



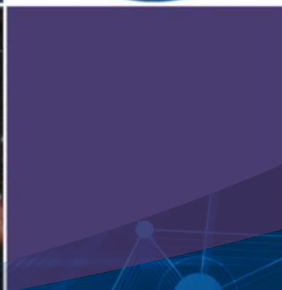
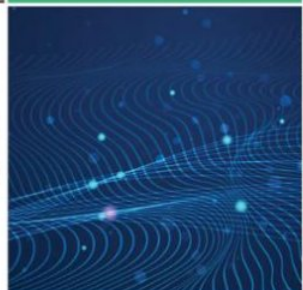
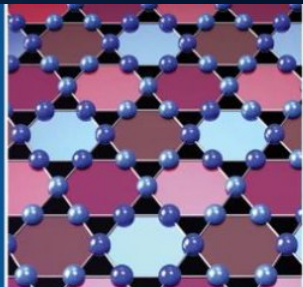
DIRECTOR'S REMARKS

*Sethuraman Panchanathan
National Science Foundation*

National Science Board Meeting

February 23, 2022

Strengthening @ Speed and Scale in 2022



3 Major Priorities of NSF



STRENGTHENING ESTABLISHED NSF



INSPIRING MISSING MILLIONS



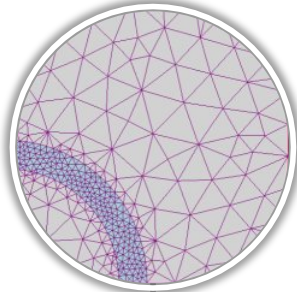
ACCELERATING TECHNOLOGY
AND INNOVATION



Investment to Impact: Advanced Manufacturing

NSF
INVESTMENTS

1950s
FINITE ELEMENT
ANALYSIS



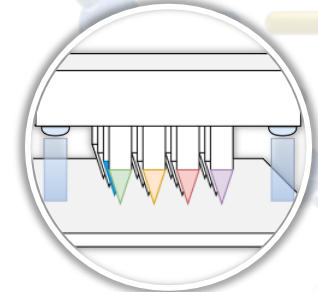
1970s
GEOMETRIC SOLID
MODELING



1980s
LASER POWDER
BED FUSION



1980s
BINDER JETTING



CURRENT
IMPACTS



DIGITAL TWIN
MODELING



COMPUTER-AIDED
DESIGN (CAD)



AEROSPACE
INDUSTRY
MANUFACTURING

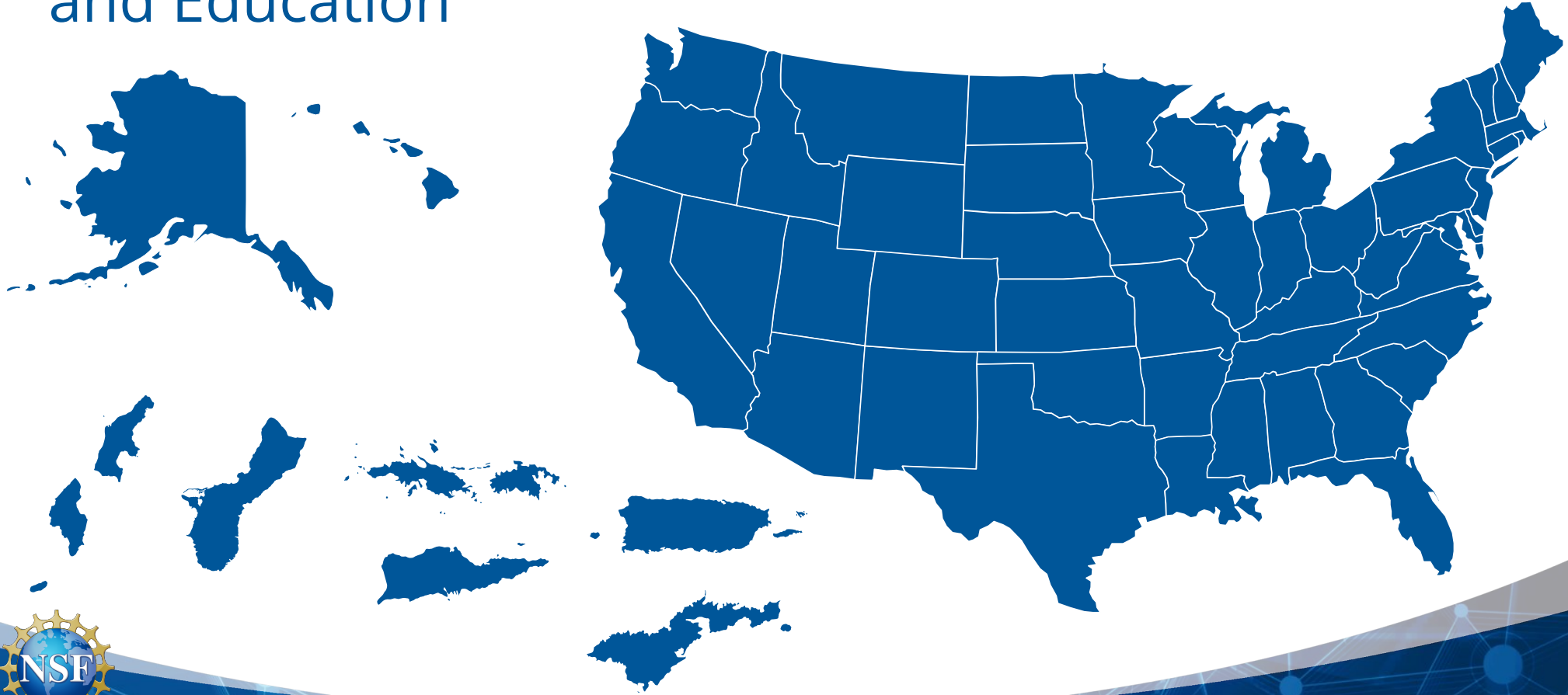


3D PRINTING PPE

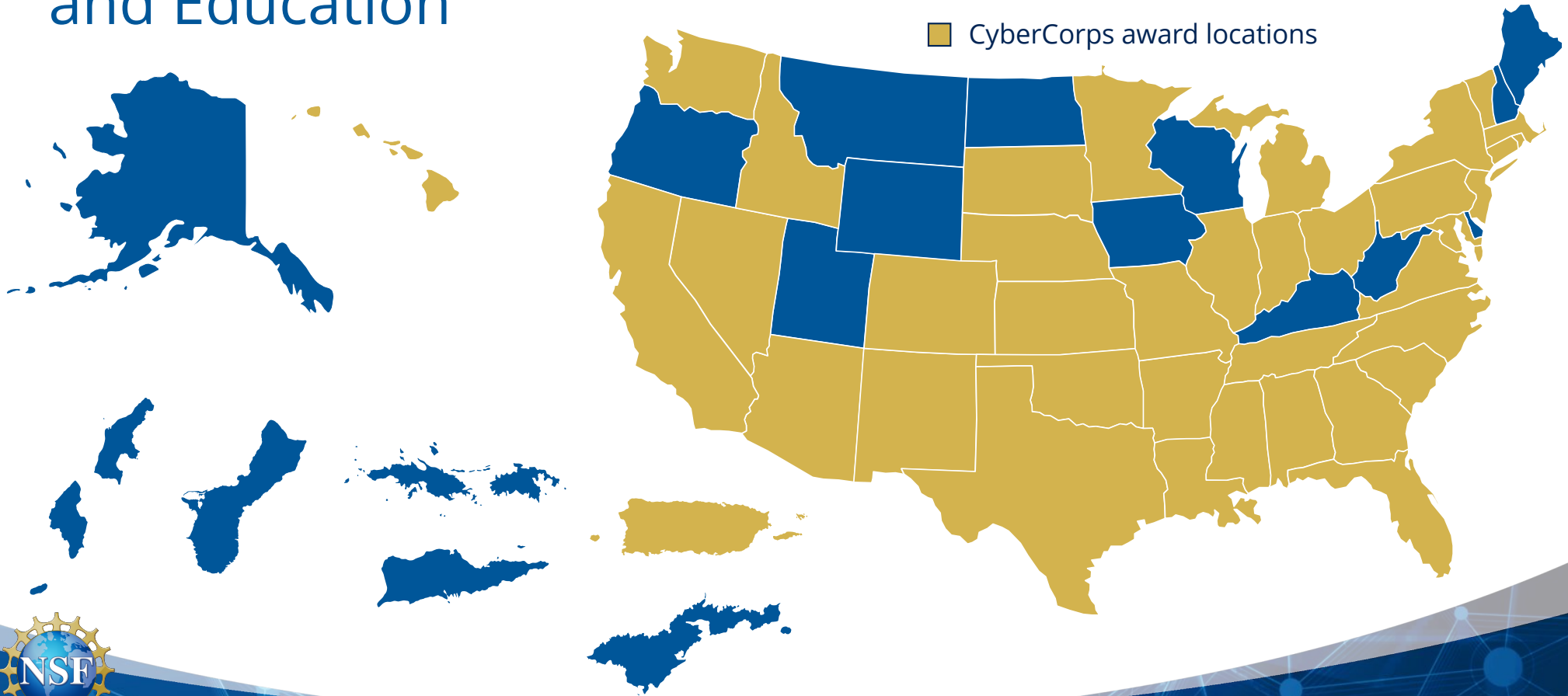




Scaling Cybersecurity Research and Education



Scaling Cybersecurity Research and Education



Diversifying Computing

2022

TODAY



BROADENING PARTICIPATION IN STEM

2015



CSFORALL AND AP COMPUTER SCIENCE PRINCIPLES

2010s



SCRATCHJR AND SNAP

1998 AND 1988



LEGO/LOGO ROBOTICS KITS

1960

2000s

RESEARCH INTO CHILDRENS' PROGRAMMING LANGUAGE



1970s

LOGO PROGRAMMING LANGUAGE FOR KIDS



A Future Made in America



\$20 billion
INTEL investment in Ohio

\$100 million
in partnership with NSF and regional education institutions

5-year agreement
with Semiconductor Research Corporation



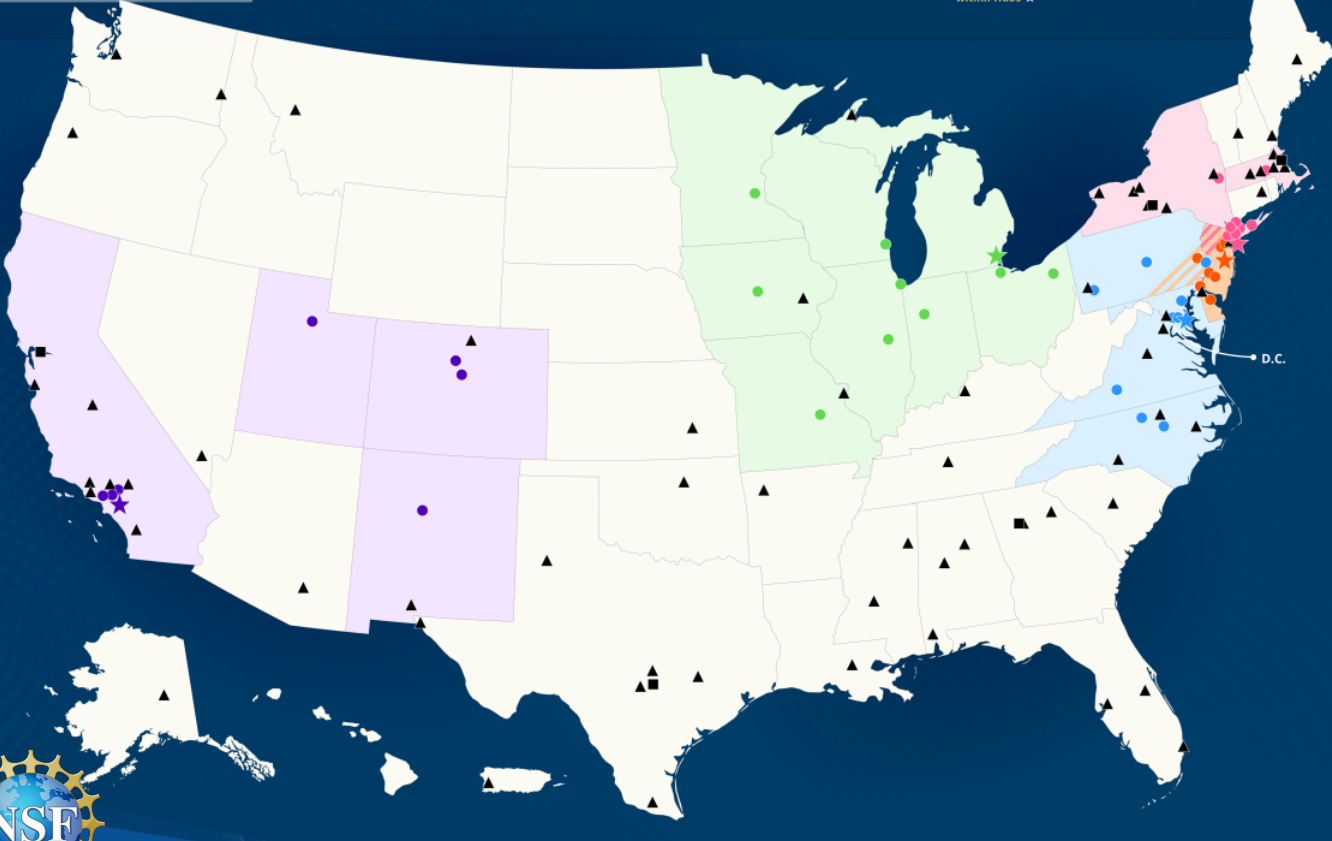


NATIONAL INNOVATION NETWORK – I-CORPSTM

The National Innovation Network is a network of universities, NSF-funded researchers, established entrepreneurs, local and regional entrepreneurial communities, and other federal agencies that help researchers learn how to translate fundamental research to the marketplace.

Click on the interactive graphic, hover your cursor over the colored rectangles to the right and the key below to display more information. In order to view the interactive features of this PDF, please download and open in Acrobat.

Hubs ● **Sites** ▲ **Nodes** ■
 Lead Institutions within Hubs ★



HUBS, AUGUST 2021

- GREAT LAKES REGION**
 - University of Michigan ★
 - Iowa State University
 - Missouri University of Science & Technology
 - Purdue University
 - The University of Akron
 - University of Chicago
 - University of Illinois Urbana-Champaign
 - University of Minnesota Twin Cities
 - The University of Toledo
 - University of Wisconsin-Milwaukee
- MID-ATLANTIC REGION**
 - University of Maryland College Park ★
 - Carnegie Mellon University
 - The George Washington University
 - Howard University
 - Johns Hopkins University
 - North Carolina State University
 - Pennsylvania State University
 - University of North Carolina Chapel Hill
 - University of Pennsylvania
 - Virginia Tech
- NEW YORK REGION**
 - The City University of New York ★
 - Columbia University
 - Icahn School of Medicine at Mount Sinai
 - New York University
 - Rockefeller University
 - Stevens Institute of Technology
 - Stony Brook University
 - University at Albany
 - University of Massachusetts Medical School
- NORTHEAST REGION**
 - Princeton University ★
 - Delaware State University
 - Lehigh University
 - New Jersey Institute of Technology
 - Rutgers University
 - Rowan University
 - Temple University
 - University of Delaware
- WEST REGION**
 - University of Southern California ★
 - California Institute of Technology
 - Colorado School of Mines
 - University of California, Los Angeles
 - University of California, Riverside
 - University of Colorado Boulder
 - The University of New Mexico
 - The University of Utah



STRATEGIC VISION ALIGNMENT



Research benefits

STEM talent

Geography of innovation

Global S&E community



Advancing research

Accessibility and inclusivity

Global leadership

Translation, Innovation,
Partnerships (TIP)



Pandemic response

Economic recovery

Racial equity

Climate change



2022-2026 NSF STRATEGIC PLAN

VISION

MISSION

CORE VALUES



Engagement Highlights



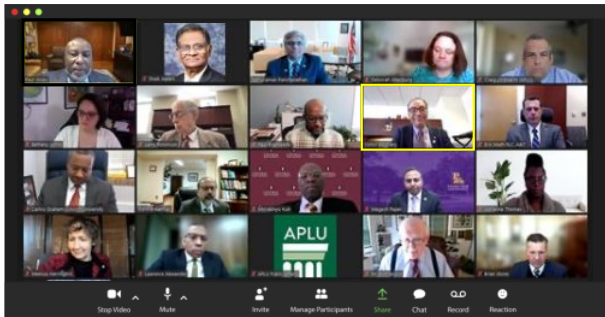
AAU Council on Federal Relations Conference



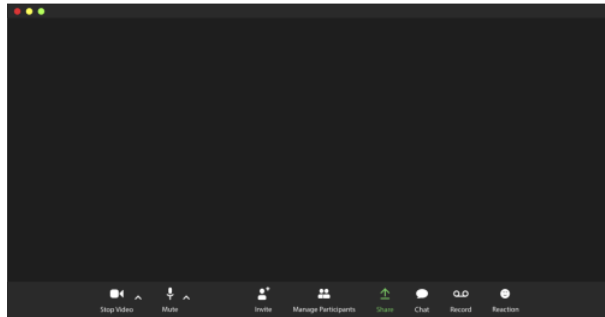
Meeting with South Korean delegation



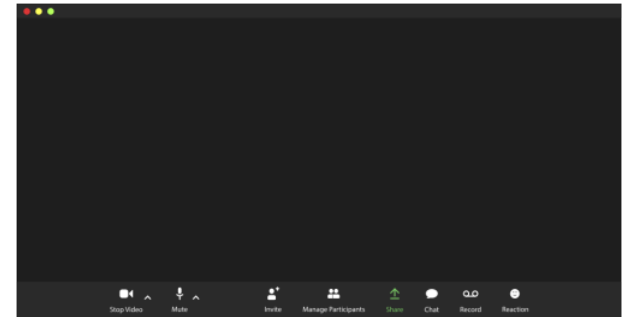
Alliance of Hispanic Serving Research Universities



APLU Council of 1890



AAAS Fireside Chat



Association of International Education Administrators Conference



NSF @ Speed & Scale

January Town Hall



America COMPETES Act

The House passed a bill aimed at boosting U.S. competitiveness with China



NATIONAL SCIENCE FOUNDATION

NSF

A+

CURRENT GRADE



A+ on FITARA Scorecard



NSF Celebrates Black History

MLK Day Observance



Combined Federal Campaign

NSF-NOAA MOU



Media Highlights

President Biden Honors 117 Individuals and Organizations with Highest U.S. Award for Science and Mathematics Teachers and Mentors

FEBRUARY 06, 2022 • STATEMENTS AND RELEASES

Today, President Joe Biden named 117 teachers, mentors, and mentoring organizations as recipients of the Presidential Awards for Excellence in Mathematics and Science Teaching (PAEMST) and Presidential Awards for Excellence in Science, Mathematics and Engineering Mentoring (PAESMEM). These awards honor the dedication, hard work, and important role that America's teachers and mentors play in supporting learners who will be future STEM professionals, including climate scientists, mathematicians, innovators, space explorers, and engineers.

NSF Director, Nobel Laureate, NASA Astronaut and Moderna Co-Founder Headline Conference of Inventor Notables

November 17, 2021 - 2 min read

The Tenth Annual Meeting of the National Academy of Inventors hosted Renowned Researchers, Policymakers, and Academic Leaders in Tampa, FL

TAMPA, Fla., Nov. 17, 2021/PRNewswire/ -- The National Academy of Inventors (NAI) hosted their tenth Annual Meeting with a packed speaker line-up featuring legendary inventors such as Robert Langer, Moderna; Sethuraman Panchanathan, Director of the

Yahoo! Main visit your phone of

FedScoop Radio

NSF Director Sethuraman Panchanathan; "Fixing computers" at DOD; Improving NatSec, IC cybersecurity

FEB 2, 2022 / FEDSCOOP



Forbes

National Science Foundation Awards \$29 Million In New Cybersecurity Scholarships

Michael T. Nietzel, Senior Contributor @ MichaelT.Nietzel
I am a former university president who writes about higher education.

Listen to article 3 minutes



. @NSF chief Dr. Sethuraman Panchanathan joined the podcast to talk STEM talent, the future of science and much more. Listen to #govexecdaily: govexec.com/technology/202...



1:00 PM · Feb 3, 2022 · TweetDeck

HIGHER EDUCATION

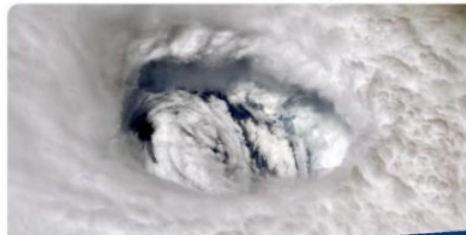
Lack of Diverse STEM Workforce a Challenge for States, U.S.

The U.S. no longer leads the world in all areas of science, the National Science Foundation says, and many states have low concentrations of STEM workers.

February 02, 2022 - Carl Smith, Governing



The US National Science Foundation (NSF) just awarded a \$12.8 million grant to FIU's Extreme Events Institute for the design of a full-scale testing facility capable of producing winds of 200 mph.



Expanding the Frontiers of Discovery and Innovation



Directorate for Engineering
Susan Margulies



Directorate for Mathematical
and Physical Sciences
Sean L. Jones



Directorate for Biological Sciences
Joanne S. Tornow



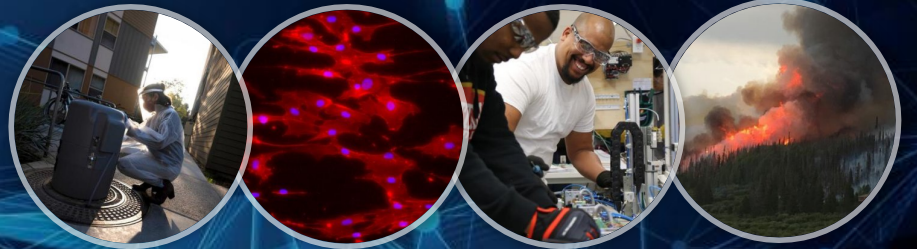


Engineering: Transforming our world for a better tomorrow

Susan Margulies, Ph.D.

Assistant Director for Engineering

February 23, 2022



Wastewater Surveillance



2000s

- Genetic tools for wastewater

2010s

- Recognition of viral load in sewage
- Detection of coronaviruses in sewage

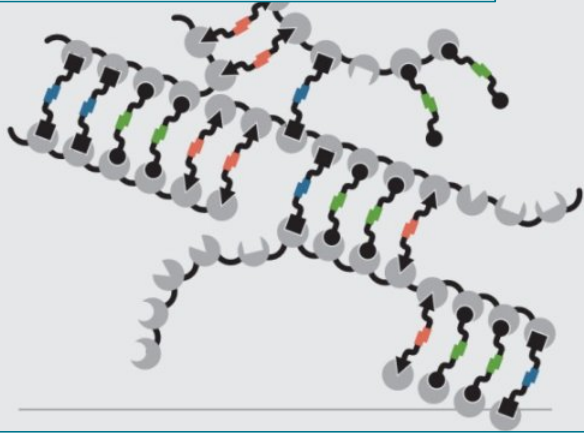
2020s

- SARS-CoV-2 Wastewater Surveillance Research Coordination Network
- Predictive Intelligence for Pandemic Prevention: BIO, CISE, ENG, SBE
- National Sewage Surveillance Interagency Leadership Council



Biotechnology Revolution

synberc

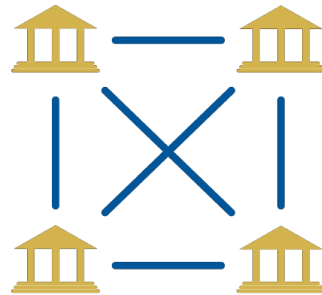


Broadening Participation Playbook

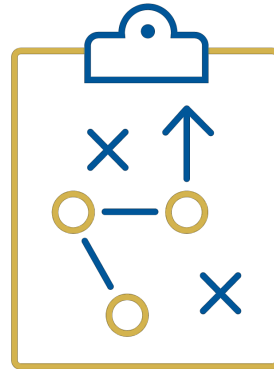


Jeremi London
Virginia Tech

Multi-case Study of
COE Exemplars



New BPE Model/
Impact Playbook



ASEE Dean's Council



Assoc. Professors
Town Hall



Graduate Course



Playbook
Implementation

Community
Exchange

Research-to-Practice
Translation

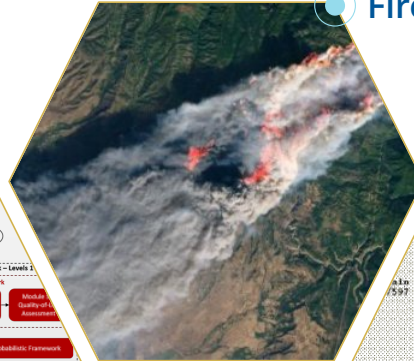


Fire at the Wildland-Urban Interface

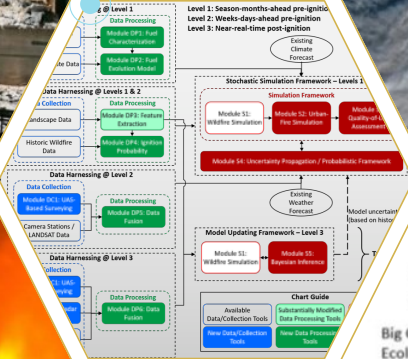
Mitigation



Fire dynamics



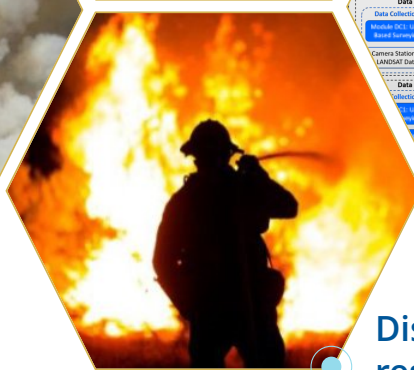
Risk assessment



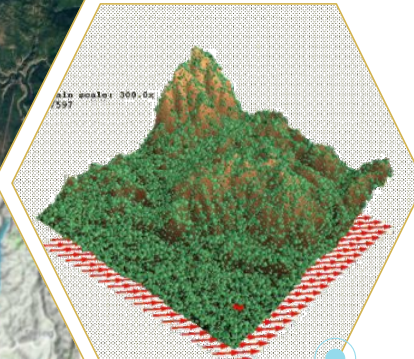
Drone technologies



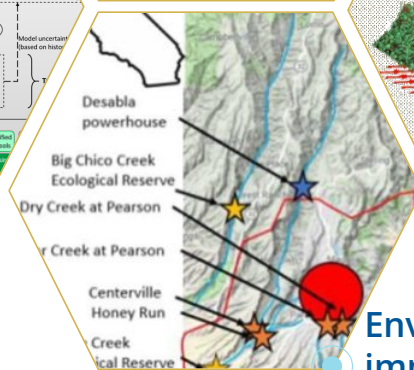
Disaster response



Modeling and simulation



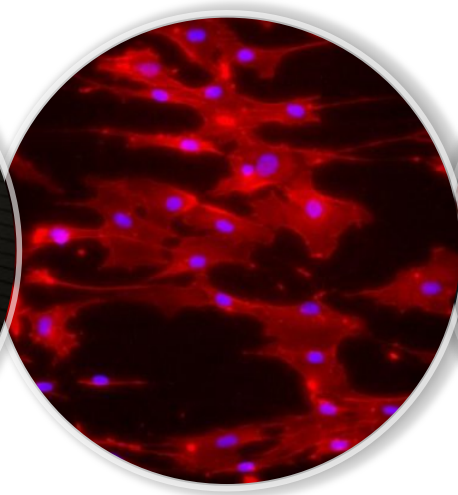
Environmental impacts



Engineering: Transforming our world for a better tomorrow *by driving discovery, inspiring innovation, enriching education, and accelerating access*



Health Surveillance



Biotechnology



Inclusive Education



Disaster Resilience





Building A More Sustainable Future

Dr. Sean L. Jones, Assistant Director
Directorate for Mathematical and Physical Sciences

Plastics are all around us

Medical
Supplies



Textiles



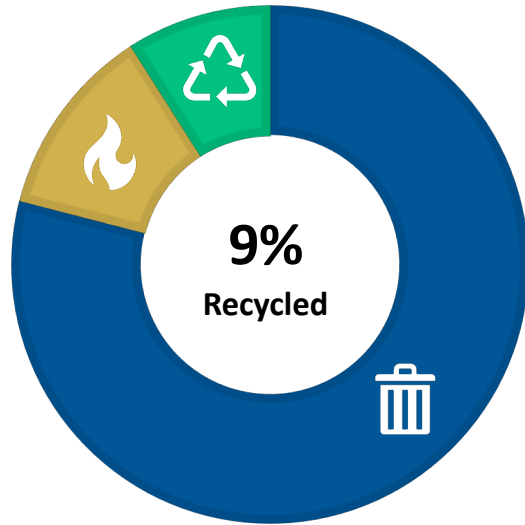
Food Packaging



Electronics



Plastics are all around us



Medical
Supplies



Textiles



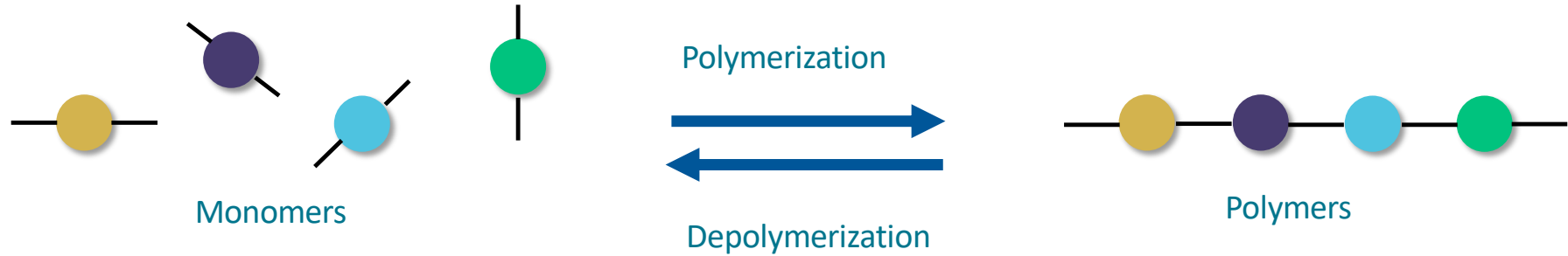
Food Packaging



Electronics



Plastic Polymers



Polyethylene Terephthalate (PETE)



High-Density Polyethylene (HDPE)



Polyvinyl Chloride (PVC)



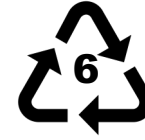
Low-Density Polyethylene (LDPE)



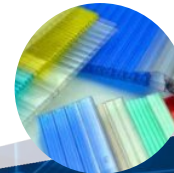
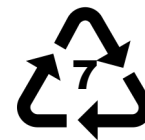
Polypropylene (PP)



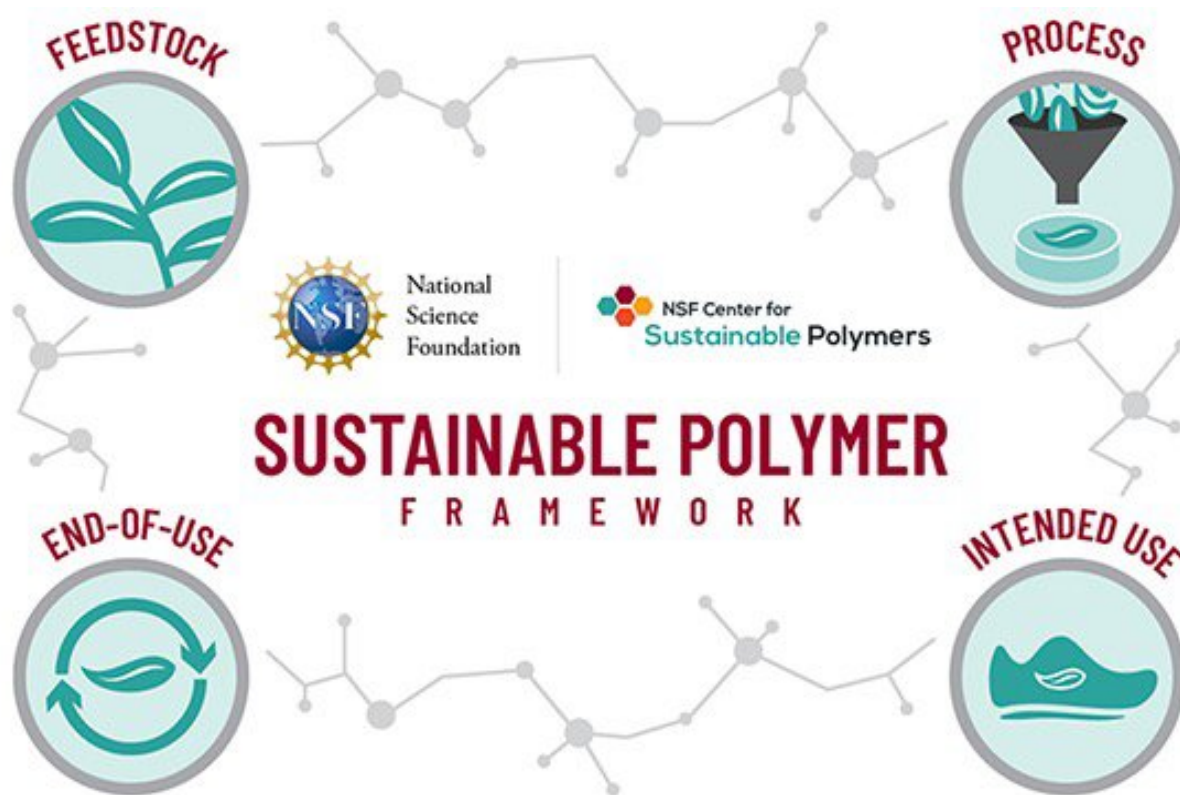
Polystyrene (PS)



Polycarbonate, BPA, and Other Plastics



A New Framework





Dr. Geoff Coates



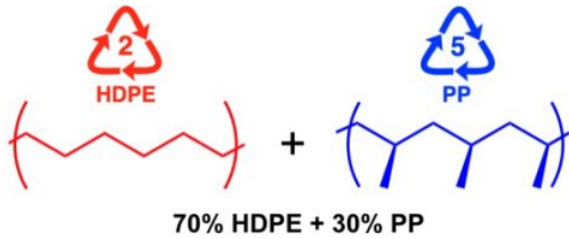
Dr. Marc Hillmyer

End of Use: Recycling More Effectively

- Polyethylene (PE) and Polypropylene (PP) represent **2/3 of all plastics** in use today



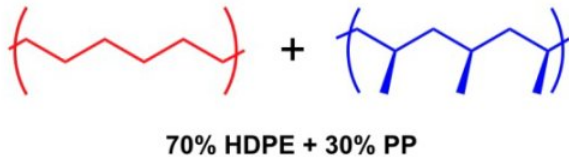
INTERMIX
performance materials



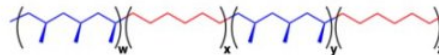
COMBINE



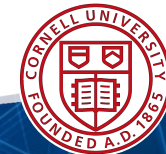
*Poor
mechanical
properties*



COMBINE



*Excellent
mechanical
properties*

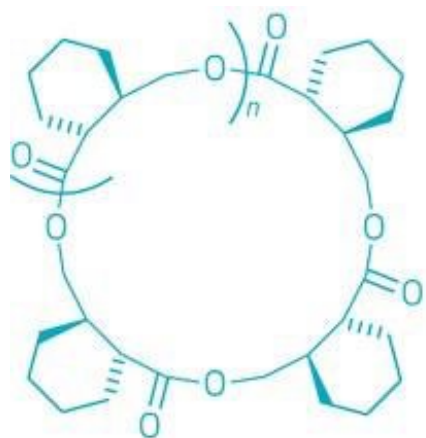




Dr. Eugene
Chen

End of Use: New Concepts for the Plastics Lifecycle

- Plastics can be synthesized, chemically deconstructed, and rebuilt – infinitely – with much less waste and no degradation in performance



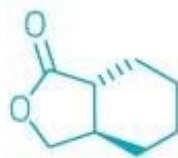
Polymerization

La catalyst



ZnCl₂, heat

Depolymerization



3,4-T6GBL

Starting Material

Polymerization

Y or Zn catalyst



ZnCl₂, heat

Depolymerization





Dr. LaShonda Korley



Dr. Thomas Epps III

Feedstock: Developing Materials From Lignin



Technical lignin

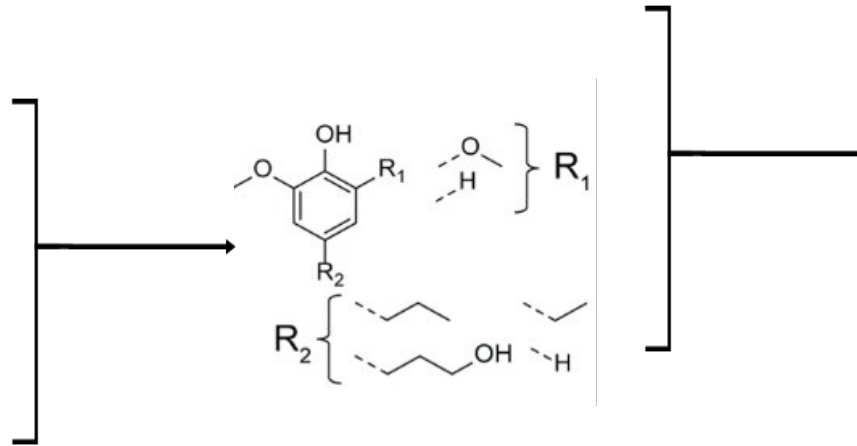
15-25% Lignin



38-50% Cellulose

23-32%

Hemicellulose



Catalytic Processes



New Plastics from Bio Waste Materials

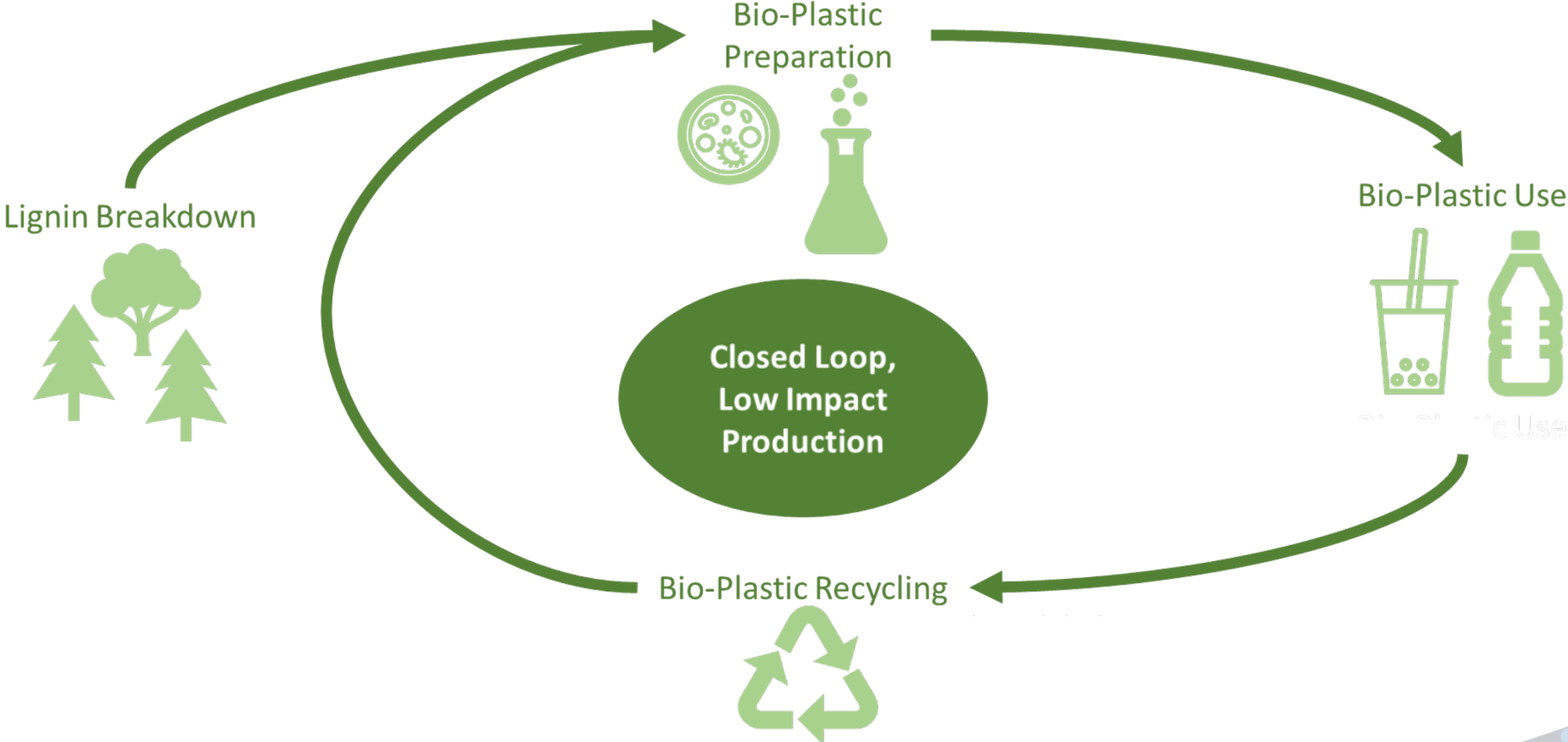


Lignolix

UNLOCKING THE VALUE OF LIGNIN



Sustainable Materials Life-Cycle



Ensuring the entire process is sustainable, not just the product



Sustainability is
the future.

Sustainability
begins here.



Directorate for Mathematical and
Physical Sciences





Discovering, Understanding, and Harnessing Life's Innovations

Presentation to the National Science Board (NSB)

Joanne Tornow, PhD

Assistant Director for Biological Sciences

Big Questions in Biology



How do genes create different visible outcomes?

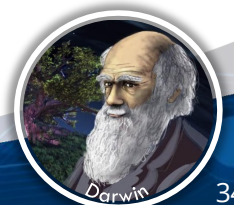


How does life evolve and adapt?



How do organisms and their environments interact?

Life's Innovations and Adaptations



Harnessing Life's Innovations and Adaptations



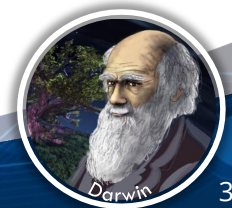
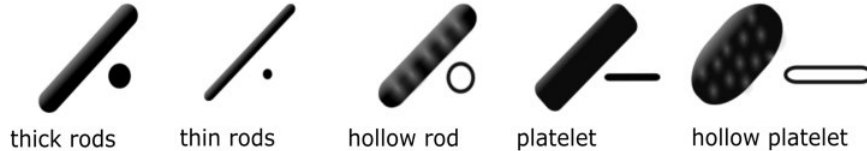
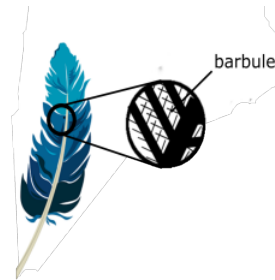
- Leverage biodiversity
- Develop biotechnologies
- Address societal issues

Understanding the Evolution of Iridescence

How do birds produce iridescent feathers?



Discovery of natural nanostructure that aids in understanding evolution and could inspire new materials

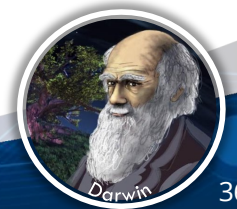


Harnessing Microbial Evolution

How do microorganisms adapt and evolve and aid hosts in adapting?



Living building block made of fungus feeding on woody waste products

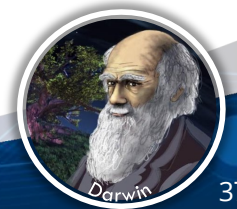


Discovering the Impacts of Invasive Species

To what extent do extinction and non-native invasive plants impact plant communities?



Insight into causes of biodiversity loss and ability to reject long-standing hypothesis



Harnessing Life's Innovations and Adaptations

