Aerospace and Defense Sector
Technological Challenges

Material Science

Fundamental research to advance design and energetic materials for performance and efficiency

Manufacturing and Fabrication

Fundamental research to advance technologies, techniques, and procedures for speed and accuracy

Standard Missile
Guidance & Navigation
Control Systems
Structural Materials
*Micro Sensors*
Propulsion

Multidisciplinary STEM disciplines

Precision Sensors

National connectivity with zero trust to drive reliable and hardened, embedded systems

Power Conversion/Storage

Research and development on energy usage, transfer, and transformation of sources and storage
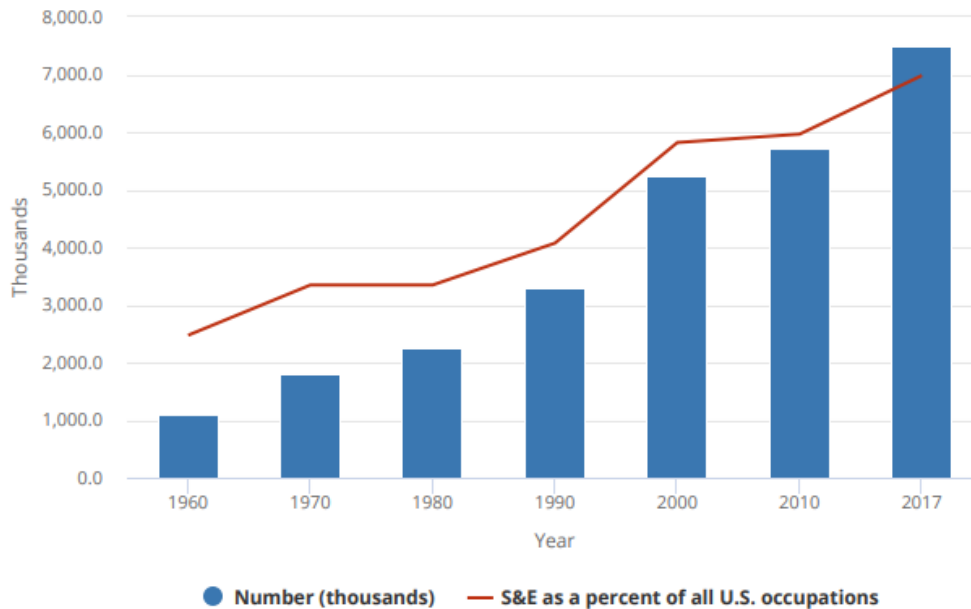
Aircraft Engine
Propulsion
Control Systems
Structural Materials
Micro Sensors
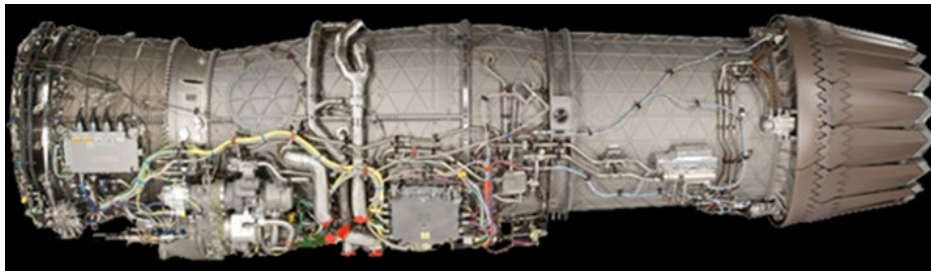
Multidisciplinary STEM disciplines

Cryptography/Cyber Security
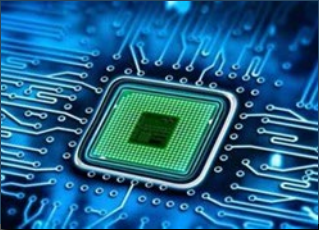
Workforce Challenges

Individuals employed in S&E occupations in the United States: Selected years, 1960–2017


Source: Census Bureau, 1960–2000

- Multidisciplinary skillsets required to design and build complex systems

- Complexity in research problems and solutions is increasing – "System-of-Systems Engineering" is the new fundamental application level

- Expanding research & production globalization threatens US leadership capability

- Workforce supply in scientific and engineering (S&E) fields is not meeting demand across industrial sectors

- Pace of global research and technological advances is accelerating; rapid US response is necessary

- Operating in a digital ecosystem is essential for speed and accuracy in design and manufacturing

- A strong US economic engine depends on a secure & healthy industrial base in materials and workforce

Urgent Actions
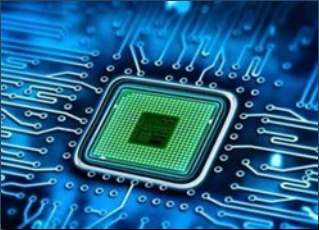
Growth rate of employed adults in the United States, by workforce and degree level: 2010-2019
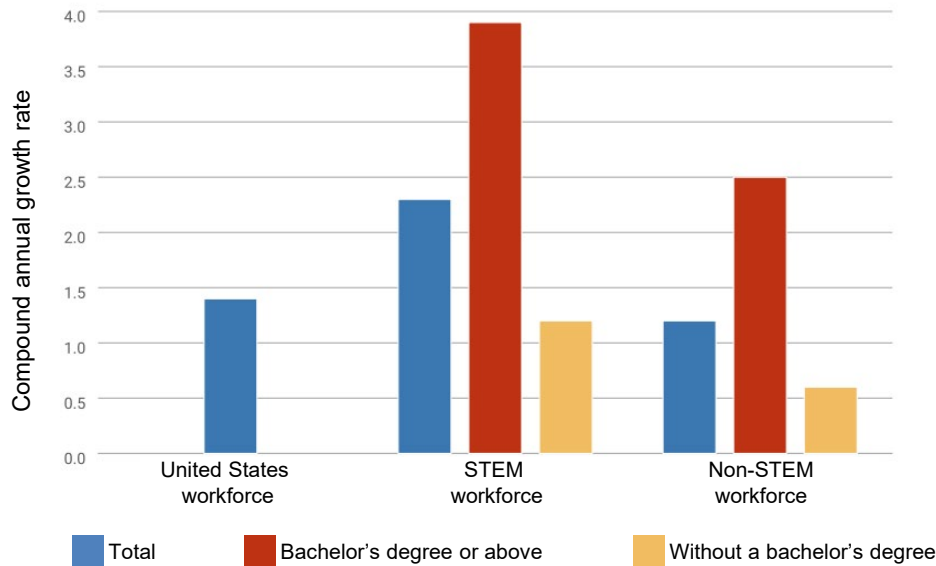
Source: National Science Board

- Develop the future workforce *today* to expand our industrial base capabilities across sectors

- *Triangulate* between academia, industry, & federal government to enable fundamental research to maintain growth alongside applied industrial research – Translational Activities

- All solutions, from education to advanced manufacturing, *must scale* to meet market demand

- Businesses should invest in *workplace learning programs* – such as apprenticeships and internships

- Create *more interaction* between academia & experienced practitioners

- Train scientists & engineers in a *multidisciplinary* approach and include *application* experience

- Address challenges associated with security clearances and Intellectual Property

- Provide *comprehensive* STEM education preK-12 to advanced degrees & include skilled technical workforce

- **Continue driving for *full appropriations* for all elements of the Act, particularly the *Science* portion**