

# CHINA IS A DETERMINED AND FORMIDABLE COMPETITOR WITH THE U.S. IN SCIENCE & TECHNOLOGY

## SIX CHARTS THAT TELL AN ALARMING STORY

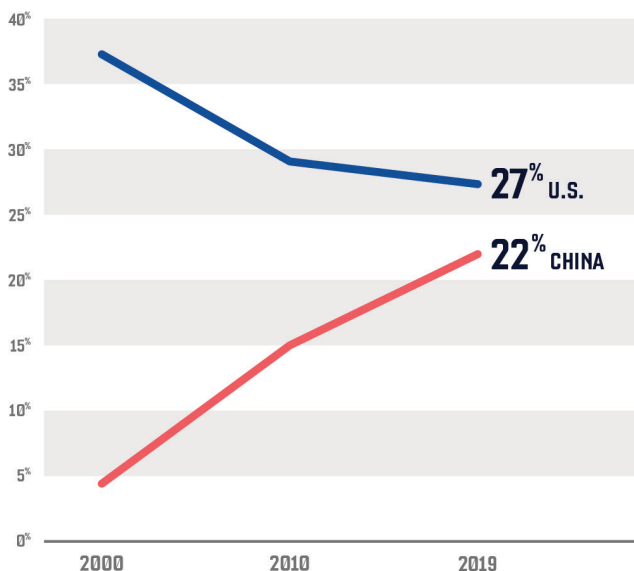
The U.S. is engaged in a fierce competition with China for world leadership in science, technology and innovation, which China may win unless Congress doubles funding for R&D and STEM education relative to GDP over the next five years. The impact to America would be devastating: fewer jobs, a weaker economy, more intrusive and unethical uses of technology and greater threats to national security.

These 6 charts illustrate the steady march of China's investments and the impact of the country's increased spending on education and innovation.

## U.S. LEAD IN R&D INVESTMENT IS NEARLY GONE

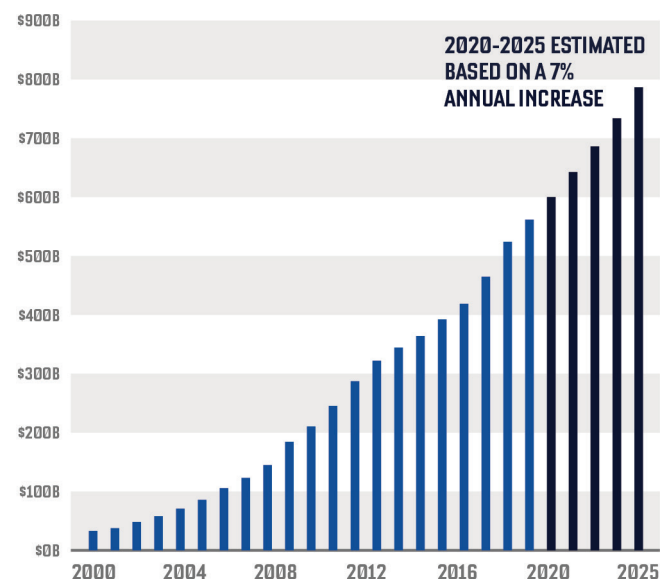
For the past two decades, China's strategy for competing with the United States economically and militarily has been to boost its STEM workforce and advanced manufacturing capabilities. Business leaders<sup>1</sup> agree there is an immediate and urgent need to build our technology workforce if we are to maintain our historic preeminence in science and technology. From 2000 to 2019, China's contribution to global R&D rose from 5% to 22% while the U.S. declined from 37% to 27% (Chart 1). During this period, China's gross R&D expenditures rose from \$32.9 billion to \$525.7 billion (Chart 2). If China continues to increase its R&D investment by 7% annually, the goal it laid out in its most recent 5-year plan, China's R&D expenditures will surpass the U.S. investment unless Congress increases federal investment.

**CHART 1:** CHINA HAS NARROWED THE U.S. GLOBAL LEAD IN R&D (% OF GLOBAL R&D SPENDING)



Source: National Science Board, The State of U.S. Science and Engineering 2022

**CHART 2:** TOTAL CHINA R&D SPENDING (BILLIONS OF U.S. DOLLARS)



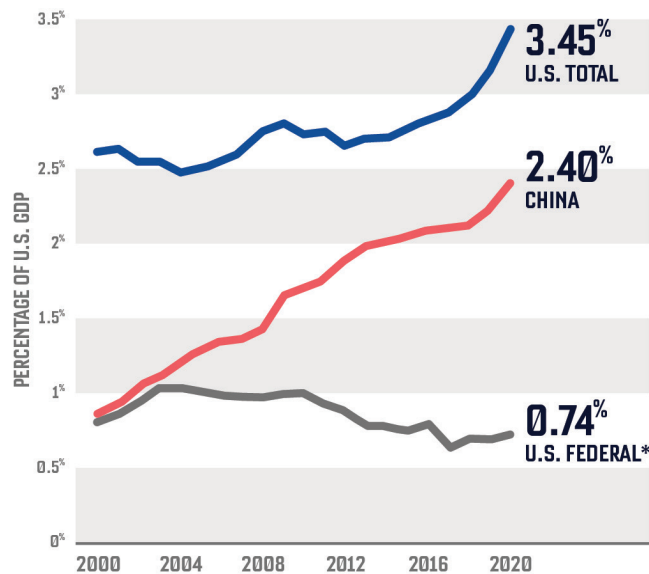
Source: National Science Board, The State of U.S. Science and Engineering 2022

<sup>1</sup> [ibm.com/policy/ceo-letter-nsf-funding/](https://www.ibm.com/policy/ceo-letter-nsf-funding/)

## CHINA'S GOVERNMENT INVESTS BIG IN SCIENCE

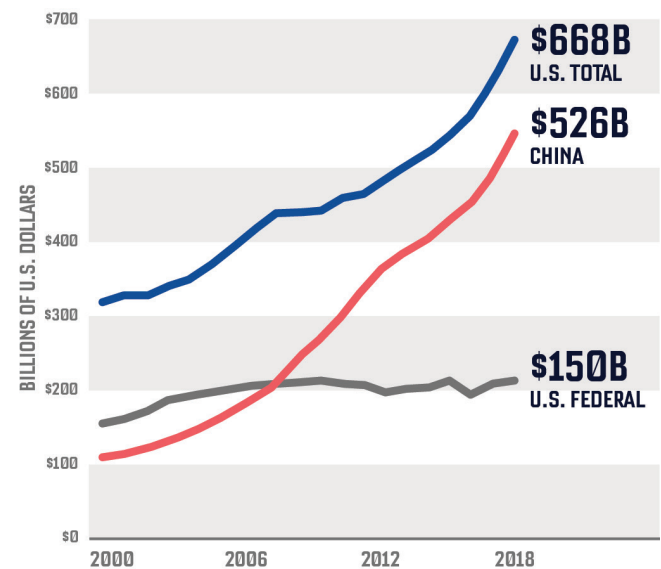
China's government has increased the percentage of GDP it spends on R&D from less than 1% in 2000 to 2.4% in 2020. The United States also has increased overall R&D spending as a percentage of GDP since 2000, but **all of that increase has come from private investment**. U.S. federal R&D investments have stayed at or under 0.8% for the last decade.

**CHART 3: CHINA & U.S. R&D SPENDING (% OF GDP)**



Source: OECD Data, Gross Domestic Spending on R&D; \*AAAS, Historical Trends in Federal R&D

**CHART 4: CHINA & U.S. R&D SPENDING (BILLIONS OF U.S. DOLLARS)**



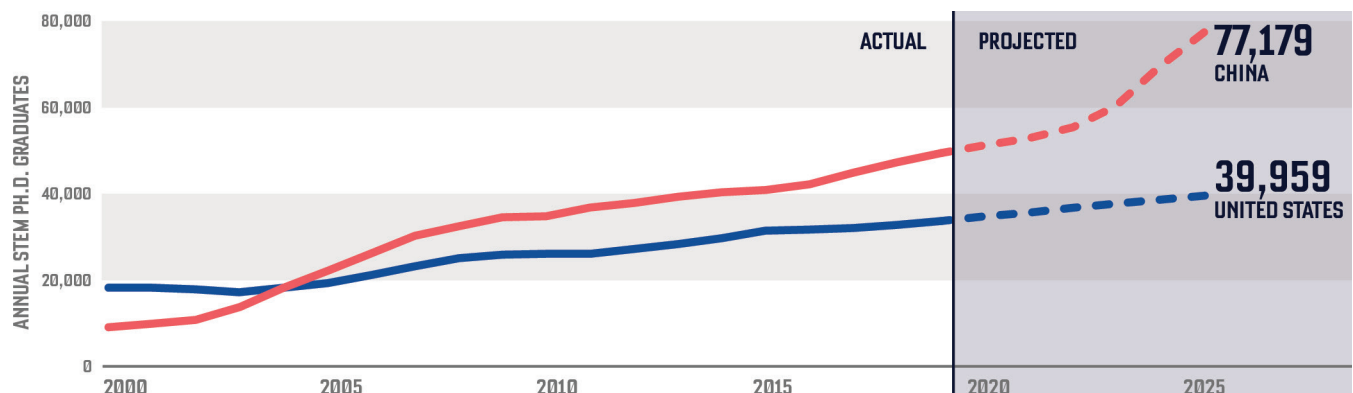
Source: National Science Board, The State of U.S. Science and Engineering 2022

## CHINA'S RAPID ASCENSION IN TALENT AND PUBLISHED ARTICLES

In a national meeting in October 2022, Chinese President Xi Jinping called on his country to “regard science and technology as our primary productive force, talent as our primary resource and innovation as our primary driver of growth.”

China's talent dominance, key to the research that leads to innovation, can be seen in the number of annual STEM PhDs the country graduates. By 2025, China is projected to nearly double the number of U.S. STEM PhD graduates.

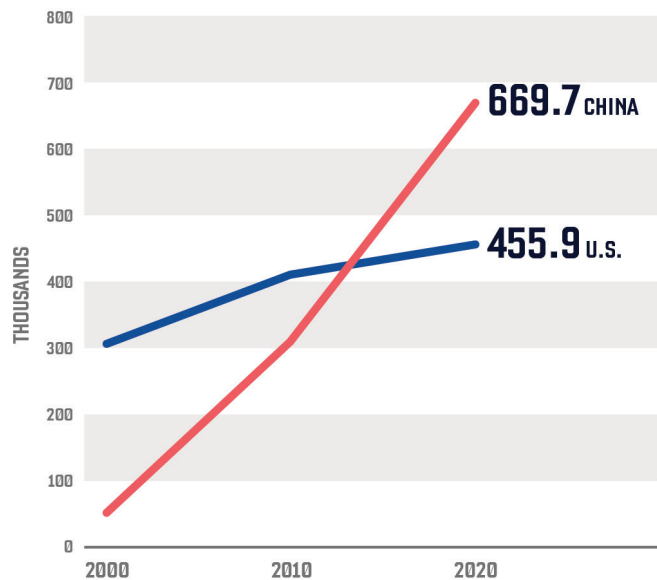
**CHART 5: CHINA & U.S. PH.D. GRADUATES IN STEM FIELDS**



Source: Center for Security and Emerging Technology, August, 2021. CSET Data Brief, “China is Fast Outpacing U.S. STEM PhD Growth”

**CHART 6:**

## CHINA & U.S. SCIENCE AND ENGINEERING ARTICLES AND CONFERENCE PROCEEDINGS



Source: National Science Foundation, The State of U.S. Science and Engineering 2022

Another common measure of scientific performance is the publication of original peer-reviewed research articles in scientific journals. These articles are how scientists share theories and discoveries. In 2020, China published 38% more peer-reviewed articles than the United States.

These six charts show China's commitment to fund R&D for economic strength, a healthier population and military advantage. The question is whether the U.S. will defend or cede our leadership position.

### SCIENCE & TECHNOLOGY ACTION COMMITTEE



#### ABOUT THE SCIENCE & TECHNOLOGY ACTION COMMITTEE

The Science & Technology Action Committee is a group of 22 non-profit, academic, foundation and corporate leaders working to dramatically strengthen U.S. science and technology. The Committee is co-chaired by: Keith Yamamoto, Vice Chancellor for Science Policy & Strategy UCSF, Sudip Parikh, CEO, The American Association for the Advancement of Science (AAAS), Mary Woolley, President & CEO, Research!America, and Bill Novelli, Professor & Founder, Business For Impact Center, Georgetown's McDonough School of Business.

Members of the Science and Technology Action Committee are available to discuss how the U.S. can stay ahead of China in science, technology and innovation. Please contact Lynn Marquis, [LMarquis@coalitionforlifesciences.org](mailto:LMarquis@coalitionforlifesciences.org).



# MAINTAINING AMERICA AS THE GLOBAL CENTER OF INNOVATION

The non-partisan [Science and Technology Action Committee \(STAC\)](#) includes individuals from non-profit, academic, foundation and corporate institutions committed to dramatically increasing U.S. investment in science and technology.

## WHY STRENGTHENING U.S. SCIENCE & TECHNOLOGY MATTERS:

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Boldly committing to renewed S&T investment will pay major dividends by surmounting societal threats, spurring a new era of innovation and promoting greater prosperity. It will make America more globally competitive, strengthen our national security, create a healthier population and grow our economy. If the U.S. prioritizes and elevates science and technology, we can bring about a future that uses advanced bioscience, clean energy, quantum computing, artificial intelligence and other cutting-edge technologies to revolutionize the way we live and work.

**With the U.S. engaged in fierce competition with China for world leadership in science, technology and innovation, the stakes couldn't be higher.** Without significant increases in federal funding of S&T, China could win the global competitiveness race. The runner-up position would be devastating for the U.S., resulting in fewer jobs, a weaker economy, more intrusive and unethical uses of technology and great national security concerns.

Since publishing its [Action Plan](#) in November 2020, STAC has become a leading voice calling for:

- Doubling federal investments in S&T research relative to U.S. GDP
- Elevating scientific leadership to the highest levels of the government
- Increasing coordination on S&T policy across federal agencies

## WHY GREATER INVESTMENT IN SCIENCE & TECHNOLOGY MATTERS:

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Science and technology investments are our greatest ally in driving American competitiveness, but federal spending in these areas isn't keeping pace with our strongest competitors and is not addressing the challenges at hand. We must at least double federal investments relative to GDP over the next five years on S&T, R&D, advanced manufacturing, technology infrastructure and greater STEM educational opportunities.

## WHY EMPOWERING FEDERAL SCIENCE LEADERSHIP MATTERS:

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President Biden's elevation of the Office of Science and Technology Policy (OSTP) Director to the Cabinet level represents a monumental step forward that will bring rigorous scientific thinking to the highest level of government. But we can't let this be a symbolic position. It must be appropriately funded and staffed.

## WHY GREATER FEDERAL COORDINATION OF SCIENCE POLICY MATTERS:

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The independence of S&T is an American strength, but coordination and collaboration between the more than 20 federal research agencies with scientific missions is critical to addressing national and global threats. We must empower the OSTP with the authority and funding to address large-scale, long-term challenges, including public health and health care, environment and climate change, food and water security, and energy production, utilization and storage.

The danger in falling short on these goals is real. It would mean limiting our ability to address urgent national challenges and making us less competitive in a global economy with nations that are methodically bolstering S&T investment, talent and capacity.

STAC is co-chaired by Keith Yamamoto, Vice Chancellor for Science Policy & Strategy at UCSF; Sudip Parikh, CEO of the American Association for the Advancement of Science (AAAS); Mary Woolley, President & CEO of Research!America; and Bill Novelli, Professor & Founder of the Business For Impact Center at Georgetown's McDonough School of Business. To see the full list of STAC members, please visit the [Science and Technology Action Committee website](#).