INNOVATION, COMPETITIVENESS, OPPORTUNITY: A Policy Agenda to Build Tomorrow's Workforce

The increasing use of and demand for technology is creating new types of jobs in every sector of the economy that require an evolving set of skills. Tasks associated with jobs across many sectors are not the same today as they were just 20 years ago. Yet, as job requirements change, new technologies are generating job growth and enhancing productivity. These trends will become even more prominent with the growing use of emerging technologies, such as artificial intelligence.

Although changes are taking place, using software to create solutions to enrich every aspect of our lives presents great opportunity. Software innovation is transforming every sector of the American economy. A recent Software.org: the BSA Foundation study shows the software industry contributed more than US$1.1 trillion to the US GDP in 2016 — a $70 billion increase in just the last two years.[1] The study also showed that the software industry is a powerful job creator, supporting more than 10.5 million jobs, with significant effect in each of the 50 US states. And there are many more jobs available than there are people qualified to fill them.

Jobs in software development, computer programming, cybersecurity, and related fields are growing at an incredible rate. The US Bureau of Labor Statistics estimates that one million computer programming jobs in the United States will go unfilled by 2020.[2] Likewise, the National Initiative for Cybersecurity Education projects a global shortfall of at least 1.8 million cybersecurity professionals by 2022.[3]

Enabling the American workforce to transition smoothly into the workforce demands of the new digital economy requires preparing new generations for jobs of the future, assisting current workers as they transition to the emerging opportunities of the digital economy, and expanding opportunities to reach a bigger pool of talented workers. The government and private sector must work together to:

- Improve access to STEM education;
- Create alternative pathways to evolving workforce;
- Expand workforce retraining;
- Broaden access to technology; and
- Promote responsible immigration policy.

Software is also generating new jobs across industry sectors, requiring new skills ranging from advanced manufacturing to new approaches to customer service and retail sales. Employers are encountering challenges in filling vacancies that require use of new technologies, but opportunities for qualified workers abound.

Both the government and the private sector have important roles in implementing policies that will prepare the next generation for the jobs of the future and allow the current workforce to transition successfully into the new job environment.

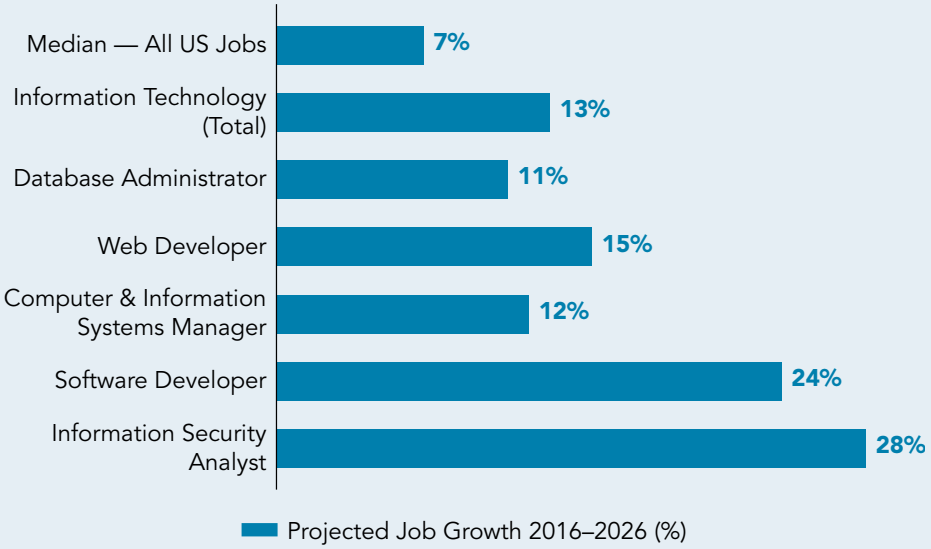
[1] "The Growing $1 Trillion Economic Impact of Software," Software.org (September 2017), available at https://software.org/reports/2017-us-software-impact/.

[2] Tom Kalil and Farnam Jahanian, "Computer Science Is for Everyone!" The White House (December 11, 2013), available at https://obamawhitehouse.archives.gov/blog/2013/12/11/computer-science-everyone.

[3] "Workforce Demand," Fact Sheet, National Initiative for Cybersecurity Education (October 26, 2017), available at https://www.nist.gov/sites/default/files/documents/2017/10/26/nice_workforce_demand_pdf.pdf.

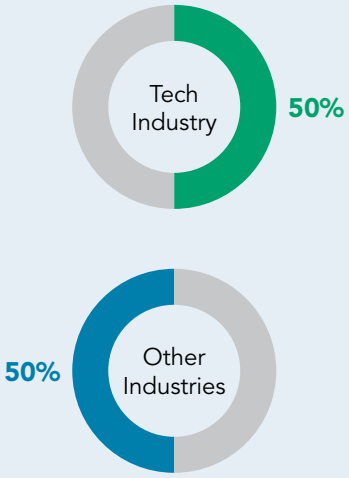
Meeting the Workforce Demands of the New Economy

IT Job Growth Will Far Outpace Other Jobs



Source: Bureau of Labor Statistics[4]

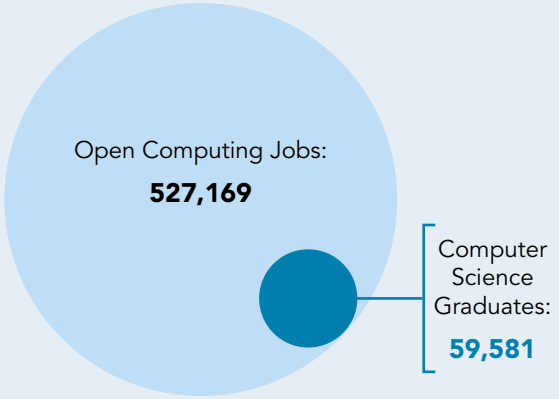
Half of All Coding Jobs Are Outside the Tech Industry, 2016



Source: Oracle Academy/Burning Glass Technologies[5]

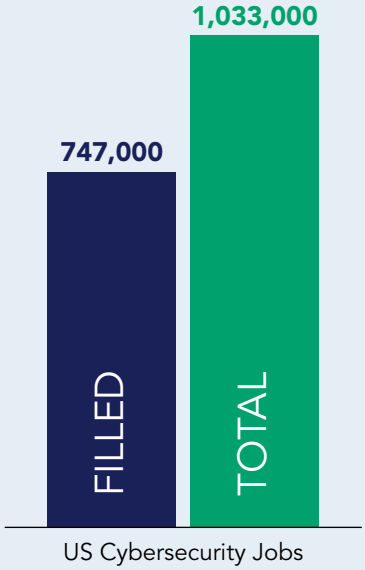
65% of children now entering primary school will hold jobs that currently don't exist.[6]

STEM Education Must Expand to Keep Pace, 2015



Source: Quartz[7]

Job Demand Far Outstripping Supply in Cybersecurity
(October 2016–September 2017)



Source: CyberSeek[8]

[4] Data drawn from Bureau of Labor Statistics, "Occupational Outlook Handbook," available at https://www.bls.gov/ooh/home.htm.

[5] "Beyond Point and Click: The Expanding Demand for Coding Skills," Burning Glass Technologies (June 2016), available at https://www.burningglass.com/wp-content/uploads/Beyond_Point_Click_final.pdf.

[6] *The Future of Jobs: Employment, Skills, and Workforce Strategy for the Fourth Industrial Revolution*, World Economic Forum (January 2016) available at http://www3.weforum.org/docs/WEF_Future_of_Jobs.pdf.

[7] Sarah Kessler, "You Probably Should Have Majored in Computer Science," *Quartz* (March 10, 2017) available at https://qz.com/929275/you-probably-should-have-majored-in-computer-science/.

[8] Data drawn from "Cybersecurity Supply and Demand Heat Map," CyberSeek, available at http://cyberseek.org/heatmap.html.

Building Tomorrow's Workforce: Why It Matters

Investing in tomorrow's workforce:

Ensures US **Competitiveness** in a Changing Global Economy

Spurs **Innovation** Across Industry Sectors

Expands **Economic Opportunity** Across the United States

Promotes **Economic Security** for Millions of Americans

Improve Access to STEM Education

STEM education equips students with problem solving, critical thinking, and other abilities that are important for jobs in virtually every industry. Making STEM education inclusive and widely available builds interest in developing in-demand skills and expands the available workforce for technology-related jobs. BSA therefore supports:

Transforming K-12 STEM Education. STEM education is essential to building a highly skilled workforce, but too few students currently have access. Enhancing government investments in early STEM interventions, expanding public-private partnerships, re-envisioning vocational education, and training more STEM-qualified K–12 teachers are critical priorities.

Encouraging Greater Diversity and Inclusivity in STEM Education. Making STEM education more widely available — and encouraging inclusion of underrepresented groups — through scholarships, loan forgiveness, and other initiatives will help ensure the jobs of the future are available to the entire population.

Broadening Exposure to STEM in Higher Education. Although many students in higher education choose non-STEM areas of study, ensuring a baseline exposure to STEM fields among these students can prepare graduates in all fields to embrace technology in whatever career they may choose.

Aligning STEM Curricula to Real-World Demands. Greater integration of high-demand practical disciplines, such as software engineering, data science, and cybersecurity, into computer science and other STEM curricula will ensure investments in STEM education translate into a qualified, highly skilled workforce.

Expand Workforce Retraining

Emerging technologies will create new jobs and change the skills demanded in many existing jobs. In addition to preparing the next generation workforce, we must ensure the current workforce has access to the skills needed as the job market evolves. Policies that promote access to training in 21st century skills for workers seeking to adapt to new professional demands can ensure that the evolving economy leaves no one behind. BSA therefore supports:

Investing in Mid-Career Training in High-Demand Tech Skills. Congress should establish mid-career retraining programs to provide American workers with high-demand cybersecurity and IT skills, helping match qualified workers to growing occupational fields. Tax incentives to offset costs to workers for specialized training and certification programs could also pay dividends.

Preparing Employees for Advanced Manufacturing. Programs such as the Manufacturing Extension Partnership can allow employees to access training to let them take full advantage of advanced manufacturing technologies.

Increasing Training and Reskilling to Prepare Veterans for Careers After the Military. Military personnel develop talents and skills needed for success in the private sector during their service, but training and certification with specific industry technology platforms can facilitate their successful transition. Targeted training and reskilling programs for transitioning military and veterans and their families will expand the high-tech workforce and create new opportunities for veterans.

Create Alternative Pathways to the Evolving Workforce

As our economy changes, we need to consider whether our education model should change as well. In the new economy, technical schools, apprenticeships, boot camps, and other alternative pathways may be just as effective as traditional classrooms in generating the skills and interests necessary to thrive in 21st century careers. BSA therefore supports:

Strengthening Apprenticeship Programs. Apprenticeships can be an important way to gain the skills and experience needed for the evolving job market. Building public-private partnerships, simplifying requirements, and identifying incentives will make apprenticeships more feasible and attractive for the future workforce.

Expanding Technical School Education. The Perkins Act CTE program, the federal government's primary career and technical education effort, should be strengthened and expanded to make technical school education more accessible to future workers, and should embrace initiatives to make technical school education more relevant to future workforce needs.

Mainstreaming Boot Camps, Online Courses, and Other Alternative Education Models. Boot camps, online courses, community colleges, and alternative educations models like P-TECH can each help reach new student populations, help students tailor their education to their own needs and pace, and impart high-demand skills to workers unable to participate in degree programs or other traditional pathways. The government should increase investments in these and other alternative models to expand the path to the 21st century workforce.

Broaden Access to Technology

Technology enables the creation of jobs in all industries and in all parts of the country. Ensuring equal opportunity to access technology is fundamental to job creation and economic growth. BSA therefore supports:

Achieving Universal, Affordable High-Speed Internet Access. Affordable access to high-speed Internet is increasingly a necessity for many professions; yet, more than a third of Americans still lack access. The government should develop a near-term plan to close this gap through investments in Internet infrastructure in underserved areas and efforts to ensure its affordability.

Ensuring Equitable Access to Technology in the Classroom. Exposing students to cutting-edge technologies at an early age can improve educational outcomes and prepare students for technology-related careers; yet access to technology in the classroom varies widely across different communities and income groups. The government should invest in innovative efforts to expand access to technologies in these underserved classrooms.

Promote Responsible Immigration Policy

As the software industry evolves, the gap between available technology-related jobs and qualified workers continues to grow. Although we work to improve education and training of the US workforce, high-skilled immigration can ensure these jobs — and the innovation they support — remain in the United States. Responsible immigration policy can enable the United States to recruit the best and brightest across industry sectors to fill high-demand jobs and contribute to American innovation. BSA therefore supports:

Strengthening the H-1B Visa Program. The H-1B visa program has enabled American industry to recruit top talent from around the world to contribute to American innovation and job creation. Strengthening the program, to include authorization for spouses to work, more support for recent graduates entering the workforce, and an expansion of visa caps, will help the US economy maintain its competitive edge.

Supporting DREAMers. Research has repeatedly shown that Deferred Action for Childhood Arrivals (DACA) recipients tend to attain comparatively high levels of education and be employed in high-skilled jobs, creating a new generation of skilled workers. The software industry — and its customers — employ DACA recipients. Protecting their future is important to workplace stability, to expanding US GDP, and, as a result, to creating new jobs for all Americans.