A New Bold Era of American Science and Technology: What We Can Learn and Leverage from EPSCoR

Dr. Kelvin K. Droegemeier
Director, OSTP
October 28, 2019

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AN AMAZING TIME!

➢ No better time in the history of the world than RIGHT NOW!!!
AN AMAZING TIME!

- No better place on the planet than RIGHT HERE!!!
AN AMAZING TIME!
HOW DID WE GET HERE?

SCIENCE THE ENDLESS FRONTIER

Report to the President on a Program for Postwar Scientific Research by Vannevar Bush, Director of OSRD
AMERICA’S MULTI-SECTOR R&D ECOSYSTEM

- Private Industry: $400B
- Academia: $20B
- Non-Profits: $22B
- Government: $150B
WE ARE ENTERING A SECOND BOLD ERA!

- US Department of Energy
- Human Brain Project
- Illumina.com
- Cisco, Inc
- NOAA/NSSL
OSTP MISSION

To ensure America is the world leader in science and technology by:

- Unleashing Discovery and Innovation
- Building the Workforce of the Future
- Advancing America’s Values at Home and Abroad
WHAT SOME TEND TO SEE
WHAT OTHERS TEND TO SEE
WHAT WE NEED TO SEE
HOW DO WE MAKE THE JUMP?
PARTNERSHIPS AND LEVERAGING

Private Industry: $400B
Academia: $20B
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HOW DO WE LOOK BEYOND THE NEXT BUDGET CYCLE?
MEMORANDUM FOR THE HEADS OF EXECUTIVE DEPARTMENTS AND AGENCIES

FROM: RUSSELL T. Vought, Acting Director, Office of Management and Budget

DR. KELVIN K. DROEGEMEIER, Director, Office of Science and Technology Policy

SUBJECT: Fiscal Year 2021 Administration Research and Development Budget Priorities

"We stand at the birth of a new millennium, ready to unlock the mysteries of space, to free the Earth from the minions of disease, and to harness the energies, industries, and technologies of tomorrow."

President Donald J. Trump, 2017 Inaugural Address

America’s rise as the global leader in science and technology (S&T) began shortly after World War II, during which the Federal Government began investing significantly in basic and applied research, infrastructure, and education across many disciplines. From then until now—during America’s First Bold Era in S&T—these Federal investments helped create a massive, multisector American S&T enterprise consisting of Federal agencies, world-leading colleges and universities, private industry, non-profit organizations, and Federal and National Laboratories. The resulting extraordinary discoveries and innovations laid the foundation for today’s Second Bold Era in S&T—one characterized by unprecedented knowledge, access to data and computing resources, ubiquitous and instant communication, and technologies that allow us to peer into the inner workings of atomic particles as well as the vastness of the universe. Unfortunately, this Second Bold Era also features new and extraordinary threats which must be confronted thoughtfully and effectively.

The Trump Administration is firmly committed to continuing American S&T leadership in the Second Bold Era. Success will depend, in large part, on our ability to leverage—in the entirely new and creative partnership and collaborative frameworks—the multisector S&T enterprise that emerged during the First Bold Era. It will depend upon striking a balance between the openness of our research ecosystem and the protection of our ideas and research outcomes. It will depend upon ensuring that our research environments are diverse, safe, inclusive, and accommodating as well as free from unnecessary administrative burdens. Success will depend upon ensuring that research is conducted with integrity and respect, which are foundational not only to the research process, but to the trust placed in the research enterprise by American taxpayers and effective of America’s values.
R&D PRIORITY AREAS

- **American Security**: Advanced military capabilities, critical infrastructure resilience, semiconductors, and critical minerals.

- **Industries of the Future**: Artificial intelligence (AI), quantum information science, 5G connectivity, and advanced manufacturing.

- **Energy and Environmental Leadership**: American energy resources, ocean science and technology, and Earth system predictability.

- **Health and Bioeconomic Innovation**: Biomedicine, bioeconomy, and Veteran health and wellness.

- **American Space Exploration and Commercialization**: In-space resource utilization, manufacturing and assembly, fuel storage and management, and advanced space-related power and propulsion capabilities.
CROSS-CUTTING PRIORITY AREAS

- Build and leverage a diverse, highly skilled American workforce
- Create and support research environments that reflect American values
- Support transformative research of high intellectual risk and potentially high reward
- Leverage the power of data
- Build, strengthen, and expand strategic multisector partnerships
NATIONAL SCIENCE AND TECHNOLOGY COUNCIL

NSTC
Chaired by the President
OSTP Director presides in place of the President

Executive Director

- Committee on Environment
- Committee on Homeland & National Security
- Committee on Science
- Committee on Technology
- Committee on S&T Enterprise
- Committee on STEM Education
NATIONAL SCIENCE AND TECHNOLOGY COUNCIL COORDINATES FEDERAL R&D AND ENGAGES THE BROAD COMMUNITY
SAMPLE POLICY ACCOMPLISHMENTS: SCIENCE

- Quantum Strategic Overview
- Quantum Summit
- Ocean Decadal Vision
- RBM-reducing administrative burdens
- Opioids
- Emerging Contaminants
- Desalination

SUMMARY:

The Office of the Director, National Institutes of Health (NIH), on behalf of the National Science and Technology Council (NSTC); Committee on Science; Fast Track Action Committee on Health Science and Technology Response to the Opioid Crisis (Opioid FTAC), is requesting input on the content of a draft report, “Health Research and Development to Stem the Opioid Crisis: A Federal Roadmap.”
SAMPLE POLICY ACCOMPLISHMENTS: TECHNOLOGY

- Established the Select Committee on AI
- Created a National Strategy for American Leadership in Advanced Manufacturing
- Held the first ever AI Summit
- Executive Order on AI
- Quantum Information Science Bill/National Coordination Office
- Developed Presidential Memorandum on 5G/spectrum
SAMPLE POLICY ACCOMPLISHMENTS: NATIONAL SECURITY

- Near Earth Objects Plan and Workshop
- Critical Minerals
- National Space Weather Strategy and Action Plan
- Space Weather Benchmarks
- Executive Order on National Resilience to EMP
- Presidential Memorandum on Launch of Space Nuclear Systems
- Counter UAS
- Economic and Security Implications Quantum Science (ESIX)
SAMPLE POLICY ACCOMPLISHMENTS: STEM EDUCATION

- Re-chartered the Committee on STEM Education
- National Council for the American Worker
- HBCU Executive Order
- Apprenticeships Executive Order
- Hosted State-STEM Education Summit
- STEM Strategy and Implementation Plan
Skilled Technical Workforce is a key part of our innovation system and economy

350+ companies have pledged to re-skill and up-skill more than 14 million people
Joint Committee on the Research Environment (JCORE)
RESEARCH ENVIRONMENT DEFINITION

Professional research settings including but not limited to laboratories, field sites, institutions, classrooms, conferences and workshops, and any location (physical or virtual) where scholarly colleagues interact.
America Leading the World in Science & Technology

OSTP R&D: Priority Cross-cutting Actions
- Skilled Workforce
- Research Environment
- Leverage Data
- Multisector Partnerships
- Transformative Research

Need for Change

Factors Impacting S&T Leadership
- Integrity
- Security
- Safe & Inclusive Research Environments
- Administrative Burden

Joint Committee on the Research Environment (JCORE)
National Science and Technology Council (NSTC)
Committee on Science
Committee on S&T Enterprise
New NSTC Committee: JCORE

S&T Leadership & Sustained Cultural Change

Joint Committee on the Research Environment (JCORE)
Driving a Culture of American Research Leadership
- Integrity
- Decreasing Administrative Leadership
- Industry
- Academia
- Government
- Non-profit

Safe and Inclusive Environments
- Research Security
- Promoting American Values
September 16, 2019

Letter to the United States Research Community

Dear Colleagues,

As a fellow researcher and former university vice president for research, I know firsthand that the open and internationally collaborative nature of the United States research enterprise has been critical to our success in research, and that this success has underpinned our Nation’s prosperity and security. Indeed, as Americans are the poster children of research itself, namely, the freedom to explore new frontiers, the commitment to openness and transparency through the sharing of methods and results, the ability to debate difficult issues thoughtfully and with civility, and the passion to work with and improve the lives of others. By adhering to these values and operating with due regard to principles of integrity— including reciprocity, openness, and transparency—your work has made America the world leader in science and technology. The Nation is in debt to you.

Yet we must not take our research enterprise or its global leadership position for granted. Over the past several years, some nations have exhibited increasingly sophisticated efforts to exploit, influence, and undermine our research activities and environments. As researchers, we must acknowledge the changing geopolitical and international scientific landscape. United States policies and practices must evolve thoughtfully and appropriately to meet current and future challenges.

The success of our research enterprise is dependent on everyone upholding the principles of research.

Some of these recent efforts to exploit America’s research enterprise have come through foreign government-sponsored talent recruitment programs. Historically, researchers at United States institutions could in many cases participate in a talent program and simultaneously receive both foreign and United States government support. Under some circumstances, this may still be acceptable. However, it has become clear that features of some talent programs are unacceptable and inconsistent with our research values and research principles. Breaches of research ethics, both within talent programs and more generally, include the failure to disclose required information such as foreign funding, unapproved parallel foreign laboratories (so-called shadow labs), affiliations and appointments, and conflicting financial interests. Other inappropriate behaviors include conducting undisclosed research for foreign governments or companies on United States agency time or with United States agency funding, diversion of intellectual property or other legal rights, and breaches of contract and confidentiality in or surreptitious gaming of the peer-review process.

Ultimately, these inappropriate behaviors, whether or not they arise through participation in a foreign talent program, interfere with the allocation of Federal funding to a fair manner based on merit. As a result, these breaches of research security and integrity position others to reap the benefit of your hard work without bearing the associated risks or making the investments borne by American taxpayers and other funders. These activities ultimately undermine the integrity of the research enterprise and, thus, our economic and national security.

As Director of The White House Office of Science and Technology Policy (OSTP), I see a significant opportunity for the Federal government, research institutions, private companies, non-profit organizations, and law enforcement to come together to ensure the integrity and security of the American research enterprise in light of increasing threats. Striking the right balance between openness and security, using a risk-based framework, is especially important.

OSTP plays a unique role in this multi-sector activity by virtue of its formal authority to convene all research funding agencies on matters of policy through the National Science and Technology Council (NSTC). Both OSTP and NSTC engage other elements of the research enterprise as well, and I write here to apprise you of the structure and progress of OSTP and NSTC activities.

Specifically, on May 6 of this year, NSTC, which I chair on behalf of President Donald J. Trump, formally established the Joint Committee on the Research Environment (JCORE). This top-priority committee contains four sub-committees: research security (the main topic of this letter), safe and inclusive research environments, research transparency and integrity, and coordinating administrative requirements for research. Each sub-committee consists of approximately two dozen top leaders across numerous Federal sciences, foreign affairs, and security agencies. These sub-committees collaborate on interrelated issues and are making exceptional progress. Additionally, JCORE is working closely with the Congress, the National Academies of Science, Engineering, and Medicine, private companies, non-profit organizations, and professional associations and societies to inform the work of its four sub-committees.

With regard to research security, JCORE is organizing its work along the following four lines of effort:

• Coordinating outreach and engagement with Federal agencies, academic research institutions, companies, non-governmental organizations, researchers, and students. In order to help relay the nature and scope of the challenges America faces, JCORE is assembling an array of examples in which our research enterprise was exploited or exploited.
• Establishing and coordinating disclosure requirements for participation in the federally-funded research enterprise. Disclosure is a central tenet of research integrity and a key mechanism for ensuring compliance with applicable policies and laws.
• Developing best practices for academic research institutions, in collaboration with academic, professional societies, and other organizations.
• Developing methods for identification, assessment, and management of risk in the research enterprise.

During the next few months, OSTP will be holding meetings at academic institutions across the Nation to converse with researchers and students on matters of research security and other topics within JCORE. I hope you will join in these discussions. Working together, we will ensure that our research environments are safe and inclusive; operate with maximum integrity; protect our research assets in a manner balanced with the openness and international collaboration that have been so critical to our success; and do not sanction researchers, agencies, or institutions with unnecessary administrative work. In doing so, we will ensure America continues to lead the world in science and technology. I look forward to working with you on these important issues!

Sincerely,

Kevin E. Droegemeier

Director
• **Coordinating outreach and engagement** with Federal agencies, academic research institutions, companies, non-governmental organizations, researchers, and students. In order to help relay the nature and scope of the challenges America faces, JCORE is assembling an array of examples in which our research enterprise was exploited or compromised.

• **Establishing and coordinating disclosure requirements** for participation in the federally-funded research enterprise. Disclosure is a central tenet of research integrity and a key mechanism for ensuring compliance with applicable policies and laws.

• **Developing best practices for academic research institutions**, in collaboration with academia, professional societies, and other organizations.

• **Developing methods for identification, assessment, and management of risk** in the research enterprise.
PARTNERSHIPS AND LEVERAGING

Private Industry: $400B
Academia: $20B
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Government: $150B
AMERICA’S FIRST BOLD ERA OF S&T
WITHIN THE ENDLESS FRONTIER

National R&D by Funder
Expenditures in billions, FY 2019 dollars


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PARTNERSHIP OPPORTUNITIES MISSED?

University R&D Funding by Source
expenditures in billions, FY 2018 dollars

HYPOTHESIS: AMERICA CAN OBTAIN A FORCE MULTIPLIER EFFECT BY GREATLY INCREASING ITS PARTNERING ACROSS SECTORS

Private Industry: $400B
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PARTNERSHIPS: EVERYONE AGREES ABOUT THEM

Why Higher Ed and Business Need to Work Together
by Michael D. King
July 15, 2013

Opening Industry-Academic Partnerships
by Chris Tachibana | Apr. 12, 2013, 2:00 PM

Forming collaborations between academia, industry, government agencies, and private organizations can offer benefits to all parties.

Getting the University-Industry Partnership Right … Or Not

Recent significant changes in industry are raising the level of collaboration between the private commercial sector and universities, bringing about a cultural shift in higher education. This deep—but not immediately obvious—shift in important areas of the academy. Maria Klawe, dean of 6 years as a researcher in an industry laboratory and has been ups. She discusses the ramifications of the changing role and explores the resultant opportunities and potential threats.

News Release 18-066

Boeing, National Science Foundation announce partnership for workforce development and diversity in STEM
PARTNERSHIPS: LOCAL TO GLOBAL

U. S. SMALL BUSINESS ADMINISTRATION
Mississippi District Office
210 E. Capitol Street, Suite 900
Jackson, MS 39201
601-965-4378
www.sba.gov/ms

SBA Strategic Alliance with Historically Black Universities and Colleges Initiative

In conjunction with SBA's Office of Strategic Alliance, SBA Regional Administrator Cassius Butts and Mississippi District Director Janita Stewart have signed Strategic Alliance Memorandums (SAMs) with Historically Black College and Universities (HBCUs) in Mississippi in support of minority-owned businesses and youth entrepreneurship.

NSF

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PARTNERSHIPS IN ACADEMIA

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PARTNERSHIPS ACROSS AGENCIES

https://www.nsf.gov/about/partners/fedagencies.jsp
PARTNERING IS BAKED INTO EPSCOR

ABOUT EPSCOR

MISSION

EPSCoR enhances research competitiveness of targeted jurisdictions (states, territories, commonwealth) by strengthening STEM capacity and capability.

VISION

EPSCoR envisions its jurisdictions as recognized contributors to the national and global STEM research enterprise.

GOALS

- Catalyze research capability across and among jurisdictions;
- Establish STEM professional development pathways;
- Broaden participation of diverse groups/institutions in STEM;
- Effect engagement in STEM at national and global levels; and
- Impact jurisdictional economic development.

NSF-wide

EPSCoR Research Infrastructure Improvement Program: Track-2 Focused EPSCoR Collaborations (RII Track-2 FEC)

CONTACTS
PARTNERSHIPS: WHY?

• Because they allow us to do something we otherwise could not do

• They bring important resources to the table
  • People
  • Facilities
  • Ideas
  • Money
  • Reputation
  • Linkages
PARTNERSHIPS: THE KEY ELEMENTS

• Mutual need
• Mutual benefit
• Mutual trust
• Effective management
GREAT EXAMPLES, BUT ARE WE MISSING OPPORTUNITIES?

10 Case Studies of High-Value, High-Return University-Industry Collaborations

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The International Food Safety Training Laboratory: A Partnership that Improves the Safety of Food Globally ................................................................. 28
What Do Companies Need/Want?

- Workforce
- Facilities/Infrastructure
- Capital Incentives
- Tax and Other Incentives
- Land
- Corporate-Friendly Policies/Laws
- Technology
- Raw Materials/Suppliers
- Transportation
- Quality of Life/Culture/Community
- To be Good Corporate Citizens
- Others...

From the Oklahoma Access for Success Concept
What Do Colleges & Universities Need/Want?

- Jobs for graduates
- Internships for students
- Funding & practical uses for research
- Projects for capstone projects/service learning
- An ability to show practical value to stakeholders, including with regard to community engagement
- Philanthropic support
- A clear ROI for state funding
- Input about future directions/needs
- Other...

From the Oklahoma Access for Success Concept
Program Elements

- Access to Consultants (A2C)
- Access to Data (A2D)
- Access to Entrepreneurs (A2E)
- Access to Interns/Apprenticeships (A2I)
- Access to Facilities (A2F)
- Access to Opportunities (A2O)
- Access to Partnerships (A2P)
- Access to Research (A2R)
- Access to Technology (A2T)
- Access to Workforce (A2W)

From the Oklahoma Access for Success Concept
PARTNERSHIPS FOR HBCU LEADERSHIP

• Create deep, mutually beneficial, trusting, and **sustainable partnerships** between HBCUs and private for-profit companies
  • Contribute to local and regional **job growth and economic development**
  • Substantially advance the research, educational and public service **mission and public view of HBCUs**
  • **Make HBCUs the go-to place** where private sector interests obtain transformative ideas, professional expertise, informal consultation, business-critical data, access to unique facilities, a highly educated and diverse workforce, and research outcomes that drive innovation
PROGRAM ELEMENTS

• Access to HBCU Faculty and Students as Contract Consultants and to Company Professionals and Researchers as Loaned Consultants
• Access to HBCU and Corporate Data Sets and Data Analytics Capabilities
• Access to HBCU Entrepreneurs and Company Intrapreneurs
• Access to HBCU Students for Internships/Apprenticeships and to Company & Federal Lab Faculty Externships
• Access to and Leveraging HBCU Facilities
• Access to and Creating Opportunities Uniquely Afforded HBCUs
• Access to HBCUs for Public-Private Partnerships
• Access to and Strengthening HBCU Research Capabilities
• Access to HBCU Technology for Startups, Investment and Licensing
• Access to HBCU Students as Workforce of the Future
ISSUES FOR CONSIDERATION

• Appropriate **value recognition/credit** for participants
• Sharing of practices and policies in consulting and **conflict of interest** for institutions that don’t have them
• **Inventory** of available facilities and other assets
• Staff who will provide **administrative support** to the program, including research administration
• **Marketing** the partnerships program
SOME MEASURES OF SUCCESS

- Greatly increased numbers of students serving in internships, apprenticeships and faculty serving in externships
- More effective portrayal of workforce availability to the private sector, including STEM-capable individuals
- Faculty and students working on R&D projects relevant to private company needs, including as consultants
- Much greater use of university facilities by private companies
- Greater alignment between higher education curricular priorities and local and state workforce needs
- Development and adoption of local and state strategies to strengthen HBCU research, tech transfer and commercialization, returning greater local value
SOME MEASURES OF SUCCESS

• More students staying in state and actually **becoming entrepreneurs**
• An increase in the number of **startup** companies
• **Increased capture** of companies wishing to locate in the HBCU city/state
• Much better **understanding**, and greater **visibility**, of the **value and practical benefits** of HBCUs beyond simply awarding degrees
• Greater amount of **public and private capital** attracted to institutions, faculty, staff and students
OSTP ACTIVITIES IN PARTNERSHIPS

• Interagency roundtable on October 31
• Meeting at Stanford with UIDP on December 3
• National Multi-Sector Summit early next year
• Other…