The Defining Workforce Challenge in U.S. Aerospace & Defense

STEM EDUCATION, TRAINING, RECRUITMENT & RETENTION
STEM Workforce Development: A Call to Action
A highly skilled and robust defense and aerospace workforce is essential to our nation’s security and economic prosperity. Yet today the industry faces impending retirements and a shortage of trained technical graduates while work and skills requirements become increasingly advanced – a challenging situation forecast to worsen in the next decade.

The Aerospace Industries Association (AIA) is urging Congress, the Executive Branch, industry trade associations, education institutions and other stakeholders to acknowledge the ongoing need to develop a workforce for the industry’s 21st century missions and requirements, and to demonstrate a willingness to address these issues through policies, programs and investment. As an industry, AIA and its member companies are confronting the issue by engaging education and workforce development programs, supporting initiatives that improve our nation’s education and innovation systems, campaigning to raise awareness of the nation’s workforce needs and opportunities, and advocating for policies to help address these shortfalls.

At issue is a nationwide shortage of workers for jobs requiring skills in science, technology, engineering and mathematics (STEM). These workers form the backbone of an aerospace and defense industrial base that is counted on to provide sustained innovation, economic growth, global competitiveness and security for the United States and its allies.

Meeting the STEM workforce challenge is a critical priority for AIA members, but only a national movement engaging government leaders and all stakeholders across industry sectors will marshal the resources, creativity and urgency required to tackle one of the most serious threats to our economy in a generation.

Addressing the STEM Gap: A National Imperative
Despite numerous programs, initiatives and campaigns geared toward filling the nation’s hiring pipeline with STEM-ready employees, a significant academic and skills gap remains.

“AIA’s workforce strategy is to collaborate with other industry, academia, philanthropic, and government stakeholders on workforce issues. Together we will find a way to develop the talent required for our industry to remain successful in an increasingly competitive global economy.”

— David F. Melcher
President and CEO
Aerospace Industries Association

Every year, reports and calls-to-action generated by analysts, government agencies and business coalitions stress the ongoing threat this gap poses to productivity, innovation and competitiveness. In the aerospace and defense sector, the problem is acute.

One recent study found that 39 percent of aerospace companies predict an “extreme” impact on their business growth caused by this labor shortage, reflecting concern not only about a lack of senior-level engineers, but also a paucity of skilled/technical workers versed in technology fundamentals and “soft” skills such as problem-solving, critical thinking, literacy, communication and collaboration.

Conspiring against those seeking skilled workers are generational trends, for which there are no easy remedies. They include the retirement of the country’s aging baby boomers and shifting attitudes among young professionals about job satisfaction and what it means to pursue a career in engineering and manufacturing.

AIA member companies are among a subset of advanced manufacturers and technology employers uniquely impacted, and without hiring remedies available to others. Offshoring, for example, is often not an option due to defense-related contracts requiring work by U.S. citizens with security clearances. The industry also suffers from the legacy of its hiring downturn during the 1980s and ‘90s, and negative perceptions about the sector. And today more than ever, aerospace and defense recruiters must compete for talent among candidates who also have skills highly-coveted in Silicon Valley.
Re-tooling the nation’s education system to generate more qualified STEM graduates is part of the solution, but the challenge isn’t purely academic. Aviation Week’s 2015 Workforce Study reveals valuable insights – not only about why schools aren’t preparing more job-ready workers, but also why many graduates who enter the STEM workforce leave after a few years. The under-representation of diverse populations in the aerospace and defense industry also carries with it a real cost, in terms of the STEM talent deficit and growth opportunities left on the table.

Like most affected stakeholders, AIA and its member companies are engaged in sustained efforts to improve STEM workforce development and ensure a pipeline of employees with globally competitive skills. Many aerospace companies have advocated for and supported education initiatives for decades. Since 2006, AIA has provided a venue for its members to share information and collaborate across the industry and with other stakeholders for systemic impact on national scale.

This report sets forth the current progress of AIA and industry STEM initiatives, and points the way forward for policymakers and other leaders working to build an aerospace and defense workforce for the 21st century.

A Robust STEM Workforce Supports a Strong Industrial Base

**U.S. Global Competitiveness**
The U.S. aerospace and defense industry achieved a record $69.6 billion trade surplus in 2015.

**Innovation**
The aerospace industry is at the forefront of new technologies including virtual prototyping and 3D printing for jet and rocket parts on the International Space Station and for advanced aircraft materials and design.

**Economic Strength**
The industry consists of more than 1.6 million Americans across 50 states and is one of the largest contributors to annual GDP.

**National Security**
The strength of the aerospace and defense industry helps keep our men and women in uniform safe and successful on the battlefield.

Competition for specific engineering skills is broadening and becoming more intense as automotive, high tech and oil and gas industries begin to overlap to a greater extent in terms of technology development.

Source: Aviation Week 2015 Workforce Study
Industry Retirements: Tsunami or Ripple?
A steady stream of data gives the industry and policymakers a clear picture of the size and scope of the country’s STEM workforce challenges, and it’s no surprise that the growing number of retirement-eligible employees remains one of the industry’s most pressing concerns.

Tracking to the country’s aging population, current statistics describe what has been called a “bow wave” of pending aerospace and defense industry retirements:

- In 2015, 18 percent of all U.S. aerospace engineers and 24 percent of all hourly manufacturing employees in the aerospace industry were eligible for retirement.
- It is predicted that 41 percent of skilled tradesmen in the aerospace industry will retire by 2017.
- Boeing, for example, employs 14,000 workers over age 61, and 56 percent of the company’s engineers are 50 years old or older. Replacing these workers, say experts, will take 10 to 20 years.

While the retirement alarm has been sounding for a number of years, the exact timing of the “wave” has been difficult to predict, and recessionary conditions over the past decade may have delayed retirement for some.

“As defined pensions have given way to defined contribution programs, the term retirement itself has less relevance,” the Aviation Week study posits. “Retirement, by definition, means withdrawal from active/work life. Few people are exercising the right to withdraw from the workforce completely and are instead choosing to shift their careers—either in terms of hours worked, the organization they lead or follow, or the entire focus of their work.”

In the Aviation Week study, 1.7 percent of those over age 62 retired in 2014, at roughly the same rate as the previous year. Companies participating in the study, however, expected the percentage to increase in 2015.

“In reality, even if the ratio of retirements doubled to 3.4% in 2015 from 1.7% in 2014 of those over age 62,” says the report, “the total impact would be fewer than 5,000 people retiring.”

Yet the aerospace and defense industry’s workforce does skew to the retirement-eligible end of the spectrum, especially among...
companies with more than 1,000 employees, and when compared to other sectors such as technology, financial services and life sciences. In the chart below, for example, 2.9 percent of workers age 66 and older represents 15,000 people, 3,500 of whom are over the age of 71.

“Add to this 15,000 the more than 44,200 people who are 61-65 years old,” says the Aviation Week report, “and the potential exodus does lead people to jump to the term ‘gray tsunami.’”

Whether the retirement wave breaks as a tsunami or ripple, the challenge remains the same: preparing a steady talent stream of younger workers with the right skills, aptitude, experience and interest to step into the jobs vacated by senior-level engineers and skilled technicians.

**Abundant STEM Positions Go Unfilled**

Retirement trends tell only part of the story. Job creation tells the other. The good news is that aerospace and defense companies plan to do a lot of hiring in the coming decade, meaning that opportunities for those pursuing STEM careers will be abundant. Despite a shrinking overall workforce, the industry planned to make 55,000 hires in 2015, after beating a forecast of 31,000 hires by more than 20,000 in 2014.

In civil aviation alone, the sector expects to need 480,000 new technicians in the next decade to meet the demand of producing 25,000 new aircraft entering the commercial fleet.

The bad news: A massive skills gap faces companies that need to fill these jobs, most of which demand engineering, skilled manufacturing and other proficiencies requiring globally competitive STEM education and training.

Simply too few qualified candidates are in the market. As a result, many of the 4 million job openings in the U.S. go unfilled every year. Worldwide, a skilled worker shortage of 85 million is predicted by 2020.

At the same time, only 1.5 percent of the nation’s 25- to 34-year-olds has a science degree, putting the U.S. at the bottom third of all countries in the Organization for Economic Cooperation and Development.

If the nation neglects to provide the basic skills required for interested professionals to enter the STEM workforce, it represents a missed opportunity not only in terms of individual employment, but also in terms of strengthening productivity, competitiveness and innovation in the U.S.
Requirement for STEM-Ready Workforce: A Lifetime of Learning

In 2013, the authors of a report on STEM education in the U.S. assessed the skills gap in dire terms. “Business and education leaders have engaged in discussions about the gap between the outputs of higher education and the needs of 21st century innovation and commerce for some time,” wrote members of the Business-Higher Education Forum. “Despite these discussions, the misalignment between student outcomes and workforce needs persists.”

Today, the misalignment remains, and is not limited to higher education. High schools, technical schools, community colleges and elementary schools are all being examined for opportunities to improve STEM curricula.

Among some experts, there is even examination of pre-Kindergarten activity, early childhood development and pre-natal brain development in the search to identify the emergence of achievement gaps that eventually manifest as a lack of preparedness for the workforce. Attendance of pre-primary school, for example, led to higher mathematics performance among children, especially those of more favorable socio-economic status.

The disconnection between the older and newer generation adds complexity to acquiring and retaining the new Millennial recruits. Millennials would often rather engineer virtual airplanes and warcraft in a video game than work on the real thing.

As students progress through the system, mountains of data are generated to track the likelihood of interest and/or success in a STEM education and career. The information consistently shows room for improvement. In 2015, it was discovered that U.S. 4th and 8th graders were performing worse in math (and reading) than in 2013, after a two-decade upward trend.

Only 17 percent of 12th graders are both interested in STEM careers and college-ready in math. Although 85 percent of these students enroll in four-year colleges, fewer than 40 percent of students who declare a STEM major go on to earn a STEM degree. Community colleges – critical pipelines for two- and four-year degree or credential holders, skilled manufacturing and technical graduates – fare even worse. Only 7.3 percent of students who start a STEM degree in community colleges complete STEM bachelor’s degrees in six years.

Source: IBM
At the same time, the system is leaving talent on the sidelines. Despite increases in engineering enrollment among U.S. universities of nearly 500,000 students and annual graduation of 100,000 students, the percentages of African-American and female students have not increased.19

**STEM Workers on the Job**

But what about those who do graduate with a STEM degree and actually enter the aerospace and defense workforce? The industry currently enjoys a relatively low attrition rate of 5.2 percent, but there remains concern about retaining young professionals (YPs).

According to Aviation Week, the YPs surveyed believe that “overarching opportunities are those that overlap with other industries” such as robotics, cyber security and software development. A recovering housing market and the sustained availability of IT jobs during a slow economic recovery may also lead YPs to change jobs more frequently, according to researchers, who fear that these factors “may result in voluntary attrition climbing among the YPs who will have opportunities with non-traditional and more commercially oriented companies.” 20

While more data on employees age 25 and under is required, job satisfaction in the Millennial generation is based on many factors, some considered “non-traditional.” Salary and benefits remain the most important lures for Millennials entering aerospace and defense jobs, but once on the job, their priorities change.

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**IMPORTANT JOB SATISFACTION FACTORS, BY DEMOGRAPHIC GROUP:**

<table>
<thead>
<tr>
<th>Women</th>
<th>Latinos</th>
<th>African-Americans</th>
</tr>
</thead>
<tbody>
<tr>
<td>Independence in my work</td>
<td>Flex time/independence in my work</td>
<td>Flex time</td>
</tr>
<tr>
<td>Part of a larger team; supervisor values my contribution; flex time</td>
<td>Supervisor values my contribution/Part of larger team</td>
<td>Supervisor values my contribution</td>
</tr>
<tr>
<td>Job stability</td>
<td>Variety in work assignments</td>
<td>Part of larger team/independence in my work</td>
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Source: Aviation Week 2015 Workforce Study
In its analysis of YPs, Aviation Week found that the most important drivers of job satisfaction were “challenging work,” access to “tools, learning and technology,” and being part of an organization that “encourages innovation in technology, processes and business.”\(^2\) The need for growth and change among YPs was consistently cited as important, yet 25 percent reported never having been promoted.

Among YPs, under-represented populations are being employed at increasing rates relative to the general population, but just 5 percent of aerospace and defense workers were African-American and only 7 percent Latino, proportions far lower than in the overall U.S. workforce.\(^2\)

The number of women in aerospace and defense careers is on the rise. In 2014, after much effort to improve the diversity of the aerospace and defense workforce, 10.5 percent of our engineering executives and 17.9 percent of our software and development employees were females.\(^2\)

Despite these gains, the industry must strive to create corporate environments that reflect the indicated job satisfaction drivers of a diverse workforce, which include the need for independence among female workers and flex time for Latinos and African Americans. Career decision factors among African-Americans differ from those of other demographic groups, and include proportionally higher rates of concern regarding geography, family and student loan burdens.\(^2\)

Addressing the drivers of career choice and job satisfaction among under-represented populations is a business imperative. Workers in these groups comprise 41 percent of the attrition rate among young professionals who voluntary left engineering positions after less than five years on the job.

Failure to connect with, recruit and retain talent from a diverse population will only compound the nation’s shortage of skilled workers.

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**The Manufacturing Skills Gap**

Across sectors and industries, manufacturers are predicting that 3.5 million jobs will need to be filled in the next decade. A skills gap is expected to prevent 2 million of those 3.5 million jobs from being filled. U.S. manufacturers of all kinds point to four areas in which employees are considered “most deficient.”

70% technology/computer skills

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Source: Deloitte
Today, 82 percent of U.S. manufacturers across all industries say talent shortages will have a moderate or extreme impact on production levels to meet growing customer demand. To compensate, forced overtime is often imposed, resulting in average annual working hours that are 17 percent more than in all other industries. And yet, stretching the workforce actually results in suppressed productivity— to say nothing of what it does for the work/life balance sought by a new generation of employees.

The losses caused by this shortage are real – up to $3,000 per existing employee, and an average of $14,000 per open position, by some estimates. “The skills shortage needs to be managed and tackled given the serious implications it has not only on an organization’s growth and margins, but also on the U.S. economy as a whole,” say the authors of a 2015 report by Deloitte.

The U.S. economy relies on a strong aerospace and defense industry, which generates an annual trade surplus and supports approximately 1.6 million jobs. The lack of skilled workers is yet another threat to an industry already struggling with the effects of sequestration, shrinking defense budgets and a corporate tax rate that is 10% higher than the OECD average. An ongoing commitment to STEM training and education must remain a national priority, lest the labor shortage and declining budgets threaten the industry’s ability to sustain America’s global competitiveness and technological edge on the battlefield.
STEM Workforce Development: Industry Initiatives, National Policies and Local Progress

There is no shortage of industry engagement on the topic of STEM education and workforce development. AIA and its member companies have made significant and sustained local, regional and national commitments that reflect the need to inspire students and educators, engage STEM workers across the country and inform policymakers regarding the skills crisis facing the industry.

AIA’s commitment to STEM workforce development complements the efforts of other industry associations, colleges and universities – and scores of partnerships, consortia, national technology competitions and local community programs – all striving to build an American workforce for the 21st century.

AIA member company initiatives include employer-driven training partnerships, where employers communicate the skills they need to area schools, and help develop curriculum (and often provide equipment and materials) to regional educational partners who provide students with training. These partnerships are found at every level of STEM education, from “cradle to career,” and include organizations that invest in K-12 and post-secondary curriculum development and provide STEM-track support at four-year universities and community colleges.

The aerospace and defense industry also supports various forms of work-based learning, including internships, mentorships, apprenticeships (registered and non-registered), on-the-job training, job shadowing and simulated work environments.

Change the Equation

Change the Equation (CTEq) is an organization established in 2010 through a CEO-led effort to dramatically improve education in STEM and launched as part of President Obama’s “Educate to Innovate” campaign. 3M and Lockheed Martin are two of thirteen CTEq members that took a pledge in November 2015 to achieve a 25 percent increase in skills-based volunteering by STEM professionals. Lockheed Martin is partnering with Project Lead the Way to pilot a virtual mentoring program for high school students in Washington, D.C.

Soaring in Seattle

The Seattle-area’s Raisbeck Aviation High School has been called a “lighthouse model of STEM education.” Founded in 2004 and relocated in 2013 to a new, $43 million state-of-the-art facility, the Raisbeck school is supported by a major financial contribution from Boeing, and a mix of private and public funds from donors, foundations, the State of Washington and the Highline Public School District. The school’s express mission is to provide a “pipeline of future employees to fill critical gaps within the STEM workforce.”

A Higher Level of Partnership

CEOs of aerospace and defense companies including Boeing, Raytheon Company and Northrop Grumman are members of the Business-Higher Education Forum (BHEF), which has launched a six-year effort that includes regional projects focused on business partnerships with higher education institutions in several states. The goal is to create a model that increases student “interest and persistence” toward STEM degree completion and “align undergraduate education with emerging workforce needs.”

STEM Fighters for the Virtual Battlefield

In 2012, Northrop Grumman and the University of Maryland launched the Advanced Cybersecurity Experience for Students (ACES), an academic honors program designed to educate the next generation of cybersecurity professionals. Students in the program interact directly with industry and government mentors, and have the option of interning at Northrop Grumman and preparing for security clearances.

NATIONAL PROGRAMS & COMPETITIONS CREATE STEM CHAMPIONS

CyberPatriot:
CyberPatriot is part of the National Youth Cyber Education Program conceived by the Air Force Association. Every year, the National Youth Cyber Defense Competition puts teams of high school and middle school students in the position of newly hired IT professionals tasked with managing and defending the network of a small company.

FIRST Robotics:
Under strict rules, limited resources, and an intense six-week time limit, teams of students are challenged to raise funds, design a team “brand,” hone teamwork skills, and build and program industrial-size robots to play a difficult field game against like-minded competitors. Volunteer professional mentors lend their time and talents to guide each team.

National Engineer’s Week:
For 65 years, Engineers Week has become embedded in hundreds of organizations around the world and is the foundation of their volunteer engagement. From college students to professionals, local volunteers provide engineering experiences for children, parents, and educators who may otherwise never be introduced to engineering.
Real-World Design
The Real World Design Challenge (RWDC) is a high school competition established in 2008 with the goal of increasing the STEM workforce. A partnership between industry, government, and non-profits provides participating schools with $1 million in software along with training, curriculum materials, and access to mentors. Teams of 3-7 students use these resources to solve real word engineering challenges currently faced by industry.

Ensuring Innovation
Raytheon Company and the University of Massachusetts Lowell announced an agreement in 2014 to establish a joint research facility focused on the advancement of innovative technologies in a “collaborative, state-of-the-art” institute. It will provide UMass students with opportunities for research and employment at Raytheon. The company has committed up to $5 million over ten years for the facility, which will be housed at the university’s 84,000-square-foot Mark and Elisia Saab Emerging Technologies and Innovation Center.

Community & Technical School Support
Launched in 2012, the National Aviation Consortium set a goal to train more than 2,500 technical and community college students for entrance into the aviation and advanced manufacturing workforce. The consortium includes campuses in five states, and offers students “clear aviation pathways... tied to regional economies and employers’ demand” for skilled workers. In Washington State, the consortium has achieved a 90 percent graduation rate from aviation-related programs at Edmonds Community College in Everett, with 80 percent of those graduates entering the Boeing workforce.

Rocket Science
AIA’s Team America Rocketry Challenge (TARC) is the largest student rocket contest in the world, with approximately 5,000 students participating each year. The competition gives middle and high school students a chance to engage in hands-on STEM learning, explore aerospace careers and compete for scholarship money, and it is a critical piece of the aerospace and defense industry’s strategy to build a stronger workforce development pipeline. In 2015, 700 teams representing 48 states, the U.S. Virgin Islands, Puerto Rico and Washington, D.C., participated in TARC’s qualifying rounds. A student team from Alabama beat teams from the United Kingdom and France at the Paris Air Show to take home the international title.
AIA supports long-term policies that help create access to STEM education, training and employment opportunities for students and professionals nationwide. These include measures to make college education affordable, lower student debt, align education resources to workforce needs and engage employers.

**The Every Student Succeeds Act.**
The Every Student Succeeds Act (ESSA) is a landmark education bill, which replaces the No Child Left Behind Act and regulates Federal K-12 policy and spending as a reauthorization of the Elementary and Secondary Education Act. ESSA governs more than $24.5 billion in federal spending, notably including $3.3 billion for Title II funding (educator training and recruitment, including STEM focused) and $1.65 billion of Title IV funding, some of which can be used for STEM and Career Technical Education (CTE) grants. ESSA transfers significant authority to the states but does so in a way that will ensure states develop and implement standards that are globally competitive and result in students who are college and career ready for 21st century jobs. It includes numerous industry-supported STEM and CTE provisions, including significant expansion of allowable uses for STEM grant funds (including STEM competitions and after school programs, like TARC or FIRST Robotics). The bill passed the House and the Senate with strong bipartisan support and was signed into law on December 10, 2015. AIA will look to work with states and localities as the law is implemented.
The Perkins Career and Technical Education (CTE) Act
The Perkins Career Technical Education (CTE) Act is a $1.2 billion program that provides states with secondary and post-secondary grant money for effective and impactful CTE programs. The program, however, currently relies on outdated language, which has resulted in funds disbursed to training programs for jobs that don’t exist and skills that employers do not need. A reauthorization and modernization of the Perkins CTE Act is likely in 2016. Such a reauthorization should promote transfer pathways between secondary and post-secondary CTE programs, increase the use of work-based learning, ensure programs include training for skills required by in-demand occupations, increase employer engagement, and result in the attainment of more industry recognized credentials.

The STEM Education Act
Enacted in 2015, this legislation expands a variety of existing federal grants and programs at numerous agencies related to STEM education by explicitly including computer science education in the definition of STEM.

The America COMPETES Act
The America COMPETES Act builds on a history of awarding prizes and using competitions to foster innovation and encourage participation in technology challenges. This includes approximately $900 million in annual “Education and Human Resources” funding for the National Science Foundation. It allows all federal agencies to award prize money for competitions, much like those awarded in the private sector for robotics, self-driving cars and automated computer security. In 2015, the Administration and its foundation partners announced 23 new national challenges that will award prizes to competitors offering technology solutions to national problems. The Senate may consider a bipartisan reauthorization of the America COMPETES Act in 2016.

The Workforce Innovation and Opportunity Act
This landmark legislation provides close to $3 billion for state and local workforce initiatives, and provides job training for adults and youth. Reauthorized in 2014, it is now in the active rulemaking process. AIA supports this program and is working to ensure it is implemented effectively. AIA will continue to offer feedback to proposed rules during public comment periods, and will work in coordination with regional Workforce Investment Boards.

AIA also supports a commonsense STEM immigration policy, such as the STEM Optional Practical Training (OPT) program. The STEM OPT program allows non-U.S. students who graduate in the States with a STEM degree to remain in the country for an additional 17 months for training. The Department of Homeland Security recently proposed extending the allowable stay to 29 months, but the program and its participants are threatened by court action against the extension.

Any regulation or policy that inhibits pathways or threatens the employment for STEM graduates and skilled workers will be damaging to the industry and productivity. This includes recent regulations such as the “Fair Pay and Safe Workplaces” Executive Order, which could result in federal contractors being blacklisted for any possible labor infraction from themselves or their subcontractors over a 5-year period – possibly at the expense of thousands of jobs.

AIA advocacy will remain focused on long-term, inter-generational policy initiatives that have the potential to reach, encourage and support the greatest number of potential STEM graduates from the most diverse and wide-ranging segments of the population.
Conclusions and Recommendations

Effective STEM workforce development takes place at both a programmatic and a personal level. Individuals must first be inspired to pursue a STEM career and then must be afforded access to resources that help them discern an aptitude, pursue a STEM education, and fulfill their aspirations with a rewarding career.

Negative messages stand in the way. Too often popular culture conveys an outdated picture of the nation’s “dirty and dangerous” manufacturing jobs, whether in aerospace and defense or in skilled trades across sectors. This must change. Perhaps one of the greatest challenges industry faces is to position STEM careers as having a similar cachet as the “hip” high-tech jobs in Silicon Valley. Some companies, such as GE, are confronting this perception gap head on with advertising campaigns and TV programming sponsorships that showcase STEM innovation.

Positive messages from national advocates and policymakers are important as well. When the President of the United States invites high school TARC winners to the White House and Congress passes critical STEM program legislation, it signals to future graduates that their passion for STEM is valued among some of the most important leaders and innovative employers in the world.

Efforts at sustained engagement and messaging to change images and perceptions of the industry and its workforce underpin many of the recommendations AIA has formulated for ongoing STEM education and workforce development in the United States. They include:

**Diversity mentoring**
A sustained effort must be made to increase student and graduate exposure to mentors, role models and sources of inspiration in the aerospace and defense industry. The industry must ensure that mentors and other role models have appeal across diverse populations and are drawn from among young professionals.

**Generate additional data, gain more insight**
Information about industry attrition among young STEM professionals remains scarce. The industry must commit to additional studies, surveys and research regarding graduate career decisions and perceptions. Despite an abundance of statistics on other aspects of the STEM workforce gap, more information is needed about the factors motivating young professionals and diverse demographic groups.

**Demonstrate workplace evolution**
The industry must do a better job of addressing the work/life balance priorities of its employees and market how the workplace for STEM professionals is evolving to match their personal and professional goals. The motivating factors of the STEM workforce are changing – from a focus solely on salary and benefits to other considerations such as flex time and the opportunity to work on innovative projects. While many aerospace and defense companies already offer these opportunities, perceptions have not caught up to reality.
“The fact is that until and unless we attract and leverage the brainpower of the smartest people, including those who may not have initially been interested in becoming engineers, our innovative capability falls short of what it could be. …Our success or failure in achieving this has broad leverage over the future of humankind. This is because ours is an innovation-driven world, an innovation-based economy, and our national and economic security rests on a foundation of innovation.”

- Wes Bush, Chairman, CEO & President, Northrop Grumman Corporation, 10/23/15

Market the mission
Recruiting and retention messages must focus on the industry’s vital mission with regard to innovation and national security. Creating the next smartphone app won’t necessarily keep America safe – working on a team designing the next generation of aviation or space vehicles or cyberdefense systems just might. Although program lifecycles might be longer than those in Silicon Valley, the level of innovation – and rewards – are just as great. This message must reach potential STEM recruits beginning in grade school. It is also a message that must be heard by their parents, teachers and mentors.

Stabilize funding for government innovation
For decades, federal agencies such as the Department of Defense, Federal Aviation Administration and the National Aeronautics and Space Administration have launched the careers of thousands of STEM professionals while benefiting from an ability to attract top talent for some of the country’s most important defense, exploration and safety missions. Yet the ability of these agencies to attract innovators is threatened by policies such as sequestration, short-term funding measures and program cancellations that limit their ability to act as incubators serving national priorities. Funding threats also undermine the ability of government researchers to convert technologies for use in non-military markets, which has long been a boost to the economy and a spark for commercial and consumer innovation. Stable, long-term funding for research and development among these agencies must remain a priority.

Create effective models and measurement
Despite being the stated goal of several initiatives, tools are still lacking for gauging the impact and effectiveness of various efforts undertaken by industry and its partners for encouraging STEM education, engaging potential recruits and retaining personnel. A model should be developed that helps organizations navigate objectives, prioritize use of resources and measure the return on investment of STEM-related initiatives.

Meeting the nation’s 21st century workforce requirements demands a national-level, multi-generation-long commitment on the part of federal, state and local governments, industry organizations and companies of all sizes. The U.S. aerospace and defense industry currently enjoys a top position in terms of global competitiveness and technical superiority – and plays a vital role in maintaining national security and sustaining U.S. innovation. Nevertheless, seismic national demographic changes and dynamic economic forces demand a renewed effort to build and grow a STEM-capable U.S. workforce in the coming decades. New approaches must bolster initiatives that encourage among students and workers the attainment of globally competitive manufacturing and fundamental career skills. The nation’s leaders and the aerospace and defense industry must continue their partnership on STEM education, recruitment and retention. The future of the U.S. economy and national security depends on it.
SOURCES

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