2
	Web Developer				1		1
	Web Publishing				1		1
	Cosumnes River College	Application Analyst				1	
Application Data Entry					1		1
Application Manager					1		1
Application Technician					1		1
Computer Programmer			1				1
Computer Programmer - SQL					1		1
Database Analyst - SQL					1		1
Database Design					1		1
e-Business Infrastructure					1		1
Information Processing					1		1
Information Systems Security			1		1		2
Internet Programming					1		1
Linux System Administrator					1		1
Management Information Systems			1				1
Network Systems Administrator			1				1
Network Systems Engineer			1				1
Programming			1				1
Relational Database Administration					1		1
Software Development Using Visual BASIC.NET					1		1
Software Development with JAVA					1		1
Web Programming C/C++				1		1	
Web Publishing				1		1	

²⁵ 2007-2008 Catalogs for American River College, Cosumnes River College, Folsom Lake College, Sacramento City College, Sierra College, Yuba College, and 2006-2008 Catalogs for UC Davis, & CSU Sacramento.

School	Program Title	AA	AS	BS	Cert.	MS	Total
Folsom Lake College	Application Analyst				1		1
	Application Data Entry				1		1
	Application Technician				1		1
	Computer Programmer - SQL				1		1
	Computer Science		1				1
	Database Analyst - SQL				1		1
	e-Business Infrastructure				1		1
	Information Processing				1		1
	Programming				1		1
	Relational Database Administration				1		1
	Web Developer				1		1
	Web Publishing				1		1
	Windows Programming				1		1
	Sacramento City College	Active Server Pages Developer				1	
Advanced CISCO Networking, Level 3					1		1
Computer Science			1		1		2
Database Management					1		1
Information Processing			1				1
Information Processing Specialist					1		1
Information Processing Technician, Level 3					1		1
Information Systems Security			1		1		2
Management Information Science			1		1		2
Microcomputer Technician			1		1		2
Network Administration			1		1		2
Network Design			1		1		2
PC Support					1		1
Programming					1		1
Web Developer					1		1
Webmaster, Level 1					1		1
Word Processing Technician, Level 2 or 3					1		1
Sierra College		Administrative Technical Support	1	1		1	
	Computer Applications	1	1		1		3
	Computer Essentials Skills				1		1
	Computer Support	1	1		1		3
	Internet	1	1		1		3
	Microsoft Office Specialist Skills, Core Level				1		1
	Microsoft Office Specialist Skills, Expert Level				1		1
	Online Business Skills				1		1

School	Program Title	AA	AS	BS	Cert.	MS	Total
	PC Care Skills				1		1
	Virtual Office Professional				1		1
	Web Page Editor Skills				1		1
	Web Site Production Skills				1		1
Yuba College	Computer Science		1		1		2
	Information Technologies		1				1
	Internet Technology				1		1
	Network Security				1		1
	Networking Technologies				1		1
	Systems Administrator				1		1
	UNIX				1		1
CSU, Sacramento	Bioinformatics Technology				1		1
	Computer Architecture				1		1
	Computer Engineering				1		1
	Computer Networks and Communications				1		1
	Computer Science			1		1	2
	Data Management Systems				1		1
	Intelligent Systems				1		1
	Managing Information on the World Wide Web				1		1
	Software Engineering				1	1	2
	Systems Software				1		1
UC, Davis	Computer Science			1		1	2
Grand Total		6	26	2	83	3	120