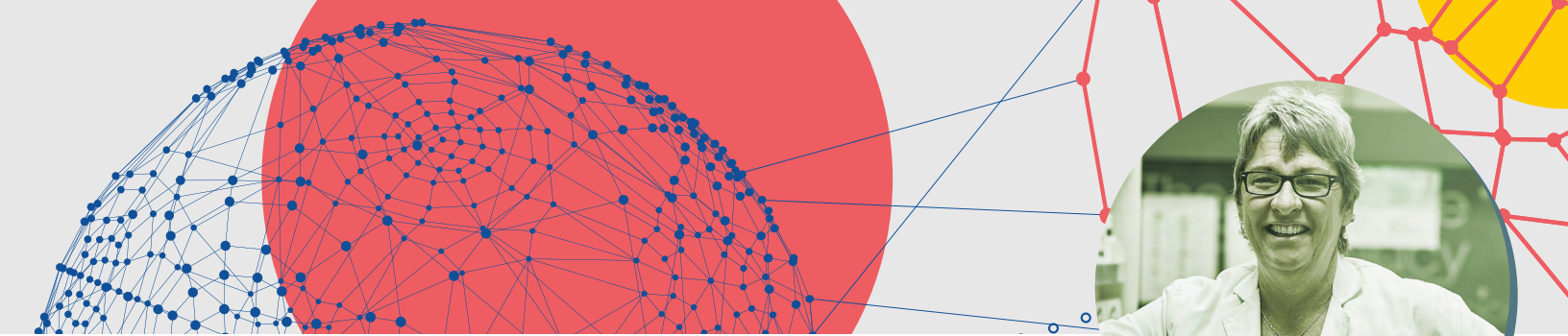


SCIENCE AND TECHNOLOGY

ACTION PLAN



NOVEMBER 23, 2020



Today, the U.S. — indeed, the global community — faces existential challenges that span such wide-ranging arenas as public health and healthcare, environment and climate change, food and water security, and energy production, utilization and storage. Further, our nation’s competitiveness in the global economic arena can no longer be taken for granted: other nations are working methodically to bolster their science and technology capacity and talent, utilizing those strengths to create and capture new export markets. We must invest in ourselves to drive the innovation and change that can serve our nation and our planet.

Failure to confront these realities, coupled with destabilizing and dangerous breaches in basic tenets of social justice, not only limits our potential to thrive as a nation, but imperils our individual and collective well-being, economy, and national security.

To overcome these challenges and create opportunities, we assert the urgent need for a *National Plan with enhanced science and technology leadership; strategic, multi-agency and cross-sector partnerships aimed at confronting urgent and emerging threats; and dramatically increased federal support for science and technology (S&T) — research, development and education.*

While the U.S. S&T enterprise is highly innovative and productive, S&T policy is neither centralized nor positioned at the highest level of government, and hence not readily responsive to challenges at the scope and scale such as those noted above, or those yet to come. Moreover, decades of decline in federal investment in research and development (R&D), as a fraction of GDP, have left us ill-prepared for the future. Our underinvestment in R&D, currently 0.7% of GDP compared to 1.9% in 1964, contrasts with strategic increases elsewhere, notably China,

which is on track to exceed the U.S. in total (public and private) R&D investment by the end of the decade. Meanwhile, existential challenges continue to deepen, to the detriment of every element of society, with lives lost, health and well-being eroded, jobs imperiled, social and racial disparities widened, economic competitiveness and prosperity jeopardized, and national and global security put at risk.

Americans have long relied on S&T discoveries and advances that have driven our economy, assured national security, and improved lives nationally and globally. Yet we have come to take such progress for granted, and in so doing, our commitment to R&D has diminished, and along with it, our attention to producing a diverse, talented STEM workforce. We have assumed that challenges, even existential ones, would be vanquished by S&T innovation. But the current challenges, including rising global competition, are certainly not the last we will face. They will not be met without a renewed and elevated commitment and strategy. We must compete, but also cooperate globally for the benefit of all, bringing an intensity of focus, risk-tolerance and urgency not presently found in our non-coordinated and underfunded federal S&T enterprise.

In developing this document, we were richly informed by numerous detailed, carefully researched expert reports (Appendix 1), and by illuminating results from a recent public survey (Appendix 2). **We propose here three bold actions toward a renewed S&T commitment** dedicated to surmounting overarching societal threats:

1. **S&T Leadership.** The Office of Science and Technology Policy (OSTP) Director should be elevated to the Cabinet and hold the title “Assistant to the President for Science and Technology,” endowing S&T with an appropriately prominent voice at the highest level of government. The Director will provide the President and Cabinet with advice and counsel to establish sound policies and create S&T strategies that drive innovative and effective federal programs, and motivate and enable private sector approaches, directed to the threats our nation faces. The Director should serve as Vice Chair (with the President as Chair) of the National Science and Technology Council (NSTC).
2. **S&T Coordination and collaboration around urgent and emerging threats.** Support for the federal R&D effort emanates from more than twenty departments and agencies. This distributed structure enables each component to define and focus on individual missions and strategies. However, the system lacks the capacity to mandate coordinated and collaborative activities and programs across bureaucratic boundaries, which is necessary to achieve synergies essential for addressing large-scale societal challenges. Such challenges require a robust National S&T Plan that relies on science and evidence-based decision-making, and enables sustained coordination of government-wide resources through a structure with authority for implementation of the plan.

As one possible approach to such a National Plan, NSTC, which is managed by OSTP, would appoint four Coordinators, each charged with oversight of one of four Presidential National Initiatives, placing federal focus on existential challenges: Public Health and Healthcare; Environment and Climate Change; Food and Water Security; and Energy

Production, Utilization and Storage. Each would receive sufficient mandatory funding (determined by need, but likely >\$250M each, totaling \$1B, which is less than 0.7% of the federal R&D allocation) to incentivize, integrate and enhance cooperative mechanisms and programs across S&T-relevant department and agency boundaries, and additionally to attract participation from the private sector.

This new coordination function within NSTC will bring together powerful transdisciplinary combinations of expertise, personnel and facilities from across the public and private sectors to advance the four Presidential National Initiatives. Moreover, the Coordinators will themselves work cooperatively, recognizing that the challenges are closely intertwined. Environment and climate, for example, profoundly affect health, food and water, while energy production and utilization strongly impact environment, climate and health. The four Initiatives demand individual focus, yet must be approached in an integrated manner.

The NSTC will additionally be charged with “horizon scanning” to keep its programs evergreen, identifying potentially disruptive technologies, innovations and trends within each Initiative’s scope, and conceiving new Initiatives in the future.

To ensure that programs (i) develop and maintain focus on the National Initiatives, (ii) draw on and engage America’s full racial, ethnic, social, gender, and geographic diversity, and (iii) motivate partnerships with industry, academia and NGOs, the Council will confer periodically with the President’s Council of Advisors on Science and Technology (PCAST), the National Science Board, and perhaps with a new independent Citizens’ Commission, for counsel and advice.

3. **S&T Investment.** Over the next five years, the federal expenditure for R&D and STEM education should double relative to GDP, from 0.7% to 1.4%. This level of funding, estimated to reach roughly \$380B in year 5, should be appropriated predominantly to S&T-intensive agencies. Importantly, STEM education programs in the Department of Education should gain substantial resources, to develop and underwrite programs that convey the excitement of science and maximize this nation's remarkable intellectual resources among students and trainees at every level, that provide support and resources to teachers and unleash creativity and innovation in learners, and that produce a professional and expert STEM workforce that reflects the full diversity of the nation.

While continuing to underwrite programs in their focused mission areas, federal agencies that fund S&T will address the National Initiatives by allocating significant portions of their increased resources toward four broad sectors: *research* (e.g., increase fundamental discoveries in physical, natural and social/behavioral sciences; motivate elevated private sector investment to develop applications of research findings); *technology and manufacturing* (e.g., establish geographically dispersed Manhattan Project-like technology research and development centers that in turn serve as cores to attract industry and academia partners); *infrastructure* (e.g., collaborate with other agencies charged with ensuring universal broadband access for all; create a public health emergency fund;); and *education and human capital* (e.g., provide every student with a laptop computer, internet access, and basic programming skills; expand K-12, pre-baccalaureate and graduate curricula, training programs and fellowships to increase participation and diversity in S&T fields; develop federally supported retraining programs that enable qualification for S&T and S&T-related employment).

The increased investment in R&D and STEM education would incorporate, connect and enhance developing legislation and Congressional reports (Appendix 3) and proposals from the new Administration (Appendix 4), and incentivize new actions as well, creating high quality, high paying jobs held by a diverse, healthier, more resilient workforce, bolstering public safety, the economy and security, and strengthening U.S. S&T leadership.



To endorse the Science and Technology Action Plan, please visit [ScienceTechAction.org](https://www.ScienceTechAction.org).

SCIENCE AND TECHNOLOGY ACTION COMMITTEE

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APPENDIX 1

PRIOR REPORTS

MEETING THE CHINA CHALLENGE: A NEW AMERICAN STRATEGY FOR TECHNOLOGY COMPETITION

(November 2020) — The Working Group on Science and Technology in U.S.-China Relations, UC San Diego 21st Century China Center, Chair, Peter Cowhey.

Outlines a national strategy for a U.S. approach to China that achieves the following objectives: Self-strengthening (Bolster U.S. innovation capacities to stay competitive and secure), Preserve Openness (Leverage a globally integrated S&T system to benefit the United States and the world), Mitigate Risk (Tighten targeted measures for risk management to address security threats and minimize costs to the United States). Among other recommendations, this includes increasing federal R&D spending to at least 1% of GDP.

PERILS OF COMPLACENCY: AMERICA AT A TIPPING POINT IN SCIENCE & ENGINEERING

(September 2020) — American Academy of Arts & Sciences (AAA&S). Co-Chairs: Norman R Augustine & Neal Lane.

Lays out policies to ensure that the U.S. maintains a strong position of global leadership in discovery and innovation, addressing four measures of scientific and engineering assets: financial capital, human capital, knowledge capital, and the R&D and innovation ecosystem. Recommends increasing federal investment in basic research by 50%, from 0.2% to 0.3% of GDP (at 4% per year), and increasing national investment in R&D (public and private) to at least 3.3% of GDP within 10 years.

THE PUBLIC FACE OF SCIENCE IN AMERICA: PRIORITIES FOR THE FUTURE

(August 2020) — American Academy of Arts & Sciences (AAA&S).

Continuation of the Academy's multi-year Public Face of Science initiative, which has created recommendations for improving connections between the public and science. Priorities include building capacity for effective science communication and engagement in the scientific community; shaping the narrative around science; and developing systemic support for science engagement efforts. Highlights the crucial role of the social and behavioral sciences.

RISING ABOVE THE GATHERING STORM: ENERGIZING AND EMPLOYING AMERICA FOR A BRIGHTER ECONOMIC FUTURE

(2007) — National Academies of Science, Engineering, and Medicine (NASEM). Chair: Norm Augustine.

Makes four recommendations along with 20 implementation actions that federal policy makers should take to create high-quality jobs and focus new science and technology efforts on meeting U.S. needs, especially in the area of clean, affordable energy. Recommends increasing federal investment in long-term basic research by 10% per year for 7 years.

SECOND PLACE AMERICA? INCREASING CHALLENGES TO U.S. SCIENTIFIC LEADERSHIP

(May 2019) — Task Force on American Innovation.

Benchmarks the U.S. against other nations in R&D investment, knowledge production, education, workforce, and high-tech sectors of the economy, which illustrate that while the U.S. continues to lead the world, other countries are on track to catch up and soon surpass the U.S.

VISION 2030

(May 2020) — National Science Board (NSB), National Science Foundation (NSF).

Lays out actions to ensure that the U.S. remains a world innovation leader, which consist of delivering benefits from research, developing STEM talent, expanding the geography of innovation across the U.S., and fostering a global science and engineering community.



APPENDIX 2

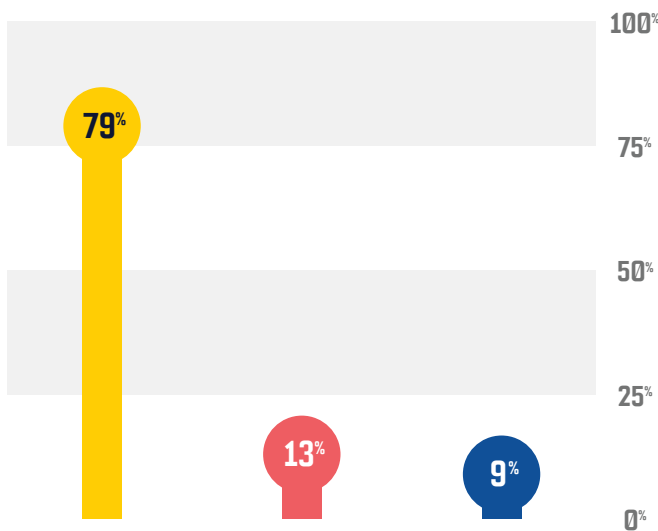
SURVEY DATA

In August 2020, Research!America commissioned a public opinion survey on behalf of the Science and Technology Action committee. The goal was to gain a sharper understanding of American's views toward science, research, and how we should be prioritizing our national resources in the context of the pandemic and other societal challenges.

There has been an increase in support for better STEM education, with 70% saying in 2017 that the federal government should assign a higher priority to that area, **INCREASING TO 77% TODAY.**

IT'S TIME FOR AN URGENT REFOCUS ON SCIENCE

Which statement is closest to your view?



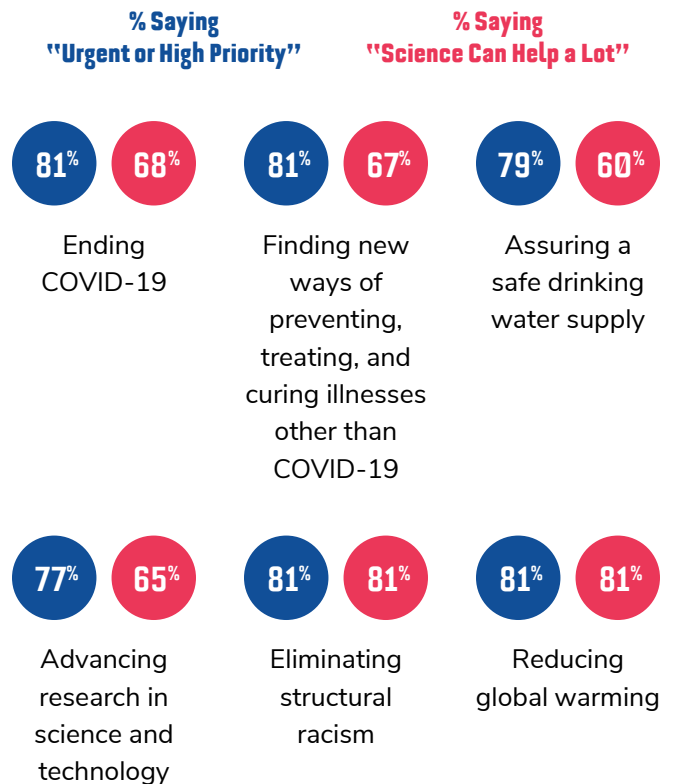
Statement A: The COVID-19 pandemic is a disruptive event and requires urgent refocusing of America's commitment to science.

Statement B: Things will get back to normal soon; we don't need increased efforts in science.

Not sure

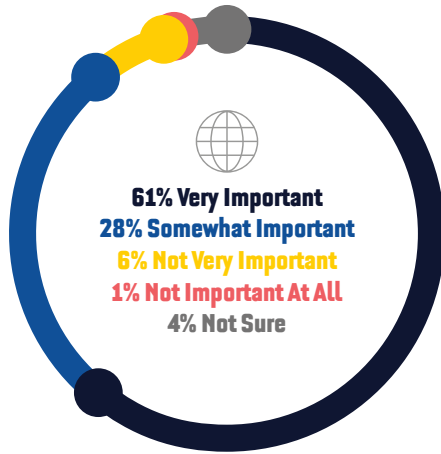
THE UNITED STATES FACES EXISTENTIAL CHALLENGES

How much of a priority are each of the following issues for the United States and how can science, technology, and innovation help address them?



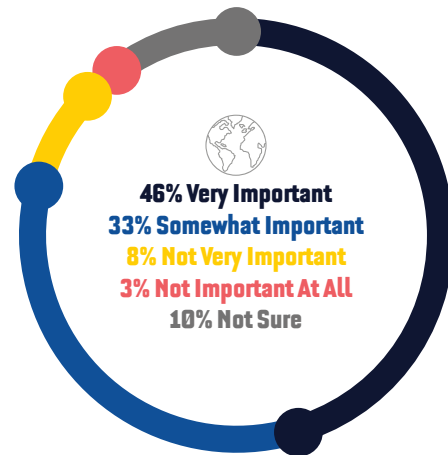
9 OF 10 AGREE U.S. SHOULD BE GLOBAL LEADER IN SCIENTIFIC RESEARCH

How important do you think it is that the U.S. is a global leader in scientific research?



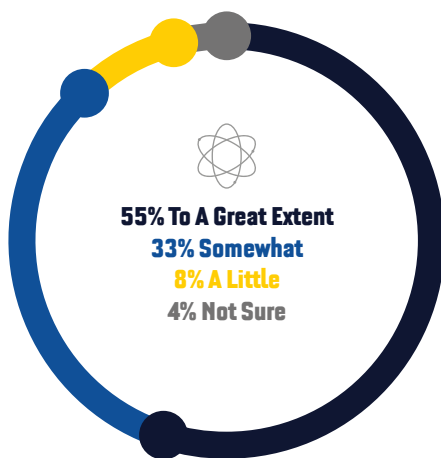
AMERICANS SUPPORT IMPORTANCE OF INCREASING PERCENT GDP ON RESEARCH

Some governments have a goal to spend 3-5% of GDP on research and development, and some, including Japan and Korea, have already met this goal, and others, including China, have pledged to do so. How important do you think it is for the U.S. to achieve this goal?



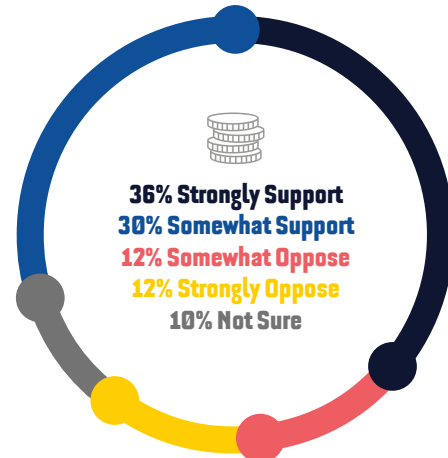
STRONG MAJORITY AGREE THE WORK OF SCIENTISTS BENEFITS THEM

In general, to what extent do you think the work that scientists do benefits you?



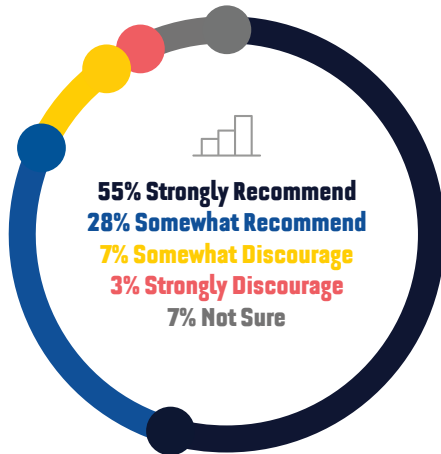
TWO THIRDS OF AMERICANS WOULD PAY MORE IN TAXES FOR MORE SCIENTIFIC RESEARCH

Would you support or oppose paying \$1 more per week in taxes for more scientific research?



AMERICANS SEE A POSITIVE FUTURE FOR SCIENCE FIELDS

Would you recommend or discourage your child, family member, or another young person from entering a science, technology, engineering, or medical field?

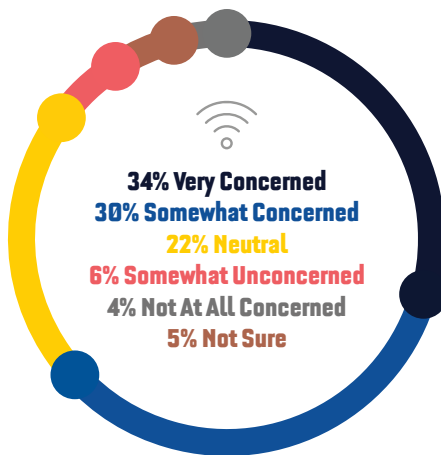


82% STRONGLY OR SOMEWHAT SUPPORT

federally supported scholarships for science, technology, engineering, and math students, so that the nation has a stronger pool of scientific talent.

MANY ARE CONCERNED ABOUT CHILDREN WITHOUT INTERNET ACCESS

How concerned are you about each of the following?
Currently, 14% of children ages 3-18 — about 9.4 million in total — are without home internet access.

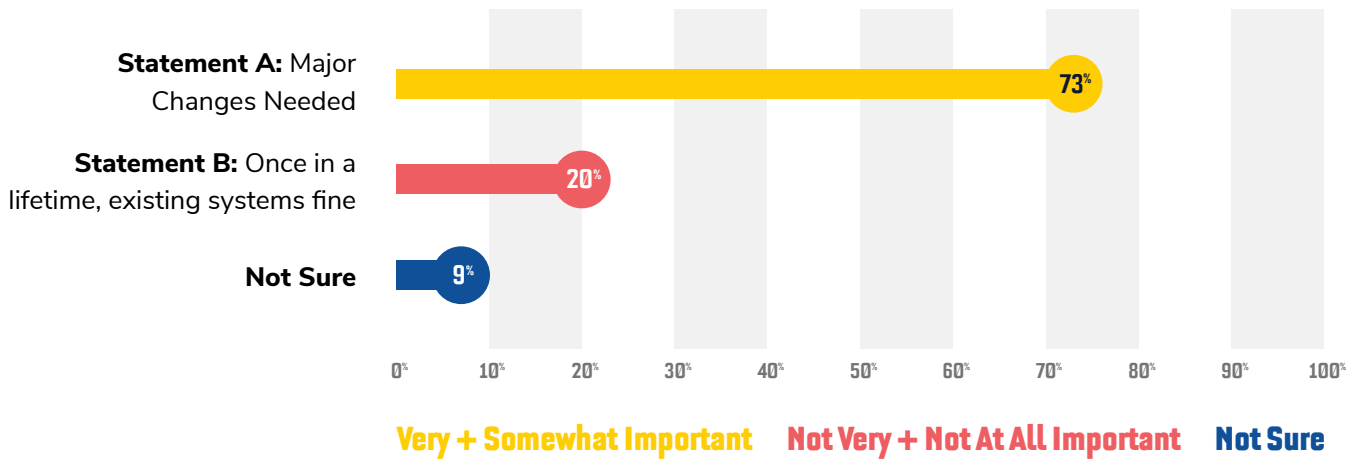


76% STRONGLY OR SOMEWHAT SUPPORT

creating a national cloud computing reserve to ensure that adequate computing power is available.

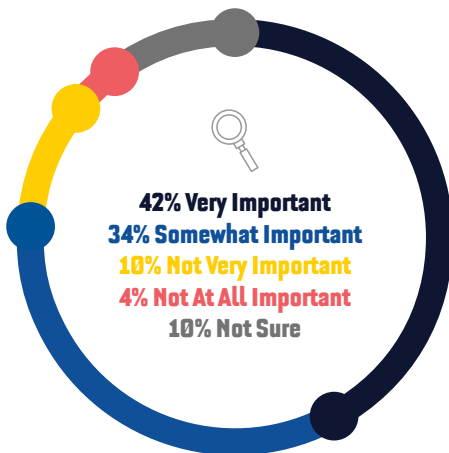
THREE QUARTERS OF AMERICANS AGREE THAT COVID-19 REVEALS NEED FOR MAJOR CHANGES IN PUBLIC HEALTH SYSTEM

Which statement is closest to your view?



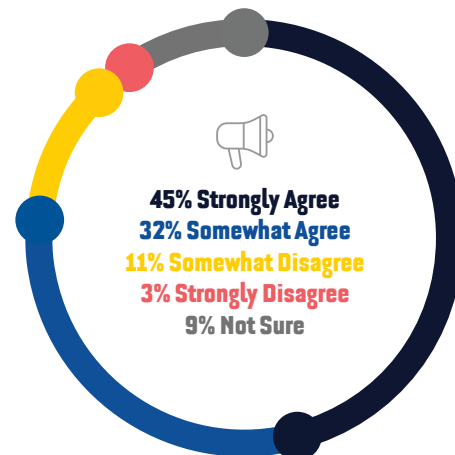
STRONG MAJORITY AGREE THAT BASIC RESEARCH IS IMPORTANT TO PRIVATE SECTOR INNOVATION

How important is basic research funded by the federal government to private sector innovation?



IT'S TIME TO COMMIT TO A MAJOR NEW INITIATIVE TO ASSURE THE HEALTH, SECURITY, AND PROSPERITY FOR THE NATION

To what extent do you agree or disagree that the U.S. is again at a critical point when we need to commit to a major new initiative to assure the health, security, and prosperity for the nation?



This online survey was conducted by Zogby Analytics on behalf of Research!America in August 2020, among 1,025 adults plus 869 additional adults for minority oversampling. For the national sample, the survey has a theoretical sampling error of +/- 3.1 percentage points.

APPENDIX 3

LEGISLATIVE PROPOSALS & CONGRESSIONAL REPORTS

ACCESSIBLE, AFFORDABLE INTERNET FOR ALL ACT

(Funding period: FY2021) — Senator Amy Klobuchar (D-MN) and Representative James E. Clyburn (D-SC)

Funding period: FY2021 — 2025

Invests over \$100 billion to build high-speed broadband infrastructure in unserved and underserved communities and ensure that the resulting internet service is affordable.

CHINA TASK FORCE REPORT

(September 2020) — China Task Force, Chairman Michael McCaul.

Investigation into U.S. policy toward China. Recommendations include doubling the funding of basic science and technology research over the next 10 years; increasing coordination and funding for STEM education to create a more capable, skilled workforce; and strengthening the protection of sensitive research at America's colleges and universities and leading research institutions, which includes restricting all federal employees and contractors from participating in foreign talent programs.

THE CHINA DEEP DIVE A REPORT ON THE INTELLIGENCE COMMUNITY'S CAPABILITIES AND COMPETENCIES WITH RESPECT TO THE PEOPLE'S REPUBLIC OF CHINA

(October 2020).

Catalogues the rise of China onto the global stage along with impressive technological progress in the areas of quantum sciences, challenging U.S. dominance in science and technology. Recommendations include engaging with U.S. Department of Education to layout requirements for the future of the national security workforce.

ENDLESS FRONTIER ACT

Senator Chuck Schumer (D-NY) and Senator Todd Young (R-IN)

Funding period: FY2021 — FY2025

Proposes an expansion of the National Science Foundation (NSF)—to be renamed the National Science and Technology Foundation (NTSF)—and the establishment of a Technology Directorate within NTSF. Authorizes \$100 billion for the Technology Directorate and \$10 billion for establishment of regional technology hubs across the U.S.

LEADS ACT

Senator Chuck Schumer (D-NY) and
Senator Bob Menendez (D-NJ)

Funding period: FY2021 — 2026

Invests over \$350 billion in American businesses, manufacturing communities, federal research and development, STEM education, and training programs. Establishes policies to mobilize all aspects of U.S. national power, including renewing the U.S. diplomatic strategy towards China and Indo-Pacific partners.

RURAL STEM EDUCATION ACT

Representative Frank Lucas (R-OK) and
Representative Eddie Bernice Johnson (D-TX)

Funding period: FY2021 — 2025

Directs the National Science Foundation (NSF) to support research regarding STEM education in rural schools, gives teachers more resources and training in STEM, engages students through hands-on education, and increases access to broadband.

PREPARING FOR THE NEXT

PANDEMIC: A WHITE PAPER

(June 2020) — Senate Committee on
Health, Education, Labor and Pensions,
Chairman Lamar Alexander.

Outlines recommendations to ensure U.S. pandemic preparedness in the following categories: accelerating research and development for tests, treatments, and vaccines; expand ability to detect, identify, model, and track emerging infectious diseases; rebuilding and maintain federal and state stockpiles and improve medical supply surge capacity and distribution; improving state and local capacity to respond; and improving coordination of federal agencies during a public health emergency.

APPENDIX 4

PROPOSALS FROM THE NEW ADMINISTRATION

THE BIDEN PLAN TO ENSURE THE FUTURE IS "MADE IN ALL OF AMERICA"

By All of America's Workers (June 2020). Biden-Harris Campaign.

Funding Period: FY2021-FY2024

Invests \$300 billion in R&D and breakthrough technologies like electric vehicles, lightweight materials, 5G, and artificial intelligence to unleash high-quality job creation in high-value manufacturing and technology. Calls for major increases in R&D spending, at the National Institutes of Health, National Science Foundation, Department of Energy, a new Advanced Research Projects Agency for Health (ARPA-H), and Defense Advanced Research Projects Agency (DARPA). Aims to secure U.S. global leadership in S&T while creating 3 million jobs or more. In addition to these proposals, President-Elect Biden has indicated interest in [**elevating the Director of the White House Office of Science and Technology Policy \(OSTP\) to the Cabinet.**](#)

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