



Maryland's Information Technology Industry

Workforce Report and Recommendations

Governor's Workforce Investment Board

Information Technology Industry Initiative Steering Committee

March 2009

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Anthony G. Brown, Lt. Governor

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Department of Labor, Licensing and Regulation

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Governor's Workforce Investment Board



Governor's Workforce Investment Board

Executive Summary

Maryland has consistently been ranked nationally among the top ten states for several measures of technology and science, including: investment in human capital, the technology and science workforce, and technology concentration and dynamism (Milken Institute, State Technology and Science Index 2008). Maryland has world-class education institutions, is home to a large concentration of federal labs, government agencies and military bases, and has a highly educated workforce. These factors help make for a vibrant IT industry with exceptional opportunities for growth. But there are significant challenges as well – challenges that must be addressed to ensure the industry's continued growth.

A highly-skilled technical workforce is crucial to Maryland's IT industry and to maintaining the state's competitive edge in a knowledge-based economy. Maryland's ability to retain its standing as a leading knowledge-based, entrepreneurial and technologically-prepared state depends upon its ability to attract, train, and retain skilled IT workers. Yet, Maryland's companies struggle to recruit and retain sufficient numbers of qualified IT employees with the right skills from within the state, representing a serious challenge for the industry.

Highly paid and highly skilled, IT workers are a benefit to both the state's knowledge and tax base. IT workers are employed in every industry in the state. Currently, the IT industry sector accounts for 3.5 percent of Maryland's employment base. IT workers earn a median annual salary that is more than double the median annual salary for all Maryland workers. In 2006, there were approximately 94,000 professionals serving in IT occupations inside and outside of the IT industry sector. Employment in IT occupations is projected to grow by 28 percent from its 2006 level by 2016.¹

Workforce Challenges

While many industries struggle with employee recruitment, retention and training, the IT industry has the additional challenge of rapid change within the industry. IT technological advancements occur almost daily. This fast pace contributes to exciting opportunities for growth, as well as some significant challenges. To remain competitive, IT companies and workers must keep up with the innovations and advancements that drive their industry. Training and retraining staff is costly and time-consuming, especially for small business owners who need to respond quickly to the ever-changing needs of their clients in order to survive and to remain competitive.

The pipeline of prospective IT workers is affected, as current skill sets are often outdated by the time an IT student graduates from college and enters the job market. Rapid changes make it difficult for those within the industry to predict the skills and knowledge an employee or student might need in three to five years.

The demand for qualified IT workers is hampered by the limited availability of a finite pool of qualified candidates in Maryland who are wooed by competing companies. These individuals are able to command large salaries, are mobile and can relocate - often outside of Maryland - to increase their opportunities.

Outcomes

The GWIB IT Industry Initiative Steering Committee accomplished the following important goals as a result of its collaborative work:

- The Steering Committee published a white paper for its IT Workforce Symposium in June 2008. The white paper provided background data, trends, and projected growth rates of the industry and identified critical industry workforce issues.
- The Steering Committee sponsored an IT Workforce Symposium at the University of Maryland, Baltimore County (UMBC) attended by nearly 80 IT industry and education leaders. Participants addressed IT workforce challenges, developing recommendations and implementation strategies to meet current and future workforce needs.
- The Steering Committee issued a report outlining its recommendations to address IT workforce challenges.

Next Steps

With the Steering Committee's work completed, the GWIB will develop an IT advisory group to carry out the recommendations of the Steering Committee. The mission of the IT advisory group will be twofold:

1. Guide and direct implementation of the recommendations; and
2. Guide the GWIB in IT policy issues, acting as an advocate, coordinator and voice for IT in Maryland. The advisory group will consist of a core group of individuals representing the IT industry and Maryland's P-20 education system.

“Our ability to create and maintain a skilled and educated workforce will determine Maryland’s future success in the increasingly competitive global economy.”

- Governor Martin O’Malley

Information Technology Industry Profile

The GWIB's IT Industry Initiative Steering Committee (Steering Committee), co-chaired by John Nyland, Managing Partner, Public Sector, Global Business Services, IBM, and Mike Curreri, President and CEO, AVIcode, was formed to address IT workforce issues. The Steering Committee is composed of IT leaders representing industry, education, government and IT-related associations.

The Steering Committee identified an overall goal of developing a pipeline of qualified IT professionals and support personnel with the skills needed by the industry. The goal addresses the challenges of recruitment, retention and training, both within the IT industry and within IT occupational categories in non-IT industry sectors.

A major Steering Committee initiative was the GWIB's IT Workforce Symposium held at UMBC in June 2008. Proposed solutions and implementation strategies that emerged from the Symposium guided development of the final recommendations report.

Trends: Opportunities and Challenges

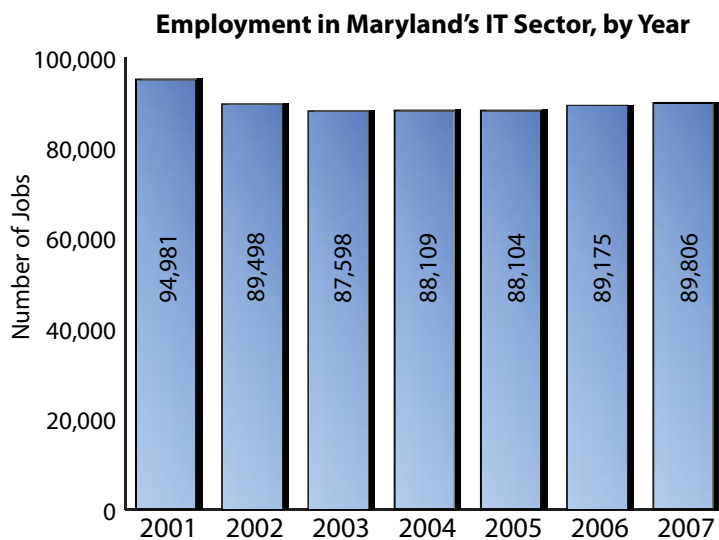
Mobilization and globalization of the IT industry, 24/7 work demands, increased off-shoring, outsourcing of work to other countries, and increased use of contractual employees (versus permanent employees) creates both new opportunities and workforce challenges for IT companies in Maryland. Potential changes in Maryland's business climate can lead to additional opportunities or challenges for the industry.

Growth opportunities far outweigh the challenges. Maryland has numerous federal labs, world-class education institutions, military bases and government entities engaged in IT-related work. These entities have contributed to Maryland's growth and reputation as a center for entrepreneurial knowledge-based companies. Aggressively promoting Maryland as an IT power is key to continued growth.

Additionally, the Base Realignment and Closure Act (BRAC) will result in thousands of new IT jobs coming to Maryland, beginning this year.

Workforce Profile

The Steering Committee defines the IT workforce as all workers (both IT and non-IT) employed in IT sector companies, as well as IT workers employed in companies that are not within the IT industry. For example, all workers at an IT company fall under the Steering Committee's definition of IT, as do all of the IT workers at a healthcare or financial services company, or a non-profit or government agency.



Data Source: MD Department of Labor, Licensing and Regulation

In 2007, Maryland's IT sector employed 89,806 people. Jobs in the IT sector account for about 3.5 percent of Maryland's employment base. While employment in Maryland's IT sector has remained relatively flat, the IT services and computer system services sub-sectors added more than 3,000 jobs between 2002 and 2006.²

Assuming that Maryland's IT industry follows national employment trends, around 55 percent of these people worked in computer and math occupations.³ The remainder of the IT sector's employees

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worked in a variety of management, administration, financial, sales and business occupations.

Employment in Maryland's IT Sector in 2007, by Industry

Industry	2007 Employment
Computer and Peripheral Equipment Manufacturing	1,093
Communications Equipment Manufacturing	4,705
Audio & Video Equipment Manufacturing	125
Magnetic Media Manufacturing & Reproducing	2,099
Computer & Software Merchant Wholesalers	5,861
Other Electronic Parts Merchant Wholesalers	4,402
Business to Business Electronic Markets	1,237
Software Publishers	1,791
Internet Publishing & Broadcasting	736
Data Processing & Related Services	5,338
Other Information Services	4,421
Computer Systems Design & Related Services	57,396
Computer & Office Machine Repair	602
Sector Total	89,806

Data Source: Maryland Department of Labor, Licensing and Regulation

Projected Growth of IT Occupations

Occupational estimates for Maryland indicate that more than 94,440 of Maryland's workers in 2006 were employed in computer occupations.⁴ These professionals fill vital needs in a wide variety of areas such as finance, insurance, government, information, education, and almost every other industry.

Computer and math occupations are the second highest paid occupational group in Maryland. Workers in this group earned median annual wages of about \$78,749 in 2007, more than double the median annual wage of \$36,358 for all Maryland workers.⁵

Maryland-based employers are projected to hire workers to fill more than 47,000 computer specialist positions between 2006 and 2016.⁶

More than 20,000 hires for computer specialist jobs will be needed in order to fill the voids left by retiring workers, workers who move into other occupations, and workers who leave the workforce for any number of reasons.⁷

Another 26,000 of these hires will result from the increasing demand for computer occupations, which are vital to every sector of the economy. This equates to an annual growth rate of 2.8 percent for computer specialist occupations, twice the economy-wide occupational growth rate of 1.4 percent in Maryland. Moreover, the two fastest growing occupations in Maryland are computer specialist occupations. Network systems and communication analysts are expected to grow at an annual rate of 5.5 percent, and computer software application engineers are projected to grow by 4.9 percent per year.⁸

Maryland-based employers are projected to hire workers to fill more than 47,000 computer specialist positions between 2006 and 2016.

Occupational Projections for Maryland

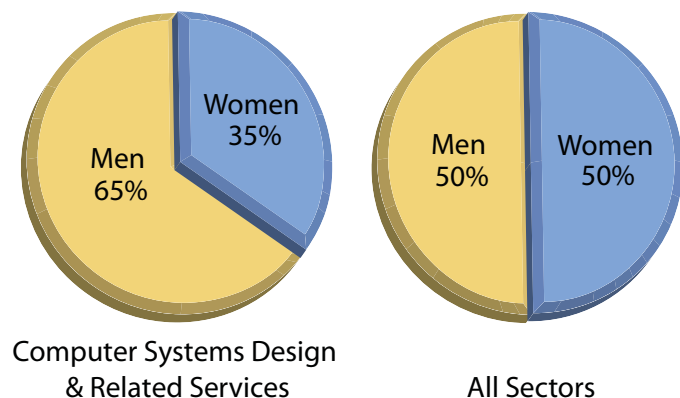
Occupation	2006 Employment	Annual Openings	Annual Growth Rate
Computer & Information Scientists	1,820	73	1.3%
Programmers	9,510	199	-0.2%
Software Engineers, Applications	11,495	734	4.9%
Software Engineers, Systems	12,875	637	3.5%
Support Specialists	11,870	555	1.6%
Systems Analysts	12,465	727	3.2%
Database Administrators	3,395	160	3.6%
Network & Systems Administrators	9,080	523	3.5%
Network Systems & Data Communications Analysts	8,990	681	5.5%
Specialists, All Other	12,940	413	0.5%
Total - Computer Specialists	94,440	4,700	2.8%

Data Source: Maryland Department of Labor, Licensing and Regulation (Numbers are rounded).

Diversity in the IT Workforce

Gender disparity is an ongoing workforce issue in the IT industry, as women continue to lag behind men in IT jobs. This is reflected in the lack of diversity in enrollments in IT programs at two and four-year higher education institutions, as well as at the PreK-12 education level. While current studies highlight the problem, a lack of disaggregated occupational data for Maryland prevents more detailed study. A more in-depth understanding of the problem could be gained with newly disaggregated data for IT fields.

Workforce Gender in Maryland: 2007



Data Source: U.S. Census Bureau's Longitudinal Employer-Household Dynamics

Critical Industry Workforce Issues

One of the challenges that the Steering Committee encountered was a lack of standardized descriptions and classifications for IT employees and employers. Without an accurate system to fully describe, track and measure Maryland's IT industry and its workforce, it is impossible to measure the full impact of the industry.

The Steering Committee identified a number of critical issues impacting IT workforce development. While the Steering Committee recognizes there are other issues, such as an aging workforce, it is the Steering Committee's intention to focus on those issues that, if addressed, have the most potential to significantly improve development of Maryland's IT workforce. As expected, many worker shortages and workforce issues were common to IT occupations and organizations, regardless of whether those occupations and organizations were in the IT industry, or in a non-IT specific industry.

Employers of IT workers in Maryland share a common problem: a critical shortage of workers in many skills categories needed to fill current and future IT jobs. Maryland companies cannot recruit and retain sufficient numbers of qualified employees with the skills needed from within the state. Further, Maryland does not have an adequate pipeline of prospective IT workers to populate additional IT jobs as the state's IT industry grows.

The issues and recommendations outlined below address both the current need for IT employees and projected growth of the industry.

Attraction, Recruitment and Retention

Issue: Maryland companies cannot recruit and retain sufficient numbers of qualified IT workers from within the state. There is increased competition for a finite pool of workers due, in part, to fewer graduates from certain IT degree programs. The existing pool of workers lacks diversity. Additionally, the complex process for securing security clearances hinders rapid hiring.

Recommendation 1: Develop education and workforce incentive programs that appeal to a wide range of target populations.

Strategies:

1. Create tuition incentives and scholarships for students interested in Science, Technology, Engineering, and Mathematics (STEM) disciplines to work, live and study in Maryland. Incentives include a tuition reduction based upon an agreement to work in the state for a specific number of years, and in-state tuition fees for out-of-state students who major in STEM disciplines.
2. Offer incentives, such as training funding and flexible work schedules, to attract retirees from government, the military, and other industries.
3. Businesses collaborate with education to offer guaranteed job opportunities for graduates in IT-related fields.

Recommendation 2: Develop programs and procedures that pave the way for streamlined security clearances.

Strategies:

1. Educate students, as early as elementary school, about the requirements for obtaining security

- clearances and appropriate behaviors that lead to eligibility.
2. Create a “pre-clearance” program at the PreK-12 level as a first step toward an entry-level security clearance for interns.
 3. Collaborate with military transition assistance programs to connect retired or separated military personnel, who already possess security clearances, with IT employment opportunities.

Recommendation 3: Develop a coordinated statewide plan to promote Maryland and its IT workforce as a regional center of IT.

Prior to development of a statewide plan, commission a study, disaggregated by gender and race, to determine graduation rates, the extent of out-migration of IT workers from Maryland versus inward migration, the retention rates of IT employees (especially females and minorities), and the retention rate of students in critical IT disciplines. Results of the study will help shape development of the plan.

Strategies:

1. Develop a comprehensive, cohesive marketing plan that highlights Maryland as an IT center with world-class education institutions, a high concentration of federal labs and federal agencies, military bases, a highly-educated workforce, and extensive support systems for the IT industry.
2. Create centralized and easy access to relevant industry information and resources via a portal for Maryland’s IT industry. The portal should include information such as tax credits, training funding assistance and internships.

Training and Retraining

Issue: While core skills and competencies are consistent across the industry, much of IT training is specific to particular job or contract requirements. To remain competitive, IT employers must constantly train/retrain their employees in new or different skills sets required to compete for new business. Quick response time for training is essential, yet problematic, as technologies rapidly change. The high cost of continually training/retraining for new contracts is particularly burdensome for small and mid-sized companies.

Recommendation 1: Market existing training funding programs and resources, and develop new programs.

Strategies:

1. Identify and catalogue existing federal, state, and county funding resources for training. Market them through a central IT portal (described under Attraction Recruitment and Retention), as well as through the state’s One-Stop workforce development system.

Recommendation 2: Education institutions and businesses partner to develop new, flexible on-line delivery systems for cutting-edge training.

Strategies:

1. Expand training through non-credit courses and seminars that fit the needs of businesses and can be quickly developed and deployed by educational institutions.
2. Create partnerships among small businesses and community colleges to bundle workers into

training programs, thereby reducing costs and maximizing resources.

Pipeline Development

Issue: Maryland has an inadequate pipeline of prospective new IT employees. This is due, in part, to reduced IT enrollments in two and four-year colleges and universities. Reduced enrollments may be caused by ongoing misperceptions surrounding the industry. A lack of STEM educators in some areas of education exacerbates the problem. Further, the industry lacks diversity in its worker population.

Recommendation 1: Education institutions and IT entities collaborate to provide the future IT workforce with factual information about opportunities within the industry. Use standardized industry definitions of job and skills descriptions developed through a collaboration between industry and education.

Strategies:

1. Create industry mentoring programs to help students appreciate the many varied career opportunities within the IT industry and improve the retention rate of existing IT students.
2. Engage students in academic courses and programs that link career opportunities with IT, such as robotics or simulation training, as well as computer clubs sponsored by local IT companies.
3. Partner with Maryland Business Roundtable for Education (MBRT) to disseminate information about careers in IT.

Recommendation 2: Expand internships statewide through the development of a simple and streamlined process for connecting interns and companies.

Strategies:

1. Provide students with internships that lead to full-time jobs as they complete their coursework for graduation.
2. Provide supervisory training for businesses in ways to work with interns that encourages retention.
3. Develop a process for companies to create and market their internship opportunities to students.
4. Education institutions allow students to have multiple internships, as opposed to one.

Recommendation 3: Develop state government policies that integrate and support IT programs in PreK-12 school curricula.

Strategies:

1. Develop additional statewide innovative PreK-12 STEM curriculum programs. Designate computer science/IT as a science credit and/or mandate completion of an IT course.
2. Encourage high schools to adopt the Maryland State Department of Education (MSDE) Career Research and Development Program.

Recommendation 4: State contracts provide requirements and incentives for IT workforce development and training.

Strategies:

1. Revise state contracts to support workforce development through the use of incentives and contract set-asides, especially for small businesses, to facilitate hiring of interns.
2. Review state government contract minimum credentials, particularly years of experience for entry-level workers, to determine if adjustments can be made to increase the pipeline of new workers.

Recommendation 5: Increase the numbers of women and minorities within the IT industry through programs and image marketing targeted to those populations.

Strategies:

1. Develop more female mentorship programs for PreK-12 girls through collaboration with Maryland Women in Technology and the Center for Women and Information Technology.
2. Create marketing/promotional programs that focus on diversity and encourage students at all levels of P-20 to choose STEM majors and pursue STEM careers.
3. Create marketing programs that encourage women, minorities, and non-traditional workers interested in career changes to consider a career in IT.

Alignment of Industry and Education

Issue: Rapidly changing technologies pose an ongoing challenge to the education community to provide training in the most current skill sets needed by the industry. The programs and curricula offered by education institutions may not match the skills currently required by industry, and may lag behind the real-world skills and expertise the industry requires.

Recommendation 1: Create better alignment between the IT industry and education institutions through structured opportunities for communication and collaboration.

Strategies:

1. Develop ongoing industry/education events coordinated through Maryland's technology councils to include networking opportunities.
2. Establish regional alliances between industry and education to identify and address regional education and training needs.
3. Create a centralized clearinghouse of resources, information, research, events and networking opportunities for education, industry, state and local agencies via a portal described in the section "Attraction, Recruitment and Retention".

Recommendation 2: Standardize IT industry job and skills descriptions and definitions to reduce inconsistencies and improve understanding of industry jobs and required skills.

Strategies:

1. Develop a clear definition of the IT industry and IT job descriptions, including required skills and competencies.
2. Clarify differences among computer science, IT, computer information systems, and informatics.
3. Incorporate standardized IT industry job and skills definitions into PreK-12 and post-secondary programs, as well as higher education curricula.

Conclusion

The opportunities for growth in the IT industry far outweigh the challenges, but the challenges must be addressed. The state has laid the groundwork for achieving more cohesive partnerships. Systems exist at the county and state level for education and training. Non-traditional pools of potential employees are available. The future of the IT industry in Maryland depends upon innovative strategies to recruit and retain skilled technology workers. Fortunately, innovation, dedication, and creative problem-solving are cornerstones of the IT industry. As the industry focuses on developing a robust workforce, the state will become a magnet for those who wish to learn and achieve in technology occupations.

A Commitment to Maryland's Information Technology Future

The Governor's Workforce Investment Board believes that it is imperative for key leaders and stakeholders to develop creative strategies and solutions that will ensure the vitality of Maryland's dynamic economy. Having a highly-skilled IT workforce is crucial both to the future of Maryland's IT industry and to Maryland's economy.

The GWIB is committed to supporting the businesses, agencies and organizations implementing the recommendations in this report. The GWIB will assess the status and progress of the initiatives and will request periodic updates. The GWIB's collaboration with Maryland's IT stakeholders will create a vital pipeline of qualified employees for the state's dynamic IT industry.

End Notes

- ¹ Maryland Department of Labor, Licensing, and Regulation, Maryland Occupational Projections 2006-2016
- ² Maryland Department of Labor, Licensing, and Regulation, Quarterly Census of Employment and Wages Data
- ³ United States Department of Labor, May 2007 Occupational Employment Statistics
- ⁴ Maryland Department of Labor, Licensing, and Regulation, Maryland Occupational Projections 2006-2016
- ⁵ United States Department of Labor, May 2007 Occupational Employment Statistics
- ⁶ Maryland Department of Labor, Licensing, and Regulation, Maryland Occupational Projections 2006-2016
- ⁷ Ibid.
- ⁸ Ibid.

Information Technology Industry Initiative

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About the Governor's Workforce Investment Board

The Governor's Workforce Investment Board (GWIB) is the governor's chief policy-making body for workforce development. The GWIB is a business-led board of 45 members, a majority of whom represent the business community, as mandated by the Workforce Investment Act of 1998 (WIA). Other members include the governor and the lieutenant governor, cabinet secretaries, college presidents, the state superintendent of schools, elected officials, labor, and representatives of non-profit organizations. The GWIB is responsible for developing policies and strategies to form a coordinated workforce system from a variety of education, and employment and training programs. It brings together and focuses various workforce development partners and stakeholders on two key outcomes - a properly prepared workforce that meets the current and future demands of Maryland employers, and providing opportunities for all Marylanders to succeed in the 21st century workforce.

GWIB's Center for Industry Initiatives

The GWIB's Center for Industry Initiatives assesses the workforce issues and demands of Maryland's targeted industry sectors. Through the Center for Industry Initiatives, leaders from private industry, government, education and other stakeholders are engaged in a collaborative process which identifies critical industry workforce challenges and develops recommendations and strategies to address those challenges.

Vision

A Maryland where every person maximizes his or her career potential and employers have access to the human resources they need to be successful. The vision includes:

- Alignment of the business, workforce system, and economic development interests in Maryland.
- Well-integrated, coordinated and collaborative systems across agencies, institutions, local municipalities, and business.
- Preservation and expansion of Maryland's highly-educated workforce.
- Creation of opportunities for all Maryland residents to participate and succeed in the workforce.

Goals

- Align the educational system (P through 20) with economic development and industry needs.
- Increase the supply of skilled and trained workers to address worker shortages.
- Enhance connections between the emerging workforce (youth) and the workplace.
- Provide opportunities for untapped workers (people with disabilities, ex-offenders, TANF recipients, immigrants, etc.) to realize their full potential.

Priorities for Education

- Develop a Science, Technology, Engineering and Math (STEM) agenda to prepare the emerging workforce for knowledge-based industries and occupations, and the influx of STEM-related jobs associated with Base Realignment and Closure (BRAC) actions.
- Expand Career and Technology Education (CTE) programs.
- Align adult learning efforts with existing workforce development programs.
- Increase faculty capacity in critical shortage areas (e.g., healthcare, education, STEM instruction, engineering, and BRAC-related occupations).
- Enhance opportunities for "early access" from high school to college.

Priorities for Workforce Creation

- Increase access to employment opportunities for historically untapped workers.
- Ensure a supply of well-prepared workers to address critical worker shortages.
- "Grow our own" skilled workers and link them with Maryland businesses.
- Create greater awareness and expand use of Maryland's One-Stop Workforce System with employers.



Governor's Workforce Investment Board

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