

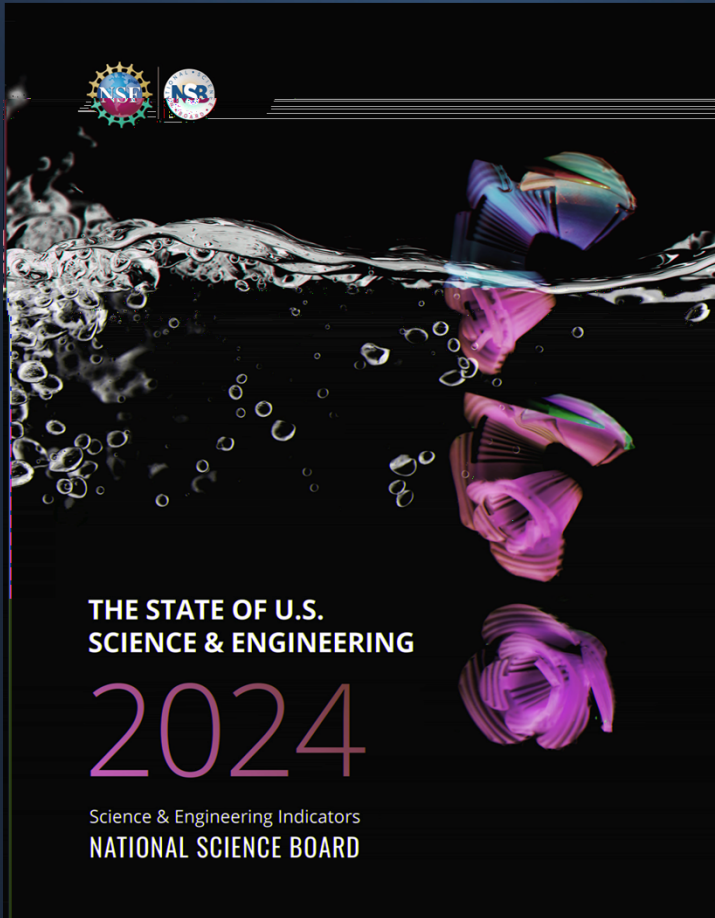


National Science Board

The State of U.S. Science & Engineering

Science & Engineering Indicators 2024

Thursday, April 11, 2024



Speakers:

Daniel Reed

Chair, National Science Board
(NSB)

*Presidential Professor of
Computational Science and
Professor of Computer Science
and Electrical & Computer
Engineering
University of Utah*

Sylvia Butterfield

Acting Assistant Director
*Directorate for Social, Behavioral
and Economic Science
U.S. National Science Foundation*

Emilda Rivers

Director
*National Center for Science and
Engineering Statistics*

Christina Freyman

Deputy Director
*National Center for Science and
Engineering Statistics*

Maureen Condic

Chair, NSB Committee on National
S&E Policy
*Associate Professor of
Neurobiology and Anatomy
University of Utah, School of
Medicine*



National Science Board

The National Science Board



National Science Board

Science and Engineering Indicators

➤ *The State of U.S. Science and Engineering: Talent, Discovery, and Translation*

➤ Thematic reports on key topics

➤ State Indicators tool

The image shows a composite of two screenshots from the National Science Board's Science & Engineering Indicators website. The top screenshot displays the cover of the report 'The State of U.S. Science and Engineering 2024' with a date of March 2024. The bottom screenshot shows the 'Science & Engineering State Indicators' tool interface, which includes a navigation menu, a description of the tool's focus on U.S. state trends, and two main sections: 'Indicators' (with an 'EXPLORE INDICATORS' button) and 'State Data' (with a 'COMPARE STATES' button). The National Science Board logo is visible in the top right of the interface.

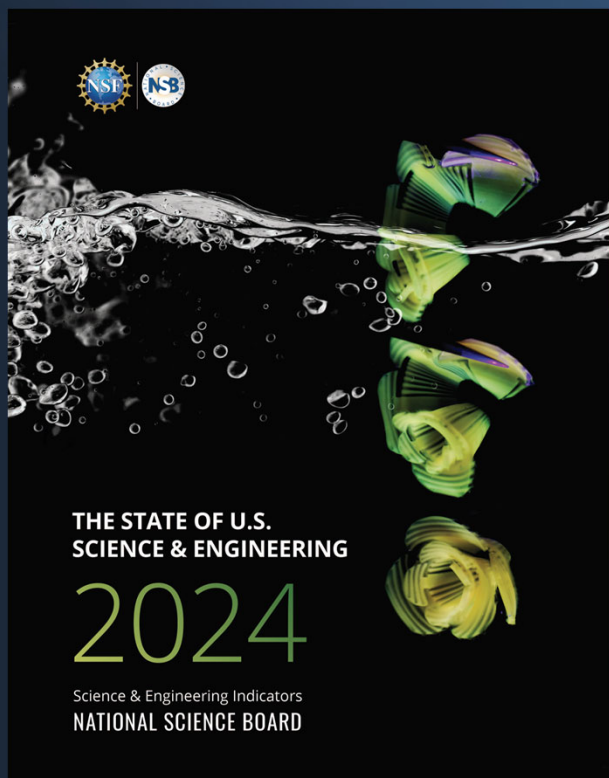


National Science Board

<https://ncses.nsf.gov/indicators>

NATIONAL SCIENCE BOARD

The State of U.S. Science & Engineering



- The U.S. performs more total R&D than any other country
- But the nation's global position is slipping, as countries in East and Southeast Asia, particularly China, increase their activities.
- The nation's ability to compete in S&E depends on robust and sustained national investments in STEM talent, R&D-driven discovery, knowledge translation, and innovation.

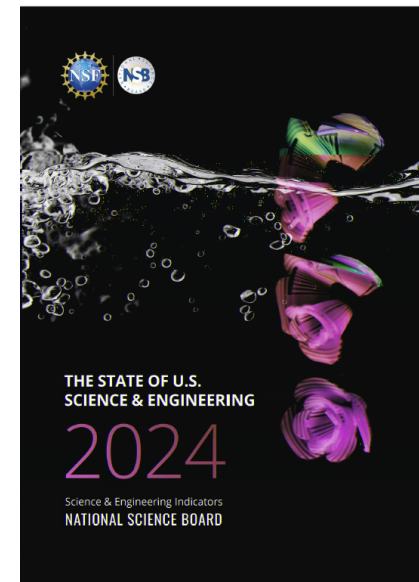


National Science Board

NCSES: Trusted Source of Objective Data on the S&E Enterprise

A Variety of Data Sources

- NCSES official government statistics
 - University
 - Government
 - Business
 - Individuals
- Census, BLS, NCES, etc.
- International, OECD data
- Bibliometric data
- Patent data information



Data From Across the Globe



Securely Liberating Data for You



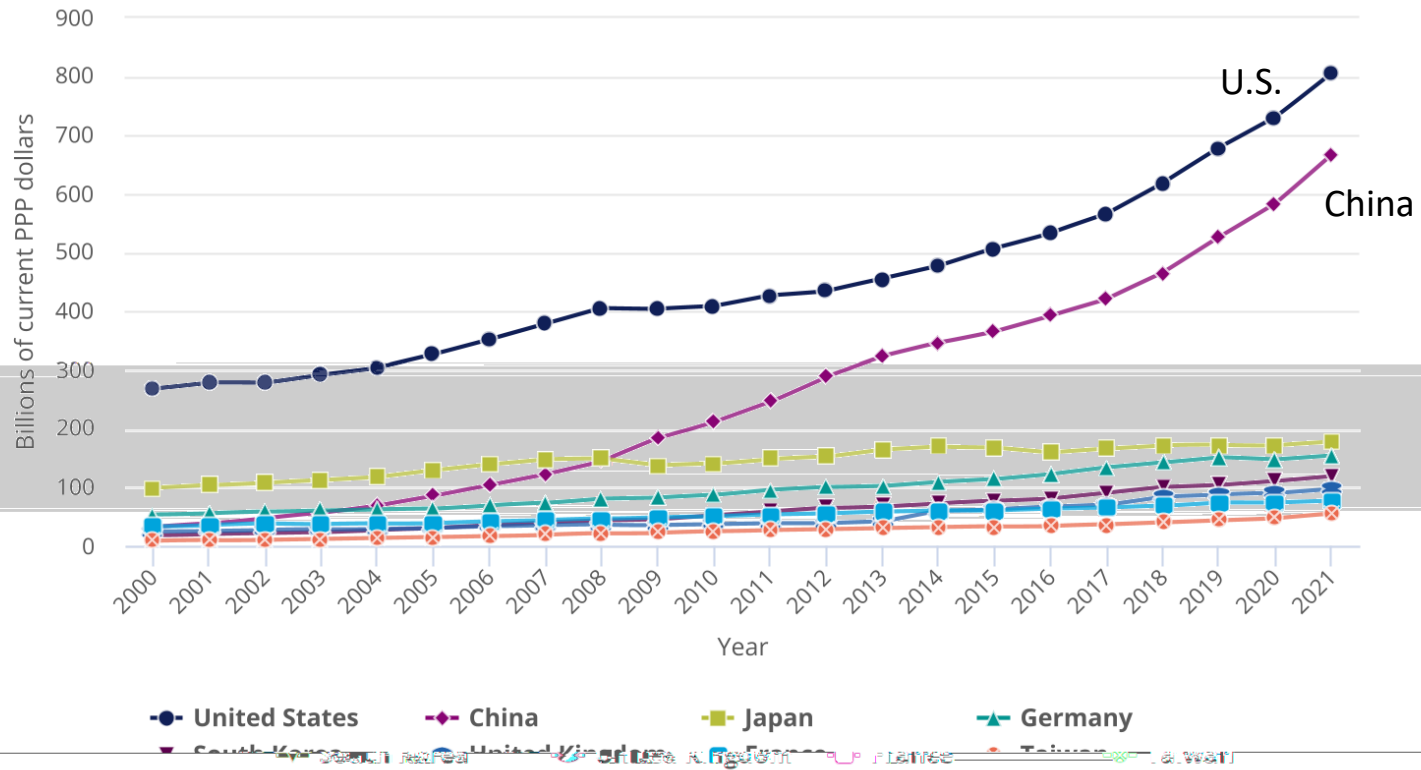
Standard
Application
Process



**National Secure
Data Service**

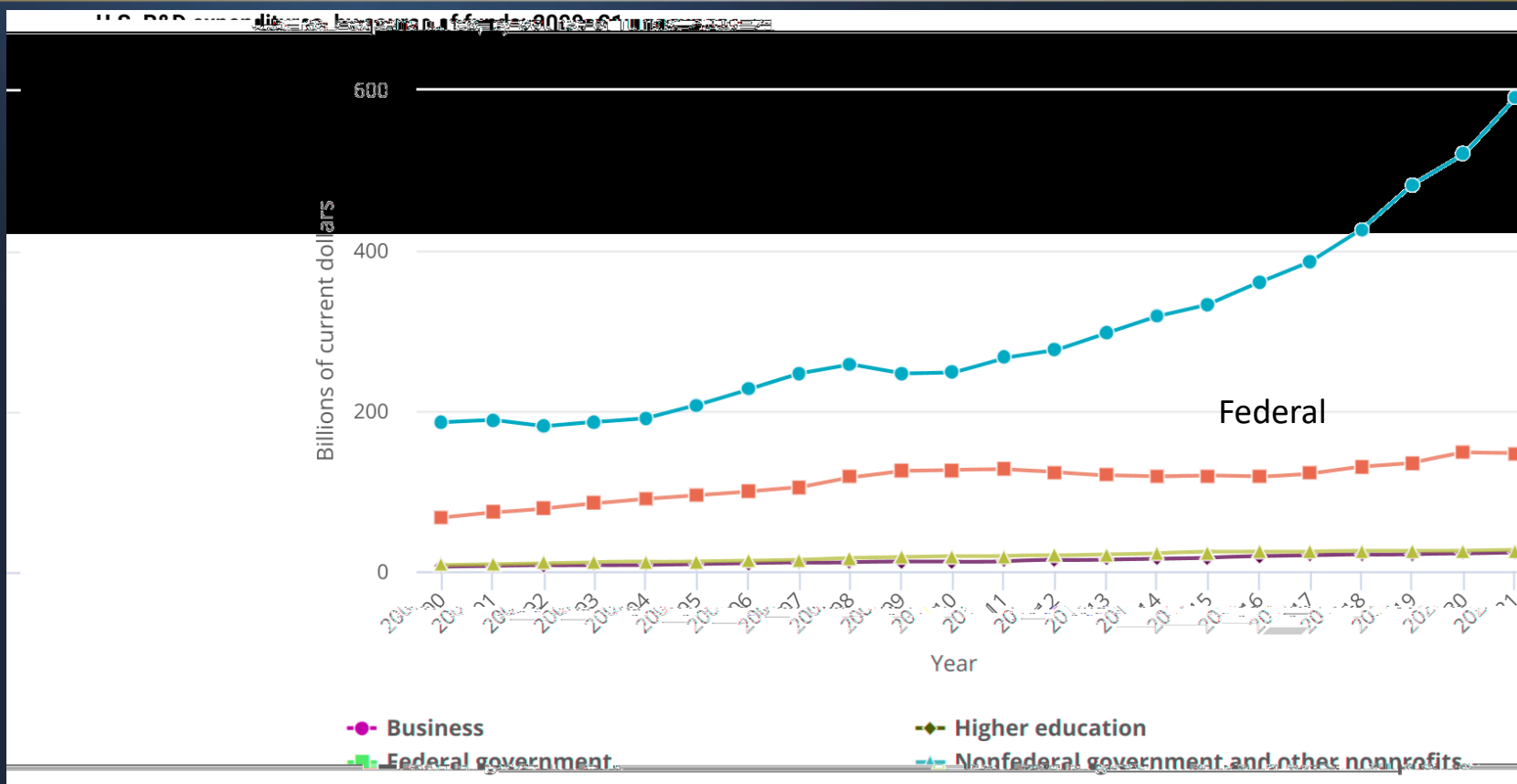
Discovery: Gross Domestic Expenditures on R&D

Gross domestic expenditures on R&D, by selected country or economy: 2000–21



National Science Board

Discovery: U.S. R&D Expenditures



National Science Board

Translation: Publications, Patents, and Industry

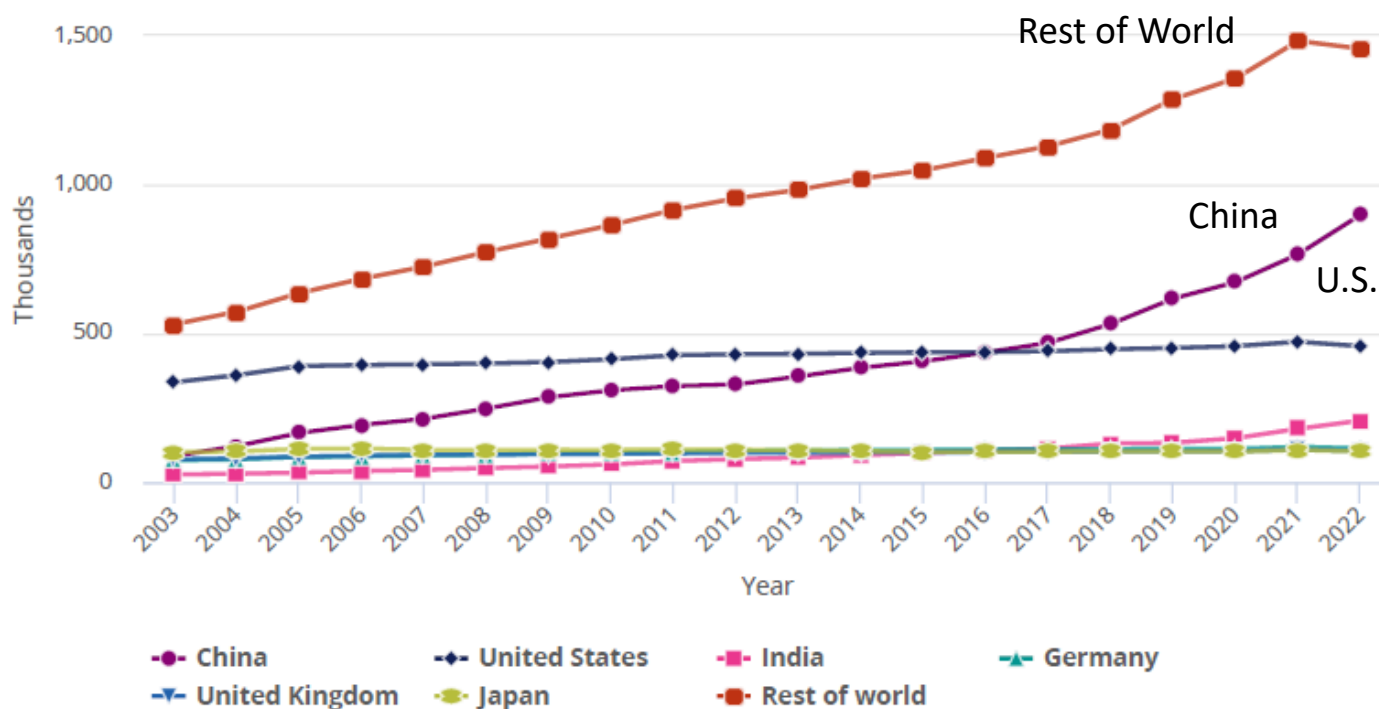
S&E research publications, patents, and knowledge- and technology-intensive industry output are concentrated in the United States, East and Southeast Asia, and Europe.

China has significantly increased its share of global science, technology, and innovation capabilities over the last decade.



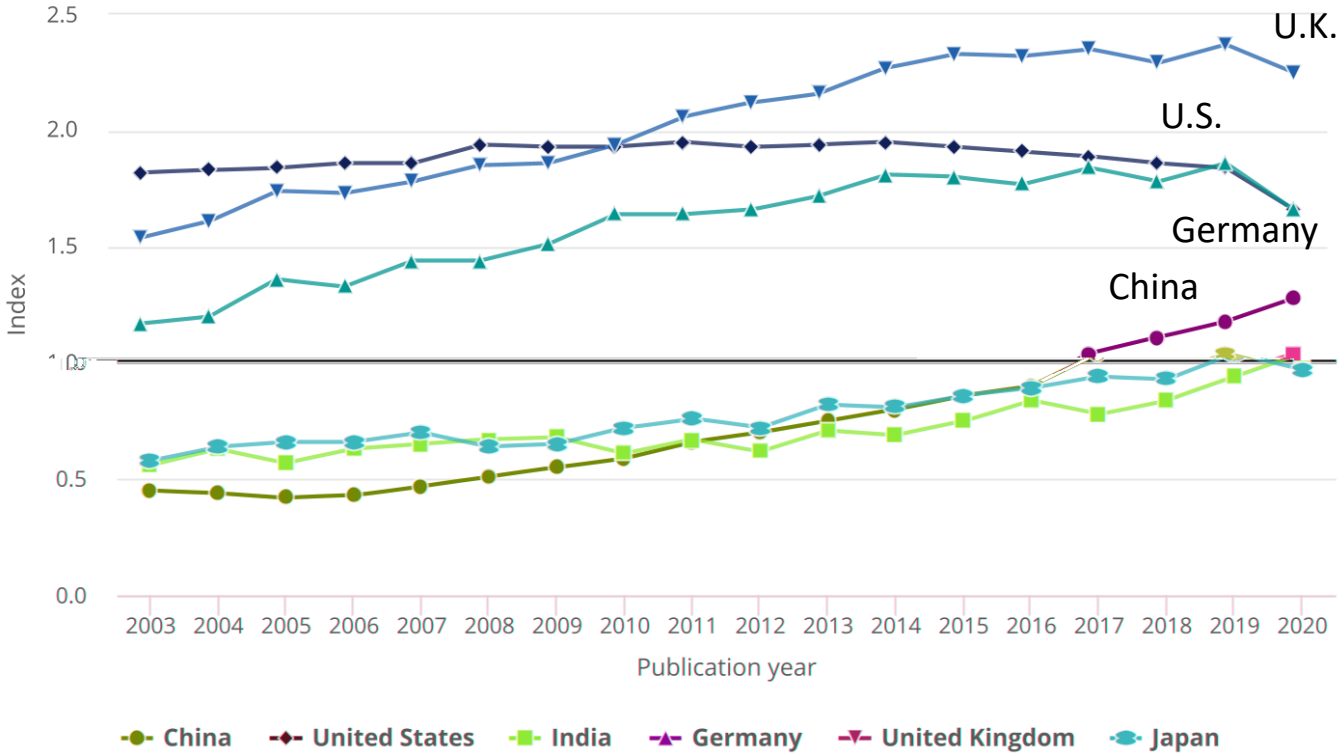
Translation: Publications

Figure 18. S&E articles, by selected region, country, or economy: 2003–22

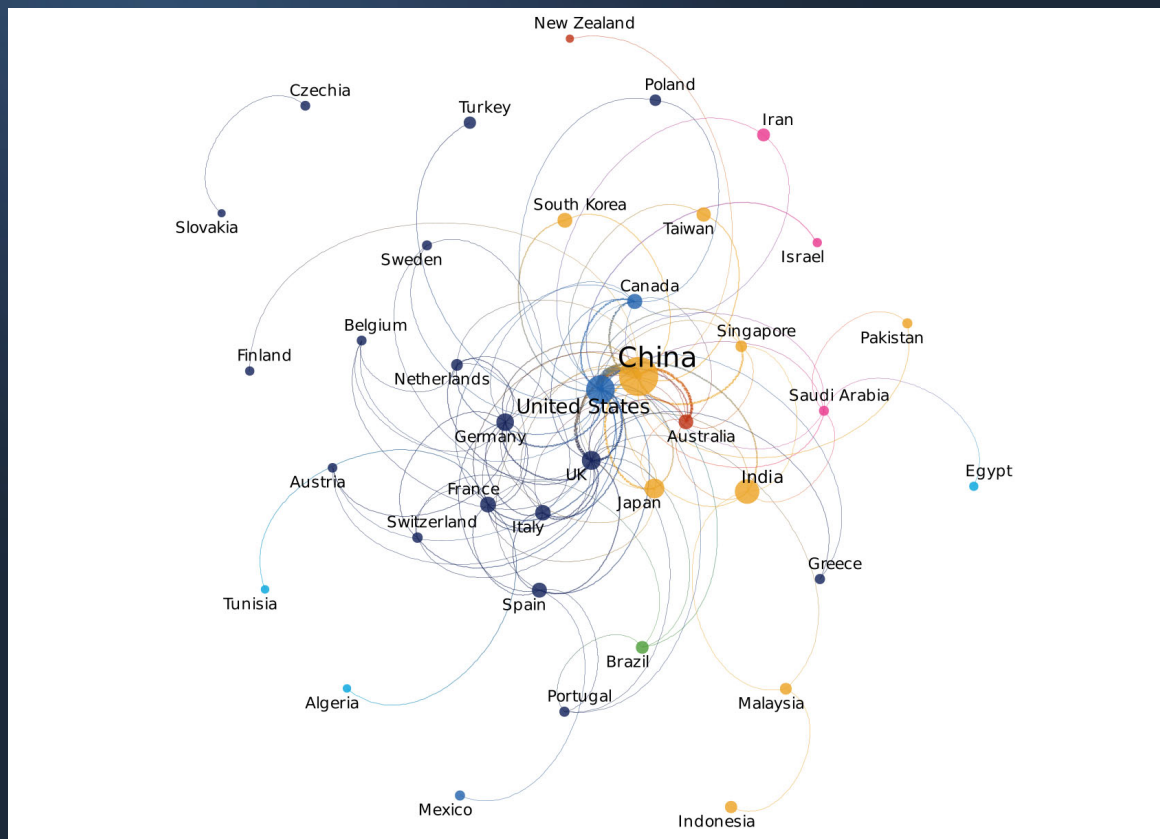


Translation: Highly Cited Publications

Highly cited article index, by selected country: 2003–20



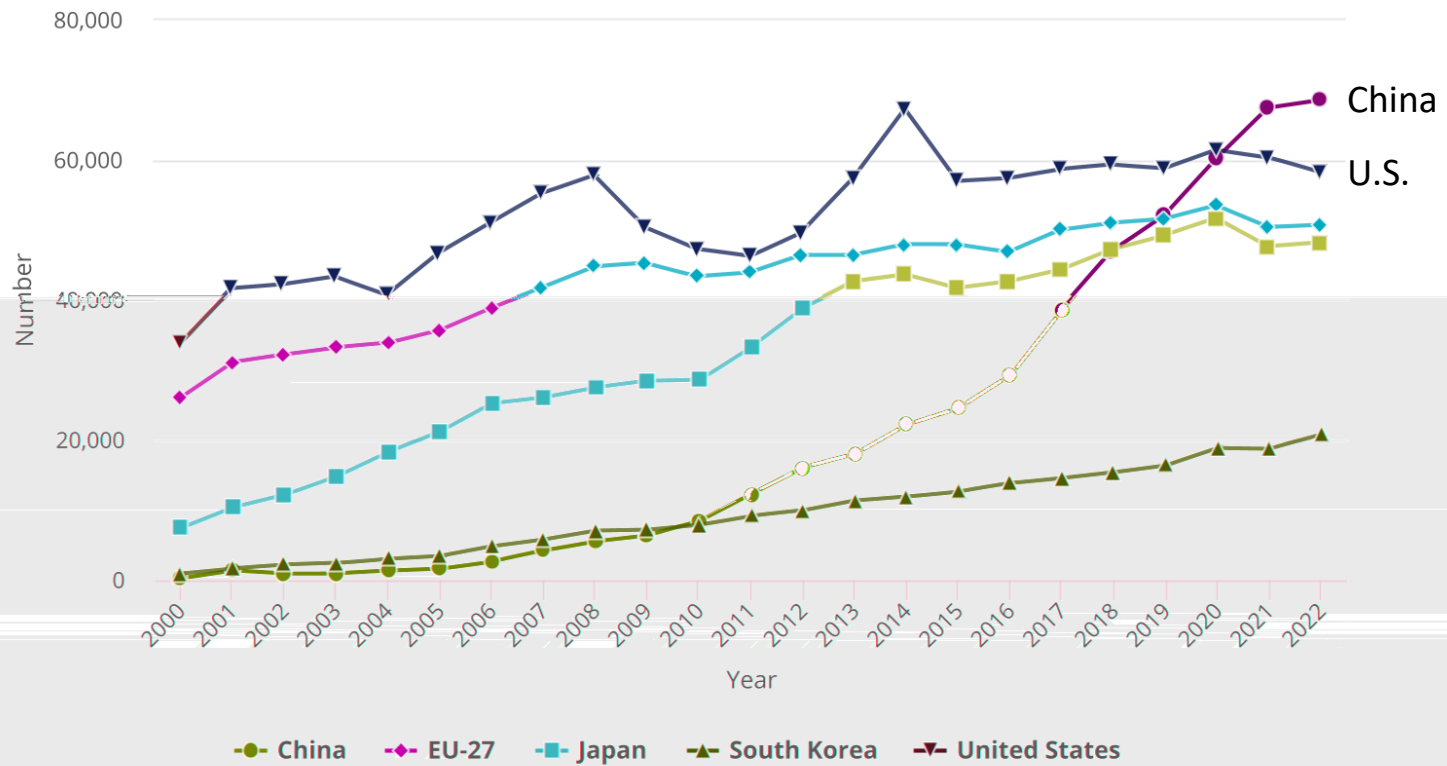
Translation: Global Network of AI Research Publishing



National Science Board

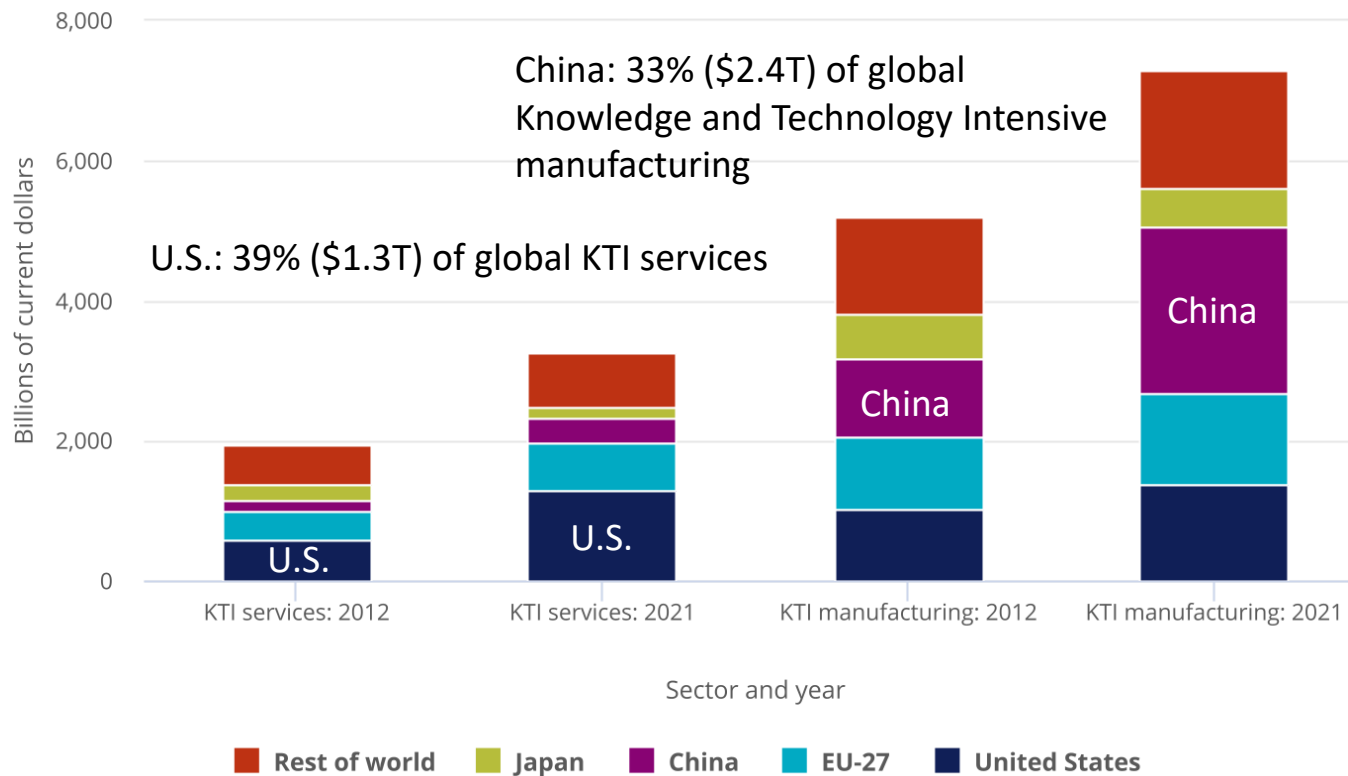
Translation: Patents

Patent Cooperation Treaty applications, by selected region, country, or economy: 2000–22



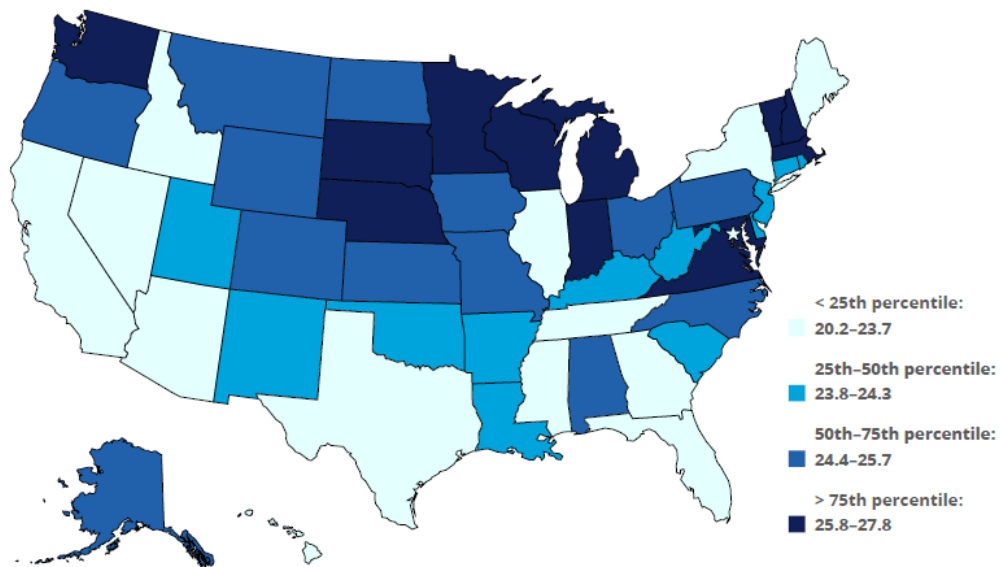
Translation: Knowledge- and Technology-Intensive Industries

Value-added output of KTI industries, by selected region, county, or economy and by sector: 2012 and 2021



The State of U.S. S&E: STEM Talent

Figure 8. Employment in the STEM workforce, by state: 2021



Note(s): STEM is science, technology, engineering, and mathematics. Quartiles are based on point estimates and do not account for sampling variability.

Source(s): Census Bureau, ACS, 2021. Indicators 2024: Labor Force

- *A globally competitive STEM education system equips Americans with the skills and knowledge needed to participate in the STEM workforce.*
- *STEM workers with a broad range of educational credentials sustain the U.S. research enterprise and drive innovation in critical and emerging technologies, supporting the nation's competitiveness in the global economy.*



National Science Board

National Science Board: Vision for the Future



- Deliver Benefits From Research
- Expand the Geography of Innovation
- Foster a Global S&E Community
- Develop STEM Talent for America

**A CASE
FOR
URGENCY**

<https://www.nsf.gov/nsb/NSBActivities/vision-2030.jsp>



National Science Board

NSB Policy Messages: Talent is the Treasure



- The U.S. needs a robust, resilient STEM workforce for a strong economy and national security
- But the nation is facing a STEM talent crisis
- Strategic action is sorely needed across educational and workforce levels



Need for Robust, Resilient STEM Workforce

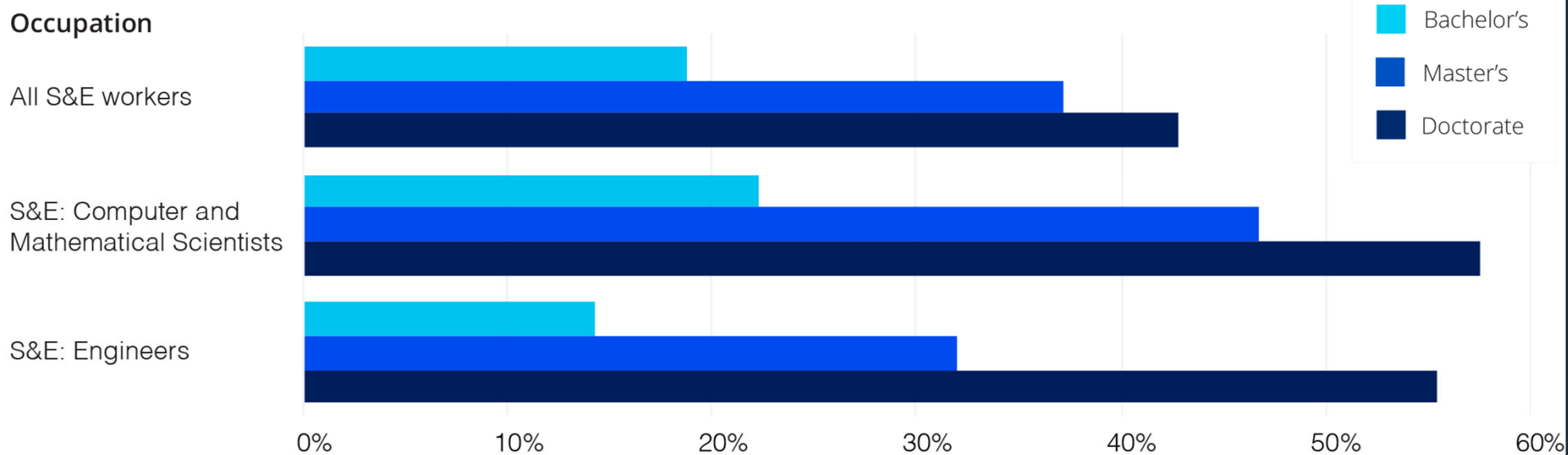


- STEM workforce: 37 million people
- With bachelor's degree: 18 million
- Without bachelor's degree (Skilled Technical Workforce): 19 million



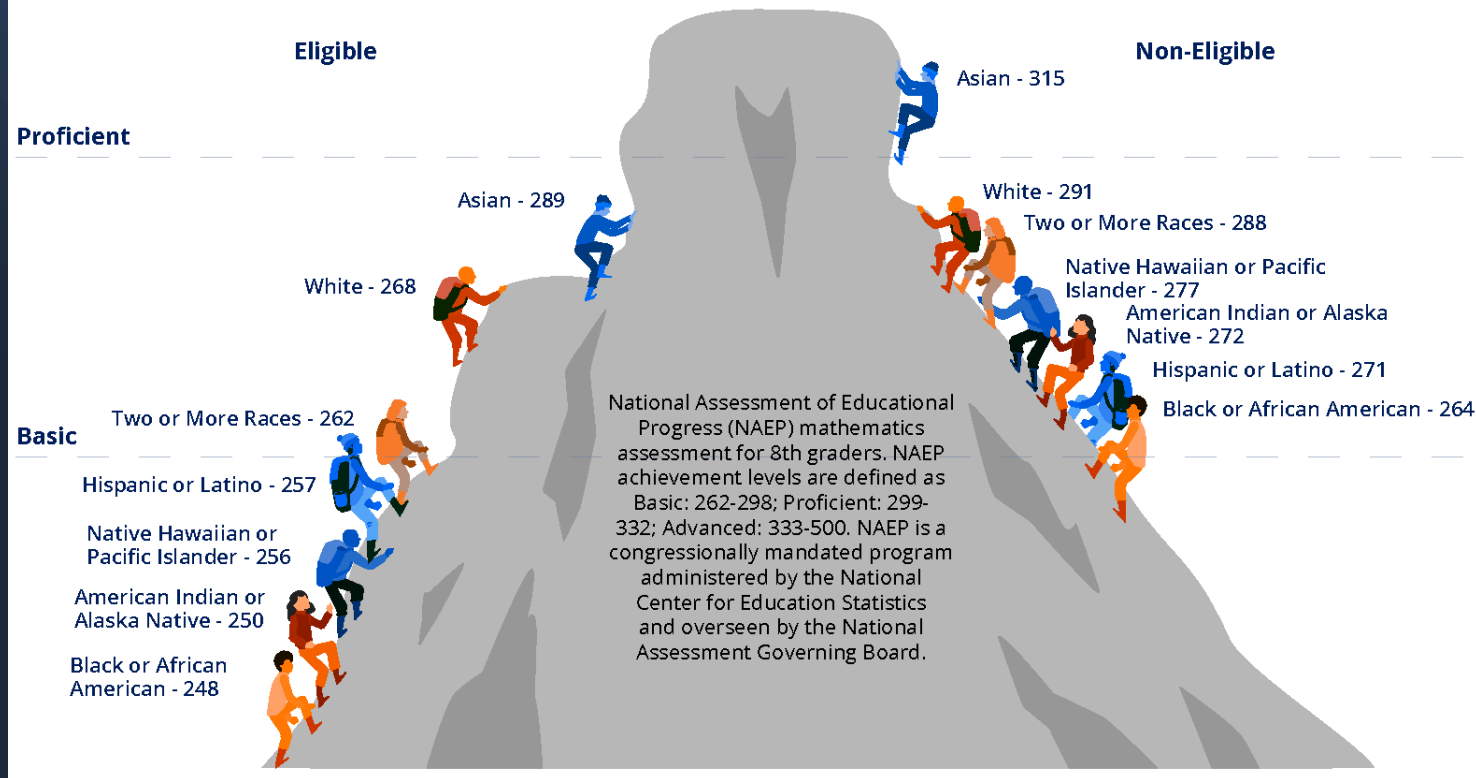
Leadership Risk: Talent Supply Chain

Foreign-born Share of Workers with a Bachelor's Degree or Higher, by Highest Degree Level and Major Occupation: 2021



Leadership Risk: PreK-12 STEM Education

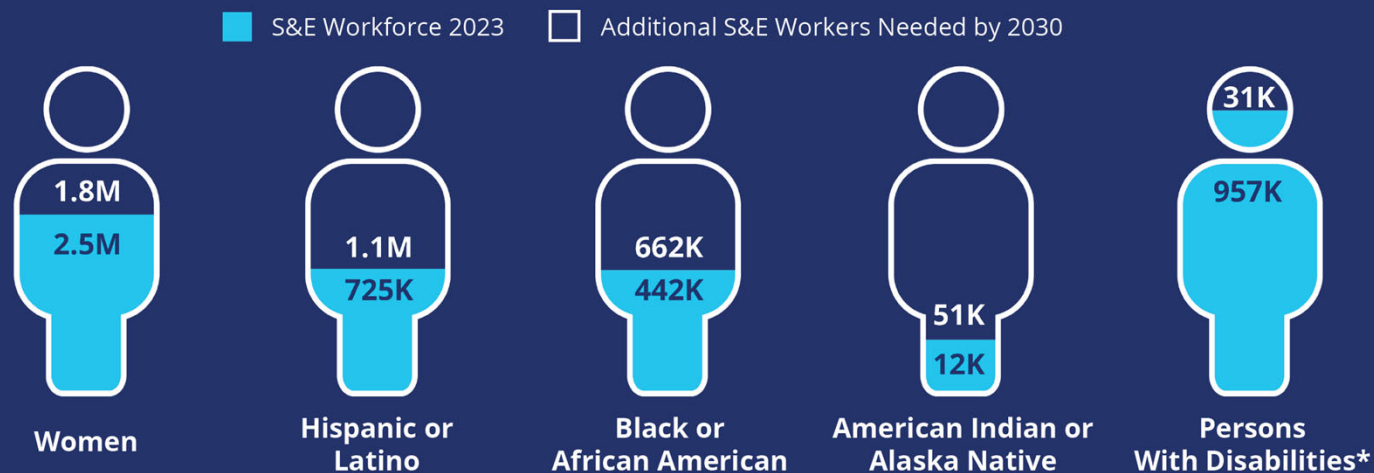
Average Scores of 8th Grade Students on the Main NAEP Mathematics Assessment, by Race, Ethnicity, and Eligibility for Free or Reduced School Lunch: 2022



Leadership Risk: the Missing Millions

Missing Millions: Closing the Diversity Gap in the S&E Workforce by 2030

Over the past decade, the United States has seen significant growth in underrepresented groups in the science & engineering (S&E) workforce. However, the National Science Board is urging an even swifter expansion to create a more diverse workforce that mirrors the U.S. population and meets the demands of 2030.



*Visual (30%), Cognitive (29%), Hearing (26%), Lifting (8%), and Walking (7%) disabilities

Source: Estimates are based on projections from the U.S. Census and Bureau of Labor Statistics, together with data from the National Center for Science and Engineering Statistics, and assume that participation of these groups in the S&E workforce increases at current rates.



Opportunities for Action



Strategic Action: Access to Higher Education




Increase scholarships for low-income individuals (e.g. S-STEM)

Initiate national service programs (e.g. Defense Civilian Training Corps)

Increase Pell grant amounts to reflect the current cost of education

Build out capacity at community colleges, Minority Serving Institutions (MSIs), and Emerging Research Institutions (ERIs)



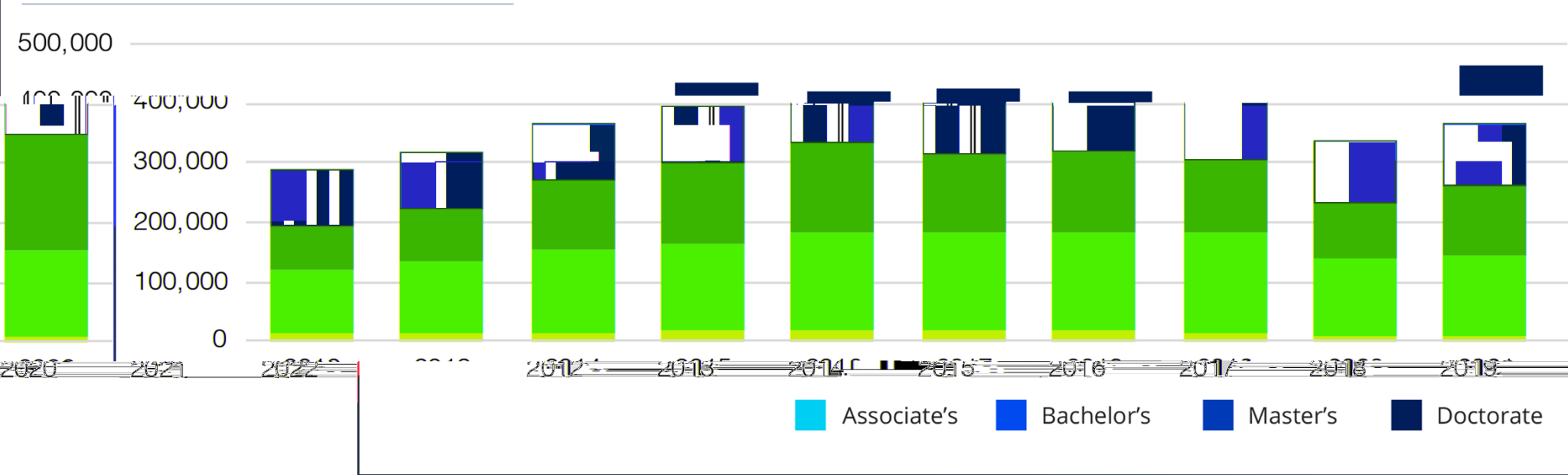
For STEM Doctoral Students

- Expand graduate fellowship programs, with an emphasis on critical and emerging technologies
- Increase doctoral stipends & annually adjust for inflation
- Provide doctoral students with benefits

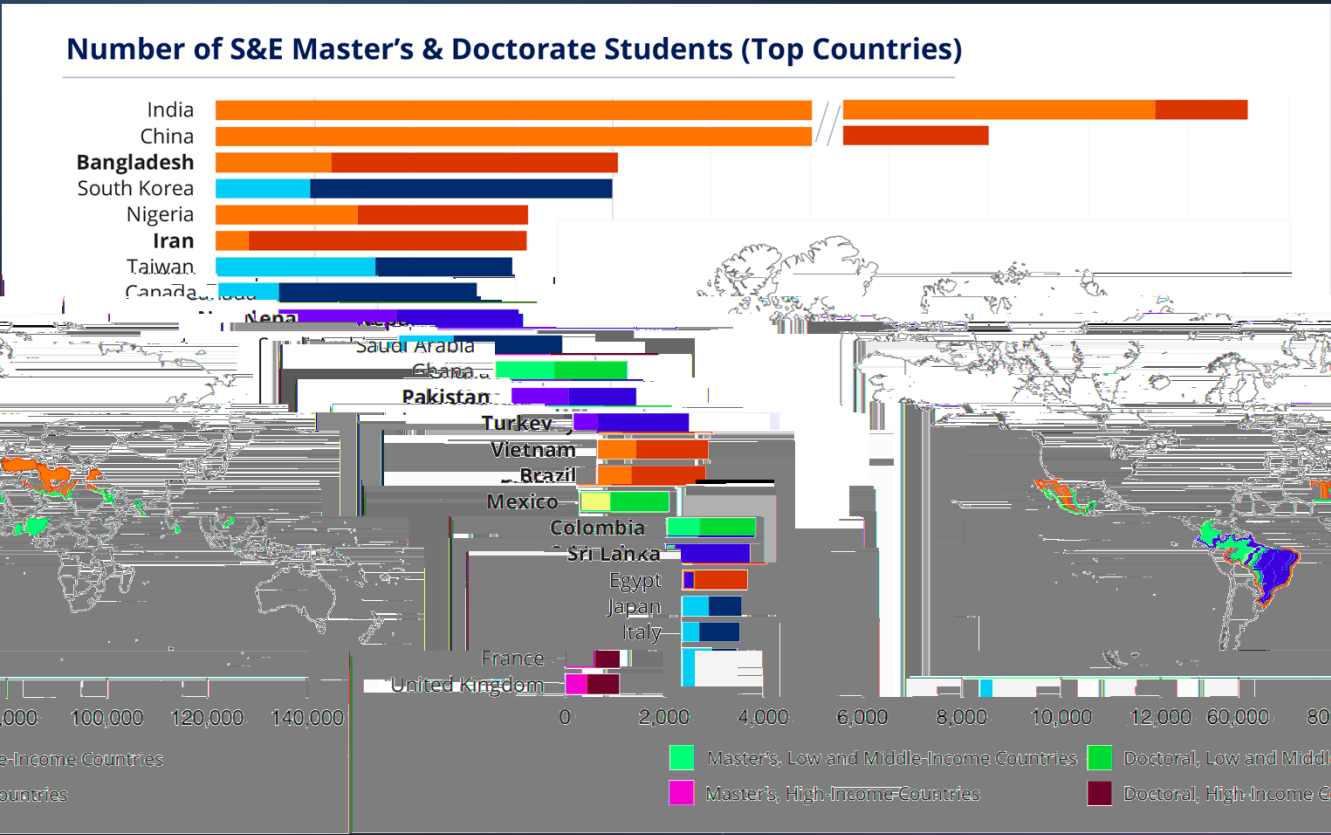


Strategic Action: Emerging Science Partners

International S&E Students on Visas Enrolled in U.S. Higher Education Institutions, by Level of Enrollment: 2012-22



Strategic Action: Emerging Science Partners

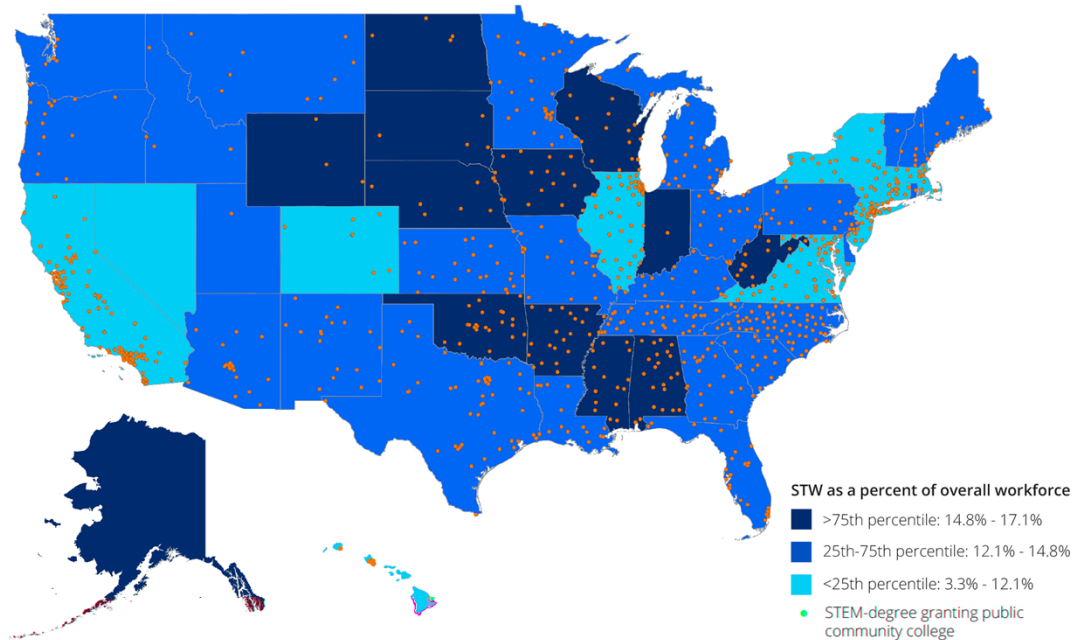


Strategic Action: Skilled Technical Workforce

THE SKILLED TECHNICAL WORKFORCE:

Crafting America's
Science & Engineering
Enterprise

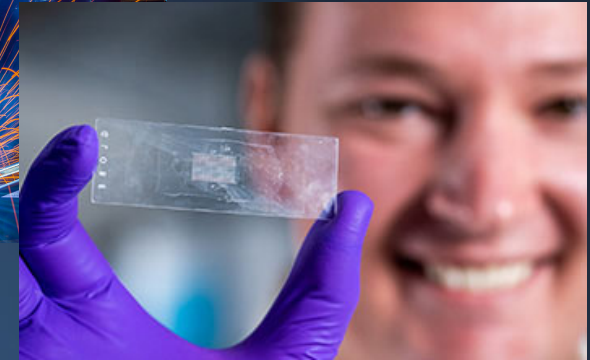
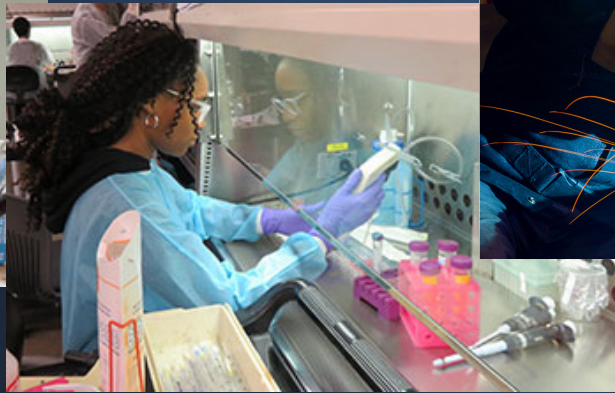
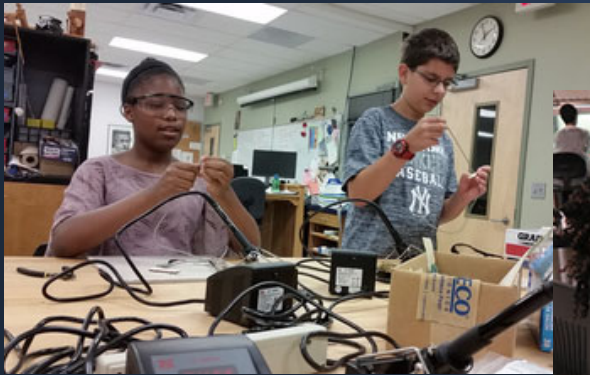
STEM-Degree Granting Community Colleges and STW Employment by State



National Science Board

A Bedrock for the Nation's R&D Enterprise

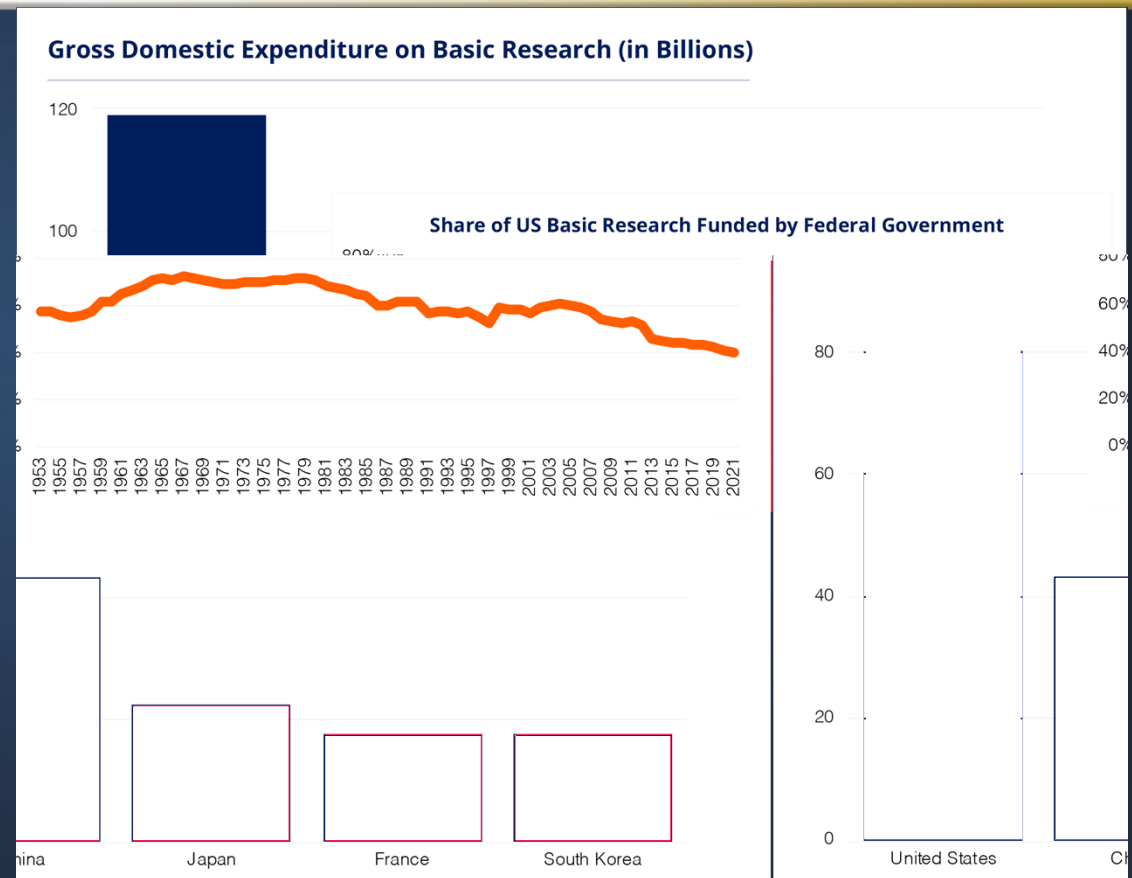
With a robust and concerted effort to close the STEM talent gap - preK-12, higher education, the Skilled Technical Workforce, international talent - the U.S. can fully lean into longstanding, strategic approaches to ensure it remains a global S&E discovery powerhouse



National Science Board

A Bedrock for the Nation's R&D Enterprise

- Invest in basic research
- Identify “under the radar” discoveries and opportunities
- Invest in critical and emerging technologies



Talent is the Treasure



Keep in Touch



<https://www.nsf.gov/nsb/>



@NSF_NSB



@National Science Board



National Science Board
