Science & Engineering Indicators

STEM Education Data Resource
+
Revisiting the STEM Workforce

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National Science Board Office

February 22, 2016

National Science Board

Founded in 1950 as part of NSF Act

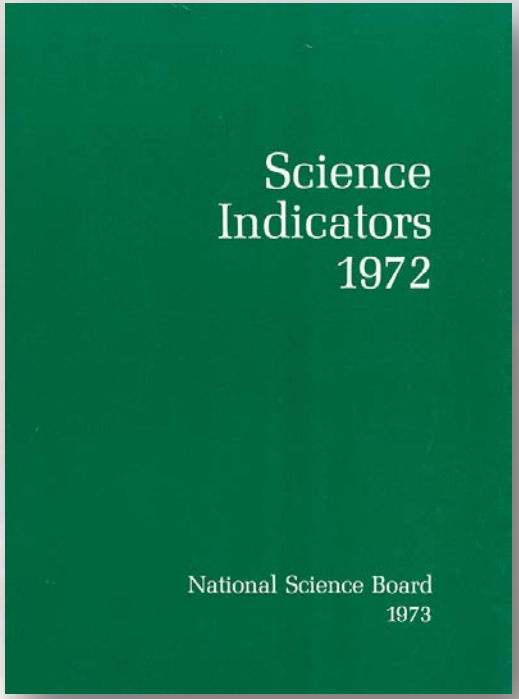
24 Members + NSF Director

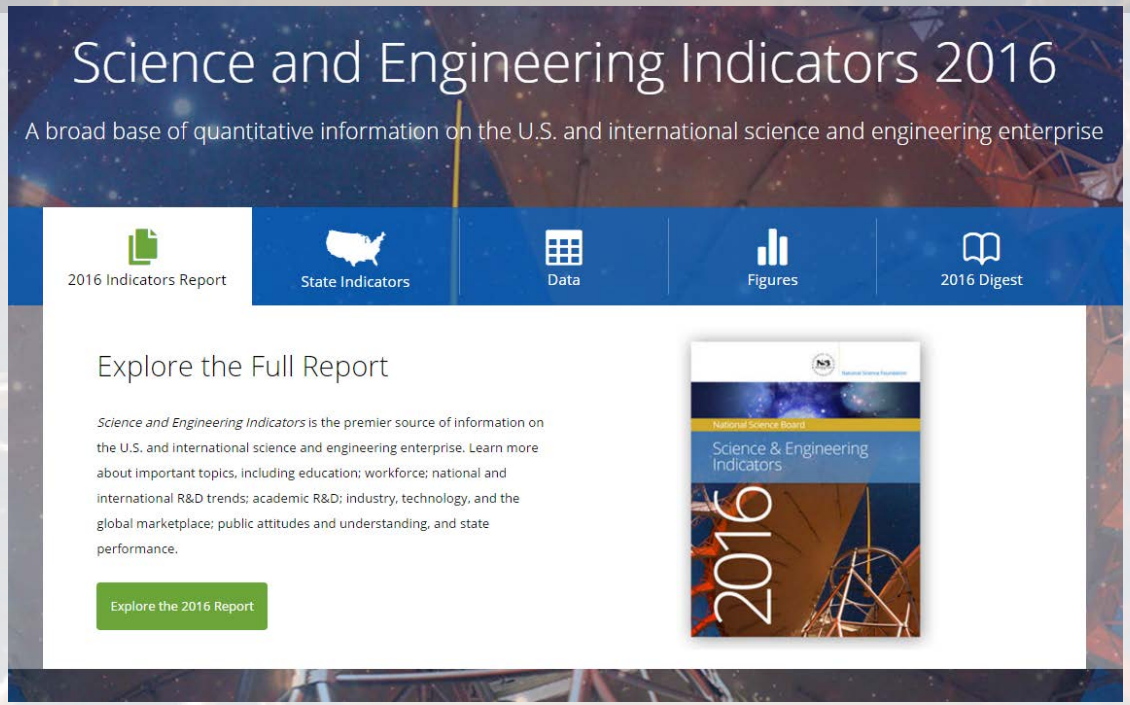
Policy making body for NSF

- Develops a long-term vision for NSF
- Establishes NSF policies
- Identifies issues that are critical to NSF's mission

Serves as a body of advisors to the President and Congress on broad, national policy issues related to science and engineering

Science & Engineering Indicators





- Biennial report on the state of S&E in the U.S.
- Required by law; delivered to the President and Congress
- Factual and policy neutral
- Drawn from a wide variety of high quality data sources

Indicators Ecosystem

Making The Report More Useful

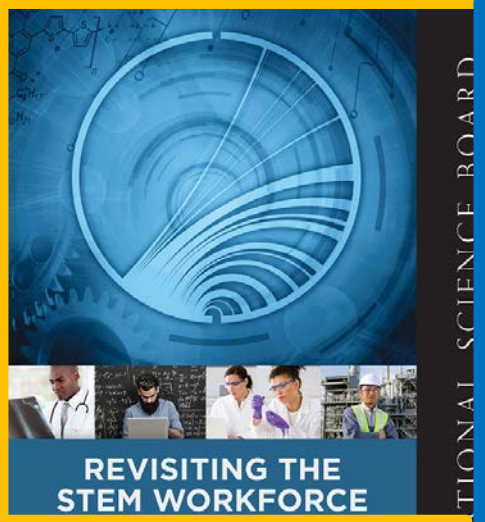
How do U.S. students score in math and science in 4th grade?

STEM Education Data

Welcome to the STEM Education Resource website, where you can discover the answers to important quest
on science, technology, engineering, and mathematics (STEM) education and careers using the information
the National Science Board's *Science and Engineering Indicators* report.

Explore these questions through interactive charts and maps that focus on different topics across all levels
education and the STEM workforce.

Explore The Data



REVISITING THE STEM WORKFORCE

NATIONAL SCIENCE BOARD

HOME SCIENCE AND ENGINEERING INDICATORS COMPANION BRIEFS OTHER PRODUCTS ABOUT NSB AND NSF

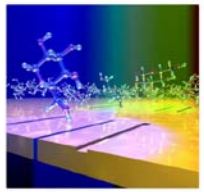
Higher Education as a Public and Private Good

Universities and colleges are key societal institutions that shape our Nation. Among their many contributions to the public and private good, they serve our country by:

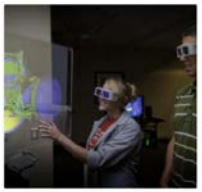
- Discovering and disseminating new knowledge through science and technology research
- Developing an educated citizenry with science, technology, engineering, and mathematics (STEM) capabilities

Over a century ago, the United States forged a modern system of higher education. It combined the idea of the research university – dedicated to creating new knowledge in all fields – with commitments to engage students in both classical and practical studies and make higher education available to a much wider swath of the nation. In the past 154 years, legislation ranging from the Morrill Acts of 1862 and 1890 to the GI Bill of 1944 has made widespread access to higher education a reality. Since the 1940s, the federal government, through the Health Service Act of 1944, the NSF Act of 1950, and the National Foundation of the Arts and Humanities Act of 1965 has reinforced that the research mission of our colleges and universities is a public good. Our colleges and universities' innovative combination of research, practical education, and accessibility coupled with the commitment of public resources to achieve these ends, have made the U.S. system of higher education a model for the world.

Today, the pursuit of new knowledge and access to higher education matter as much as ever to individual and national prosperity. Yet data indicate that U.S. higher education institutions' ability to support research and provide access to a high quality education is at risk, in part because our Nation's commitment to public investment in higher education is wavering. Federal support for R&D conducted at colleges and universities has declined, and long term federal budget challenges loom. Likewise, tuition costs have increased for both private and public higher education institutions. This trend is particularly acute for public colleges and universities, which face significant declines in state support while experiencing increased enrollment and expenditures. These developments are eroding our research enterprise and putting the education needed to thrive in a knowledge-intensive global economy out of reach for many Americans.



Innovation through



Human Capital Development

Challenges and Pressures

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Science & Engineering Indicators

2016 DIGEST

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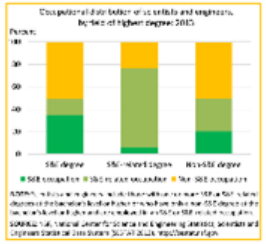
STEM EDUCATION AND THE WORKFORCE

PATHWAYS, NOT PIPELINES

WHAT TYPES OF JOBS DO STEM DEGREE HOLDERS HAVE?

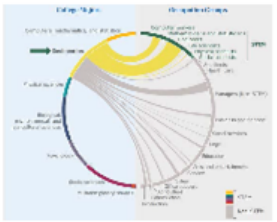
STEM (science, technology, engineering, and mathematics) knowledge and skills enable individuals to follow career pathways to many jobs, not just those traditionally defined as STEM occupations (science and engineering).

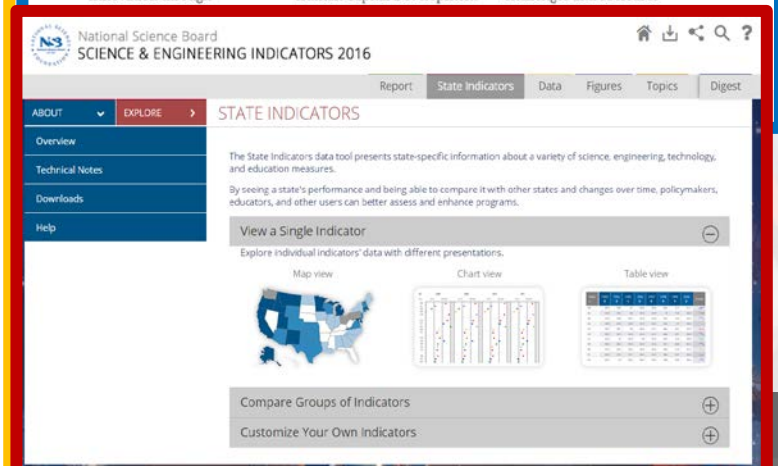
- Among college-educated U.S. workers with the highest degree in an S&E field, 74% are employed in an S&E or S&E-related job.
- A majority (52%) of these workers are employed in non-S&E occupations.
- Non-S&E jobs held by S&E degree holders include science management, sales, marketing, social services, and teaching in other STEM fields.



A "PATHWAYS MODEL" OF CAREER PROGRESSION

In our dynamic economy, careers are continually being created, augmented, and reshaped. Rather than a "pipeline" model suggests a straightforward progression from formal STEM education to STEM occupation, this model does not reflect the full range of career opportunities available to STEM degree holders and the many factors that influence career choices and outcomes.





National Science Board

SCIENCE & ENGINEERING INDICATORS 2016

Report State Indicators Data Figures Topics Digest

ABOUT EXPLORE

Overview
Technical Notes
Downloads
Help

STATE INDICATORS

The State Indicators data tool presents state-specific information about a variety of science, engineering, technology, and education measures.

By seeing a state's performance and being able to compare it with other states and changes over time, policymakers, educators, and other users can better assess and enhance programs.

View a Single Indicator

Explore individual indicators' data with different presentations.

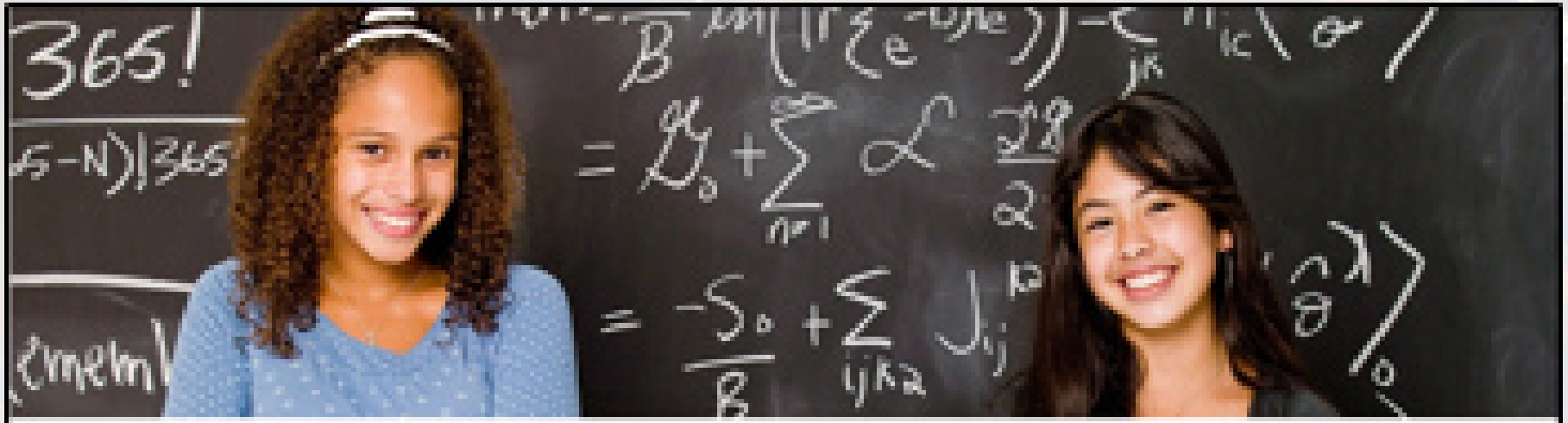
Map view Chart view Table view

Compare Groups of Indicators

Customize Your Own Indicators

Increase usefulness of *Indicators*

STEM Education Online Data Resource



Increase usefulness of *Indicators*

STEM Education Online Data Resource

STEM Education Data | Explore | All Data | NSB | S&E Indicators 2014 | Help | Search

How do U.S. students score in math and science in 4th grade?

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Explore these questions through interactive charts and maps that focus on different topics across all levels of education and the STEM workforce.

Explore The Data

What is Science and Engineering Indicators?

The STEM Education Resource allows the user to connect to data, trends, and analyses from the National Science Board's *Science and Engineering Indicators* report. *Science and Engineering Indicators* (*Indicators*) is the "gold standard" of high-quality quantitative data on U.S. and international science, engineering, and technology. *Indicators* is factual, unbiased, and is widely used by state and federal policymakers, businesses, universities, and many others to inform their decisions. By law, the report, with the latest high quality data on the state of U.S. science and engineering, is delivered to the President and Congress every two years on or before January 15.

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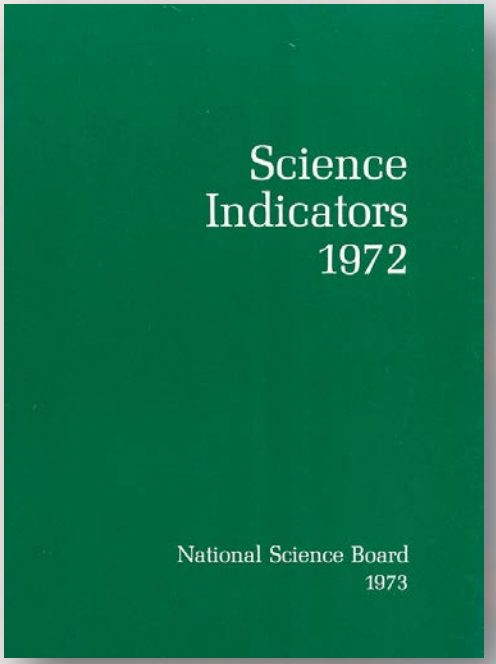
Policy Companion Reports to *Indicators*

Revisiting the STEM Workforce, 2015

Why Revisit the STEM Workforce?

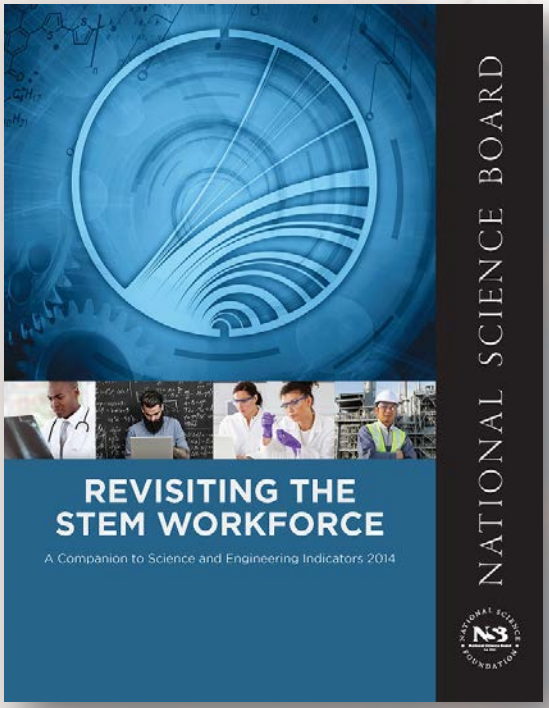
- Human capital is of critical importance to the long-term health of U.S. science and engineering
- As the workplace changes, our concept of who is a “STEM worker” is changing
- NSB can bring data to bear on a variety of policy debates involving the STEM workforce



Revisiting the STEM Workforce, 2015

Goals for the Report

- Provide nuance and context, not solve or take sides in debates
- Identify insights that could help move the discussion forward
- Identify data/research gaps



Revisiting the STEM Workforce, 2015

Three Major Insights

I: The "STEM workforce" is extensive. It is also defined in various ways and is made up of a heterogeneous mix of many "sub-workforces."

- The "STEM workforce" lacks a consensus definition

- *Indicators* describes the "S&E workforce"
  - Work in an **S&E job**: 5.4 million
  - Have an **S&E degree**: 19.5 million
  - Job requires **S&E expertise**: 16.5 million

Revisiting the STEM Workforce, 2015

Insight I *(continued)*

The “STEM workforce” is extensive. It is also defined in various ways **and is made up of a heterogeneous mix of many “sub-workforces.”**

- There is no single, monolithic “STEM workforce.”
- There are differences based on degree, occupation, geography, etc.

Revisiting the STEM Workforce, 2015

Insight I *(continued)*

The "STEM workforce" is extensive. It is also defined in various ways **and is made up of a heterogeneous mix of many "sub-workforces."**

- There is no single, monolithic "STEM workforce."
- There are differences based on degree, occupation, geography, etc.
- ***Is there a glut or shortage? It depends…***

Revisiting the STEM Workforce, 2015

Insight II

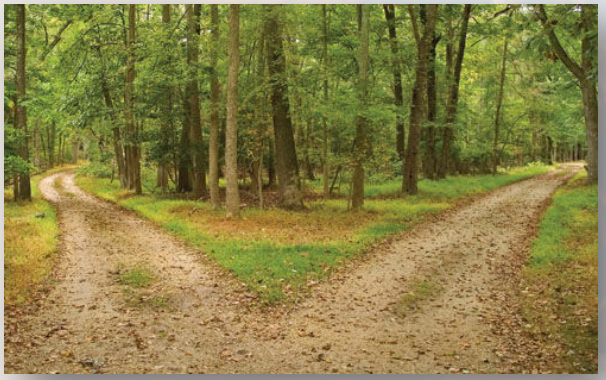
STEM knowledge and skills enable multiple, dynamic pathways to STEM and non-STEM occupations alike.

- Not a linear pipeline from STEM degree to STEM career
- Individuals with an S&E degree embark on many pathways
  - Only about 1/3 of individuals with an S&E degree are employed in a job classified as S&E
  - Over half are employed in non-STEM occupations

Revisiting the STEM Workforce, 2015

Insight II *(continued)*

STEM knowledge and skills enable multiple, dynamic pathways to STEM and non-STEM occupations alike.



- Pathways are dynamic and change over time

- Better questions: e.g., what knowledge and skills do students and incumbent workers need to thrive?

Revisiting the STEM Workforce, 2015

Insight III

Assessing, enabling, and strengthening workforce pathways is essential to the mutually reinforcing goals of individual and national prosperity and competitiveness.

- What influences career pathways? How do they change over time?
- Are careers in STEM attractive?
- Roadblocks?

Revisiting the STEM Workforce, 2015

STEM Workforce

STEM-Capable U.S. Workforce

Revisiting the STEM Workforce, 2015

NSF Role

- **NCSES:** Better longitudinal data on careers; data on factors that influence career pathways; covering certifications and non-degree credentials

- **EHR:** Identifying core STEM competencies; learning in informal settings; broadening participation

Revisiting the STEM Workforce, 2015

NSB Role

❖ **NSB:** Short, timely follow-up pieces that unpack some workforce complexities. Examples:

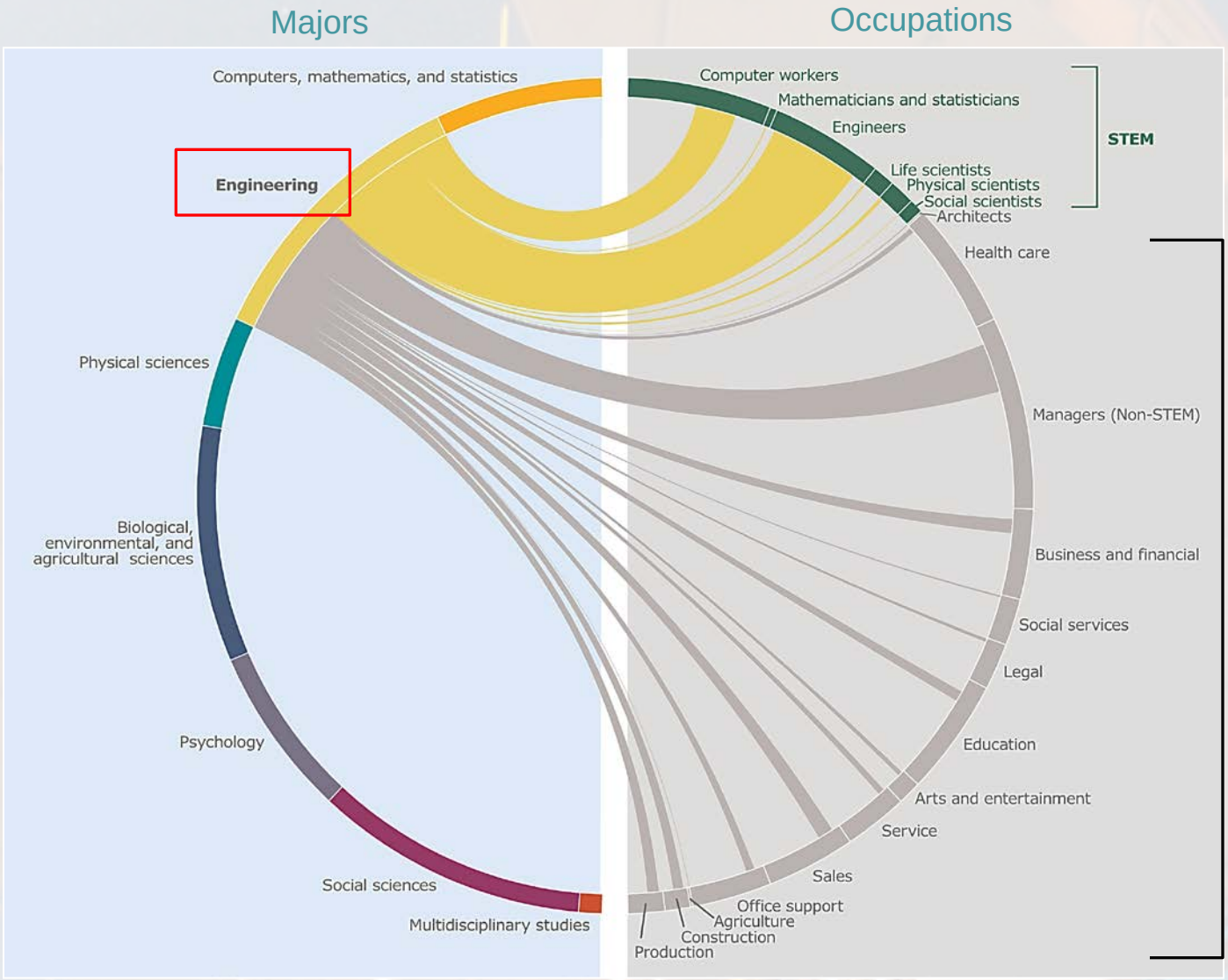
- Career destinations for STEM graduate students
- Nuance in discussions about “roadblocks”
- Higher education as a public and private good

Revisiting the STEM Workforce, 2015

QUESTIONS?

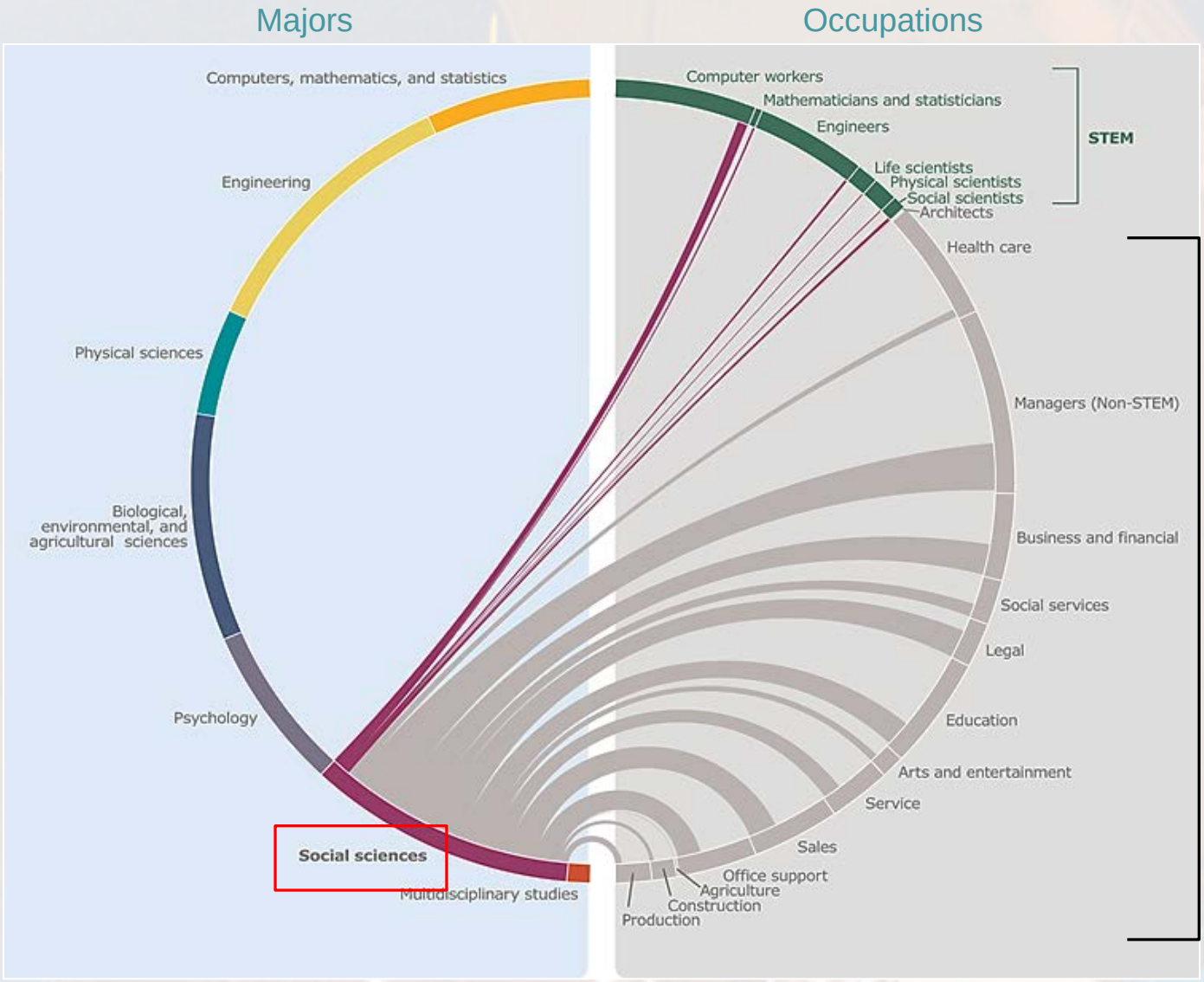
Contact: mbwilson@nsf.gov

Pathways – Engineering



U.S. Census Bureau, 2012 American Community Survey. https://www.census.gov/dataviz/visualizations/stem/stem-html/

Pathways – Social Sciences



U.S. Census Bureau, 2012 American Community Survey. https://www.census.gov/dataviz/visualizations/stem/stem-html/

Insight II *(continued)*

Degree/Occupation Group	Highest Degree = Bachelors in Field	Highest Degree = Masters in Field	Highest Degree = Doctorate in Field
S&E degree holder working in an S&E job	31%	51%	74%
Social science degree holders working as social scientists	3%	19%	65%
Biological, agricultural, environmental life sciences working as bio/agri/enviro scientists	13%	35%	60%
Physical sciences working as physical scientists	24%	40%	56%
Engineering working as engineers	48%	53%	62%
Computer & math sciences working as computer & math scientists	49%	60%	77%

Science & Engineering Indicators 2012