# HBCUs:

## *America's Innovative Asset*


**30 July 2020**
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**VP for Research**
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**202-274-7443**

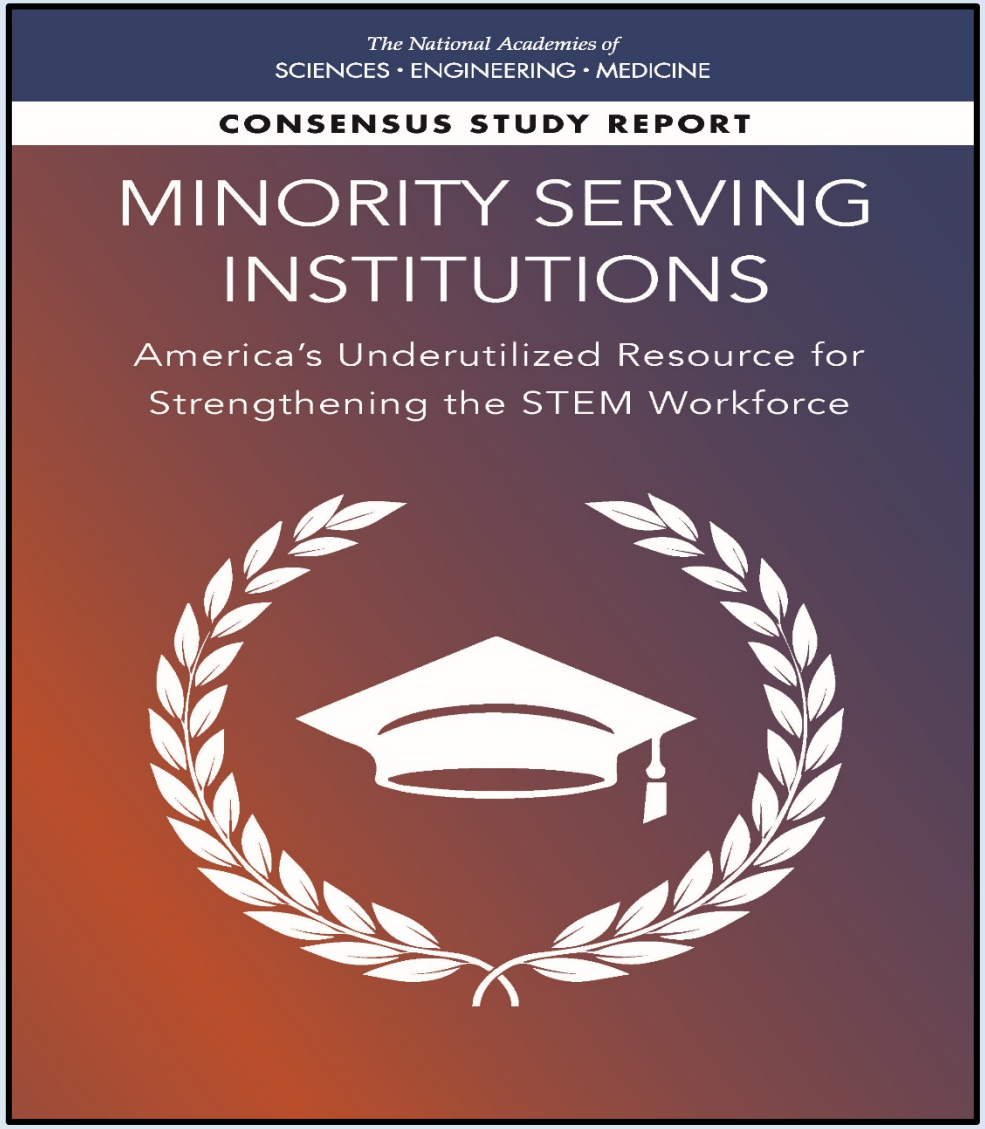

UNIVERSITY OF THE DISTRICT OF COLUMBIA
1851

# MINORITY SERVING INSTITUTIONS:

America's Underutilized Resource for Strengthening the STEM Workforce

Free report available at:

https://www.nap.edu/catalog/25257




The National Academies of | SCIENCES ENGINEERING MEDICINE

# Authoring Committee

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# MSI Types

- Historically Black Colleges and Universities (HBCUs)
- Tribal Colleges and Universities (TCUs)
- Hispanic-Serving Institutions (HSIs)
- Asian American and Native American Pacific Islander-Serving Institutions (AANAPISIs)
- Alaska Native-Serving and Hawaiian Serving(ANNHIs)
- Predominately Black Institutions (PBIs)
- Native American-Serving Nontribal Institutions (NASNTIs)

# Contributions and Reach

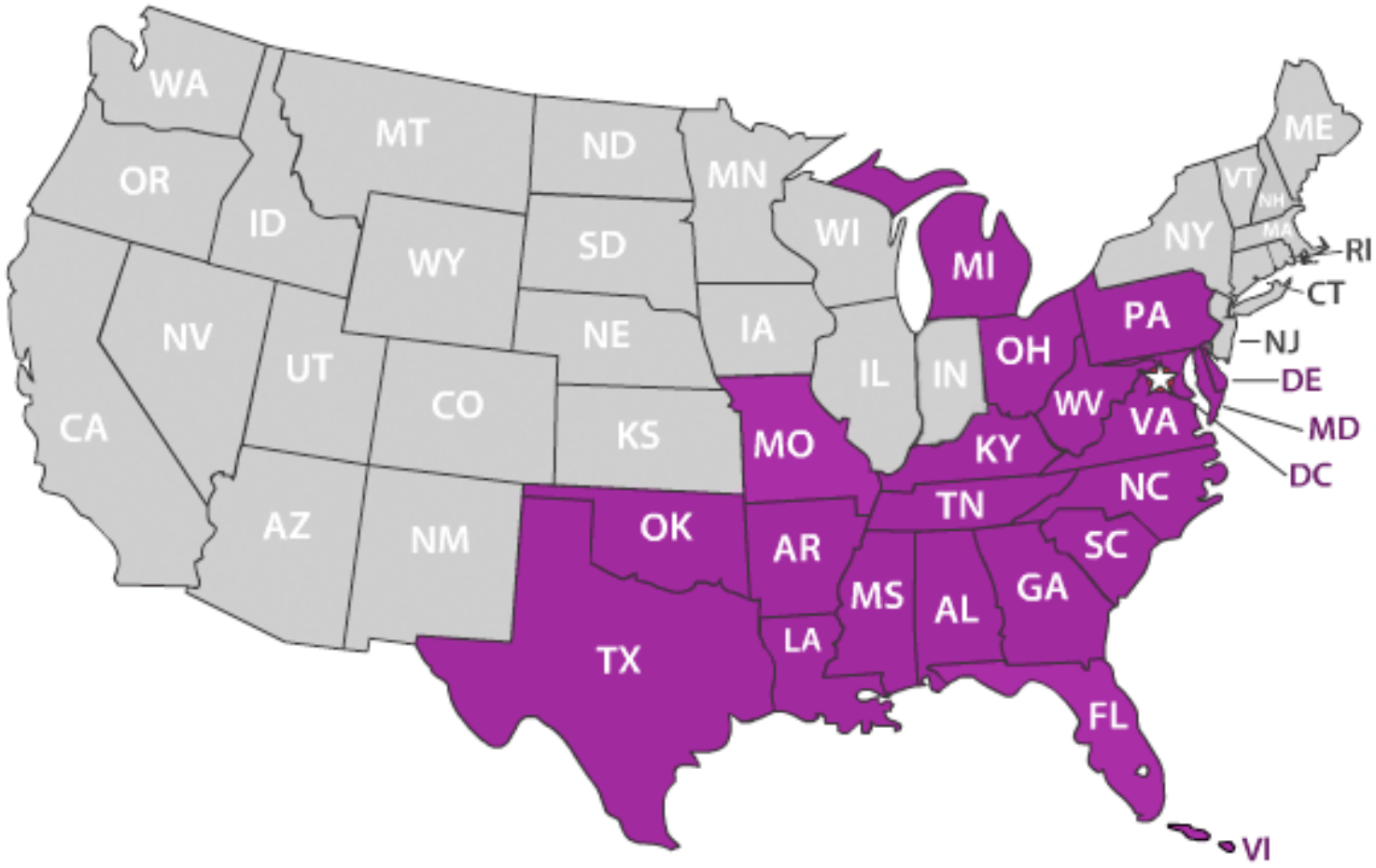
- Roughly 700 two- and four-year colleges and universities, enrolling nearly 30 percent of all undergraduates in U.S. higher education
- Constitute nearly a third of all two-year institutions or looked at another way, over half of all MSIs are two-year institutions
- More undergraduate students (from all backgrounds) are enrolled in STEM fields at four-year MSIs than at four-year non-MSIs
- Taken together, HBCUs, HSIs, and AANAPISIs produce one fifth (20%) of the nation's STEM bachelor's degrees

# HBCU: *Fast Facts**


- **101 Accredited HBCUs**
- **HBCUs are 3% of the Nation's Colleges & Universities**
- **HBCUs enroll 10% of the Nations Black students (300,000)**
- **HBCUs produce 20% of all Black graduates**
- **HBCUs generate $14.8B in economic impact**
- **HBCUs account for 24% of Blacks in STEM fields (30% in engineering at the bachelors level)**
- **The top eight institutions which produced Blacks who went on for STEM PhDs were HBCUs**

** Source: UNCF*

# HBCUs: *Where Are They Located*



| University | Carnegie Designation 2020 | Moody's Rating | Research Expenditures (2018) | NSF* Expenditures (2018) | NSF* Expenditures (2016) | Endowment (2016-2019) |
|---|---|---|---|---|---|---|
| **Clark-Atlanta** | R2 | Ba2 | **$8M** | **$1.9M** | **$1.5M** | $69M |
| **Delaware State** | R2 | Aa3 | **$21M** | **$3.3M** | **$5.4M** | $28.6M |
| **FAMU** | R2 | Baa1 | **$40M** | **$3.0M** | **$2.4M** | $98M |
| **Hampton** | R2 | Aa2 | **$14M** | **$3.2M** | **$3.8M** | $263.2M |
| **Howard** | R2 | Ba1 | **$46M** | **$6.7M** | **$7.8M** | $692.8M |
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| **Texas Southern** | R2 | Baa3 | **$4M** | **$0.5M** | **$0.8M** | $54M |
| **UDC** | **M2** | **Aaa** | **$2.9M (FY19 = $4.8M)** | **$0.86M (FY19=$1.014M)** | **$0.86M** | **$51M (FY19)** |
| **UMES** | R2 | Aa1 | **$5M** | **$0.0M** | **$0.0M** | $26.2M |

**** Source: National Science Foundation FY18 HERD Survey***

# ABET ACCREDITED ENGINEERING HBCUs

- Alabama A&M University (M1)
- Florida A&M University (R2)
- Hampton University (R2)
- Howard University (R2)
- Jackson State University (R2)
- North Carolina A&T State University (R2)
- Morgan State University (R2)
- Norfolk State University (M2)
- Prairie View A&M University (M1)
- Southern University & A&M College (M1)
- Tennessee State University (R2)
- Tuskegee University (M2)
- University of the District of Columbia (M2)
- University of Maryland – Eastern Shore (R2)
- Virginia State University (M2)

National Aeronautics and Space Administration

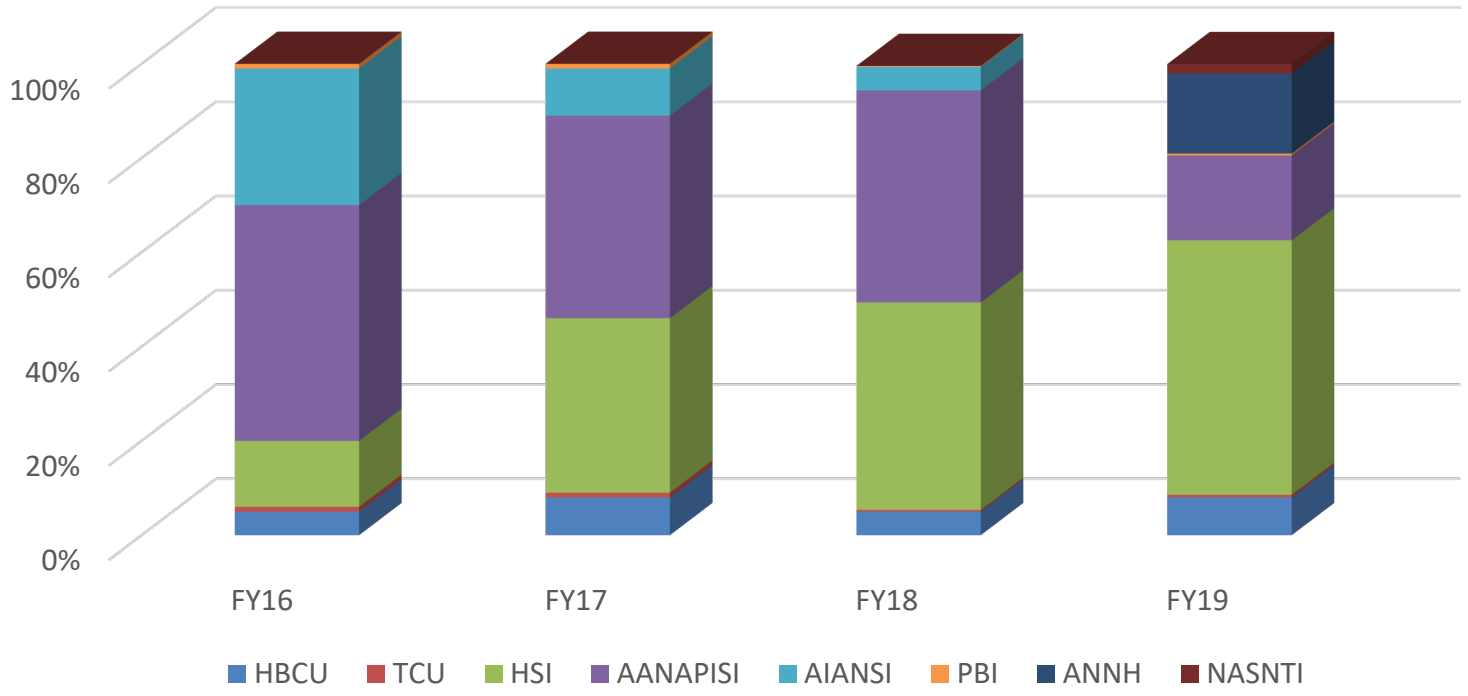
INSPIRE - ENGAGE - EDUCATE - EMPLOY
The Next Generation of Explorers

# NASA and MUREP Investments and Engagement at Historically Black Colleges and Universities

## Investment FY 2016 – FY 2018 / Engagement FY 2019 – FY2020

# Funding from Agency to MSIs (By Institution Type)

*Out of the **AGENCY** dollars that went to all MSIs, what percentage went to each MSI type?*




| | HBCU | TCU | HSI | AANAPISI | AIANSI | PBI | ANNH | NASNTI |
|---|---|---|---|---|---|---|---|---|
| **FY16** | 5% | 1% | 14% | 50% | 29% | 1% | 0% | 0% |
| **FY17** | 8% | 1% | 37% | 43% | 10% | 1% | 0% | 0% |
| **FY18** | 5% | 0.35% | 44% | 45% | 5% | 0.20% | 0% | 0% |
| **FY19** | 8% | 0.54% | 54% | 18% | 0% | 0.40% | 17% | 2% |

Note: ANNH and NASNTI did not exist as a separate category in 2018.
This chart further analyzes the funds that were awarded to the Minority Serving Institutions (MSIs) by MSI type.

National Aeronautics and
Space Administration

INSPIRE - ENGAGE - EDUCATE - EMPLOY

The Next Generation of Explorers

# MUREP FY2019 – FY2020 Engagement at HBCUs

# MUREP HBCU ENGAGEMENT

## CIAA Conference Support


President/Chancellor Meetings
Middle School Day
High School Day
Career Fair
Exhibit Booth

## White House Initiative on HBCUs

Interagency Working Group
Student Engagement
Strategic Planning
Training Workshops/Sessions
Networking

## NASA Aeronautics Research Mission Directorate (ARMD)


Two MUREP HighVolume Awardees –
Tuskegee/Virginia State;
New Lead HBCU – North Carolina A&T
Additional Funding Opportunities

# MUREP HBCU ENGAGEMENT

## MSI Capability Gateway


https://msigateway.larc.nasa.gov/

Externally Available
Database of MSIs
Listing of Research Capabilities
Searchable by HBCU

## HBCU/MSI Road Tour

Agency 1% Contracting Goal for MSIs
Training Workshops
Networking
Matchmaking

## MUREP Institutional Research Opportunity (MIRO)

Seven HBCUs funded
out of 20 Existing Awardees

# School of Engineering and Applied Sciences - Research

## *Recent Awards*

NIST National Institute of Standards and Technology U.S. Department of Commerce

**Professional Research Engagement Program (PREP)**
**$7M for 5 years**
**Advanced Manufacturing**

**Center of Research Excellence in Science & Technology (CREST)**
**$4.8M for 5 years**
**Nanotechnology Research & Education**

**Center for Advanced Manufacturing in Space Technology & Applied Research**
**$3M for 3 years**
**Advanced Manufacturing**

**AMP3 Additive Manufacturing Post Processing Partnership**
**$2.8M for 3 years**
**UDC-led HBCU Consortium**

UNIVERSITY OF THE DISTRICT OF COLUMBIA
SCHOOL OF ENGINEERING AND APPLIED SCIENCES

# NASA External Advisory Committee Meeting February 7, 2020

EAC Lead, **Dr. Henry Molintas**, Lead Mechanical Engineering for Department of Defense Innovation Program, Booz Allen Hamilton

**Dr. Jack Price**, Director of Research, Naval Surface Warfare Center, West Bethesda, MD

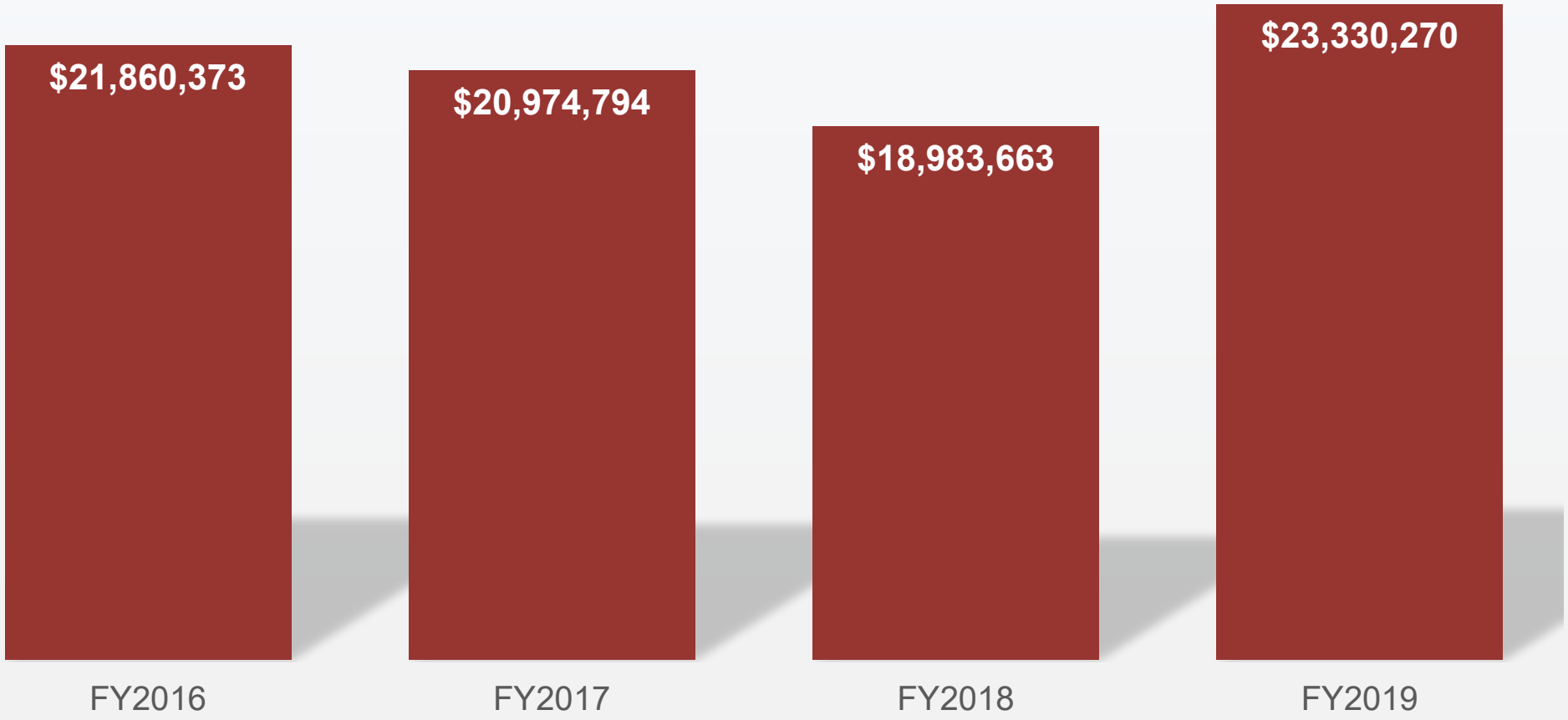
**Susan E. Dunnings**, the Vice President and Associate General Counsel, Employment and Labor Law, for Lockheed Martin in Bethesda, Maryland

**Walter Falconer**, President of Space Consultant, member of the NOAA Science Advisory Board as well as the NASA JPL Science Advisory Board

**Patrick Hill**, Parker Solar Probe project manager, Space Department, Johns Hopkins University Applied Physics Laboratory

**Michelle Pourciau**, Former Director, Department of Transportation, Baltimore, MD

# TOTAL VALUE OF AGENCY AWARDS TO HBCUS




*FY2019 data is preliminary



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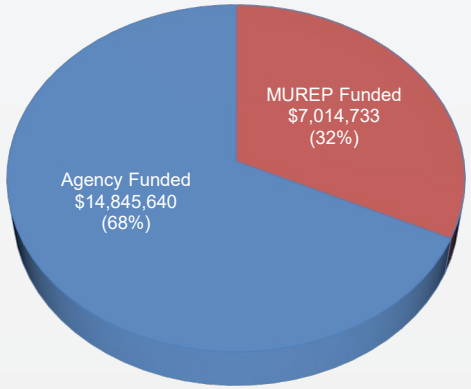
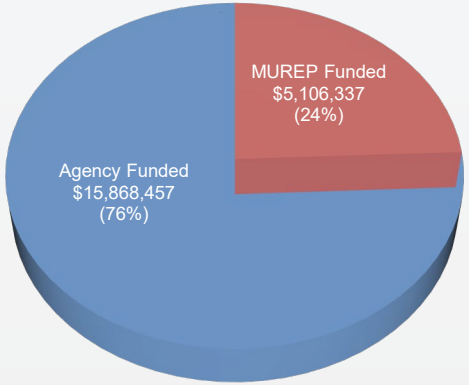
# MUREP CONTRIBUTION TO HBCU AWARDS

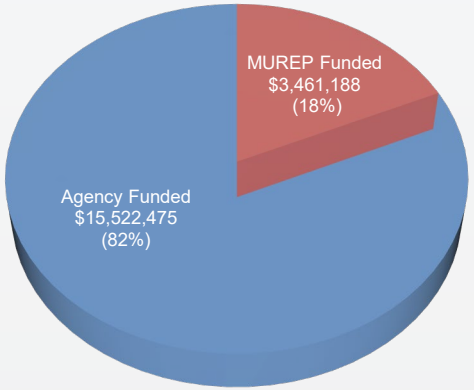
## FY2016



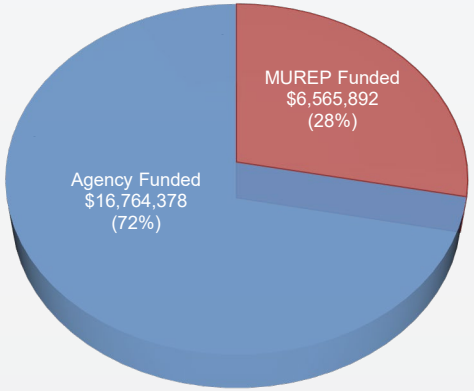

## FY2017




## FY2018

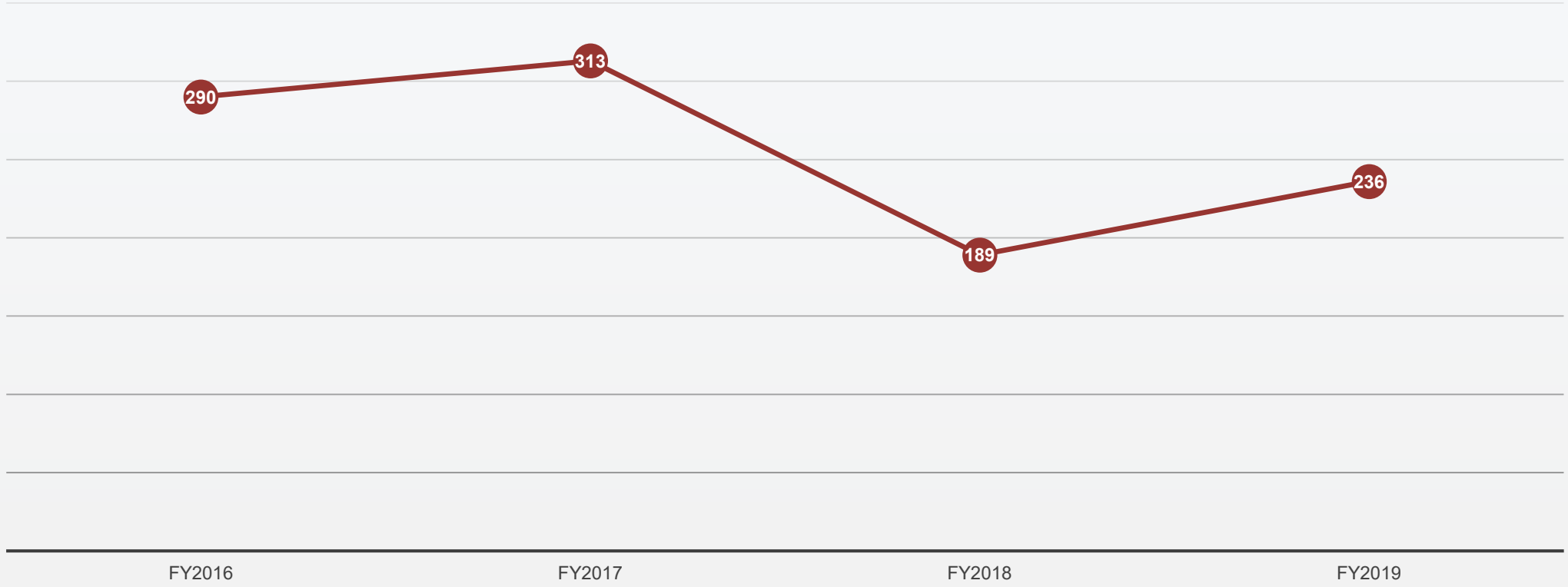



## FY2019




**FY2019 data is preliminary*

# NUMBER OF AGENCY AWARDS TO HBCUS

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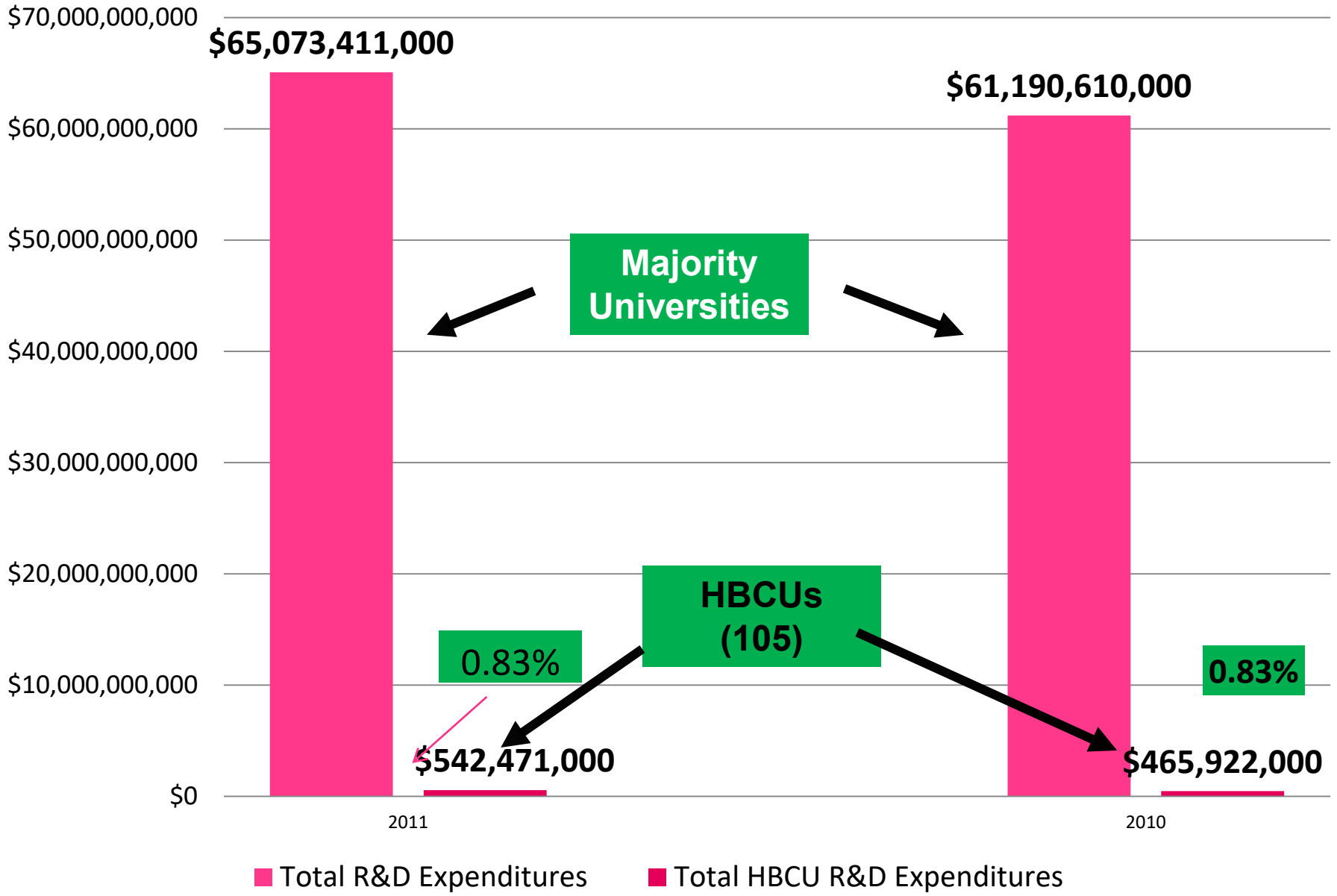
# Total U.S. R & D Expenditures in 2010 and 2011




*source: J. Lee, Association of Public & Land Grant Universities*

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| FAMU | R2 | Baa1 | $40M | $3.0M | $0.083M | $98M |
| Hampton | R2 | Aa2 | $14M | $3.2M | $5.6M | $263.2M |
| Howard | R2 | Ba1 | $46M | $6.7M | $0.25M | $692.8M |
| Jackson State | R2 | Aa2 | $19M | $6.5M | $0.15M | $60M |
| North Carolina A&T | R2 | A1 | $38M | $8.6M | $0.3M | $57M |
| Morgan State | R2 | A1 | $13M | $1.0M | $4.4M | $32.9M |
| Tennessee State | R2 | Aa1 | $18M | $1.7M | $0.065M | $51M |
| Texas Southern | R2 | Baa3 | $4M | $0.5M | $0.050M | $54M |
| UDC | M2 | Aaa | $2.9M (FY19 = $4.8M) | $0.86M (FY19=$1.014M) | $0.033M (FY19= $0.0M) | $51M (FY19) |
| UMES | R2 | Aa1 | $5M | $0.0M | $0.0M | $26.2M |

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|---|---|---|---|---|---|
| Johns Hopkins | R1 | $2.2B | $39M | $264M | $6.3B |
| U. Wash. | R1 | $989M | $111M | $20M | $2.94B |
| U. Michigan | R1 | $850M | $81M | $29M | $12.4B |
| Stanford | R1 | $711M | $76M | $22M | $28B |
| UNC Chapel Hill | R1 | $701M | $35M | $1.8M | $5B |
| U. Penn | R1 | $688M | $45M | $4.6M | $14.7B |
| Columbia | R1 | $686M | $87M | $21M | $11B |
| UC San Francisco | R1 | $669M | $7.7M | $0.5M | $3.89B |
| Georgia Tech | R1 | $654M | $66M | $12.8M | $2.17B |
| U. Pittsburgh | R1 | $649M | $27.4M | $1.1M | $4.3B |
| Duke | R1 | $645M | $38M | $2.5M | $3.8B |
| UC San Diego | R1 | $636M | $82M | $10M | $1.73B |

** Source: National Science Foundation FY18 HERD Survey*

# NATIONAL SCIENCE BOARD


## NSB Vision 2030 Task Force:

Roger Beachy, Chair
Ellen Ochoa, Vice Chair
Vicki Chandler
Bob Groves
Julia Phillips
Maria Zuber

**nsf.gov/nsb/publications/vision2030.pdf**

**NSBVision@nsf.gov**

# FOCUS ON THE FUTURE: NSB ROADMAP

**DELIVER BENEFITS FROM RESEARCH**

**DEVELOP STEM TALENT FOR AMERICA**

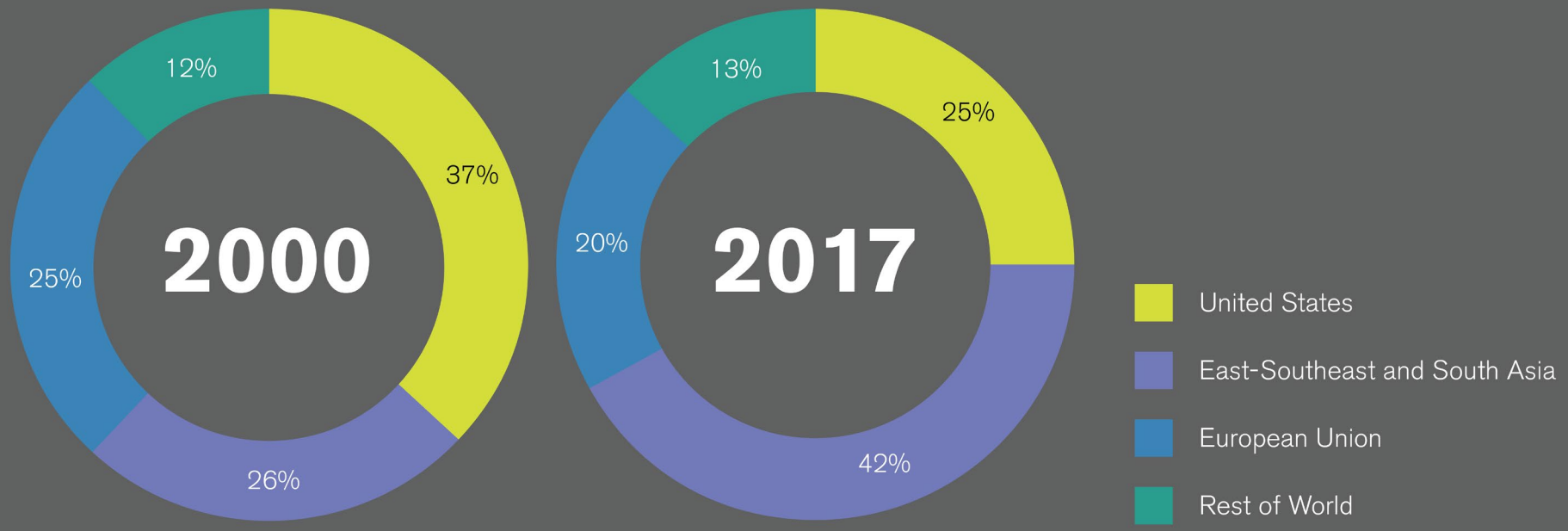
**EXPAND THE GEOGRAPHY OF INNOVATION**

**FOSTER A GLOBAL S&E COMMUNITY**

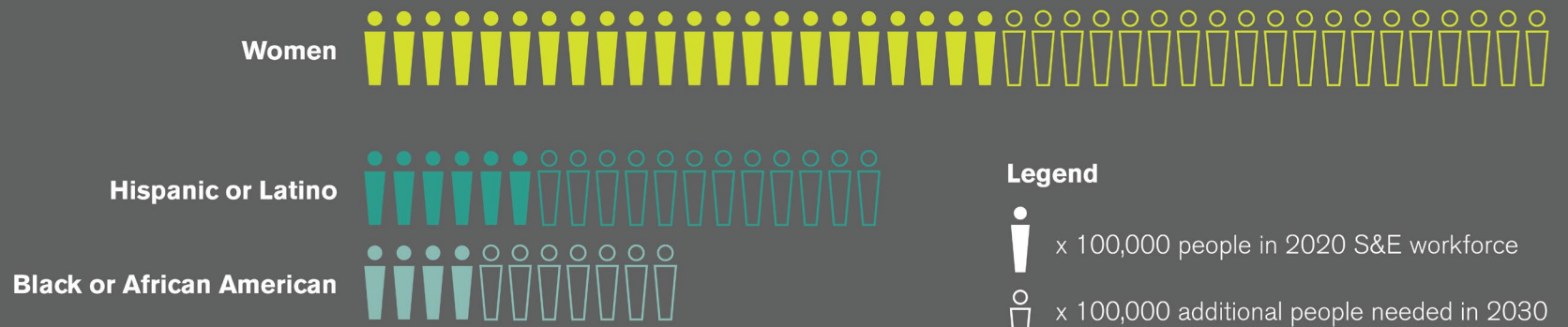
# DEVELOP STEM TALENT FOR AMERICA

The U.S. must make education a federal, state, and local priority and hold itself accountable with reliable, up-to-date data.

# CONTEXT: U.S. SHARE OF R&D DECREASING AS GLOBAL S&E GROWS



# MISSING MILLIONS: FASTER PROGRESS IN INCREASING DIVERSITY NEEDED TO REDUCE SIGNIFICANT TALENT GAP




While the number of people from under-represented groups in the S&E workforce has grown over the past decade, faster increases will be needed for the S&E workforce to be representative of the U.S. population in 2030. To achieve that goal, the NSB estimates that the number of women must nearly double, Black or African Americans must more than double, and Hispanic or Latinos must triple the number that are in the 2020 U.S. S&E workforce. These 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.



# The Skilled Technical Workforce: Crafting America's Science & Engineering Enterprise

*Victor McCrary, VP for Research & Graduate Programs,*
*University of the District of Columbia; Vice-Chair, National Science Board*

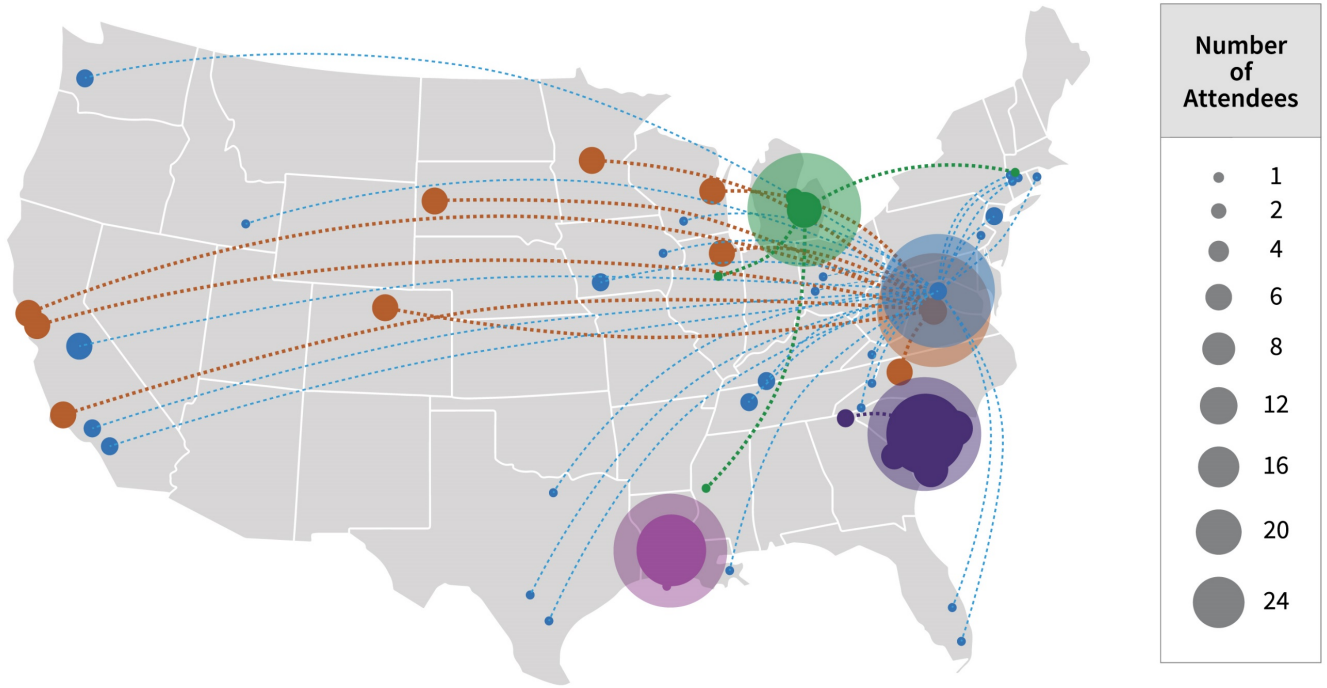
UNIVERSITY OF THE DISTRICT OF COLUMBIA 1851

National Science Board

# Why is NSB Focusing on the STW?

- Increased need for S&T skills and knowledge across many sectors and at all educational levels
- National prosperity and security in a competitive, S&T-intensive world
- Long-term health of the U.S. S&E enterprise
- Near-term workforce needs
- Opportunities for all Americans

# LISTENING SESSION & PARTICIPANT LOCATIONS




* Translucent circles represent listening session locations
* Solid circles represent attendee locations

### Advanced Technological Education Conference
Washington, D.C. - 45 Attendees, 31 Participant Locations

- Academia - 45

### Community College Innovation Challenge
Alexandria, Virginia - 56 Attendees, 10 Participant Locations

- Academia - 45
- Industry - 1

### Florence Darlington Technical College
Florence, South Carolina - 40 Attendees, 9 Participant Locations

- Academia - 20
- Industry - 14
- Government - 2
- Non-Profit - 4

### Macomb Community College
Warren, Michigan - 22 Attendees, 10 Participant Locations

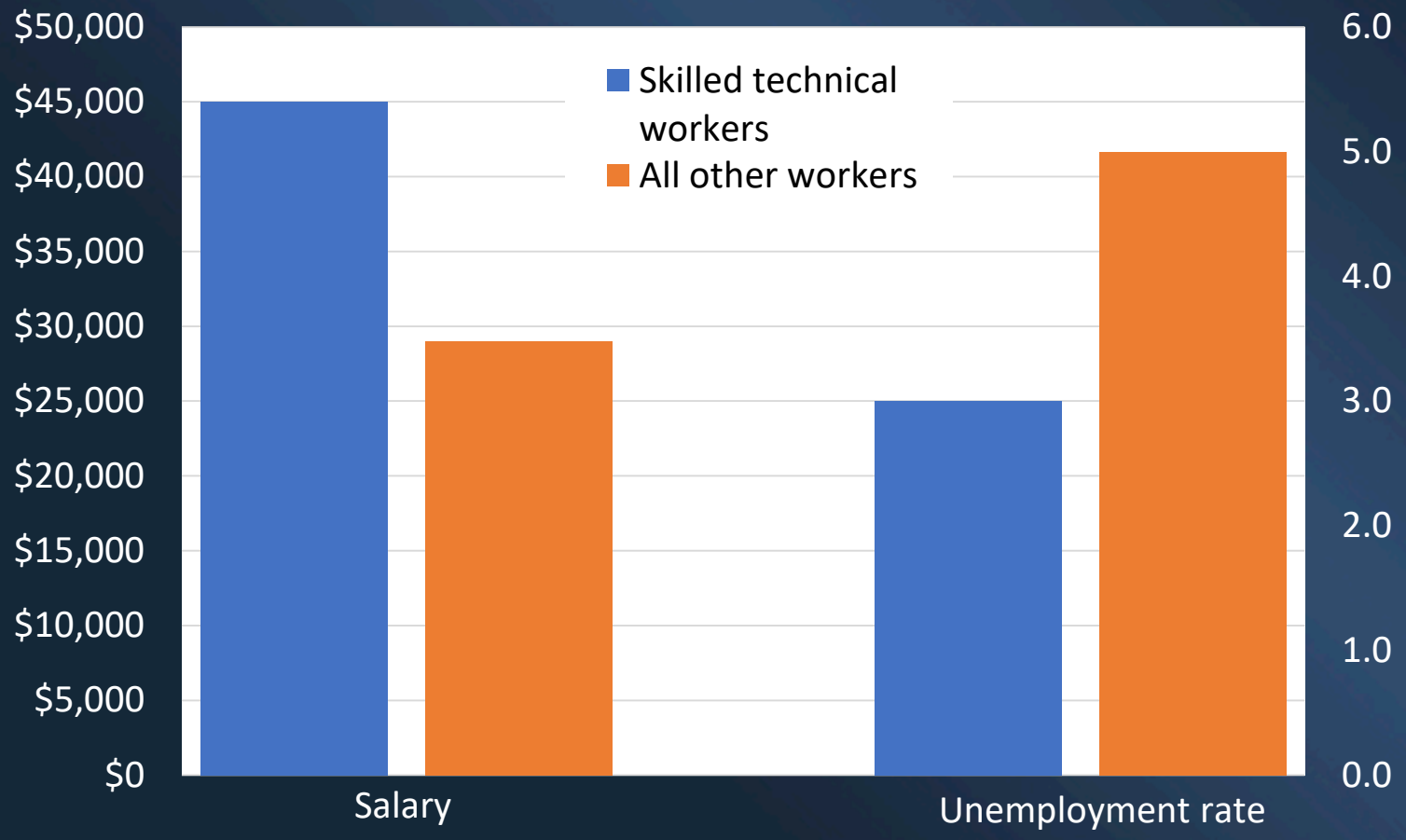
- Academia - 10
- Industry - 8
- Government - 3
- Non-Profit - 1

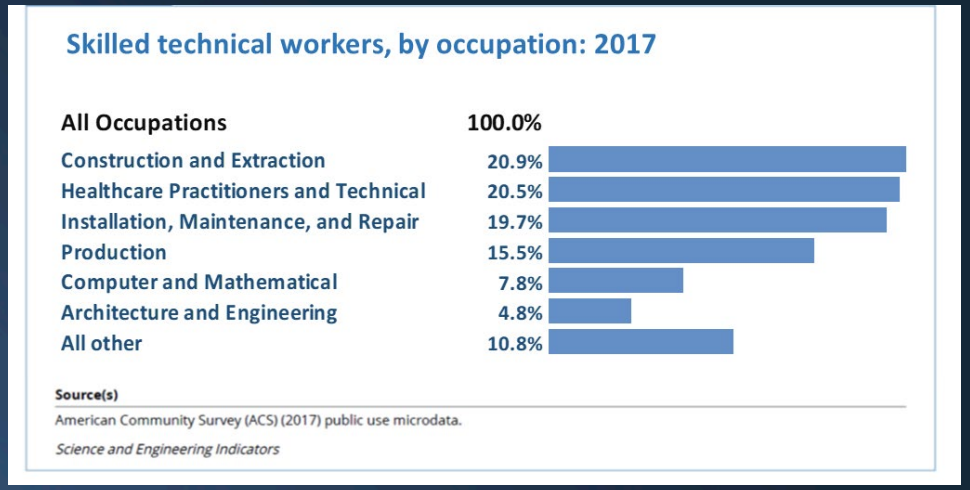
### Baton Rouge Community College
Baton Rouge, Louisiana - 21 Attendees, 2 Participant Locations

- Academia - 12
- Government - 5
- Non-Profit - 4

# STW Data Portrait

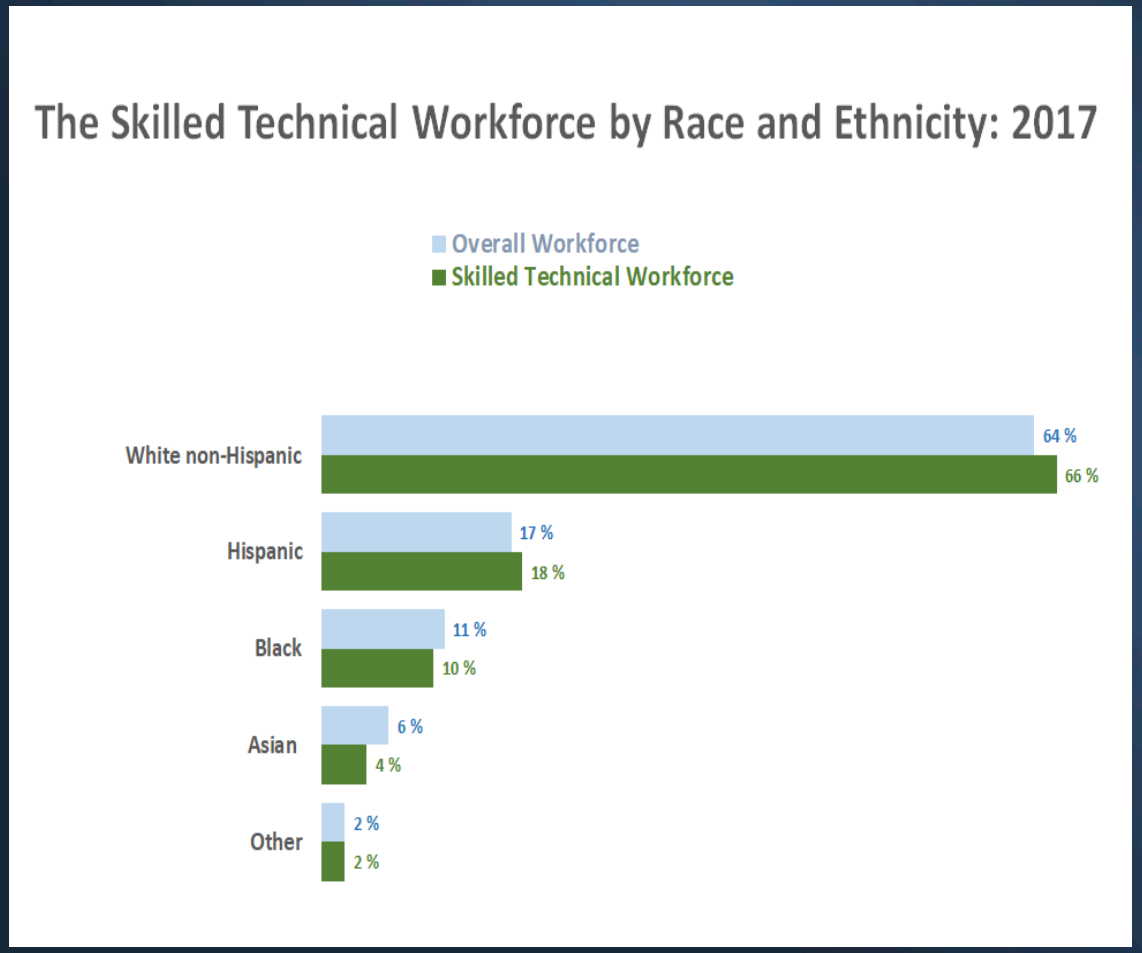
Workers with high school or some post-secondary training: 2017

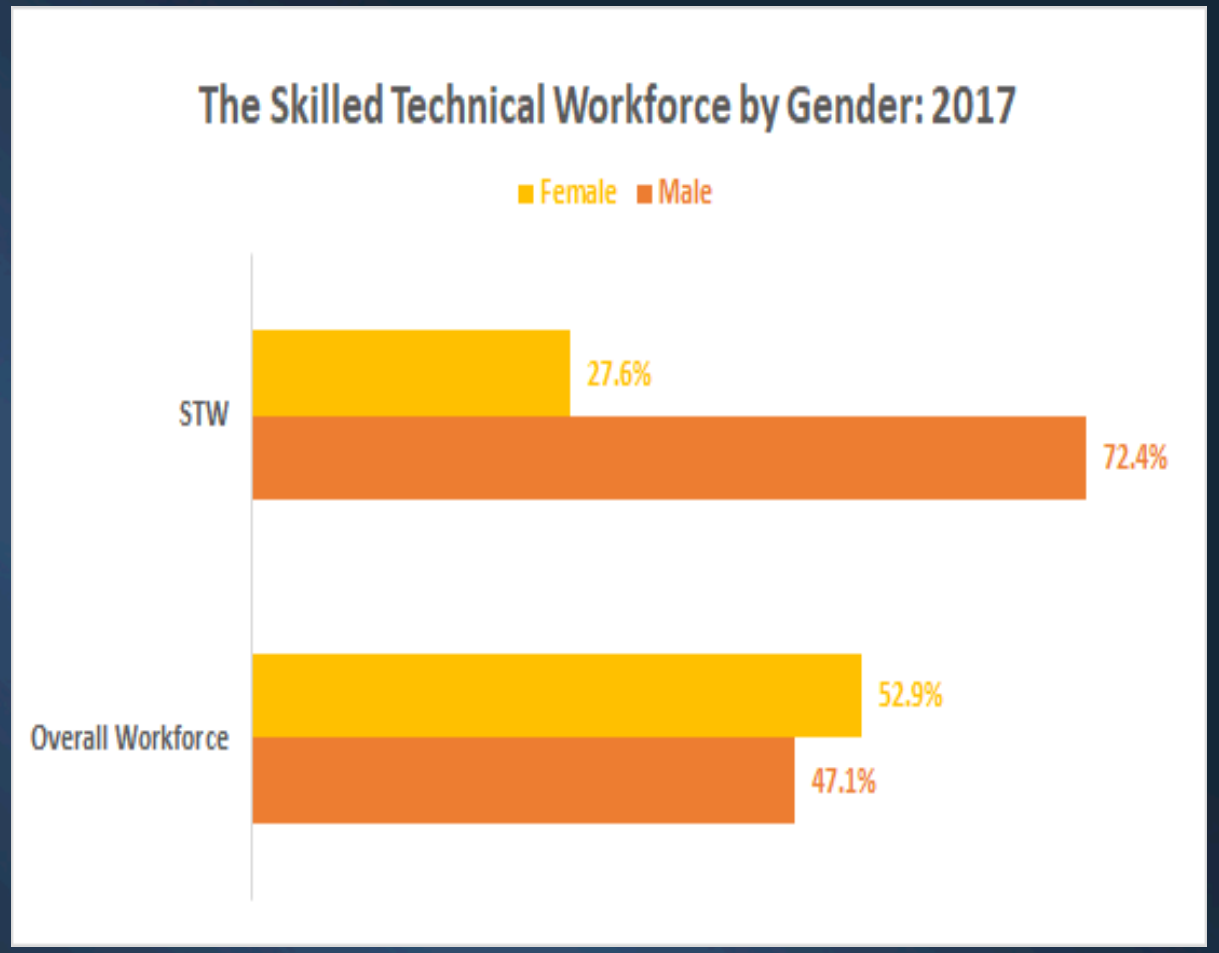


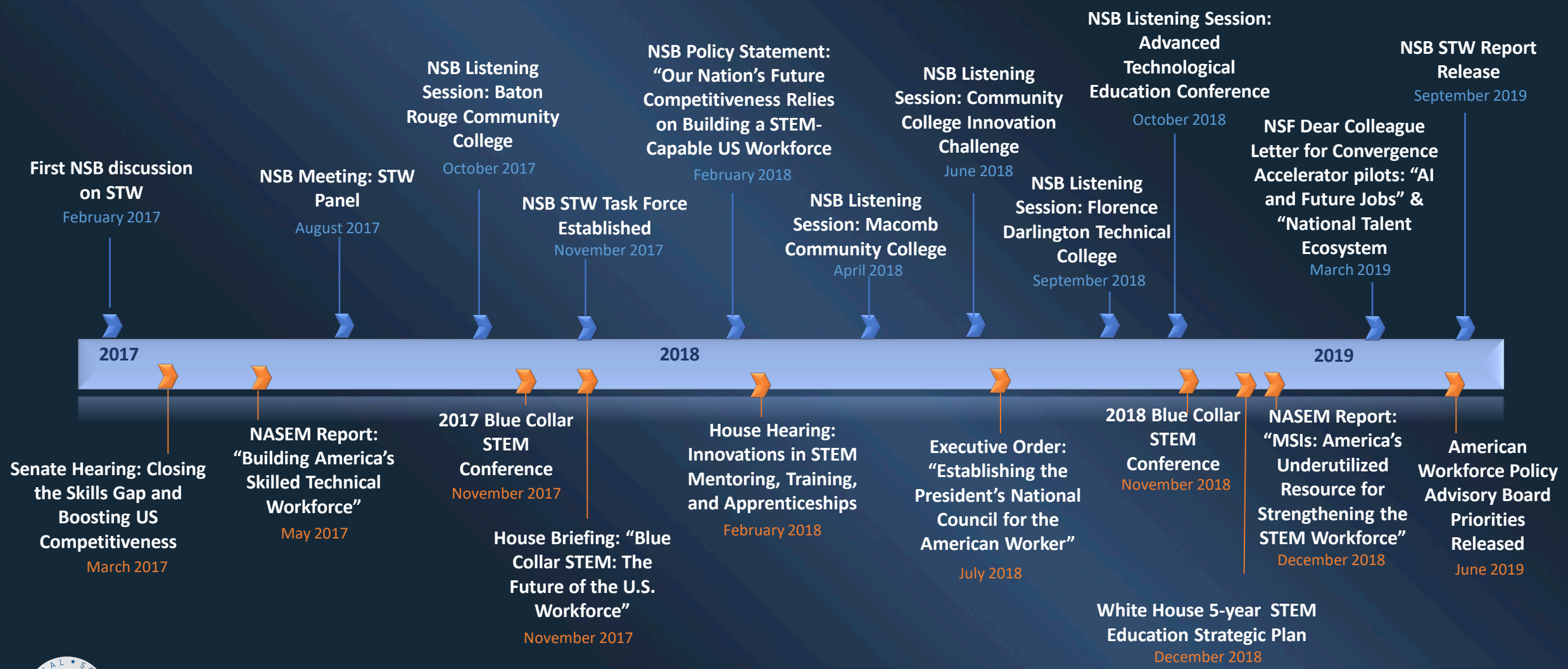

Science & Engineering Indicators 2020, “S&E Labor Force” (forthcoming)

# STW Data Portrait



# Momentum


First NSB discussion on STW
February 2017
NSB Meeting: STW Panel
August 2017
NSB Listening Session: Baton Rouge Community College
October 2017
NSB STW Task Force Established
November 2017
NSB Policy Statement: "Our Nation's Future Competitiveness Relies on Building a STEM-Capable US Workforce
February 2018
NSB Listening Session: Macomb Community College
April 2018
NSB Listening Session: Community College Innovation Challenge
June 2018
NSB Listening Session: Florence Darlington Technical College
September 2018
NSB Listening Session: Advanced Technological Education Conference
October 2018
NSF Dear Colleague Letter for Convergence Accelerator pilots: "AI and Future Jobs" & "National Talent Ecosystem
March 2019
NSB STW Report Release
September 2019
2017
2018
2019
Senate Hearing: Closing the Skills Gap and Boosting US Competitiveness
March 2017
NASEM Report: "Building America's Skilled Technical Workforce"
May 2017
2017 Blue Collar STEM Conference
November 2017
House Briefing: "Blue Collar STEM: The Future of the U.S. Workforce"
November 2017
House Hearing: Innovations in STEM Mentoring, Training, and Apprenticeships
February 2018
Executive Order: "Establishing the President's National Council for the American Worker"
July 2018
2018 Blue Collar STEM Conference
November 2018
White House 5-year STEM Education Strategic Plan
December 2018
NASEM Report: "MSIs: America's Underutilized Resource for Strengthening the STEM Workforce"
December 2018
American Workforce Policy Advisory Board Priorities Released
June 2019

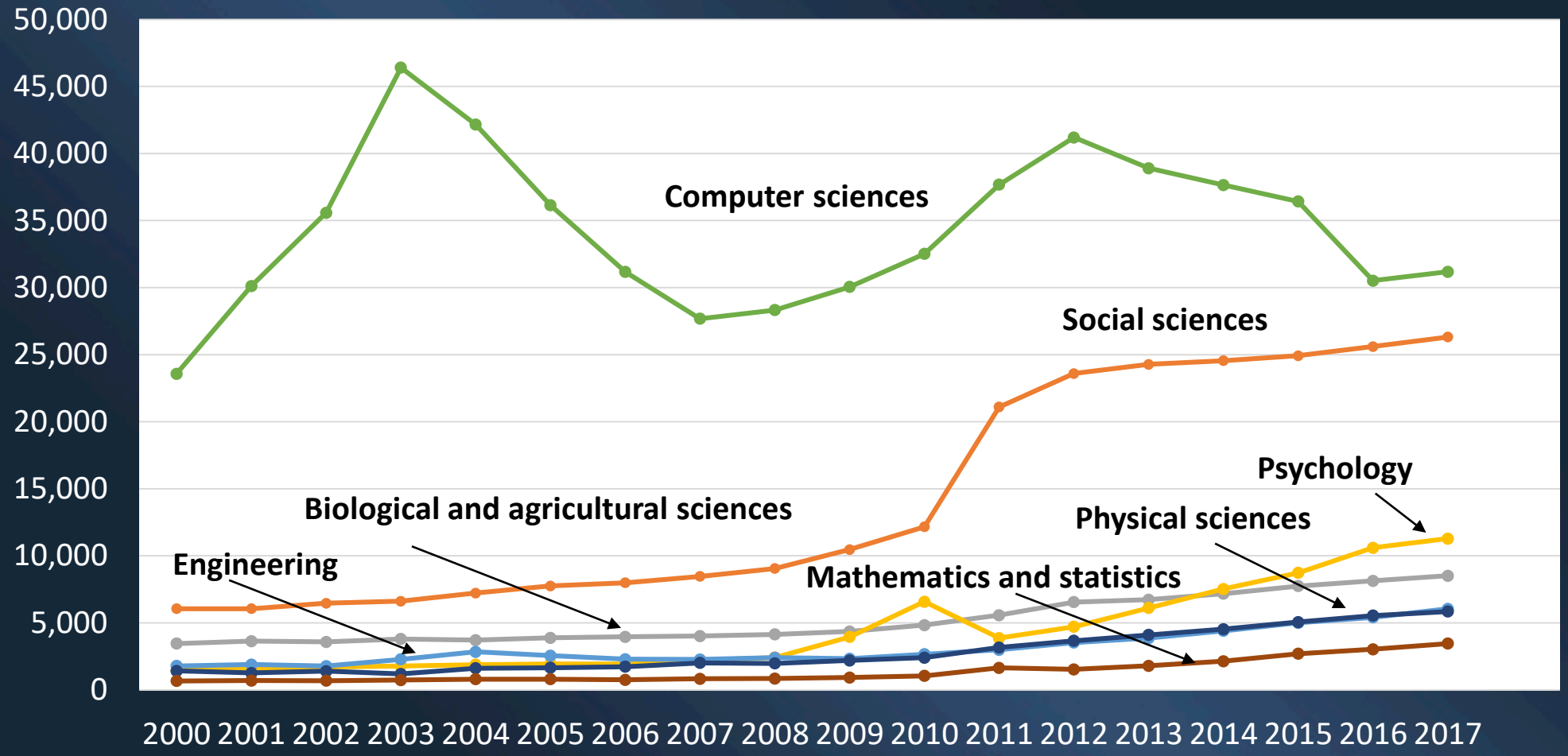
# Systemic Challenges and Opportunities

- **Designing STW education** to meet the needs of individuals
- **Building partnerships among** industry, government, and educational institutions to leverage resources and knowledge, and respond to local industry/community needs
- **Conveying accurate information** about the STW, including employment and career opportunities
- **Addressing data gaps and data silos** to maximize effectiveness of programs and initiatives

# Recommendations

- **Change the Message**: The NSB and NSF, and other S&E leaders should communicate the importance of the STW to the nation's S&E enterprise, individual economic prosperity, national security, and U.S. global competitiveness
- **Focus on the Data**: To understand and begin to address data gaps, NSF's NCSES, with additional federal resources and collaborating with other statistical agencies, should collect nationally representative data on the education, skills, and workforce characteristics of the STW. NSF should promote partnerships between governmental and non-governmental (industry, academia) stakeholders in the STW to share data and develop tools for public use and workforce planning.

# S&E associate's degrees awarded in the U.S., by field: 2000–17



# Recommendations

- **Leverage the Portfolio of Federal Investments:** NSF should conduct a full portfolio analysis of its STW investments. The analysis could publicize and inform stakeholders about the breadth of NSF's contributions to the STW, build awareness of funding opportunities, and maximize and leverage the impact of these investments.
- **Build Partnerships:** Two-year colleges and four-year colleges **(e.g. HBCUs)** and universities should work as partners, together with business, to grow the STEM-capable U.S. workforce via programs tailored to the needs of local communities. Policymakers can encourage this by developing federal programs that require partnership participation from stakeholders in multiple sectors.

# Points to Consider Going Forward - PCAST

- Focus on nurturing, diverse domestic STEM talent:

- **Establish research centers at HBCUs/MSIs for national priorities in AI, quantum information processing, and cyber**

- **Programs to introduce students early to National Security R&D and the value of holding a security clearance**

# *The Value Proposition of HBCUs:*

# "We Are Essential for the National Security of the US Research Enterprise"

**DIVISION B—COMMERCE, JUSTICE, SCIENCE, AND RELATED AGENCIES APPROPRIATIONS ACT, 2018**

NATIONAL SCIENCE FOUNDATION

This Act includes $7,767,356,000 for the National Science Foundation (NSF). This strong investment in basic research reflects the Congress' growing concern that China and other competitors are outpacing the United States in terms of research spending, as noted in the 2018 Science and Engineering Indicators report of the National Science Board.

**Omnibus Budget, signed into law March 23, 2018**

# *Dr. Vic's 'Asks' of the UAG*

- **UAG members visit NASA-funded HBCUs this year**
- **Increase NASA's budget commitment to HBCUs (from <1% to 2%) for FY21**
- **Partner w/ NSF/AFOSR/ONR/ARO to leverage HBCU budget portfolios & programs for FY21**
- **NASA Administrator meet new NSF Director to discuss building research capacity at HBCUs – next 30 days- DONE**

# Thank You

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