Shaping the Department of Defense Engineering Workforce

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Organic Engineering Workforce Importance

A competent organic engineering workforce across the Defense ecosystem is needed:

- **To retain United States' technological superiority over our adversaries**
- **To identify and mitigate program risks**
- **To efficiently and effectively engineer and deliver complex, flexible systems to our warfighters that adapt and are resilient to evolving missions and threats**

DoD and Industry collaboration is crucial to proactively manage organic engineering capability and competence

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DoD R&E Ecosystem

Engaging with all partners to ensure technological superiority

Win today's fight

Design and acquire for the next fight

R&E Ecosystem

Global Partners

Academia and Industry Partners

FFRDCs and UARCs

DoD Laboratories, Engineering and Warfare Centers

Force acceleration of science and engineering – driving ideas to capability

FFRDC Federally Funded R&D Center
UARC University Affiliated Research Center

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Our Common Challenge

"Right now…there is a sufficiency of engineers, but one of our greatest industrial organizations, after careful study, predicts the entire absorption of this group by the end of 1936, with a probable shortage of available engineers at that time."

— Collins P. Bliss, dean of New York University's College of Engineering, **1934**

"With mounting demands for scientists both for teaching and for research, we will enter the postwar period with a serious deficit in our trained scientific personnel."

— Vannevar Bush, director of the U.S. Office of Scientific Research and Development, **1945**

"Our national welfare, our defense, our standard of living could all be jeopardized by the mismanagement of this supply and demand problem in the field of trained creative intelligence."

— James Killian, president of MIT, **1954**

"From 1972 through 1975, the expected demand for engineers will exceed not only the supply coming from American engineering schools, but also the combined supply from the United States and foreign countries, according to the [Engineering Manpower Commission] estimates."

— John W. Graham Jr., president of Clarkson College of Technology, **1970**

"The electronics and information technology industries will be short more than 100,000 electrical and computer science engineers over the next five years."

— American Electronics Association, **1983**

"Already spot shortages exist in some science fields in the United States, and unless dramatic changes are made in the way we educate all of our students, including our most talented, the shortages will increase."

— U.S. Office of Educational Research and Improvement, **1993**

"U.S. companies face a severe shortfall of scientists and engineers with expertise to develop the next generation of breakthroughs."

— Bill Gates, chairman of Microsoft, **2008**

"There is a skills gap in this country—for every unemployed person in the United States, there are two STEM job postings. The gap will only widen if we don't engage now to address STEM education at the elementary and high school levels."

— Richard K. Templeton, chairman, president, and CEO of Texas Instruments, **2013**

Our STEM workforce challenge isn't a recent phenomenon, but can be traced back decades

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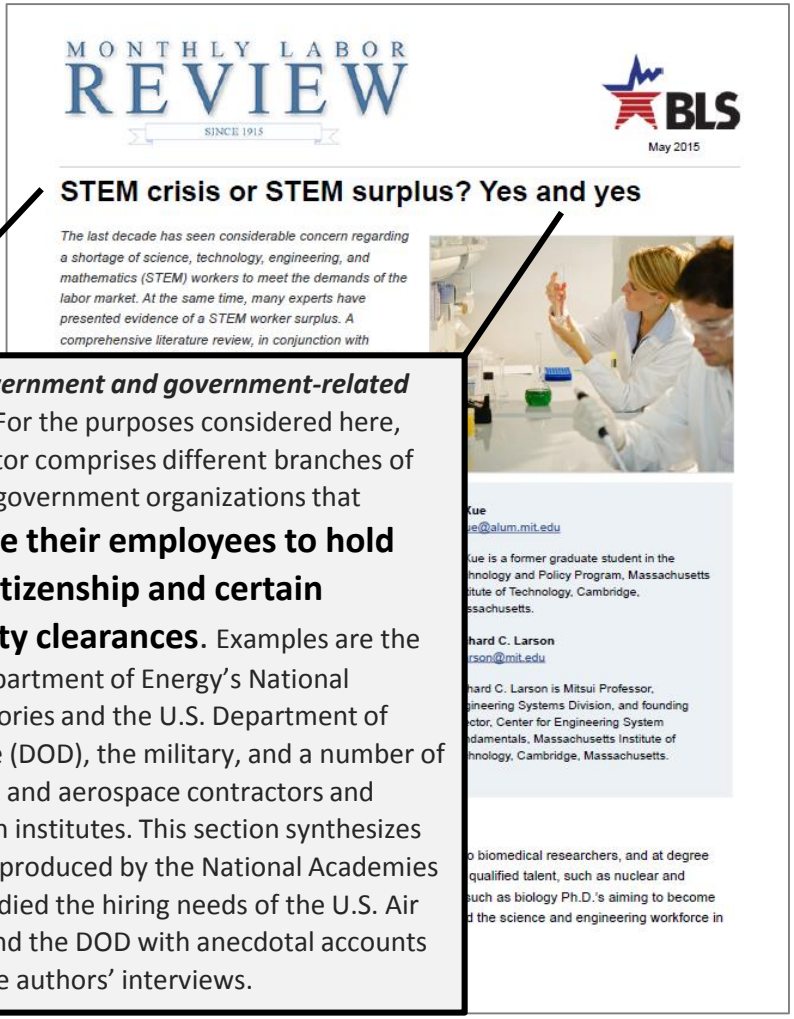
Our Common Challenge

In the May 2015 *Bureau of Labor Statistics (BLS)* study "STEM crisis or STEM surplus? Yes and yes," the government and government-related sector were grouped together because of their common need for "employees to hold U.S. citizenship and certain security clearances."


MONTHLY LABOR REVIEW
SINCE 1915
BLS
May 2015
STEM crisis or STEM surplus? Yes and yes
The last decade has seen considerable concern regarding a shortage of science, technology, engineering, and mathematics (STEM) workers to meet the demands of the labor market. At the same time, many experts have presented evidence of a STEM worker surplus. A comprehensive literature review, in conjunction with

The government and government-related sector. For the purposes considered here, this sector comprises different branches of civilian government organizations that **require their employees to hold U.S. citizenship and certain security clearances**. Examples are the U.S. Department of Energy's National Laboratories and the U.S. Department of Defense (DOD), the military, and a number of defense and aerospace contractors and research institutes. This section synthesizes reports produced by the National Academies that studied the hiring needs of the U.S. Air Force and the DOD with anecdotal accounts from the authors' interviews.

Our "different" workforces come from the same pool of clearable talent

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BLS Identified STEM Shortages

- **Shortages realized in specific areas within the Government and Government-related sector**
  - Systems Engineering
  - Cybersecurity
  - Material Science
  - Nuclear Engineering
- **Deficits observed for clearable candidates due to**
  - U.S. citizenship requirement
  - Early legal infractions making potential candidates un-clearable

We are working to mitigate gaps but can do a lot more with your partnership

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DoD Organic Engineering Talent Management

- **DASD(SE) promotes organic engineering talent management discussions on current workforce challenges and cross-cutting initiatives**
  - First meeting held 29 November 2016, where Services identified the following common skill / competency gaps:
    - Systems Engineering
    - Cybersecurity
    - Digital Engineering
- **Services continue to assess their needs / gaps; Progress to date will be reported at next meeting in November 2017**

OSD can advocate/support mitigations at the enterprise level

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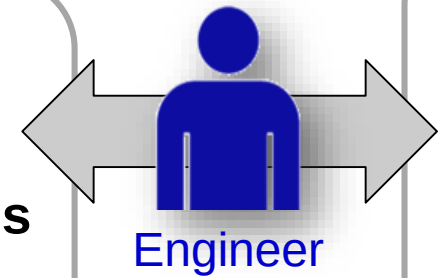
Technical Edge Project

Technical Edge

New or Emerging Technologies

Advanced Techniques

Novel Approaches



DoD systems to maintain technological superiority and military advantage

- Identify emerging technologies, techniques, approaches
- Determine engineering skills and competence needed to implement the "Technical Edge"
- Assess whether DoD has appropriate expertise
- Identify how to educate/train our engineers to fill expertise needs and avoid gaps

One of our challenges is keeping the workforce fluent in the latest advances

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Emerging Technologies

Top Technologies Identified Through Tech Edge Project
Autonomy – human machine interface
Robotics
Cybersecurity – system security
Cybersecurity – assessment
Alternative Fuels / Energy Storage
Directed Energy Weapons
Trusted Circuits
Model-Based Systems Engineering
Inertial Navigation Systems
Lightweight Materials

How do we ensure our workforce has competence in these technical areas?

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Our Common Future

- **Opportunity exists to investigate and address shared workforce challenges**
- **Currently engaging with Aerospace Industries Association (AIA) in a Workforce Roundtable and would benefit from National Defense Industrial Association (NDIA) participation**
- **Through a broader collaboration base, we can identify common key talent gaps and devise solutions that benefit the overall Defense ecosystem**

Take advantage of the opportunity to improve talent management

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Systems Engineering: Critical to Defense Acquisition










Defense Innovation Marketplace
http://www.defenseinnovationmarketplace.mil

DASD, Systems Engineering
http://www.acq.osd.mil/se

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For Additional Information

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