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Report of the Rhode Island Information Technology Skills Gap Task Force With Addendum

Governor's Workforce Board Rhode Island

Today's Vision... Tomorrow's Opportunity.

Supported by the Rhode Island Governor's Workforce Board Industry Partnership Program

January 2008

Report of the Rhode Island Information Technology Skills Gap Task Force With Addendum

Table of Contents

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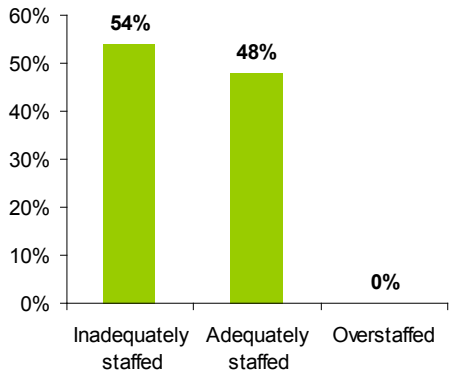
Rhode Island TechnoPoll

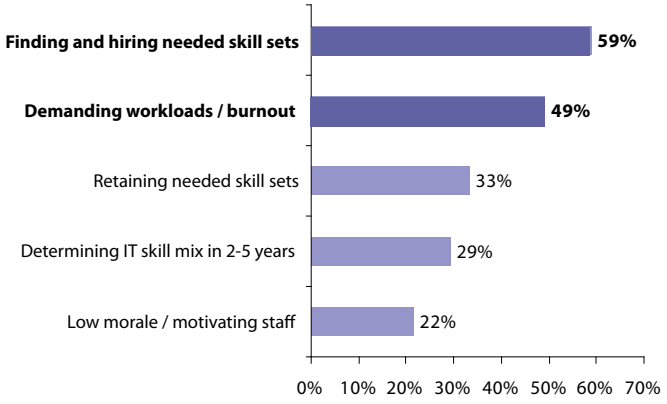
Over half of employers are inadequately staffed in IT

How would you describe your current staffing environment?



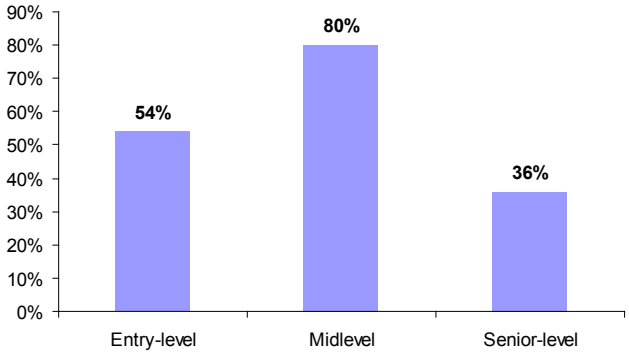
The twin problems facing RI IT employers

What are your top concerns regarding your IT staff in 2006 and 2007?



Employers want to hire IT workers with proven skills

What levels are you hiring?



The Tech Collective TechnoPoll is an internet based survey of information technology related partners in industry, government, and academia. The first TechnoPoll was conducted in October 2006.

Introduction

Information Technology (IT) is clearly a strategic resource and competency vital to every successful enterprise, large or small. Rhode Island's future economic success will depend in no small part on the quality and quantity of its IT workforce. As a first step toward building a world class IT workforce development effort, the Governor's Workforce Board awarded a grant to Tech Collective to identify issues and solutions associated with IT career opportunities in Rhode Island.

Approach

The IT Skill Gap Task Force surveyed employers and involved over 70 representatives in business, non-profit, and academic sectors and 35 students in grades 9-16 in discussions about the skills Rhode Island employers demand from IT professionals. The research spotlights changes in entry-level skill requirements needed by our state's IT employers. These sessions provided an open venue in which substantial discussion and deliberation occurred, and many common issues emerged.

Findings

Tech Collective's TechnoPoll documented the twin problems facing Rhode Island IT employers: problems finding and hiring the needed skill sets and the workload and burnout problems the shortage causes.

The findings from the 2007 IT Skills Gap Task Force show a shift in the critical skills employers identify as being in most short supply. Employers tell us that it is increasingly hard to separate information technology skills from business skills. Information technology education programs are focused on hard skills (how the technology works), but today Rhode Island employers see soft skills as the most important gap.

Not only do businesses identify soft skills as a gap, university faculty who participated in the dialogues have noticed the lack of preparation in soft skills in incoming freshman limiting their ability to perform at the college level.

Student Work Experience Opportunities Continuum

job shadow (4-8 hours)	e-mentor (10 to 12 hours)	field experience (10 to 40 hours)	practicum (40-120 hours)	co-op internship (240-1000 hours)
Student is an observer only, accompanying host employer to events, meetings, and activities normally associated with position. Host provides some career overview and insight.	Student interacts with a professional (mentor) via e-mail. Student uses mentor as knowledge resource, sounding board and guide. Mentor answers questions, shares work experiences, explains issues, etc.	Student conducts research in a business setting. Employer provides advice, facilities, and access to human and data resources relevant to research.	Student is assigned to a specific, real world project with close relevance to academic coursework. Typically assigned to an individual or team responsible for a specific, one time outcome.	Student is a "worker" performing most or all duties of a specific occupational position, under close supervision of mentor. May also serve as transitional bridge to employment by this employer.

Source: Center for Corporate and Technology Careers at CCRI

Information technology work is social and collaborative requiring the integration of technical know-how, collaborative problem solving skills, and complex communication skills. Technology is used to accelerate business productivity growth so people who combine understanding of business strategy with technology expertise add the highest level of value. There are few jobs that can be done well with only technical knowledge and those that do exist can be easily outsourced. Employers expect the importance of soft skills in hiring decisions to grow.

The number of computer science degrees awarded in the U.S. peaked in 1985 while the number of IT jobs continues to grow. It is often commented that interest in IT careers has dropped off because high tech is not stable due to the dot com bust and Y2K scare and many jobs are being outsourced and offshored. It is true that IT degrees awarded in RI are falling, but it is not true that job opportunities are shrinking. IT jobs are stable; the majority of those who responded to the TechnoPoll state they would recommend IT careers to their family and friends. Most companies outsource some functions like payroll, but not entry level IT positions.

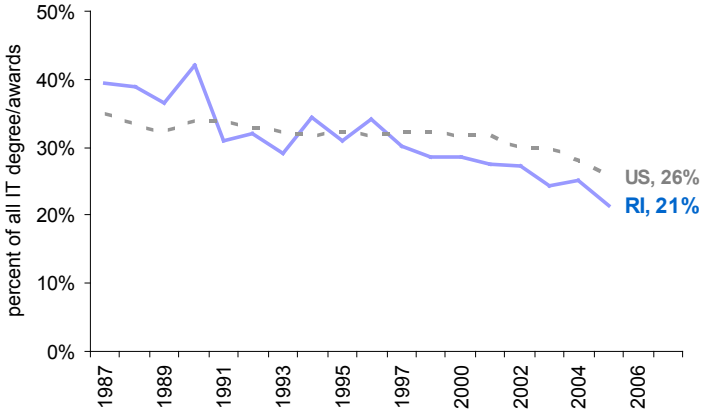
The narrow image of IT as "programing" particularly does not appeal to women, who while a growing segment in most professions, have dropped from earning 39% percent of information technology degrees in 1987 to 21% in 2005. In reality IT isn't only solitary "programing," it is a collaborative profession that is revolutionizing healthcare, expanding knowledge by enabling new approaches to genetic and climate change research, and creating technologies that change the way people live their lives. In order to have more people self-select into IT we recommend education become more team based and use more case-based learning that contextualizes IT applications in real-world challenges. There is a need for experiences like Grrl Tech that expose girls to high tech role models and show the many faces of information technology careers.

The speed of technological change will continue to make specific technology skills less important, relative to the conceptual skills that allow a person to learn new languages and systems. A fundamental understanding of core IT concepts combined with well rounded business skills are the formula for a high value employee.

The Tech Collective held IT Skills Gap dialogue sessions with a diverse range of high school and university students. College students studying CIS felt "well prepared" to enter the workforce, and most knew what skills were needed to gain an entry level job. In contrast, the majority of high school students did not know about "IT." They were unable to articulate specific career aspirations and felt they lacked the necessary skills to obtain entry level positions in IT.

Fewer Women are Completing IT Degrees or Certificates

The decline in Rhode Island has been steeper than average



Source: IPEDS Completions Survey available at http://webcaspar.nsf.gov

Skill Demands of Rhode Island Information Technology Employers

Business Skills (Soft Skills)

Technology Skills (Hard Skills)

Highest Priority

- Communication
  - Written/verbal
  - Presentation
  - Complex
  - Conflict resolution
- Teamwork
- Project management
- Learning to learn
  - Continuing education (general & technical)
  - Adaptability/mobility
  - Research
  - Staying current

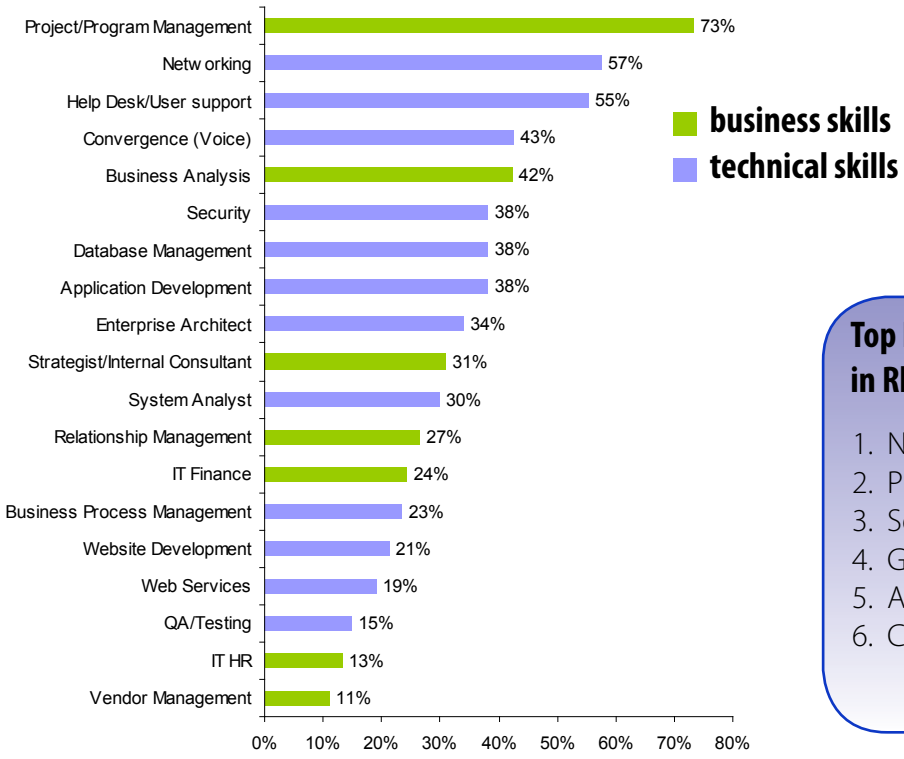
- Security
- Business continuity planning
- Web development
- Technology transfer integration
- Convergence
- IT overview/concepts
- Core technology concepts
  - Hardware
  - Operating systems
  - Network
  - Desktop tools

Important

- Customer service
- Cultural awareness
- Self organization
- Personal presentation
- Big picture perspective
  - Overall organizational vision and goals
  - Scope of impact
- Critical thinking about systems and business objectives
- Business process analysis
- Information literacy
- Solution driven
- Leadership

- Network
  - Concepts
  - Architecture
  - Design
  - Voice engineering
- Data base/storage
  - Concepts
  - Architecture
  - Design
- Linux development and administration
- Programming / coding
- Knowledge of alternative development methods
- Change management

What are the skills that you are currently hiring, outsource currently, or will need to hire in the next 2-5 years?



Businesses value IT professionals with well rounded skills and the values and motivation to contribute to the enterprise.

Top IT training expenditure categories in Rhode Island:

1. Networking
2. Project management
3. Security
4. General leadership
5. Application development
6. Convergences (voice)

Unlike many other professions and careers, IT does not have a uniform process, nor ample opportunities for work experience such as internships, job shadows, mentoring, or field assignments. This is particularly problematic because many IT employers emphasize experience over credentials even for entry level positions. Moreover, technical knowledge can be gained through studying texts, but the soft skills employers value are acquired through experience and interaction with mentors. Employers told us that college programs where faculty interact with employers, know the culture of business, and require students to participate in a continuum of work experience opportunities prepare students to succeed in IT careers.

Employers project shifts in entry-level hiring practices with more positions requiring a degree as a prerequisite. Certifications will also maintain their importance, but employers say they will choose well rounded candidates with the strongest values and motivation and require certifications to be earned post employment rather than preferring candidates with the certification in hand.

Solutions

Tech Collective has an important role to play sustaining relationships between technology educators and businesses, helping professors become more aware of the challenges in business and vice versa as part of the ongoing work of improving information technology education.

◤ *Intentionally teach soft skills as an integral part of information technology education at the high school, college and professional development levels.*

Information technology programs must teach the full circle of skills including college level writing, effective communication, teamwork, and problem solving. This can be done by creating a more business like atmosphere in the classroom, having students collaborate in teams and present work using real world formats including written proposals and persuasive presentations. With the help of focus groups coordinated by Tech Collective, university faculty and leadership will continue to identify and address implementation of curriculum redesign to address areas of concern. The Tech Collective will continue to partner with higher education to offer short courses in complex communication skills for incumbent IT professionals.

◤ *Train people with superior soft-skills in information technology.*

Some businesses reported that technical skills are easier to acquire than well rounded soft skills that combine business strategy acumen and the ability to communicate persuasively across disciplines. More businesses could train employees from other disciplines in information technology to help fill the gap.

◤ *Create more quality work experience opportunities*

Rhode Island needs to increase the quantity and quality of work experience opportunities available to high school and college students. Successful models demonstrate that this can be done by funding work experience coordinators who coach business mentors, teachers, and students to create effective opportunities and clear obstacles to participation. The coordinators' work should be technology enabled through an online clearinghouse. The clearinghouse will list current student internship and teacher externship opportunities, share reviews of experiences from past participants, and provide templates for what makes a successful work experience opportunity. This important effort will need sustained financial support from government and business to have an impact on the IT skills gap. This effort should be complemented by an "IT is Cool" campaign to increase interest.

Impact

Pulling together business, government, workforce development, and education around these recommendations can have a far reaching impact on Rhode Island's economic future. The availability of the right mix of information technology skills impacts productivity and growth of many industries in Rhode Island and thus has impacts on employment opportunities for Rhode Islanders up and down the job ladder. Beyond this, high schools and colleges that more effectively teach collaboration and complex communication skills will better prepare workers for success in the knowledge economy across industries and professions.

Future Directions

The Tech Collective is the voice of technology employers in Rhode Island. We are building a learning community through networking our members and creating professional development opportunities. Tech Collective intends to expand its contributions to the workforce development system and economic development by getting more deeply involved in netWORKri, Junior Achievement Worldwide, and higher education. The Tech Collective can play a greater role in business development by joining RIEDC in speaking with companies about the workforce development system and community of learning we have created in Rhode Island.

Information Technology Career Ladder

Average Salary

Years Exp.

Chief Information Officer (CIO or CTO)

Average Salary	Director of Applications & Systems	Director of Network Systems	Director of Desktop Systems
high $90,000-$130,000	Systems architect Business systems analyst	Data communications architect Network analysts	Systems security analyst Operating system developer/ programmer
medium $65,000-$90,000	Project manager Applications support specialist Database designer Programmer/analyst	Network administrator	Software engineer Technical writer
low $30,000-$65,000	Software programmer Web master	Network technician Network installer	Desktop support specialist Computer hardware technician Help desk
	Responsible for the development and support of the software and systems which process the customer, business, financial, and manufacturing activities of the company	*Responsible for the development and support of the components which connect the computer systems to each other, and to the Internet to allow communication between them*	*Responsible for the development and support of the hardware and software components which comprise the technology infrastructure, and the processes which keep them operating continuously and correctly*

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Addendum

Introduction to Addendum

The following report is an addendum to Tech Collective's original RFP for the Industry Partnership Grant for Year One. While some of this information was reported in the IT Skills Gap Analysis study, this addendum uses careful research and analysis of reviews, reports, interviews, forums, dialogue sessions and surveys to further identify and detail the opportunities and challenges of Rhode Island's Information Technology industry. References are cited within the narrative and appendices and comprehensively listed at the end of this report.

CHAPTER 1:
IT INDUSTRY WORKFORCE CHALLENGES

Rhode Island's Information Technology industry faces several challenges focused around workforce demographics, skill sets and involvement. Below, the Information Technology Skills Gap Task Force has provided and described the top six workforce challenges identified through research and industry input.

Challenge 1 – Under-representation of women and minority groups.

I. Women and minority groups are severely under represented in STEM (science, technology, engineering and mathematics) educational careers related to the Information Technology industry. This is a national problem, not just regionally related to Rhode Island. While the percentage of women graduating in Computer Engineering or Computer Science degrees nationwide is increasing, the overall number of students – both male and female – graduating with such degrees is decreasing. Therefore, despite higher comparative percentages, there are still smaller numbers of female IT graduates. In his Campus Technology article "Women Lose Ground in IT, Computer Science," David Nagel reports that in 2006, of the 60% of women earning bachelor's degrees, only 11% of Computer Engineering degrees were earned by women. Similarly, women earned 15% of Computer Science degrees. Finally, in the IT professional world, only one in every four women hold an IT related position.

II. According to the research of Ioannis N. Miaoulis, Ph.D, Director of The Boston Museum of Science and former Dean of Tufts University School of Engineering, there is evidence that females are naturally inclined in STEM areas, but culturally there is no exposure at young ages to interest them. Additionally, research suggests female students make unconscious decisions at younger ages as to what they can be successful at and, ultimately, what paths they will follow. In light of this information, there is a lot more that needs to be done to attract females to these career paths at younger ages.

III. Minority groups also represent the same footprint as females when it comes to attracting them to STEM industry sectors. Limited programs and resources related to the Information Technology industry also impact minority communities and individuals considering their future career paths. As with females, interesting minority students at a young age in extra-curricular activities, youth centers and at school would be a start. Also, having a focus to provide entry-level paths into careers through adult educational programs and displaced worker training could be another short-term approach for improving the representation of these populations.

Challenge 2 – The "Brain-Drain, Brain-Gain" Factor – The migration of the college educated population.

I. Research by the Federal Reserve Bank of Boston and the Economic Policy Council conclude that Rhode Island has a small net loss of college educated young professionals, and that Rhode Island is losing young talent to higher cost, higher pay metros like Boston, New York, and Washington, DC. The "pull" factor of Boston IT employers is strong, and many young Rhode Island professionals access those jobs while still benefiting from the lower cost Rhode Island housing market. In looking at Rhode Island resident and out-of-state IT graduates, both are searching for jobs in other parts of the country. Recent graduates are looking for high salaries to pay off student loans, justify the educational time they have spent and meet this generation's expectations as well. Right or wrong, the expectations of today's graduates are real and are being not met in Rhode Island. The severely low wage levels in Rhode Island (particularly in comparison to the rest of New England and the country) pose a considerable challenge

for Rhode Island to overcome in order to retain its much-needed college graduates. This stiff competition is related to the persistent national shortage of workers with information technology competencies.

II. Rhode Island colleges and universities are brain magnets, attracting students from the region and nation and introducing them to Rhode Island. In 2005, the Economic Policy Council analyzed alumni databases from seven Rhode Island institutions of higher education and found that on net Rhode Island was capturing out-of-state students and keeping them in Rhode Island. Thirty-six percent of freshman entered as Rhode Island residents, and 43% still lived in Rhode Island 2 years after graduation. That number dropped to 38% five years after graduation. When we isolate retention rates for graduates in STEM fields (Science, Technology, Engineering, a nd Math), the brain gain effect is even stronger with 58% of alumni living in Rhode Island five years after graduation. Rhode Island could better leverage colleges and universities as allies in reversing the IT brain drain by increasing course offerings in high demand IT fields and connecting students to Rhode Island IT employers. Compared to the nation as a whole, Rhode Island colleges and universities grant relatively high numbers of degrees in computer related fields for the size of the state's labor force, but relatively few degrees in several high demand fields including Computer Engineering, IT Administration and Management, and Systems Networking. Moreover, even an above average number of IT degrees falls short of employer demand in New England.

Challenge 3 – Skill standards and requirements change rapidly.

I. Every high-tech industry sector is challenged with the constant and rapid rate of change. Rhode Island's IT industry is mainly made up of small to mid-size companies which are challenged everyday with the growth of revenue to insure their sustainability. A trademark of companies this size, no matter the industry, is the lack of funds for training and development. Any one training certification becomes outdated within three years of reception, and is obsolete within five. Because of this, finding and keeping up with this training and education for incumbent workers is a challenge for existing Rhode Island companies. Additional concerns are in regards to the burden on transitioning workers looking for a career change or to update their skills and education. Finally, the risk of training workers in an IT industry which also has high – and costly – turnover rates continues to create a challenge in finding, retaining, maintaining and affording proper industry skill sets.

Challenge 4 – Inadequate education capacities through public and private providers.

I. Citing under-qualified educators and outdated curriculums, employers are not satisfied with the gaps found in Rhode Island education systems and institutions. Rhode Island's educational institutions both public and private need to listen to industry and utilize them on their curriculum assessment teams/boards. Through the skills gap analysis, we have mapped related training opportunities here in the state. We have also found achievable steps we can take to work with educators. There is a lot that needs to be accomplished in looking at the overall system used by higher education institutions when developing their curriculums. This process must change to keep up with evolving technology developments. Stronger education models and curriculums will only improve Rhode Island's students, schools, businesses and economy. We have started to make strides in these areas with the Community College of Rhode Island as well as with Roger Williams University.

Challenge 5 – Educational programs do not provide sufficient hands-on or experiential training; there is a need for internships and apprenticeships.

I. This is one of the key findings and most obvious needs of Rhode Island IT employers. While internships do exist throughout the state, they are at a low rate and are not dimensional. Educators are not strong on placement and employers are not prepared and trained on how to host interns. The overall request is to provide programs through internships and apprenticeships that can provide experiential learning situations, develop soft skills and identify career paths and needed skill sets. Employers that are "trained" on hosting interns would be most successful in identifying new candidates for open positions, as well as assimilating them to their company. Last is the opportunity for matching interns and their interest properly, educators struggle with this today, and therefore we are proposing to establish an internship/apprenticeship clearinghouse program that will not only do the matching between high education and employers, but will also "train" everyone involved on how to make each experience a successful one.

II. It was found in our assessment that there are no IT apprenticeship programs that exist in the state today.

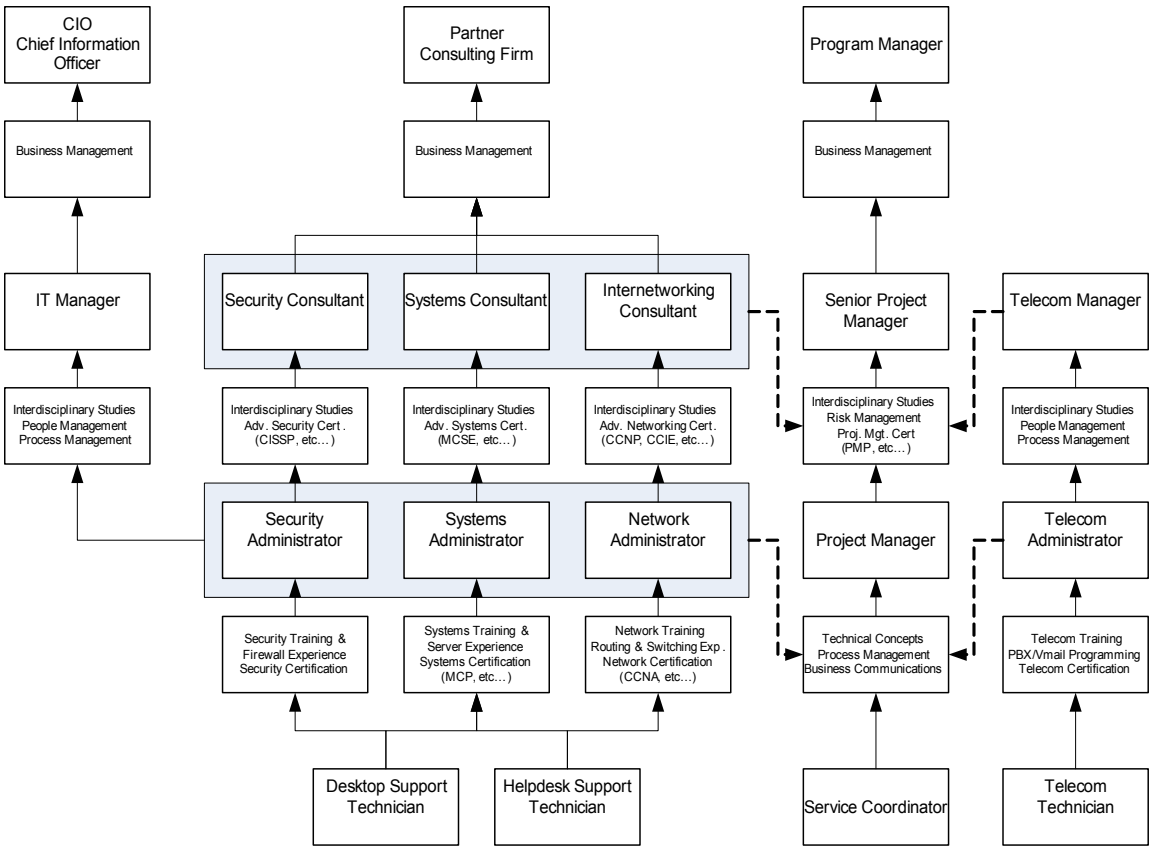
Challenge 6 – Incumbent and future workers lack "soft skills"

I. Soft Skills, this was the theme of all our findings. It appears that as the IT industry sector has matured, the sector here in Rhode Island has developed strongly into a service provider focused industry. This means working with clients directly is now a necessity. IT professional are no longer hidden in a back room clicking away as they stare at their monitors. Today, communication skills, professionalism, teamwork, project management, and personality are what Rhode Island's IT employers are looking for. Employers tell us they can teach hard skills, but soft skills are not as easy to teach or attain. Employers are more apt to hire an educated worker who has the soft skills, but has not worked in the IT industry sector than vise versa. The other challenge with soft skills is that their development depends on more than teaching a curriculum. They are part of an individual's personality, habits, and desire to grow. Soft skills have also been called "people skills,""presentation skills,""customer service skills" and "event professional etiquette" at times. But, today it is all that and more. We are recommending these skills can be taught to and/or developed in individuals through a well-rounded curriculum and internships/apprenticeships to apply that learning and shape the candidates Rhode Island's IT employers are looking for.

CHAPTER 2: INDUSTRY OPPORTUNITIES AND WAGES

While the aforementioned industry challenges of demographics and education are still growing as the state struggles to address them, the Rhode Island Department of Labor and Training's Labor Market Information (LMI) reports "Rhode Island employment is expected to increase by over 55,000 jobs during the 2004-2014 projection period." However, new workers will be needed to fill an average of more than 18,600 jobs per year due to the combination of new jobs (6,300 per year) created through economic growth and the need to replace existing workers who will leave their jobs (12,300 per year) for retirement and other reasons.

Information Technology Career Map



Entry-level positions begin with: Desktop Support Technician, Helpdesk Support Technician, Service Coordinator and/or Telecom Technician.

Currently, the Information Technology industry is one of the fastest growing and highest paid in the country. Salary.com reports the median salary of an entry level Information Technology Generalist as $47,621. Moving into more advanced positions such as Project Coordinator, the wage scale jumps to just under $100,000 annually. In spite of this, the title of "Information Technology" is not recognized as an expanding industry by RIDLT. Instead, occupations in Information Technology such as computer programmers are listed under the occupational heading of "Information" and lumped in with other professions such as motion picture and sound recording, photographers, librarians and bookkeeping, accounting and auditing clerks! According to RIDLT, any industry that is expected to grow by at least 15 percent and/or add a minimum of one hundred jobs annually is classified as an expanding industry. Even in its poor classification, RIDLT projects the "Information" field will grow 16.2% by 2014.

According to 1,100 employers responding to a Salary Survey published by Network World this September, 71% of respondents are looking to hire designers, architects or operations technicians with Cisco, VoIP and network management know-how. But hot IT skills also fall across a number of other categories with data-center management, security operations, wireless LAN design and Windows administration among them.

The skills needed to enter this growing and diverse IT industry develop around STEM and computer subjects. Early experience and opportunity have proven to be the best way to lead student interest in technology. In addition, since many people are familiar with technology as it advances in our society, workers have also been successful transitioning into IT fields after holding previous careers. However, besides just technical ability, soft skills, including critical thinking, personality and customer service are equally important in becoming successful in the dynamic IT industry.

To determine what Information Technology occupations are in high demand, not only across the country, but in Rhode Island as well, we cross referenced the Occupational Employment Statistics for Statewide Occupations provided on RIDLT's website (www.dlt.ri.gov), with the listing of high-demand jobs from the Career Voyages website (www.careervoyages.gov). Information was provided by the US Bureau of Labor Statistics. Information on IT related occupations, salary projections and projected 10-year growth are listed in Appendix A.

It should be noted that job titles and occupations used by the Information Technology industry do not correspond with those indicated in Rhode Island Department of Labor and Training's Labor Market Information documents. A sample of a typical Information Technology career map can be seen on page 8.

CHAPTER 3: TRANSITIONING WORKERS

The IT industry is unique in the fact that it is one which employs numerous professionals who have transitioned from other fields. Reasons for this include access to IT certification programs such as Cisco systems as well as a growing need for IT professionals, particularly with the soft skills acquired from other industries of work, including secretarial, teaching or liberal arts professions. During the Skill Gap study, the Task Force has reviewed the listing of the twenty-five declining occupations and industries in Rhode Island from the LMI website at www.dlt.ri.gov/lmi, and have identified five (5) occupations that can be mapped to the hard and soft skills needed for jobs in the Information Technology industry. For example, individuals trained as secretaries, word processors, data entry keyers and typists may possess the soft skills, but not necessarily the technical skills needed to secure an entry-level position such as a desktop support technician. Training as a Microsoft Certified Desktop Support Technician would be required. On the other hand, individuals employed as machine setters, operators, textile winders and electrical and electronic equipment assemblers, may transition nicely into positions that require training in Systems or Networking, and may possess some soft skills like critical thinking and self organization, but may be lacking in communication, team work, customer service and/or leadership skills.

Declining occupations involving word processors, typists and secretaries, are typically held by females. Currently Information Technology lacks a significant number of women who are either employed or hold leadership positions within the industry. A recent TechnoPoll conducted by Tech Collective showed 60% of responding companies employed either one or zero women for every nine men in an IT position! Addendum Chapters One and Five further expand on the roles of women in the IT industry. Transitioning workers from the aforementioned fields then would be a pathway towards training more women into IT.

CHAPTER 4: NEEDED IT WORKFORCE SKILL SETS AND CAUSES

During the course of the Industry Partnership Grant, the IT Skills Gap Task Force held a series of dialog sessions with more than 70 employers across most industries. In order to document the degree of skill shortages, employers were asked to identify the Information Technology positions that they were either currently hiring or outsourcing, or would need to hire within the next 2-5 years. Of the nineteen positions identified, project/program management was projected to be in the highest demand for technical skills. These nineteen positions are listed in order of their priority:

- Project/program management – 73%
- Networking – 57%
- Help desk/user support – 55%
- Convergence (voice) – 43%
- Business analysis – 42%
- Security – 38%
- Database management – 38%
- Application development – 38%
- Enterprise architect – 34%
- Strategist/internal consultant – 31%
- System analyst – 30%
- Relationship management – 27%
- IT Finance – 24%
- Business process management – 23%
- Website development – 21%
- Web services – 19%
- QU/Testing – 15%
- IT Human resources – 13%
- Vendor Management – 11%

We have determined the root causes for those shortages can be attributed, but not limited, to:

- An inadequate supply of workers
- IT curriculum being taught in RI's colleges and universities is not up to industry standards
- A shortage of women and minorities interested in STEM careers
- The best and the brightest of our college educated are leaving Rhode Island for out-of-state positions
- Incumbent and future workers lack soft skills
- Skills standards and requirements change rapidly – every 12-18 months
- Secondary and post secondary institutions do not provide sufficient "hands on" opportunities

Green = Business skills; Blue = Technical skills

CHAPTER 5: BARRIERS FACED WHEN HIRING ENTRY-LEVEL WORKERS

With needed skill sets diagnosed from IT industry dialogue sessions now established, the Task Force set about identifying the top five (5) barriers IT employers face when looking to hire new, entry-level skill sets to shape into desirable and productive employees. Those top five barriers, including the lack of an adequate education and significant wage gaps, are listed below.

Barrier 1 – Lack of adequate skill sets/education.

I. *Measuring Up: The National Report Card on Higher Education*, 2006, rated Rhode Island with an "F" on higher education "affordability." With the costs of college usurping 45 – 58 % of a low – middle class family's income, affording college in Rhode Island is a big problem, leading to lower education rates and lower available skill sets.

II. In 2006, Rhode Island Economic Policy Council's ***Workforce and Education Scorecard*** reported for every 100 ninth graders, 72 (less than 75%) will graduate high school, 40 (less than half) will go to college and 23 (less than one of every four young adults) will complete a 2 or 4-year college degree within the next six years! This alarming statistic demonstrates a lack of education beginning early and continuing on to result in the lack of workforce skill sets the state is now faced with. The Economic Policy Council's 2007 ***Economic and Workforce Scorecard*** further substantiates the previous year's reports of insufficient education levels. It cites 12.5% of working aged Rhode Islanders as having no high school diploma. 25% as

having a high school degree. 25% as having some college education. And the scorecard reports only 37.5% of working aged Rhode Islanders have a bachelors degree or higher. That is less than two out of every five Rhode Islanders who have a complete college education.

III. In addition to the low college attendance and graduation rates of Rhode Island students, STEM involvement for kids who do continue on in their education is also limited. IT involvement is down 50% for students nationwide, but in Rhode Island, due to a lack of enrollment, Salve Regina University has dropped its IS program, Bryant College is considering a similar drop and the University of Rhode Island has cut its IT offerings back. Furthermore, at a Tech Collective and Rhode Island Economic Development Corporation hosted IT Dialogue Session, more than 20 Rhode Island IT industry professionals noted even those students who are graduating in IT have often been taught with incomplete or outdated curriculums, leaving them without the skills needed to succeed in the industry.

IV. When asked if exiting college students were prepared for the IT workforce with an adequate education, the HR Specialist for one leading Rhode Island IT corporation declared, "No. All of the college students I have interviewed are not prepared with the skills we are looking for. Or, I believe, that any of our partners are looking for." The Specialist continued on to cite the vast learning curve that exists between entry level and advanced level employees. This learning curve – including a lack of experience, proper education and sometimes soft skills – is a long-term investment a company must make, but there is no guarantee the potential gain of a well-rounded, efficient employee will outweigh the expenditures in the mean while.

Barrier 2 – Failing Retention Rates.

I. While Rhode Island's colleges are universities are a brain-magnet, the demand for Information Technology skill sets in our economy far exceeds the number of graduates with IT skills. Rhode Island Information Technology employers are experiencing falling retention rates as they face competition from higher wage employers outside of Rhode Island for a undersized pool of skilled applicants.

II. According to Keri Borba, PHR, Curriculum Designer for IT Training Programs at Citizens Bank, the cost of turning over an employee can equal up to 90% of that person's yearly salary! If coupled with the average 18 month retention rate for new hires, that amounts up to a costly risk of not only money, but time and energy as well. If Rhode Island is to boost its skill sets, it needs to find a way to not only attract, but also retain young, talented and educated people into its workforce and its community.

Barrier 3 – Substantial Wage Gaps.

I. One key reason for lower attraction and retention rates in Rhode Island's workforce is the significant wage gap that exists between Rhode Island and the nation. According to the Rhode Island LMI report *Rhode Island Employment Trends and Workforce Issues*, 2007, the state ranked below national average wages for all but four industry sectors. STEM industries, including those in IT and Bio Tech, are included in those ranked below average.

II. In the same report, Rhode Island's average yearly income for 2006 is cited as $38,732. In Massachusetts that average sky-rockets to $52,798; and in Connecticut it raises even higher to $56,002 just for stepping over an invisible border. In New Hampshire the average yearly income tops Rhode Island's at $43,022. And nationally, the annual income average is less, but still higher than Rhode Island, at $42,405. Businesses might be doing great things in Rhode Island, but the high cost of education and the high cost of living cannot be reconciled with wages that are too low to compete with opportunities in neighboring and nation-wide states.

Barrier 4 – Company Dynamics.

I. The Rhode Island Information Technology Skills Gap Task Force reports 54% of employers claim they are inadequately staffed. 59% of employers say their top concern is finding and hiring needed skill sets. With sufficient skill sets less available, companies must continuously vie for the talent they are seeking. Because of this, the dynamics of a company, its culture, its indirect assets and characteristics as well as tangible commodities such as benefits and budgets, become an important part of its success in attracting, hiring and retaining entry-level talent. It is not only the salary anymore, but the job opportunity as an entire package that needs to be taken into account

II. Indirect Assets: Every employee wants to work for a company where they feel welcome, needed and respected. Particularly for the younger generation of the workforce, a flexible company with fresh, modern ideals, policies and images will be more attractive than a by-the-book, suit and tie institution. Also, it is desirable if the company is one with which the new hire can grow and vice versa. This continues to promote longer retention rates.

III. In addition to the dynamics and culture of a company comes the culture of an employee. More and more, IT companies are recruiting new hires from overseas, where technology education is more extensive and salary requirements are less expensive. Unavoidably then, companies must reconcile language and cultural barriers with new hires. In our globalized world, the successful company is the one that is able to seize and overcome these barriers.

IV. Tangible commodities: Particularly with the rising cost of healthcare and concerns of the Social Security system, companies must offer a comprehensive benefits package. At the same time, however, the company must have the finances and/or resources to provide these levels of benefits in addition to expected on-the-job training for any entry-level new hire. Certainly, it seems easier for a company to hire experienced talent because it cuts back significantly on training costs and efforts. Even though experienced talent might require a higher salary, it is less than training costs. Also, as industry professionals noted, it is not all that less than what entry level college graduates are requesting. Even less costly for employers is the growing practice of hiring temps and consultants for short-term special project needs. This exempts the employer from having to provide things such as benefits, overtime and bonuses. It is also an opportunity for the employer to "try out" a potential permanent employee and vice versa. However, these seemingly quicker, easier and less costly solutions are only short term. The will not promote the necessary development of IT's future workforce.

5. Barrier 5 – Lack of Youth Interest and Awareness.

I. As stated under Barrier 1, regarding insufficient education, high school and college students are participating in less and less STEM subjects and initiatives. This is seen mostly in low scores on STEM-based testing and in the recent decline of related courses being offered as well as college level degrees being earned. *The Governor's Blue Ribbon Panel on Mathematics and Science Education's Action Plan* for Rhode Island reports from the NAEP 28% of fourth grade Rhode Island students reached at or above "proficient standards" for mathematics in 2003. Only 24% of eighth graders reached the proficient level.

II. In his Campus Technology article "Women Lose Ground in IT, Computer Science," David Nagel reports "only 1 percent of females taking the SATs in 2006 indicated an interest in pursuing Computer and Information Sciences as an intended major." Nagel also reports of the same year, that of the 60% of women earning bachelor's degrees, only 11% of Computer Engineering degrees were earned by women. That number rises to 15% for Computer Science degrees. Finally, in the IT professional world, only one in every four women hold an IT related position. Indisputably, there is a disturbing gap between the ratio of men to women in IT career paths and professions.

III. One possible source for such a lack of interest for all gender and age levels might stem from a lack of up-to-date knowledge about the industry on behalf of teachers and guidance counselors. The uncertainty of the industry with outsourcing and outdating as well as a lower pay-scale particularly in Rhode Island might also contribute to reservations about STEM careers. All of these concerns funnel together to create a shrinking new-hire talent pool for employers. The company must either settle for less than they require in hopes that training and time will improve the new hire's skills sets, hire a experienced professional or seek necessary skill sets from outside of Rhode Island, whether it is from over the state border or overseas.

CHAPTER 6: IT TRAINING AND APPRENTICESHIP PROGRAMS

As part of its initiative to investigate the state of IT education in Rhode Island, the Task Force identified and mapped all existing training and apprenticeship programs. Computer Science and Computer Engineering programs were reviewed from Brown University, Bryant University, the Community College of Rhode Island, New England Institute of Technology, Roger Williams University and the University of Rhode Island.

In regards to training programs, flaws and inadequate skills training were identified within each curriculum using conclusions reported by the IT skills Gap Task Force. It should be noted that while academic minors and individual courses do exist to address some specific technology skill sets, those programs and courses are not required; and most degree programs do not provide an adequate level of competency for all skill sets as recommended by the IT Skills Gap Task Force. As a result, inadequate skill sets and workforce preparation are due not only to gaps in training programs, but to student discretion as well. However, most students would not be wholly familiar with industry-required skill sets. Consequently, they rely on the often outdated and inadequate requirement of the higher education institute they attend.

An apprenticeship is a combination of on-the-job training and related classroom instruction in which workers learn the practical and theoretical aspects of a highly skilled occupation. Apprenticeship programs are designed to respond to real-world business goals, such as increased productivity/performance, greater efficiency and improved customer retention. According to a representative from the RI Department of Labor and Training, while DLT does partner with local colleges and institutions for training programs, there is currently no state-sponsored apprenticeship program in Rhode Island for careers in Information Technology. However, discussions with DLT administration and public hearings will be held in the near future to address this situation. We are hopeful that these discussions include representation from employers in the Information Technology industry. Apprentice programs for Information Technology occupations could be, but are not limited to, computer operators and programmers and graphic designers. In the meantime, private training providers such as CompTIA (Computer Technology Industry Association) advertise partnering with companies to ensure that apprentices get the necessary training and instruction.

CHAPTER 7: IT DEGREE AND CERTIFICATION PROGRAMS

A significant portion of IT education, at least for the hard skills, is attained through industry recognized degrees and certifications. Currently, there are several of these programs based on skill standards. They include A+/Network+ Certifications, Cisco CCNA Certifications and various technician and specialist certifications (see Appendix B for comprehensive listings). However, there are two main issues with these programs: (1) a gap in adequate skill sets, as addressed by the IT Skills Gap Task Force; and (2) the accessibility and affordability of these programs.

While the afore-mentioned training programs do address specific technology competencies, they do not address business and soft skills gaps necessary for today's employer demands. These programs need to be supplemented with some level of training in identified gaps such as project management, team work and communication skills. DLT's current $3,500 – Section 30 funding levels impair the institutions' ability to design and offer approved programs that are comprehensive and address all or most of the gaps identified by the IT Skills Gap Task Force. We are confident such a program can be designed and implemented, but it would require higher enrollment rates, more cost effective budgeting and greater collaboration between state and education institutions.

One example of the need for greater collaboration came about through Task Force interviews, polls and dialogue sessions. It concerns limitations of the training programs being sponsored by DLT. Throughout the state, there are many IT courses and training programs being offered, however, only a limited number of these offerings appear on the RIDLT's approved listing of training providers. For example, Roger Williams University, CCRI and New England Tech each offer the Cisco CCNA Certification program, but only the program provided by Roger Williams University is approved by DLT. This means unemployed workers looking for financed or supplemented training in order to be prepared to return to the workforce are only able to attend Roger Williams University. Part of this problem as voiced by participants is the complexity of DLT program approval processes making it difficult for school involvement. In addition, infrequent program running times coupled with a three-month authorization period for trainee applications has lead to a lower level of student enrollment rates. (The trainee approval timeline in neighboring Massachusetts is only 24 hours.) If DLT-approved courses could be provided year long instead of just in September, and if they could accommodate 20 or more students per course, Rhode Island education institutions would be able to offer meaningful and comprehensive certification programs at cost effective prices.

The current lack of training programs available through DLT may be attributed to the lack of emphasis by DLT staff that IT is a viable career field –the highest paid and fastest growing. While it is true that IT degrees awarded in RI are falling, it is not true that job opportunities in information technology careers are shrinking. Rhode Island's IT industry is vital to its economy, and if it is going to continue growing, we need to improve and streamline training approval processes and take the initiative to have continued education courses likewise approved. The state needs to accommodate its displaced workers and move to quickly and effectively provide the training and skills needed to succeed in the IT industry.

CHAPTER 8: TRAINING GAPS

After reviewing the diverse continuing education programs at Rhode Island's colleges* and universities the Task Force has found gaps in the following areas:

- Oracle Database
- Microsoft Desktop Support Technician
- Certificated Cisco Network Professional

While Microsoft Desktop Support Technician (MCDST) and the Certified Cisco Network Professional (CCNP) courses are available, as part of a school's two or four-year degree program, they are not necessarily offered for the unemployed worker. In speaking with a training specialist at Roger Williams University's Center for Professional Development, RWU will customize courses to meet the needs of individuals. Salve Regina University in Newport now offers Microsoft Office Specialist training through its Continuing Education office.

Of course, other areas of training can be obtained through private vendors. For example, MTTI offers Computer Service Technician and Network Installer courses that take about seven months to complete. The Computer Technology Industry Association (CompTIA) offers certifications in PC hardware, networking, servers, Internet, e-business, project management, training, Linux, security, home technology, document imaging and RFID. Others include Learning Gate in Lincoln and DB Grant that has a satellite office in the NetWORKri's Pawtucket office. This trainer offers instruction in Microsoft Office and Customer Service.

In order to improve continuing education and training programs, government agencies and public and private education providers need to work together to properly address and amend curriculum shortcomings, as reported by the IT Skills Gap Task Force, as well as design and implement lower cost, more effective and more available programs.

** Excludes New England Institute of Technology, as they only offer degree programs*

Appendix A

IT RELATED OCCUPATIONS AND SALARY PROJECTIONS

Information Technology Related Occupations and their Projected 10 Year Growth

	Projected Need for Employees	Projected Growth	Hourly Wage Low to High	High School or less	Some College	College Degree or higher
Computer Software Engineers**	268,000	36+%	$22-$55	4%	13%	83%
Computer Systems Analysts	208,000	21-35%	$21-$51	9%	25%	66%
Computer Support Specialists	183,000	21-35%	$12-$33	17%	42%	41%
Computer Software Enginners, Systems Software	180,000	36+%	$16-41	4%	13%	83%
Network Systems and Data Communications Analysts	153,000	36+%	$18-$49	9%	31%	60%
Network and Computer Systems Administrators	138,000	36+%	$19-$47	14%	35%	51%
Computer and Information Systems Managers	124,000	21-35%	$29-$70	7%	23%	70%
Computer Programmers	117,000	0-9%	$18-$51	6%	22%	72%
Mechanical Engineers	87,000	10-20%	$22-$50	4%	16%	80%
Database Administrators	51,000	36%	$18-$50	9%	19%	72%
Sales Engineers	32,000	10-20%	$23-$61	5%	25%	70%
Computer Hardware Engineers	20,000	10-20%	$26-$65	6%	25%	69%
Computer and Information Scientists, Research	8,000	21-35%	$26-$70	9%	25%	66%

****State Report for:**

Computer Software Engineers - Wage Comparisons

United States	$22.77 - $55.84
Rhode Island	$25.46 - $54.13

Computer Software Engineers - Employment Trends

United States	682,200	48%
Rhode Island	1,480	40%

Source: www.acinet.org/career voyages
Bureau of Labor Statistics, Office of Occupational Statistics and Employment Projections; RI Employment Projections

Appendix B

IT TRAINING AND CERTIFICATION PROGRAMS

Information Technology Industry Recognized Training and Certification Programs

Program Title	University/Training Vendor	Tuition
Electronic Systems Technician	Lincoln Technical Institute, Lincoln, RI	$ 15,395
Communications Technician	MTTI, East Providence, RI	$ 10,350
Computer Service Technician/ Network Installer	MTTI	$ 12,400
A+/Network+ Certification	Roger Williams University, Providence, RI	$ 3,500
Help Desk Technician	Roger Williams University	$ 5,399
Telecom Specialist	Roger Williams University	$ 10,144
Cisco CCNA w/ A+/Network+ Certifications	Roger Williams University	$ 5,500
Computer Technology Certification	Roger Williams University	$ 5,000
Cisco CCNA w/ prerequisites A+/Network+/MCSE	Roger Williams University	$ 14,150
Cisco CCNA w/ Network+ Certifications	Roger Williams University	$ 3,500
Certified Internet Webmaster Designer	Roger Williams University	$ 4,500
Microsoft Certified Professional	Roger Williams University	$ 3,500
Microsoft Certified Systems Administrator	Roger Williams University	$ 4,480
Microsoft Certified Systems Engineer	Roger Williams University	$ 8,400
Security+/Cisco CCNA	Roger Williams University	$ 3,500

REFERENCES

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tech collective
driving innovation

TECH COLLECTIVE is the technology industry association of Rhode Island working to drive technology growth, innovation and prosperity by uniting industry, government and education in our state. Tech Collective focuses on two core functions:

Community Building – Tech Collective's community building goal is to engage every Rhode Islander in the growth of our technology industry, because it affects each of our lives everyday. Tech Collective builds and strengthens community by creating partnerships and offering thought provoking forums as well as organizing state-wide participation in events like BIO2007, GRRL Tech, and Technology Laureate's Night.

Workforce Development – Tech Collective drives technology-based education and training programs for students in grades K -16 as well as for incumbent and transitioning workers. Through state and federal grants Tech Collective provides training opportunities, workforce development initiatives, and youth activities to promote the growth of a highly skilled workforce in Rhode Island.

Tech Collective's industry associations **INFOGroup** and **BIOGroup** promote these core functions to focus on all aspects of specific industry demands, including research, design, development, manufacturing, distribution and usage.

Tech Collective is promoting, strengthening, and developing our technology industries. Join the transformation!

Visit www.tech-collective.org for more information.

Tech Collective would like to thank the Governor's Workforce Board and all individuals and organizations who have contributed to the compilation of this report.

Governor's Workforce Board Rhode Island

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