

HOW TO FIND (AND KEEP) STEM TALENT

TIM MCAWARD AND MEGAN RAFTERY

SCIENCE. TECHNOLOGY.
ENGINEERING. MATHEMATICS.

A PERFECT STORM

They may be relatively small in number, but they pull more than their fair share of economic weight. Amid higher unemployment and economic turmoil, we need them now more than ever.

STEM jobs (97 occupations that fall into the science, technology, engineering and mathematics fields) are part of a critical cycle of economic growth. They are vital for national competitiveness, fueling the economy and creating more downstream jobs.

That's the good news. Now for the not-so-good news.

By international standards, students in the U.S. rate in the middle of the pack (or lower) with respect to proficiency in science and mathematics. And, we're graduating the same proportion of STEM graduates now as we did 20 years ago. When you factor in the growth in STEM demand, this is creating a serious shortfall of talent that has implications for an increasingly global economy of innovation.

There are a number of factors that are inhibiting new entrants to STEM fields and luring existing participants away to others. These include significant cultural, gender and attitudinal shifts and long-held notions that shape who enters (and who stays in) STEM-related educational tracks and careers. Companies themselves must understand these forces, and be aware of how they may be contributing to them if they are to be turned around.

"...THE PRIMARY DRIVER OF THE FUTURE ECONOMY AND CONCOMITANT CREATION OF JOBS WILL BE INNOVATION, LARGELY DERIVED FROM ADVANCES IN SCIENCE AND ENGINEERING."

National Academies Gathering
Storm committee

DEMAND IS GROWING EXPONENTIALLY. The skills and experience of STEM-qualified workers are now being utilized across a broader range of industries, and this is only increasing the tight labor market conditions for these critical skill sets.

Today, STEM innovation doesn't exclusively take the form of advances in basic science. The reach of product innovation is expanding, extending far beyond traditional R&D into fields that connect cultures, communities and individuals in new ways. Today, there are more routes into STEM-related fields, more ways to apply technology to different aspects of life, and greater market demand for these new applications.

From 2000 to 2010, STEM jobs grew at three times the rate of other fields. And, the demand for STEM professionals is only projected to increase—growing 16.8% from 2010 to 2020. Demand will be greatest for

computer-related occupations, with numbers in this category expected to jump 21.8% from 2010 to 2020.

The demand for greater efficiencies, new products, and global business growth is increasing the need for the knowledge, skills and abilities commonly associated with STEM workers. Advancements in numerous areas are driving up the demand for core STEM competencies including:

1. Technology explosion: use of the internet, proliferation of web applications, social communities and mobile apps are increasing the demand for more sophisticated technology.

2. An aging and growing worldwide population: demand for new products and medical and scientific advancements will grow rapidly in response to aging population trends.

3. Renewed focus on innovation: cost pressures coming out of the global recession will force companies to improve and update product designs and optimize existing manufacturing processes.

4. Conservation and green energy: environmental pressures, international legislation, and the higher costs of fossil fuels are creating new market opportunities.

5. Heightened security measures: the need for security and security systems technology is on the rise in both the public and private sectors.

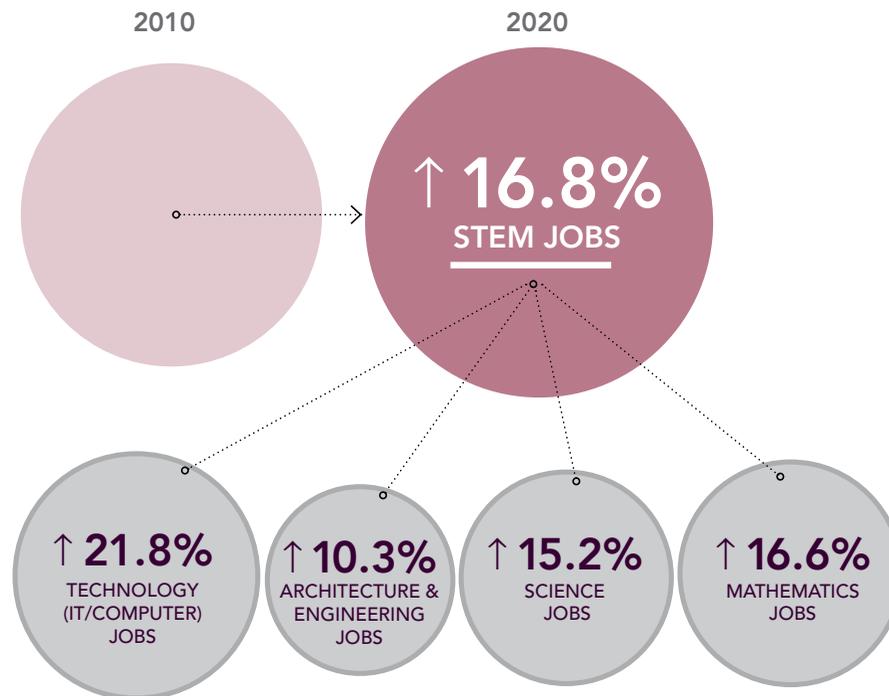
6. Adoption of nanotechnology: the U.S. National Science Foundation estimates that nanotechnology industries worldwide will require 2 million workers by 2015.

STEM BREAKDOWN AND GROWTH PROJECTIONS.

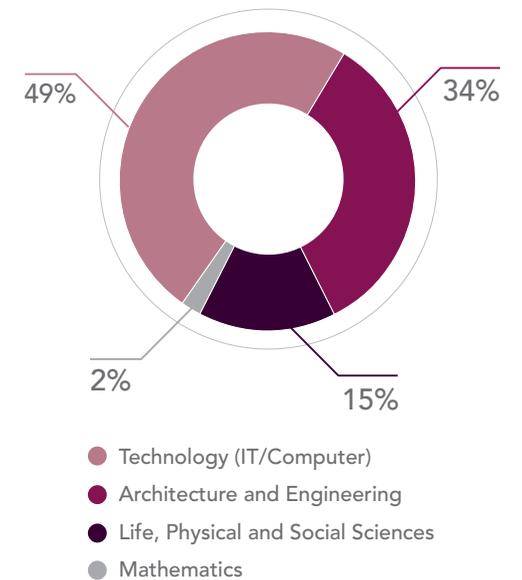
Technology (IT/Computer) occupations make up 49% of STEM employment with architecture and engineering; life, physical and social sciences; and mathematics occupations making up 34%, 15%, and 2% respectively.

In the U.S., demand for STEM professionals is expected to increase 16.8% from 2010 to 2020—adding nearly 1.3 million new STEM jobs to the workforce. The Bureau of Labor Statistics expects the demand will be the greatest for computer-related occupations, with new job openings expected to jump 21.8% from 2010 to 2020.

STEM EMPLOYMENT GROWTH THROUGH 2020



THE BREAKDOWN OF STEM EMPLOYMENT



SKILLS IN HIGHEST DEMAND. Computer and IT-related skills will continue to increase in demand through the next decade.

Out of the 10 fastest growing STEM occupations (through 2020, by numerical increase), eight are IT/computer-related.

Overall, the fastest growing STEM occupations (through 2020) in terms of numerical change are:

1. Software Developers, Applications
2. Software Developers, Systems Software
3. Computer Systems Analysts
4. Computer Support Specialists
5. Network and Computer Systems Administrators
6. Information Security Analysts, Web Developers and Computer Network Architects
7. Computer and Information Systems Managers
8. Civil Engineers
9. Computer Programmers
10. Medical Scientists, Except Epidemiologists

There are other promising STEM occupations. The following occupations are expected to grow more than 25% by 2020:

- Biomedical Engineers (61.7% growth)
- Biochemists and Biophysicists (30.8% growth)
- Database Administrators (30.6% growth)
- Actuaries (26.7% growth)

THE TOP FOUR STEM JOBS IN TERMS OF NUMERICAL AND PERCENTAGE GROWTH THROUGH 2020 ARE:

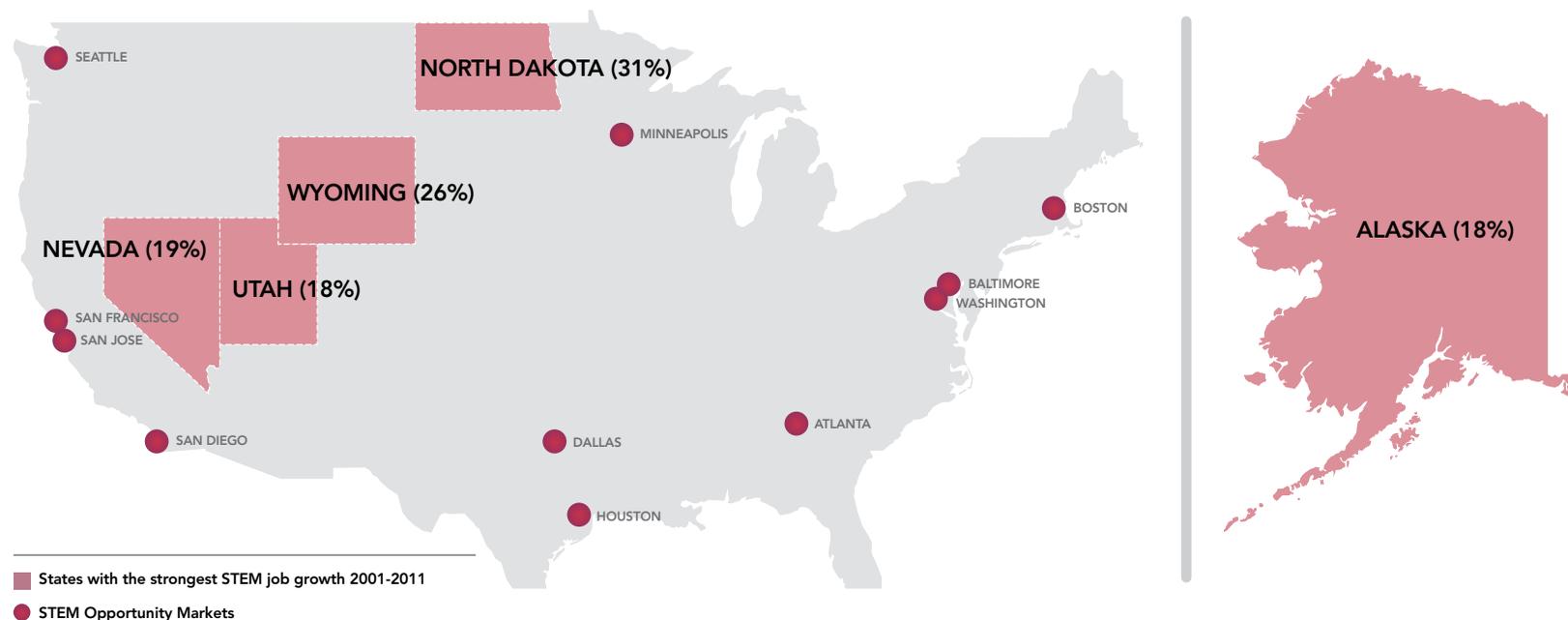
1. Software Developers, Applications (143,800 new jobs, 27.6% growth)
2. Software Developers, Systems Software (127,200 new jobs, 32.4% growth)
3. Network and Computer Systems Administrators (96,600 new jobs, 27.8% growth)
4. Medical Scientists, Except Epidemiologists (36,400 new jobs, 36.4% growth)

STEM JOBS ARE GEOGRAPHICALLY BASED. Geography plays a part in where STEM jobs exist. Regions with a strong presence of STEM-related employment are often heavily dependent on government funding. Local technology centers, research parks, and research university clusters also influence the concentration of STEM jobs in a region.

The following metropolitan areas have a **substantial volume and concentration** of STEM jobs, compared to total employment. STEM jobs in these areas are predicted to grow by more than 6% in the next five years:

1. Atlanta-Sandy Springs-Marietta, GA
2. Baltimore-Towson, MD
3. Boston-Cambridge-Quincy, MA-NH
4. Dallas-Fort Worth-Arlington, TX
5. Houston-Sugar Land-Baytown, TX
6. Minneapolis-St. Paul-Bloomington, MN-WI
7. San Diego-Carlsbad-San Marcos, CA
8. San Francisco-Oakland-Fremont, CA
9. San Jose-Sunnyvale-Santa Clara, CA
10. Seattle-Tacoma-Bellevue, WA
11. Washington-Arlington-Alexandria, DC-VA-MD-WV

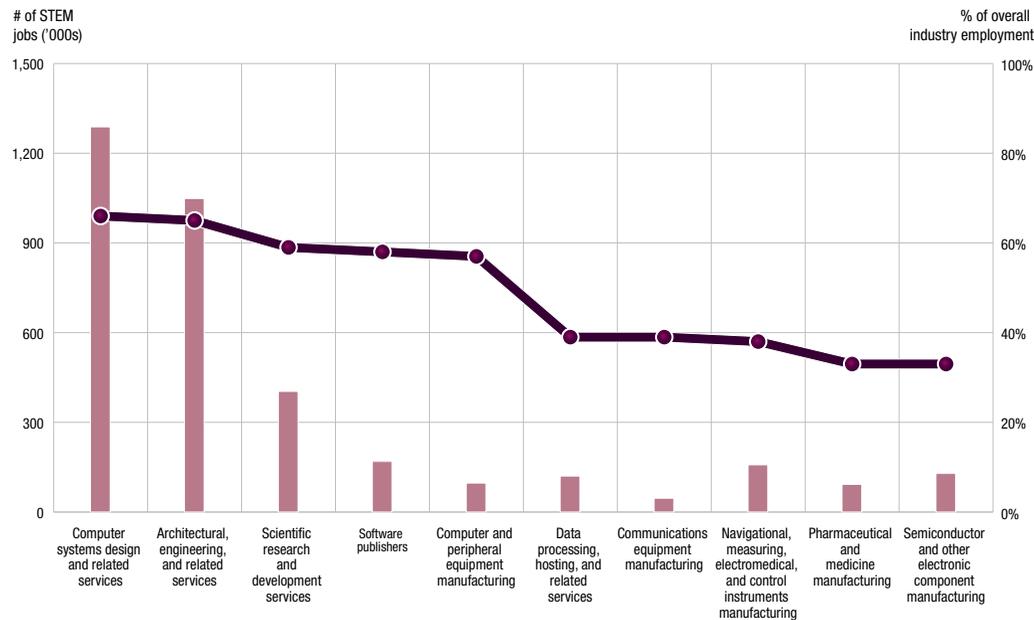
Although the volume of STEM jobs is still relatively small, the following states have experienced the **strongest STEM job growth on a percentage basis** from 2001 to 2011:



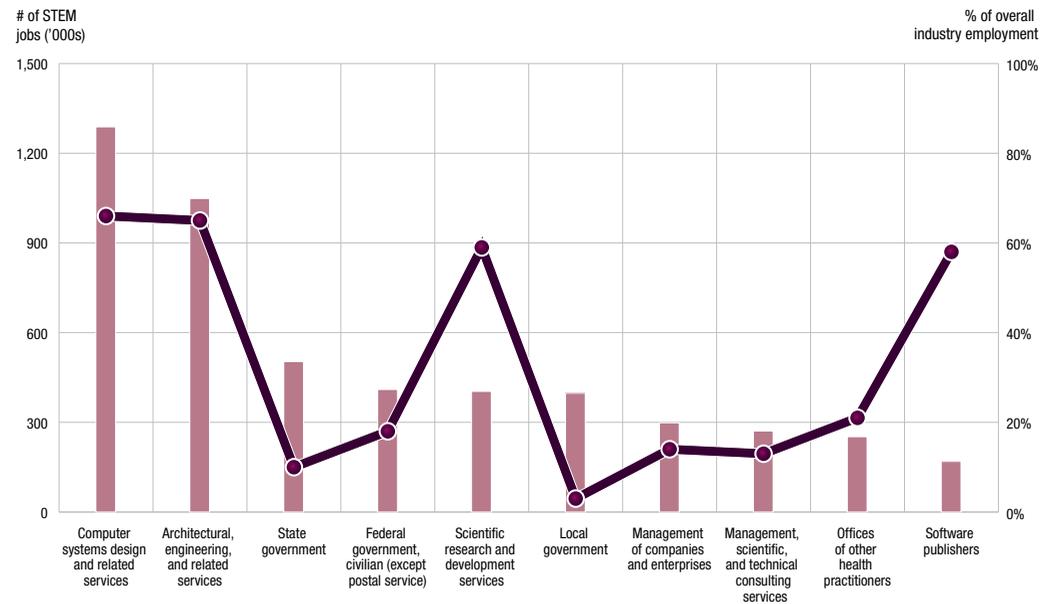
STEM JOBS ARE INDUSTRY BASED. STEM occupations make up more than half of industry employment in computer systems design and related services; architectural, engineering, and related services; scientific research and development services; software publishing; and computer and peripheral equipment manufacturing.

It's worth noting that even though the STEM workforce concentration in government is 6% overall, the government (local, state, and federal) employs more than 1 million STEM workers.

INDUSTRIES WITH THE HIGHEST CONCENTRATION OF STEM JOBS



INDUSTRIES WITH THE MOST STEM JOBS



THE IMPENDING TALENT DROUGHT. The jobs are there, the wages are attractive and high growth indicates strong future prospects for STEM-qualified workers. So why isn't the supply of talent keeping up?

There are five key reasons why the supply of STEM talent is not keeping up with demand:

1. Defection and attrition

Even in those areas where STEM graduate numbers are still strong, diversion of workers into other fields is significantly impacting supply. STEM students (including the highest performing) are diverting into other occupations partly due to their belief that other occupations will better satisfy their personal work interests and values.

- Overall, only one-third of workers with a STEM undergraduate degree work in a STEM job.

- Only about 40% of men with STEM college degrees work in STEM jobs.
- Only 26% of women with STEM degrees work in STEM jobs.
- Female STEM majors are twice as likely as men to work in education or healthcare.

2. Women and minorities are underrepresented

- Almost three out of four STEM jobs (72%) are held by non-Hispanic Whites.
- Women fill close to half of all jobs in the U.S. economy but they hold less than 25% of STEM jobs.
- Only half as many non-Hispanic Black or Hispanic workers have STEM jobs relative

to their overall representation in the U.S. workforce.

- Non-Hispanic Blacks and Hispanics each account for 6% of all STEM workers, but 11% and 14%, respectively, of overall employment.
- In contrast, the STEM picture is reversed for non-Hispanic Asians who make up 14% of all STEM workers but only 5% of the U.S. workforce.

Population shifts are translating into more women and minorities entering the workforce. Why is it that these growing worker populations are so underrepresented in STEM fields?

EIGHT KEY REASONS WHY WOMEN AND SELECT MINORITY GROUPS ARE UNDERREPRESENTED IN STEM FIELDS:

1. Culturally prescribed roles/stereotypes are negatively affecting the performance and aspirations of women and minorities
2. Lack of self-confidence in STEM-related educational pursuits
3. Limited exposure to STEM fields
4. Lack of role models and mentors leading to feelings of isolation
5. Lower interest in STEM fields due to differing value system regarding work
6. Workplace biases make it more difficult to advance in STEM fields
7. Perceived lack of flexibility/work-life balance in STEM fields
8. High costs of STEM education

THE IMPENDING TALENT DROUGHT / CONTINUED

3. Student interest is low

It is clear that something fundamental is shifting interest and focus away from STEM fields.

- The proportion of STEM bachelor's degrees awarded has remained relatively flat for the past 20 years, consistently accounting for approximately 33% of all degrees earned.
- Only 17.3% of students who are proficient in mathematics are interested in studying and entering a STEM field.
- In the 2008/2009 academic year, there were more than two times the number of bachelor's degrees earned in Visual and Performing Arts compared to Computer and Information Sciences, despite the comparable availability of jobs.

- Compared to 2000, the number of bachelor's degree in Business has grown 32%, the number of engineering degrees earned has grown 19%, and there has been a negative growth rate of -14% in Computer and Information Sciences degrees earned.

4. An aging workforce

While the aging population of the global workforce is a growing problem for all industries, for some STEM-based industries, this is compounded by a worker profile that is already older than the average.

- Less than one-quarter of the workforce (22.2%) is over 55 years of age. In the Life Sciences sector, this figure is closer to one-third (31.4%). Architectural/Engineering workers also represent an older

demographic, with 25.4% of Architectural/Engineering workers 55 years or older.

- More than 50% of all Civil, Mechanical and Industrial Engineers are over the age of 45.

5. Return migration

One in five U.S.-based STEM workers is foreign-born, of which 63% come from Asia. Significant economic growth in developing countries, particularly throughout Asia, is beginning to offer attractive opportunities "back home." Many developed nations have relied upon skilled migration to fill talent gaps in STEM industries. The relatively strong economic position of Asia now provides a genuine alternative to these workers, potentially reducing stay-rates of STEM workers in the U.S.

THE FIRST STEP IN ADDRESSING THE SHORTAGE OF STEM-QUALIFIED WORKERS IS FOR EMPLOYERS TO SERIOUSLY ANALYZE HOW THEY CAN CIRCUMVENT THESE ISSUES IN THEIR OWN WORKPLACES.

TACTICS TO WEATHER THE STORM. While the shortage of highly skilled workers is not new, we do know that this talent gap isn't going away anytime soon. So, what can employers do to access the STEM talent they need?

1. Focus on the work, not the worker

When your company needs work to be done, is your first thought usually to hire someone permanently or full-time? The supply issues outlined earlier mean that “owning the talent” may not always be possible. Instead of looking at the job to fill, look at the work that needs to be done and consider the growing population of STEM free agents to help.

Between 2009 – 2011:

- The growth of self-employed STEM workers (3.1%) was nearly twice the rate of growth for all self-employed workers (1.7%) and five times the rate of overall employment (0.6%).
- The growth of self-employed STEM workers (3.1%) was more than twice the rate of

growth for STEM workers in traditional employment relationships (1.5%).

2. Go virtual

In today's global economy of innovation, another way to widen the talent net is to go virtual. In this setting, work can be sent to the worker, not the other way around. And in high-tech industries that rely on STEM talent, instead of moving the talent, consider moving the work. This is a philosophical change for many companies, but one that is now being driven by necessity.

3. Look inside and be flexible

Look within your own walls when widening your talent net. With a large number of STEM workers (especially in some key

engineering fields) approaching retirement, the importance of retaining these skills becomes paramount. Has your company put in place a formal program for mature workers looking to work a reduced or flexible schedule as they transition into retirement? Both men and women defect from STEM careers, but women were far more likely than men to cite time and family-related issues as reasons for leaving their career. What flexible work options do you offer today? Are they a differentiator in attracting new workers?

4. Re-vamp your internship program

Internship programs are now occurring throughout the year, not just over summer, and an intern role doesn't have to apply only to college-age workers. More mature workers

are now enrolled in college programs, so internships are attracting seasoned workers. Make sure you have an internship program that works and targets the talent that's right for your organization. As a first step, it's a good idea to research existing successful internship programs. The key to the best programs is planning, long before the first intern is hired.

5. Purposefully target women and minorities

It's clear that women and minorities are underrepresented in STEM careers. But employers need to increase their efforts to engage directly with these growing worker populations. For STEM talent specifically, begin to build your talent community by reaching out to professional networking

TACTICS TO WEATHER THE STORM / CONTINUED

groups that cater to these candidate pools.

Groups like:

- The Society of Hispanic Professional Engineers
- The National Society of Black Engineers
- The Association for Women in Computing

Ask your current female and minority STEM workers if they would recommend other women and minorities to your company. Why or why not? And finally, but perhaps most importantly, look to minority staffing/recruiting firms to build your bench strength of STEM talent. Niche firms specializing in minority, women, and disabled veterans have unique insight into where and how to find this key talent.

6. Sell your company, not the job

Sell everything your company has to offer potential STEM candidates. Younger generations, and in particular, women with a STEM education, are looking for more meaning and flexibility from their work life. Whatever your employer brand, now may be the time to take a good look at it and fine-tune it if needed to focus on promoting the entire experience.

7. Connect with local schools

The most important thing your organization can do to drive change is to begin an ongoing dialogue with local universities, community colleges and high schools. Educational institutions need to

understand the demands of your industry and what skills and experience you need to grow your business so they can design curricula and job training around your needs.

To start exposing young students to STEM careers and careers with your organization, talk to your local schools about partnering with them to promote STEM careers and education. Your company can sponsor career events, offer employees to serve as role models and mentors, conduct in-school science labs, or offer on-site internships and scholarships. There are endless ways to brand your company as an employer of choice.

8. Think military

The U.S. military produces nearly 400,000 new civilian workers annually, making it one of the largest and most valuable sources of skilled talent in the country. In addition to having a broad range of technical and professional skills, servicemen and servicewomen often have other important qualities like strong leadership and teamwork skills, a flexible/adaptable approach to dynamic work situations, and a global outlook (many speak more than one language). These reasons make recruiting among the military a great STEM talent acquisition strategy.

STEM TALENT GAP— INCREASING DEMAND AND STAGNANT SUPPLY.

Job defection, women and minority underrepresentation, low student interest, an aging workforce, and return migration are all contributing to talent supply challenges. For employers, the answer to the STEM talent gap doesn't rest with a singular initiative, but rather lies in a collection of strategies that when implemented holistically, enables organizations to access talent when and where it is needed.

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