

2016 National Aerospace & Defense Workforce Summit: Proceedings Report & Recommendations



THIS REPORT INCLUDES:

- ▶ A summary of information presented at the 2016 National Aerospace & Defense Workforce Summit
- ▶ Data regarding the latest trends and challenges in STEM workforce development
- ▶ Recommendations for the new administration and 115th Congress
- ▶ Suggestions for stakeholder collaboration to address the most urgent workforce-related issues for the A&D industry.



Introduction

Angela Montez Lamb tells the story of how she developed an interest in science and technology at a young age: “I am Hispanic, was raised by a single mom, and my grandparents had only a grade school education. In seventh grade, the dean of engineering from a local university spoke to a group of students who scored high in math and science and told us we were capable of being engineers. After that, I was like Dorothy in *The Wizard of Oz*; where my world was once black and white, I could now see a world of color. I learned I had options for my future and I made it my goal that day to become an engineer. Many years later, I was working as a systems engineer for Harris Corporation, and asked my mentor if I could attend his business strategy presentation to our division president. I was a fly on the wall during the meeting; doing my best to blend in and go unnoticed. The team got into a dynamic discussion and the president turned to me and said, ‘what do you think, Angela?’ That was very empowering to me.”

Today, as Engineering Director at Harris Corporation, Lamb enjoys a career in one of the most innovative industries in the nation, but her story is the exception to the rule. As a country, we’re in trouble. There simply aren’t enough people like Lamb who are choosing to enter a workforce that is vital to the U.S. economy and national security. Whether caused by a lack of resources, information – or empowerment – it’s an urgent national problem in desperate need of a solution.

Building the nation’s 21st century aerospace and defense (A&D) workforce demands immediate action at the national level, and a commitment on the part of federal, state and local governments, industry organizations, and companies of all sizes. The U.S. A&D industry currently enjoys a prominent position in terms of global competitiveness and technical superiority – and plays a vital role in maintaining national security and sustaining U.S. innovation. Yet today the industry faces impending retirements

2016 National Aerospace & Defense Workforce Summit

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and a shortage of trained technical graduates while work and skills requirements become increasingly advanced.

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 A&D industrial base that the United States and its allies count on to provide sustained innovation, economic growth, global competitiveness, and security.

This report summarizes the proceedings of the **2016 National Aerospace and Defense Workforce Summit** held on September 7-8, 2016 in Washington, D.C., where Lamb shared her story and insights alongside leaders from industry, academia, government, and non-government organizations.

Hosted by the Aerospace Industries Association (AIA) and the American Institute of Aeronautics and Astronautics (AIAA), the summit continued a dialogue initiated at a 2008 summit held to address the shortage of STEM workers available for current and future A&D workforce requirements, an issue concerning AIA and AIAA members – both corporate and individual – for decades.

Following the 2006 release of the “Rising Above the Gathering Storm”¹ report by the National Academies of Sciences and Engineering and the Institute of Medicine, industry stakeholders agreed a systemic approach was desperately needed to address STEM workforce issues in the United States. In response, the A&D industry adopted a strategy of collaboration among companies and associations, and across a broad spectrum of stakeholders to achieve maximum impact. This approach led to the first AIA-AIAA workforce summit in 2008.² The 2016 summit was convened to take stock of developments since then and determine a way forward.

Workforce needs and the programs to address them have evolved over the last several decades. In 2006, attention was paid to recruiting enough engineers to replace retiring baby boomers. A decade later, the picture is multi-faceted and more complex. The agenda for the 2016 summit was structured to address multiple areas of interest currently being addressed by AIA and AIAA on an ongoing basis.

Key challenges today include building a workforce with the specific knowledge and skills required for STEM positions; industry’s engagement with government, academia, and others to ensure students receive effective STEM education and skills training; and the industry’s competition with other sectors for the best talent.

Over the course of two days, these and other issues were addressed by nearly 50 leaders who took part in the 2016 summit. They participated in panel discussions, networking events, and presentations covering topics including workforce diversity, the manufacturing skills gap, industry partnerships, global competitiveness, K-12 and higher education, extra-curricular STEM programs to engage youth, mentorship programs, stakeholder collaboration, federal workforce policy issues, and international workforce benchmarking.

Speakers and presenters included members of Congress, White House and executive agency officials, industry representatives, educators, researchers, members of the media, STEM program managers, mentors, and students.

Opening remarks by Dr. Sandra H. Magnus, AIAA Executive Director, and Bob Durbin, AIA Chief Operating Officer, set the stage for nearly 150 summit attendees by highlighting the workforce challenges facing the A&D sector.



“Without action today, we are at risk of leaving our industry and the nation unprepared to meet the defense and technology challenges of the 21st century,” said Durbin. “We must continue our efforts at outreach, education, and recruitment to ensure innovation and raise awareness of the needs and opportunities that exist in a vibrant aerospace and defense sector.”

With the rapid advancement of disruptive technologies and a dynamic political and policy landscape in the U.S., a sense of urgency characterized the 2016 summit. Underscoring the summit’s calls for action were trends and studies that assessed the potential economic impact of a manufacturing worker shortage – and the cost of unrealized opportunities for under-represented minorities in the United States. One key conclusion: A&D companies must compete for scarce manufacturing talent and work to increase the pool of qualified manufacturing and STEM workers from among diverse populations.

The Aviation Week & Space Technology 2016 Aerospace & Defense Workforce Study conducted in collaboration with AIA and AIAA found nearly 27 percent of the nation’s A&D workers are over the age of 55. In 2015, 9.7 percent of industry workers at the largest companies were 62 years of age or older, and the number of workers retiring from A&D companies rose from 2 percent in 2014 to 2.2 percent in 2015. Replacing these workers as they retire is a top industry priority, given a trend that shows the number of retirees increasing over time. Whether hiring replacement workers demanded by a wave of retirements or filling newly emerging STEM positions, the challenge remains the same: preparing a steady, continuous supply of young workers with the right skills, aptitude, and interest to step into jobs that require experienced engineers and skilled technicians for the A&D sector.

Objectives: Strengthen STEM Collaboration, Outreach, and Education

During the 2016 Summit, participants identified top priorities for the industry:

- Improve industry’s messaging and branding to youth and their influencers.
- Identify and analyze specific workforce requirements and identify, or if needed establish, STEM education and training initiatives to address those requirements.
- Collaborate with stakeholders at federal, state, and local levels.
- Take best practices to scale – especially those that can be sustained to address the STEM workforce challenge as a chronic issue.

The A&D industry shares these priorities, and is committed to working with all stakeholders – including the new administration and members of the 115th Congress – to strengthen the U.S. STEM workforce. Addressing the STEM workforce challenge is vital for national security as well as the nation’s economic strength. Today, our employees work at the cutting edge of technology to fulfill higher missions that include defense, space exploration, and research and development. AIA and AIAA members will work with all levels of government and across industry sectors to ensure a prosperous future for American students, workers and the missions they support.

KEY TO ICONS: These programs are valuable for their potential as national models. Accompanying icons highlight specific aspects of these programs that make them a best practice



Scalable



Diversity-focused



Project-based learning



Cost-effective



Perception-changing



Long-Term/Sustainable



Measurable



Collaborative



Focused on A&D

Changing Perceptions: Attracting New Workers to a Vibrant A&D Industry

In addition to an aging population and impending industry retirements, summit participants identified a number of different challenges facing the A&D workforce.

Chief among them was an insufficient workforce representation among diverse communities and under-represented populations. The Aviation Week 2016 Workforce Study found that Asian Americans, African Americans, Native Americans, and Latinos currently represent just 21.1 percent of the A&D workforce, whereas they constitute 37.7 percent of the U.S. population.³ Women currently account for less than 22 percent of the workforce and comprise only 20 percent of the industry's executive ranks.

The industry's appeal to young professionals is also a concern. 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." While salary and benefits remain the most important lures for millennials entering A&D jobs, once on the job their priorities change.

In a 2015 analysis of young professionals, Aviation Week found 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."⁴ The need for growth and change among young professionals was consistently cited as important, yet 25 percent reported never having been promoted. At the 2016 summit, Aviation Week presented updated data that gave the industry reasons for optimism: Engineering graduation rates have increased and the age distribution curve has improved. Concurrently, analysts warned

Objective:

Increase the appeal of careers in the aviation, defense, and space industries to a younger and more diverse population.



attendees against reading too much into reports portraying millennials as more concerned with lifestyle and other intangibles as it relates to careers.

Company representatives at the summit expressed their concern that even the most highly-educated STEM graduates were inadequately prepared in cross-functional skills such as writing, management, and interpersonal communication for manufacturing jobs across industry sectors, including A&D.

Also a concern among A&D employers: Salary competition and a "glamor gap" with Silicon Valley. As stated in AIA's 2016 report, "The Defining Workforce Challenge in U.S. Aerospace & Defense: STEM Education, Training, Recruitment & Retention",⁵ positions in the industry are too often portrayed in popular culture as 'dirty, dull, and dangerous.' "This must change," said the report. "Perhaps one of the greatest industry challenges is to position STEM careers as having a similar cachet as the 'hip' high-tech jobs in Silicon Valley."

Recommendations:

- Focus corporate recruiting and retention outreach and messages on the industry's vital national missions and commitment to innovation.
- Highlight the wages, working conditions, and sector demand for advanced manufacturing jobs – correct outdated perceptions rooted in the 19th and 20th centuries.
- Engage the largest, most diverse pool of workforce minorities, including women, Latinos, and African Americans.
- Address issues involving career advancement, salary levels, and other issues of concern to young STEM professionals, including student debt.



Issues for the Administration and Congress: Policies to Create a Workforce for the 21st Century

Objective:

Advocate for policies that will enhance the supply of STEM-educated workers for the economy and keep the U.S. workforce competitive on a global scale.



Summit participants from the U.S. government included representatives from the Federal Aviation Administration, U.S. Department of Defense, National Oceanic and Atmospheric Administration, and the White House Office of Science and Technology Policy. U.S. Senator Tim Scott (SC) and Congressman Mike Honda (CA-17) provided a legislative perspective.

Across several panels exploring effective policy approaches and education initiatives, resources for schools and students, and access to mentors and vocational training were consistently mentioned. A consensus opinion emerged: STEM education must begin before the fifth grade, and disparities in education quality and access to employment opportunities must be addressed nationwide.

“We must seek equity for all children, because they do not come to school on an equal basis, and a big gap is that schools are not equipped to address their differences,” said Rep. Honda. “We must focus on what each child needs, and focus on pre-school. Most STEM programs begin in fifth grade, but many students are [disengaged] by then.”



Activating senior citizens as mentors was suggested as a way to leverage the expertise among an upcoming wave of STEM retirees.

Panelists also said scholarships, vocational training, paid fellowships, and internships must become part of a national approach. The summit’s policy panelists noted that government agencies compete for STEM workers as well, and highlighted White House and agency programs that offer paid internships, teacher training, and other initiatives aimed at changing STEM culture in schools.

Recommendations:

- Routinely articulate A&D workforce concerns and practices to federal agencies and members of Congress.
- Collaborate with members of Congress and relevant committees to craft legislation that will bolster economic competitiveness and job opportunities in the A&D industry, and encourage education and training programs the industry requires.



Higher Education: Effective Business Partnerships

Objective:

Encourage more students to pursue STEM degrees while actively supporting the retention of students already pursuing a STEM degree.



Where do we stand? Foreign Benchmarking

Armed with compelling statistics from France and the United Kingdom, two summit panelists provided insight regarding the approach taken by their international companies and home governments toward confronting the STEM challenge.

France:

Sonia Dumas, member of the French aerospace association, GIFAS Education Committee and Head of Human Resources for Airbus, said the company recruited 11,000 new employees and trained 6,000 work-study students in 2015. In 2016, Airbus plans to make 10,000 hires and increase its overall headcount. In France, the industry recruits at air shows, organizes job forums, and maintains a website dedicated to A&D career information. Today, there are 9,000 interns at Airbus, alternating every other month between school and an internship with the company. Airbus's financial support for its work-study program increased 50 percent from 2010-2014.

United Kingdom:

Jeegar Kakkad, Chief Economist and Director of Policy of ADS, the U.K. aerospace trade association, said that two-thirds of British aerospace companies have apprentice programs and employ 4,000 apprentices, comprising 3 percent of the A&D workforce.

TAKEAWAYS FOR U.S. COMPANIES:

Overseas companies are aggressively recruiting STEM workforce candidates utilizing a variety of platforms, media, and events to identify and conduct outreach wherever and whenever possible.

University of Washington in St. Louis

The University of Washington, along with St. Louis Community College, the Workforce Solutions Group, and Emerson Center for Engineering & Manufacturing, maintain a joint venture with The Boeing Company (with assistance from the Missouri Division of Workforce Development) that develops and provides a pre-employment training program to create an ongoing pool of employee candidates for Boeing.

Business Higher Education Forum

CEOs of A&D companies including Boeing, Raytheon Company, and Northrop Grumman are members of the Business Higher Education Forum (BHEF), 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." Through its national Higher Education and Workforce Initiative framework, BHEF catalyzes regional market-driven ecosystems in emerging cross-disciplinary fields in partnership with member academic institutions and companies in high-demand industries. BHEF has also teamed with Raytheon and The Ohio State University to develop a system dynamic simulation model to identify the highest leverage points and most effective strategies for increasing the number of STEM graduates.

Advanced Cybersecurity Experience for Students Through a partnership between Northrop Grumman and the University of Maryland, the Advanced Cybersecurity Experience for Students (ACES) is an academic honors program designed to educate the next generation of cybersecurity professionals. In partnership with the BHEF, students in the program interact directly with industry and government mentors, and have the option of interning at Northrop Grumman.

Recommendations:

- Activate company employees for programs and mentorships that foster a stronger connection between academic and business cultures, and teach workplace and communication skills in addition to STEM.
- Develop, through partnerships and technology collaboration, additional tools that measure the effectiveness of academic programs, simulate the impact of education policies and generate insight regarding student choices and STEM degrees.
- Develop new business and academic partnerships for the purpose of developing STEM programs that can be scaled nationally and across industry sectors.

Technical Training: Closing the Skills Gap

Objective:

Provide skills training programs for manufacturing and other technical training for specific A&D workforce needs.



The Connecticut Center for Advanced Technology, Inc. (CCAT)

CCAT is a nonprofit organization that creates and implements STEM education and career development programs through state, regional, and national partnerships.

The Georgia Department of Economic Development

Through its High Demand Career Initiative and other programs, this program focuses on apprenticeships, company visits, and internships.

The A&D Diversification Alliance in Peacetime Transition (ADDAPT)

This program formed in 1991 as a response to significant reductions in defense spending by the federal government. Today, the organization helps New York-area A&D companies recruit and retain STEM talent with grants that help defray high costs-of-living for young professionals in training.

South Carolina Council on Competitiveness (SCCC)

Led by The Boeing Company, SCCC is a non-profit organization committed to advancing long-term economic competitiveness through education and workforce development initiatives. The SCCC maintains a collaboration with the state's aerospace companies through SC Aerospace, an effort to "advance and market South Carolina's aerospace industry cluster on the global stage." The initiative is part of a long-term effort by Boeing to develop the workforce the company requires in order to sustain and grow their business in South Carolina, where nearly 400 aerospace assembly, technical, and mechanical jobs become available each year.

Recommendations:

- Match state and regional skills to workforce needs and develop educational partnerships and technical training to bolster skillsets that would otherwise not exist in sufficient quantities to meet state and regional workforce needs.
- Advocate to industry stakeholders and government policymakers for support that would expand nationally the most successful local regional programs.



Expanding the Workforce: The Importance of Diversity and Inclusion

Objectives:

Include more diverse populations while expanding the pool of potential STEM workers.

Ensure that mentors and other role models have appeal across diverse populations and are drawn from among young professionals.



Lockheed Martin Corporation

Lockheed Martin's Minority Serving Institution diversity recruitment model involves engagement, branding, and recruiting for STEM careers with efforts originating inside the company and across external education, training, and community institutions.

Harris Corporation

Harris's commitment to diversity and inclusion is borne out through 11 employee resource groups, a corporate women's leadership initiative, a formal company-wide executive development program, and robust college recruitment.

U.S. Department of Navy

The Naval Research Enterprise Internship Program (NREIP) provides an opportunity for students to participate in research at a naval laboratory. NREIP encourages participating students to pursue science and engineering careers and builds awareness of naval research and technology efforts. NREIP internships can also lead to employment with the Navy.

National Girls Collaborative Project

Active in 40 states and supported by AIA, the project operates 32 collaborative STEM engagements involving 22,800 organizations serving 16.35 million girls and 8.5 million boys.

“Progress of recent decades has been unimpressive, in spite of meaningful investments and good will, [but] significant progress is eminently possible and predictable when we are results-oriented at the highest practical level of leadership.”

- **Dr. Achille Messac, Dean, Howard University College of Engineering, Architecture and Computer Sciences**

Recommendations:

- Expand paid internships that conduct outreach to women and minorities.
- Ensure workplace training efforts support the advancement of women and minority workers.
- Target communications, marketing, and outreach efforts consistently to diverse groups with compelling messages that are relevant to their career goals and aspirations.
- Devote more resources to scholarships, fellowships, and low-interest student loan programs available to under-represented groups in the A&D workforce.
- Broaden the academic talent pool by increasing the percentage of minority and female STEM students.

State and Local Collaboration: Best Practices and Effective Partnerships

Objective:

Track the best practices and most effective programs implemented at the state and local levels.



AIA/NDIA State STEM Forums

From 2008 through 2014, AIA partnered with the National Defense Industrial Association (NDIA) to hold regional STEM forums in 16 states and the District of Columbia. The events brought together national-level AIA and NDIA workforce development leaders with state and local STEM workforce and education stakeholders. Participants included representatives and advocates from community and business organizations, colleges and universities, regional elected officials, and local STEM program leaders. The forum's goals are to share best practices, expand the

"toolbox" of ideas for engaging communities, advance the discussion of STEM issues and solutions, and commit to collaborative action that will have systemic impact on STEM education and workforce development. AIA, along with other industry associations have partnered with local state governments and aerospace workforce development organizations to organize these meetings.

STEM Forums Since 2008



Indiana STEM Resource Network (I-STEM)

Rolls-Royce is among corporate partners supporting I-STEM, launched after an AIA/NDIA Indiana forum in 2012. I-STEM aligns an education, community, and business network working to implement high academic standards toward STEM literacy for all students in the state.

Recommendations:

- Establish and encourage partnerships at the state level among professional associations, colleges, industry and local governments to enhance STEM.
- Participate in state and regional-level STEM events to identify the potential scalability of programs on a national scale.

Engaging and Inspiring the Next Generation

Objective:
Improve the industry's messaging and branding to young people and their influencers.



GE Foundation

The GE Foundation focuses on STEM initiatives in seven school districts across the country with 1.3 million children, and is also engaged with 70 colleges nationwide. The Foundation places 8,000 college interns every summer and is expanding the program to include high school students.

GE Advertising Campaign

For several years, GE has invested in TV advertising that targets STEM students and diverse groups of tech workers. Featuring ads titled “The Boy Who Beeps,” “Ideas are Scary” and “What My Mom Does at GE,” this campaign sends clear signals to potential recruits that the company understands their career goals and provides the type of workplace that is on par with the innovative and creative environments of Silicon Valley tech firms.

Team America Rocketry Challenge

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 pursue further STEM study and careers, and is a critical piece of the A&D industry's strategy to build a stronger workforce. In 2016, 789 middle and high school teams participated.

CyberPatriot

Reaching 100,000 high school and middle school students, CyberPatriot is an Air Force Association program to inspire students to pursue cybersecurity jobs and other STEM careers. At the center of CyberPatriot is the National Youth Cyber Defense Competition, where teams are tasked with finding cybersecurity vulnerabilities in simulated IT environments.

Stand and Deliver

Raytheon employee mentors in Lawrence, Massachusetts, are engaged in a program called Stand & Deliver. The corporate campus academic mentoring program matches volunteers with under-served middle and high school students to help them prepare for the Massachusetts Comprehensive Assessment System exam and higher education.

Design/Build/Fly (DBF)

The AIAA Foundation DBF competition is a partnership between the AIAA Foundation, Cessna Aircraft Company, and Raytheon Missile Systems. Now in its 21st year, this competition provides full-time college students an opportunity to design and build a radio-controlled aircraft to perform specific missions. In 2016, 145 teams from around the world participated in the competition.

IN THEIR OWN WORDS: Experiences of Young Professionals in STEM Programs

James Lankford, Aerospace Engineering Graduate Student, University of Maryland:

“I grew up looking at rockets in stores. My uncle was a West Point engineer and a retired Kiowa pilot. I wanted to be like him. In elementary school, I read a textbook on fundamental aerodynamics. I liked math, puzzles and science. I was a shy guy, but my math teachers pushed me hard.”

Jacob Cohen, Project Leader, Macedon

Technologies - FIRST Robotics: “I founded my high school robotics team in 2007. We built a robot, and we lost, but I was hooked. I loved robotics. I went to George Mason University and studied computer engineering. Now I work on solving business process problems.”

Recommendations:

- Expand the reach of extracurricular competitions to excite and inspire interest in STEM.
- Support internships, mentorships, and co-ops that nurture interest, expose students to the A&D industry, and create access to educational and career opportunities.

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PROGRESS AND SUCCESSES

Despite numerous challenges facing the A&D industry as it works to strengthen the STEM workforce, summit participants noted several areas of progress, including:

- The A&D industry has established itself as a learning industry.
- The industry has maintained experience levels to enhance productivity.
- Engineering graduation rates have steadily increased.
- The age distribution curve among STEM professionals is improving.
- In the words of Aviation Week analysts, the industry is “keeping its finger on the pulse” of what drives the career decisions of graduates, young professionals, and diverse populations.

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CONCLUSION:

Charting the Way Forward for America's STEM Workforce

Many presentations and discussions during the 2016 National Aerospace & Defense Workforce Summit served to reinforce goals set forth by both AIA and AIAA for ongoing STEM education and workforce development in the United States. Revised to reflect summit input, these goals include:

- **Enact STEM-focused national policies.**

Support policies that will increase the number of STEM-educated workers in the United States and keep the workforce competitive on a global scale. Both the Perkins Career and Technical Education Act and the America COMPETES Act have helped advance workforce development in our industry and should be reauthorized. Also, Congress should pass legislation that encourages the retention of foreign professional STEM workers in U.S. industry.

- **Diversify mentoring.**

A sustained effort must be made to increase student and graduate exposure to mentors, role models, and sources of inspiration in the A&D industry. The industry must ensure that mentors and other role models have appeal across diverse populations and are drawn from among young professionals. This effort must be driven by corporate leadership and highlight multiple disciplines across technologies.

- **Generate additional data to gain more insight.**

Despite ongoing research by *Aviation Week*, 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 demonstrate ways in which the STEM workplace is evolving to match the personal and professional goals of young professionals. 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 A&D companies already offer these opportunities, perceptions have not caught up to reality.

- **Market the A&D industry.**

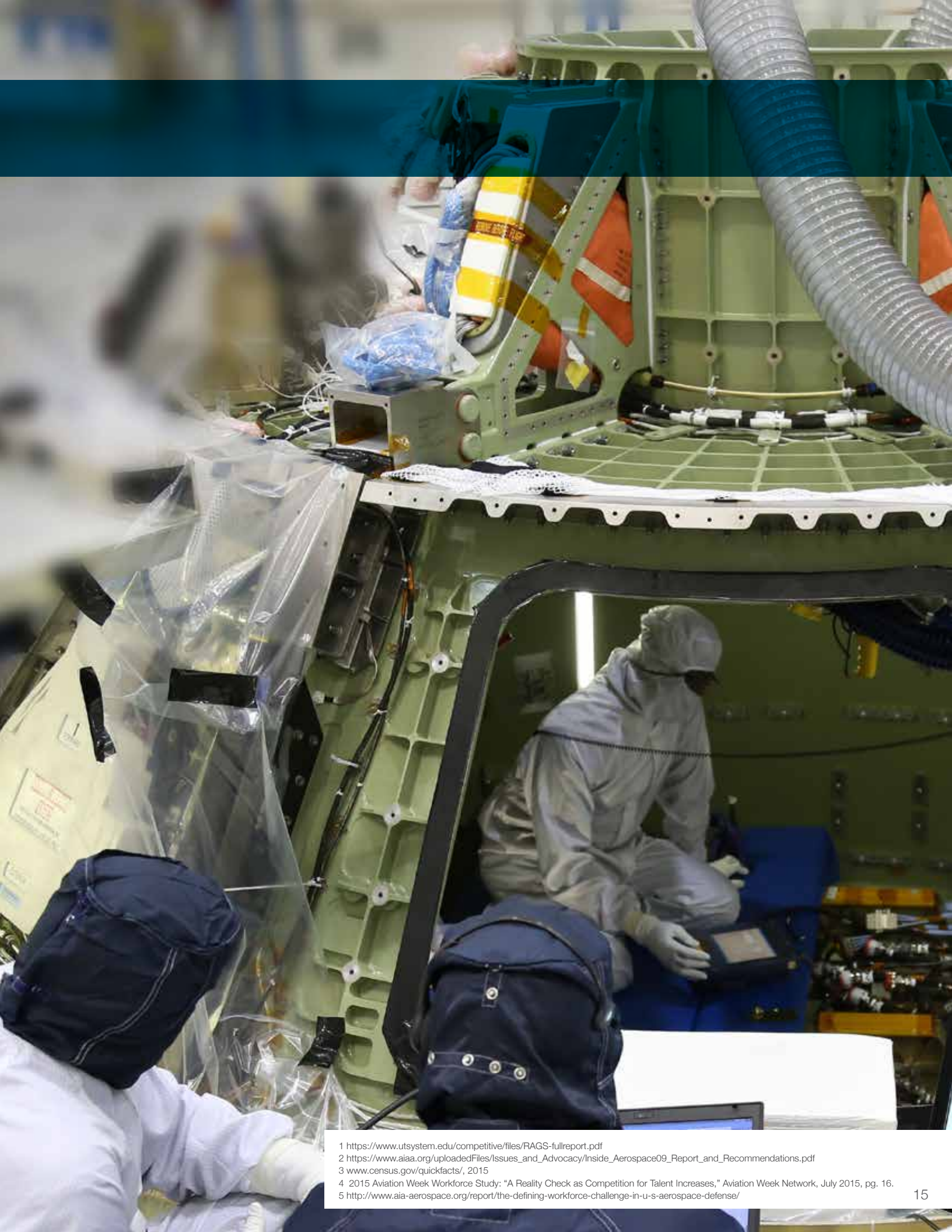
Recruiting and retention messages must dispel misperceptions about the A&D industry and market to STEM graduates and young professionals who might otherwise gravitate toward jobs in Silicon Valley. Although A&D program lifecycles might be longer than those in Silicon Valley, the level of innovation – and rewards – are just as great. This message must reach potential STEM recruits beginning in grade school – before age 12. It is also a message that must be heard by their parents, teachers, counselors, and mentors. Sustained communications and outreach is required.

- **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, efficiently utilize resources, and measure the return on investment of STEM-related initiatives.

2016 summit participants can make a significant difference through advocacy and action to overcome our industry's workforce challenges. Individually, the organizations represented are likely – at best – to affect incremental change. The benefit of the forum was to raise awareness of the broad spectrum of specific issues and learn best practices that can positively inspire the students of today who will make up the future generation of trailblazing engineers and scientists.

Looking forward, only ongoing dialogue, commitment, and support at the highest levels of the public and private sectors can ensure that the issue of STEM workforce development remains a top priority for the industry and the nation.



1 <https://www.utsystem.edu/competitive/files/RAGS-fullreport.pdf>

2 https://www.aiaa.org/uploadedFiles/Issues_and_Advocacy/Inside_Aerospace09_Report_and_Recommendations.pdf

3 www.census.gov/quickfacts/, 2015

4 2015 Aviation Week Workforce Study: "A Reality Check as Competition for Talent Increases," Aviation Week Network, July 2015, pg. 16.

5 <http://www.aia-aerospace.org/report/the-defining-workforce-challenge-in-u-s-aerospace-defense/>

2016 National Aerospace & Defense Workforce Summit:

Collaborating to Inspire and Build the Aerospace Workforce of Tomorrow

Capital Hilton Hotel • Washington, D.C. • September 7-8, 2016

Wednesday, September 7

8:00 Welcome and Opening Remarks

Dr. Sandra Magnus, Executive Director,
American Institute of Aeronautics and Astronautics

8:15 Issues and Trends: Results of the 2016 Aerospace & Defense Workforce Survey

Carole Hedden, Executive Editorial Director, Aviation Week
Executive Intelligence

8:45 Workforce Challenges in Aerospace & Defense – Company Perspectives

Moderator:

Carole Hedden, Executive Editorial Director, Aviation Week
Executive Intelligence

Panelists:

Jeff Wilcox, Vice President for Engineering and Program
Operations, Lockheed Martin; and chair of AIA Technical
Operations Council

Ralph DeNino, Vice President, Procurement, L-3
Communications; and chair of AIA Supplier Management
Council

Brett Cohen, Vice President, Human Resources and
Employee Development, Elbit Systems of America; and vice
chair of AIA Workforce Policy Council

10:15 Industry Partnerships with Higher Education

Moderator:

Brian Fitzgerald, CEO, Business-Higher Education Forum

Panelists:

Christopher C. Valentino, Director of Strategy & Technical
Fellow, Cyber & Intelligence Mission Solutions Division,
Northrop Grumman Mission Systems

Matthew Daniels, Senior Manager – Education Relations, The
Boeing Company, Defense, Space & Security

Richard Celeste, co-chair of the National Academy of
Sciences Committee that produced “Promising Practices for
Strengthening the Regional STEM Workforce Development
Ecosystem,” former Governor of Ohio and former president
of Colorado College

11:15 The Skills Gap: Providing Qualified Manufacturing & Other Technical Labor

Moderator:

Dr. Samantha Magill, External Affairs and Diversity &
Inclusion, Honda Aircraft Company

Panelists:

Jamie Moore, President, Manufacturing Consortium of Long
Island; and President, ADDAPT New York

Deborah Cameron, Director of Aerospace Initiatives, SC
Competes

Amy Hudnall, Director – Center of Innovation for Aerospace,
Georgia Department of Economic Development

Susan Palisano, Director of Education and Workforce,
Connecticut Center for Advanced Technology

12:15 Luncheon Keynote: Ensuring a Robust, Innovative and Globally Competitive Aerospace & Defense Workforce

Dr. Reginald Brothers, Under Secretary for Science and
Technology Directorate, Department of Homeland Security

1:30 K-12 STEM Education: How Can Industry Better Engage With School Systems? Lessons from Successful Programs

Moderator:

Dr. Supriya Banerjee, Director, FAMES

Panelists:

Dr. Rex Bolinger, Senior Vice President and Chief
Partnerships Officer, Project Lead the Way

Marcus Lingenfelter, Vice President, State and Federal
Programs, National Math & Science Initiative

Cindy Hasselbring, Senior Director, High School Aviation
Initiative, Aircraft Owners & Pilots Association; and former
Einstein Fellow

Paul A. Wiedorn, Teacher, Wild Lake High School, Severna
Park, MD; 2013 AIAA Foundation Educator Achievement
Award recipient

2:30 Expanding Diversity and Inclusion in the Aerospace & Defense Workforce

Moderator:

Dr. Hsiao-hua Burke, Principal Staff of Air, Missile and
Maritime Defense Technology Division, MIT Lincoln Lab; and
AIAA Diversity Working Group

Panelists:

LCDR Dr. Leedjia Svec, USN; Military Program Director at
NASA Ames Research Center

Dr. Achille Messac, Dean, College of Engineering and
Architecture, Howard University

Angela Lamb, Engineering Director, Harris Corporation

Stephanie Turner, Director of Corporate Diversity & Inclusion,
Lockheed Martin

Erin Hogeboom, Community Development and Network
Strategy Manager, National Girls Collaborative

3:45 Engaging and Inspiring the Next Generation

Moderator:

Mary Snitch, Senior Staff, Industry Organizations, Lockheed
Martin Space Systems Company

Panelists:

Jay Bennett, Vice President, Human Resources Operations,
Sikorsky Aircraft Corporation

Pamela M. Erickson, Vice President, Corporate Affairs,
Raytheon Corporation

Brigadier General Bernie Skoch (USAF, Ret.), Commissioner
of CyberPatriot, Air Force Association

Kelli Wells, Executive Director, Education and Skills, GE
Foundation

4:45 Experiences of Young Professionals Who Participated in STEM Programs

Moderator:

Michelle Lucas, Founder & President, Higher Orbits

Panelists:

Caleb Boe, Aerospace Structures Design Engineer, Aurora Flight Sciences Corporation – Team America Rocketry Challenge

Jacob Cohen, Project Leader, Macedon Technologies – FIRST Robotics

James Lankford, Aerospace Engineering student, University of Maryland – Achievement Awards for College Scientists (ARCS) Scholar

Michael Williams, Systems Engineer, Vencore, Inc. – Design/Build/Fly

5:30 Networking Reception with STEM students and their displays

Thursday, September 8

8:00 Welcome and Opening Remarks

Robert Durbin, Chief Operating Officer, Aerospace Industries Association

8:15 Stakeholder Collaboration at the State and Local Levels

Moderator:

Peter Larson, Senior Manager, Development Engineering Staffing,

Boeing Defense, Space & Security, The Boeing Company; and chair of AIA STEM Workforce Working Group

Panelists:

Patrick D'Amelio, CEO, Washington STEM

Dr. Tamara L. Goetz, Executive Director, Utah STEM Action Center

Aimee Kennedy, Vice President for Education, STEM Learning and Philanthropy; Battelle

Lisa Teague, Head, Research & Technology, Rolls-Royce Indianapolis

9:15 Legislative Priorities in STEM Education and Workforce Development for the Next Congress

Moderator:

Stacey Dion, Vice President for Corporate Public Policy, The Boeing Company

Panelists:

Senator Tim Scott (SC)

Congressman Mike Honda (CA-17)

10:30 Policy Issues for the Executive Branch

Moderator:

Rusty Rentsch, Assistant Vice President, Technical Operations and Workforce, Aerospace Industries Association

Panelists:

James Brough, National STEM Aviation and Space Education Program Manager, Federal Aviation Administration

Danielle Ellis, Acting Director HR Strategic Programs and Advisory Services, Defense Civilian Personnel Advisory Service (DCPAS), Department of Defense

Ruthe Farmer, Senior Policy Advisor for Tech Inclusion, Office of Science & Technology Policy

Dr. Marlene Kaplan, Deputy Director of Education and Director of Educational Partnership Program, National Oceanographic and Atmospheric Administration

11:30 Benchmarking with Foreign Aerospace Industry Associations

Moderator:

Robin Thurman, Director, Workforce, Aerospace Industries Association

Panelists:

Brett Cohen, Vice President, Human Resources and Employee Development, Elbit Systems of America; and vice chair of AIA Workforce Policy Council

Sonia Dumas, Head of People Resourcing, Airbus, and chair of GIFAS Workforce Commission

Jeegar Kakkad, Chief Economist and Director of Policy, ADS

12:30 Summit concludes



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180 Skills – Great Education for Real Careers. 180 Skills is an online career and technical education experience that fills the skills gap and gets the job done. We make and deliver technical education that helps people get great careers in the shortest amount of time at the lowest possible expense.

Competency-based Education. 180 Skills is the only competency-based skills education company for the advanced manufacturing industry. Our Career Programs include the exact number of competency-based Skills Courses needed to start a great career. Nothing more and nothing less.

Competency-based education means failure is a thing of the past. In a competency-based program students continue until they demonstrate competency. Every student gets the time they need to achieve skills mastery. For 180 Skills, technical education is about mastery of skills, not time spent in a classroom.

The 180 Education Experience. Each of our courses is hand-crafted to deliver an education experience like no other. There's no video, no PowerPoint, and no passive reading or listening that others call online learning. We take the time to create photorealistic illustrations, animations and simulations that immerse students in the subject. Our goal is to make every student an evangelist for online education.

The 180 Skills Library. The 180 Skills library contains over 650 competency-based Skills Courses in 22 topic areas. Skills Courses can be organized to align perfectly with individual, organizational, and market-driven career and employment opportunities. We also offer 15 Career Programs aligned with real, in-demand jobs defined by our Employer Partners.

Low-cost, High-value. The average cost of our Career Programs is less than \$2,500. Low-cost, pay-as-you-go pricing helps students control the cost of their education. Over the past six years, students have maintained a 90% graduation and placement rate.

Street to a Career in 12 Weeks. That's right. 12 weeks. 90 days. Three months. Our competency-based learning model gets the student from the street to a career fast. All of our Career Programs can be completed in 12 weeks or less.

Industry and Academic Alignment. All of our courses are created with industry and academic input. Our industry partners define the competencies and our academic partners ensure the content meets academic standards. This ensures the course fills the skills gap and gets the job done.

Nationally-Recognized Certification. 180 Skills and SpaceTEC have teamed together to offer 12 industry-defined certification exams.



Lockheed Martin Initiatives on STEM and Workforce Development. Meeting the Challenge.

- As a generation of scientists, engineers and mathematicians retire, young people are not sufficiently replacing these important technology positions.
- To remain competitive, the United States must recognize this gap and emphasize the importance of Science, Technology, Engineering, and Mathematics (STEM). Lockheed Martin also must inspire students to pursue these disciplines, which are critical to our national security and economic strength.
- Success depends on collaboration among industry, educators, policy makers and families. As an industry leader, LM is committed to working with these groups to develop programs that educate and inspire tomorrow's scientists, engineers and mathematicians.
- In 2015, LM corporate-wide contributed more than \$13 million to support education initiatives with a strong emphasis on STEM education. We are committed to supporting programs, events and campaigns that focus on student achievement, teacher development, and gender and ethnic diversity.
- Through LM's more than 56,000-strong engineering and technical workforce, our approach to STEM outreach includes non-profit and school partnerships that provide unique opportunities for our engineers to build one-on-one relationships with students as role models and mentors. We also partner with teachers to further STEM education curricula.
- LM is especially proud of Engineers in the Classroom www.classroomengineers.org, our K-12 STEM education outreach initiative, including programs like FIRST Robotics, Team America Rocketry Challenge, 4-H Robotics Clubs, and Project Lead The Way. Each of these programs enables LM engineers to work directly with students.
- LM supports numerous non-profits reaching students through a variety of avenues where they could potentially be inspired to pursue a STEM field – in school, at after school clubs and through edutainment sources.
- Project Lead The Way – LM is helping to expand their rigorous STEM education curricular programs in middle and high schools. Through this program, LM partners our engineers with schools, directly engaging with students to provide a role model and context on how engineers solve complex challenges.
- National Geographic – LM helps fund the creation of movies and associated multimedia content that are designed to engage teachers and inspire students to learn more about STEM subjects. LM's support of National Geographic also funds teacher and student STEM activity resources available on-line for free download at www.classroomengineers.org.
- 4-H – LM funds comprehensive robotics program to inspire young people and develop an early interest in engineering and technology.
- FIRST Robotics – LM supports FIRST Robotics through a mentor stipend program available to LM employee engineers. LM's various business areas support and underwrite the cost of regional competitions.
- Girls Inc. – Corporate-wide LM has a "Creating the Future" partnership with Girls Inc, sharing STEM opportunities and programs with Middle School Girls and the Girls Inc. Eureka High School programming.
- Learning for Life Exploring Posts – LM supports Aerospace Exploring Posts open to Denver-area High School Students, providing students with an opportunity to learn about different engineering principles first-hand from students.
- AIAA Foundation – LM is the largest corporate sponsor of the AIAA Foundation. This support helps provide scholarships to outstanding STEM-focused students in grades K-12 through higher education at schools across the United States.



SPONSORS - GOLD



At Boeing, we are deeply committed to preparing our future innovators and supporting the development of our talented employees.

Boeing is looking ahead to our next century with the 100 Days of Learning program – an engaging collection of free, hands on educational tools designed to strengthen students' understanding of how STEM skills can help solve real-world problems.

Additionally, we are rocketing into our second century with AIA in support of The Team America Rocketry Challenge, the world's largest student rocket contest.

Boeing partners with educational institutions across the country, from pre-K through post-secondary, to ensure that students develop the globally competitive 21st century skills they will require to be successful in tomorrow's economy.

Our commitment doesn't stop at graduation. Boeing offers many career development tools and resources, like our Learning Together tuition assistance program that has paid out more than \$1 billion to date.

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SPONSORS - MEDIA



Aviation Week Network launched its efforts to provide scope and definition to the aerospace and defense industry in 1997, working with industry leaders to ensure an appropriate workforce was in place to meet emerging and future needs. Since then, Aviation Week has worked with industry associations and leaders, as well as government agencies, to develop a single and credible source of workforce data, from retirements and demographics to job forecasts.

As part of Aviation Week's Centennial of Flight celebration, a curriculum for elementary and middle school classroom was developed and delivered to science and math teachers across the nation. LiftOff! provided hands on experiments and reference, with Neil DeGrasse Tyson serving as the presenter.

In 2009 Aviation Week expanded its STEM efforts to include a survey of young professionals. This work is designed to determine factors that most affect career decisions, but along the way unearthed student loan problems (as early as 2010), a pipeline of future talent that needs more diversity, and an age distribution that proves U.S. companies are managing the aging of the workforce in fairly sound shape. Aviation Week also conducts a survey of engineering students from universities around the globe identified as the "preferred suppliers" of A&D engineers to determine their interest in the industry for a career, but also to gauge what drives their education and career decisions.

Aviation Week also conducts a university outreach program in partnership with the Wings Club, designed to touch STEM students early in their college careers through face-to-face meetings with executives, access to Aviation Week & Space Technology as an information and curriculum resource, and in special content designed for Future Leaders. The 20Twenties initiative, developed in association with AIAA, honors 20 bachelors or masters students per year who have demonstrated the highest caliber of leadership in the classroom, the community and in the research and projects undertaken.

DESIGN/BUILD/FLY COMPETITION



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