

Strategies for Strengthening and Expanding the Research Enterprise @ Penn State

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Senior Vice President for Research

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Agenda

- FY22 Research Expenditures
- Strategies for Strengthening and Expanding the Research Enterprise
- Panel Discussion



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FY22 Research Expenditures



Penn State's \$1 Billion+ Research Enterprise

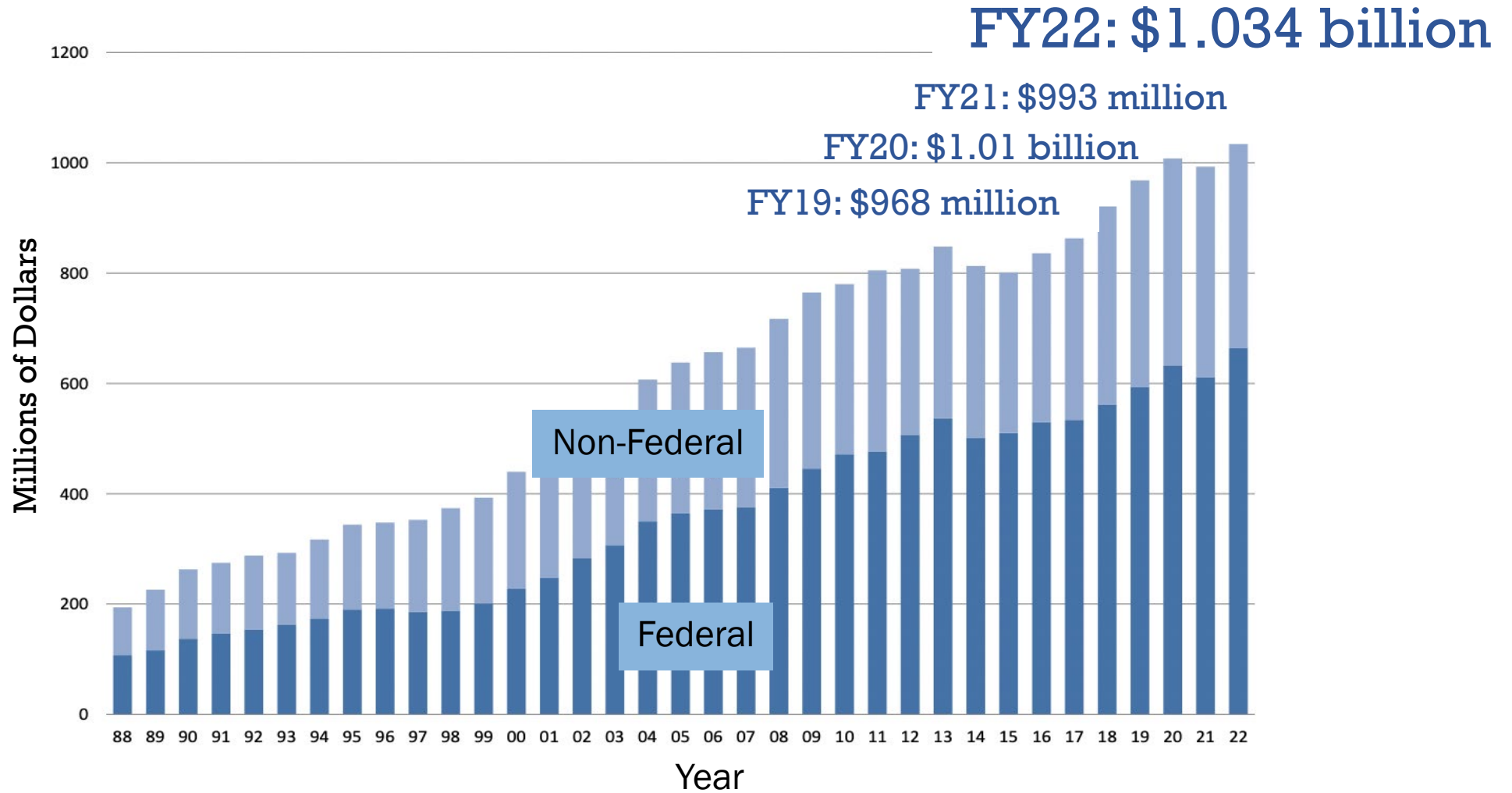
- Drives progress impacting all aspects of society, locally and worldwide.
- Inspires and attracts innovators with diverse perspectives and talent.
- Crucial for standing among AAU, Big Ten, and other world-class institutions.
- Has transformative impact:
 - Fundamental Discovery
 - Innovative Applications
 - Knowledge Creation
 - Sustainable Implementation
 - Economic Development
 - National Security



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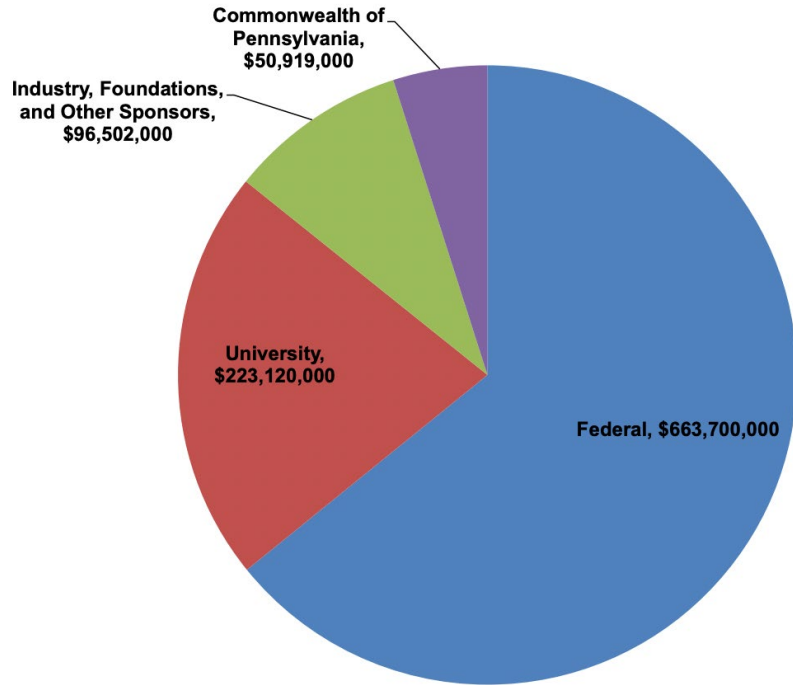
Total Research Expenditures – 35 Year History



Research Expenditures by Source of Funds

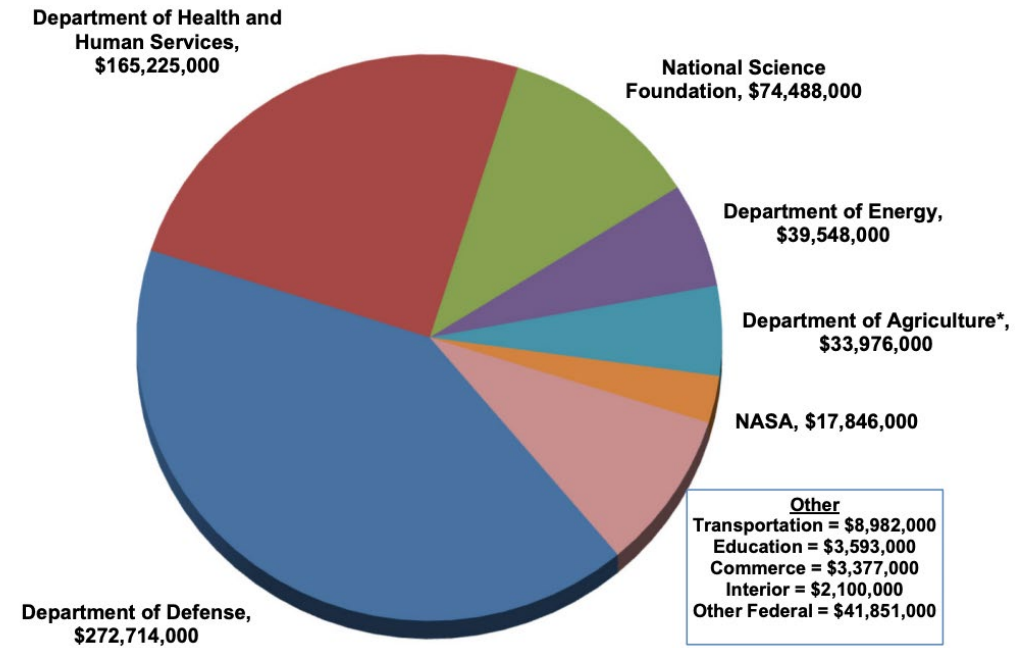
Research Expenditures by Source of Funds

FY2022 Total = \$1,034,241,000



Research Expenditures from Federal Agencies

FY2022 Total = \$663,700,000



*Includes Federal appropriations for agricultural research

➤ *4:1 return on financial investments in addition to returns from incredible knowledge creation and invaluable student experiences*



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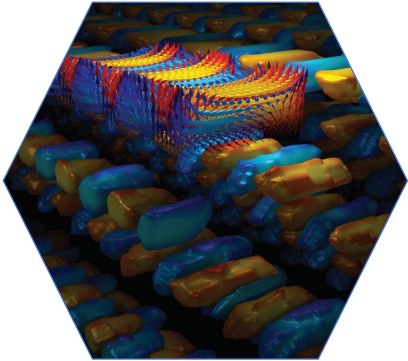
Strategies for Strengthening and Expanding the Research Enterprise

1. Strategic Leadership
2. Strategic Investments
3. Strategic Partnerships
4. Strategic Positioning

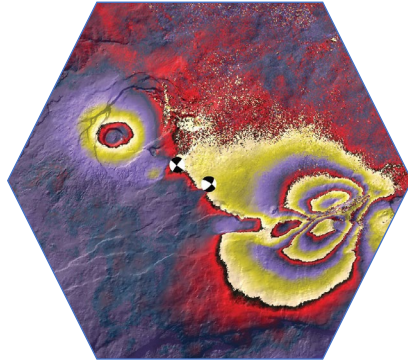
...pursuing new and novel advances in a vibrant research ecosystem, strengthening collaboration, working with partners, and investing in pipelines for people and capabilities, with the goal of having exceptionally meaningful global impact



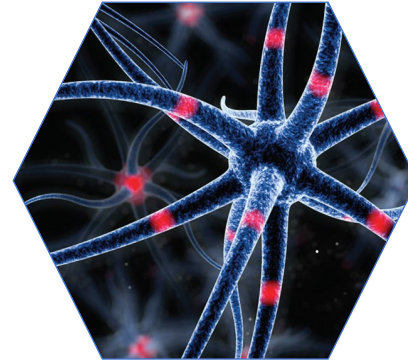
1. Strategic Leadership: through Interdisciplinary Research Institutes



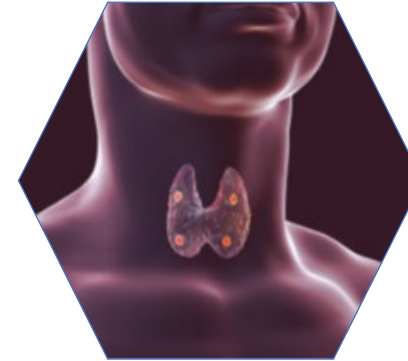
Materials Research Institute



Institute for Computational & Data Sciences



Huck Institutes of the Life Sciences



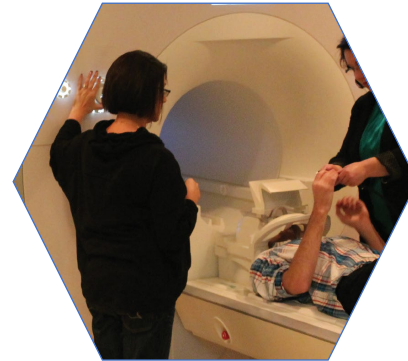
Penn State Cancer Institute



Clinical and Translational Science Institute



Institutes of Energy and the Environment



Social Science Research Institute



Applied Research Lab

...it's the culture

Profoundly different approach to leveraging our expertise



1. Strategic Leadership – cont'd

Our Interdisciplinary Research Institutes Are a **Strategic Differentiator** for Penn State

- Institute directors are top scholars
 - Aggressively pursuing and defining emerging research directions
 - ***Aligned with strategic vision, plan, and priorities***
 - Exceptionally attractive to junior hires
- Institute leaders have formed genuine partnerships with Deans
 - Shared vision, shared expectations
- Professionals are staffing our shared resources
 - Dedicated staff maintain and operate core facilities
- Institutes are strategically driving innovation through seed grant investments and strategic hires
 - High-risk/high-payoff collaborations, bold forays into new research directions, and creation of new partnerships.
 - ~41% receive external funding



The poster features the Penn State logo and the text 'Penn State Research' in large green letters. Below it, it says 'Office of the Senior Vice President for Research'. The main heading is '2019-2023 Strategic Goals' in a gold, cursive font. Underneath, 'Our Vision' is written in blue. A paragraph of text describes the university's commitment to research that impacts society, the nation, and the public good. A large number '1' is on the right side. A red banner at the bottom reads 'Advancing Precision Health in Context'. Below this banner is a photograph of surgeons in a hospital setting. To the right of the photo is a white box with text and bullet points.

Penn State Research
Office of the Senior Vice President for Research

2019-2023 Strategic Goals

Our Vision

Penn State will advance its research worldwide and be known as a leader in research that impacts all aspects of our society, our nation, and the public good. From fundamental discovery to innovative applications, knowledge creation, sustainable implementation, economic development, and national security, our research will, more than ever before, have a transformative impact on the Commonwealth of Pennsylvania, the nation, the world, society as a whole, and the condition of our planet.

1

Advancing Precision Health in Context

Penn State Research will advance precision healthcare and health resiliency in populations and individuals by leveraging a uniquely collaborative interdisciplinary research environment and applying expertise in the life sciences, social and behavioral sciences, medicine, engineering, law, and informatics for translation to clinical practice and measurable health impacts.

- Build capacity in biomedical and health science research
- Create an extensive understanding of personalized health through integration of individual biological and behavioral data and use that understanding to positively impact human health.
- Promote and support research aimed at developing programs and policies that measurably reduce adverse effects of environment and lifestyle for sustained positive human health and well-being
- Reduce social disparities in health and healthcare
- Build expertise in evolutionary medicine

2. Strategic Investments

• In People

- Faculty: superstars, rising stars, start-up packages, spousal hires, recruitment, and retention
- Staff: professional development, career advancement, and ensuring a team of inspired individuals
- Students: undergraduate and graduate research experiences

• In Seed Grants

- Bold forays into new research directions
- Rapid response to emerging needs
- High-risk, high-payoff ideas and collaborations
- Creation of new partnerships
- Ideas that are too early for sponsors to fund



Penn State team to participate in NASA's Nationwide Eclipse Ballooning Project



Seed Grant: Plant Village

- Leverage AI, cloud, and satellites to make more global Penn State's land grant agricultural mission

Initial Seed Grant: \$120,000

Resulting Funding:
>\$33,000,000



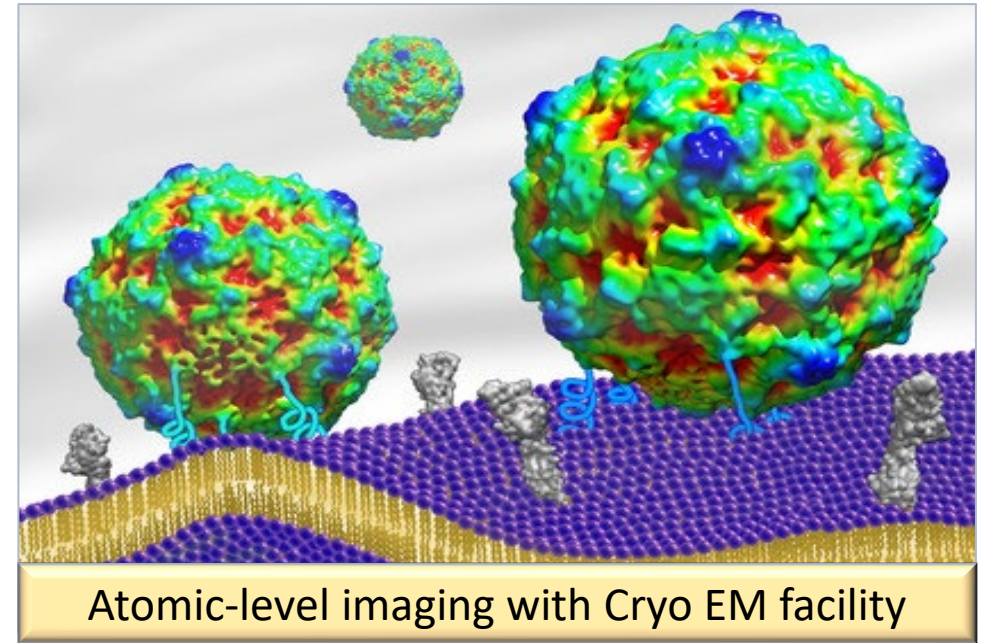
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2. Strategic Investments – cont'd

- In Facilities

- Shared Core Facilities: more than 300 instruments & services
- Supports multidisciplinary research, education, and industry
- Investments in unique equipment exceptionally attractive to new faculty
- Dedicated, professional staff maintain and operate core facilities
- Difficult to get external funding for facilities; need internal investments



Atomic-level imaging with Cryo EM facility

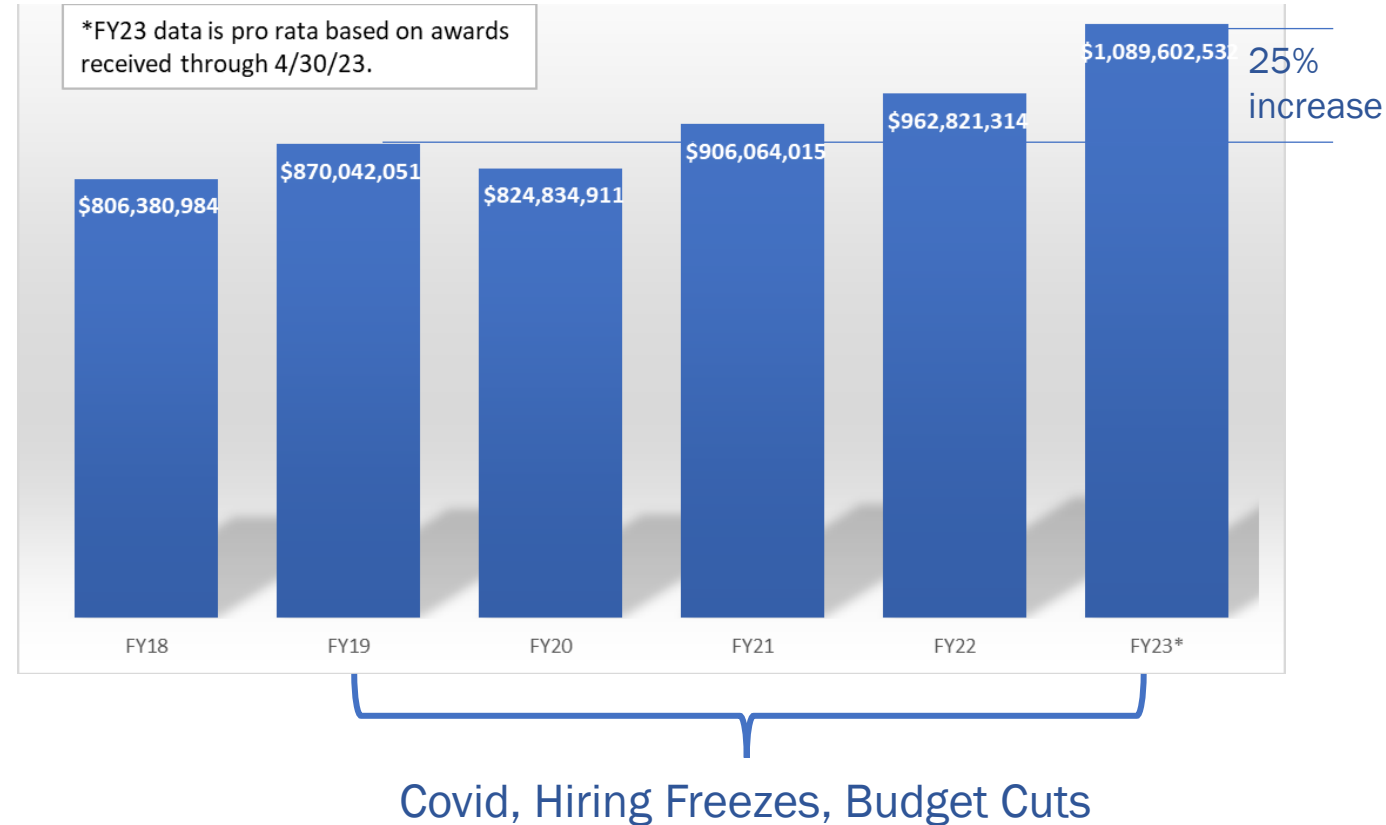


2. Strategic Investments – cont'd

- In Operations

- Research growth is increasing demand on staffing operations: pre-award, post-award, contract negotiations, compliance, etc.
- Identifying space for top talent is becoming an issue
- A new financial system, new budget model, new procurement system, centralized hiring approvals, and more make it harder to be bold when there is the constant concern about new systems and budget cuts.
- Need to invest in and grow research operations in parallel with growth in awards and expenditures

Annual Research Awards (\$)



3. Strategic Partnerships

- With Industry

Penn State is the Top Public University in PA for Industry-Sponsored Research



Penn State conducts more industry-sponsored research than any other PA public college or university



Great, but So What?

- Industry invests more than \$300B annually in R&D
- They are short on labor and *short on ideas*
- Public-private partnerships are the future

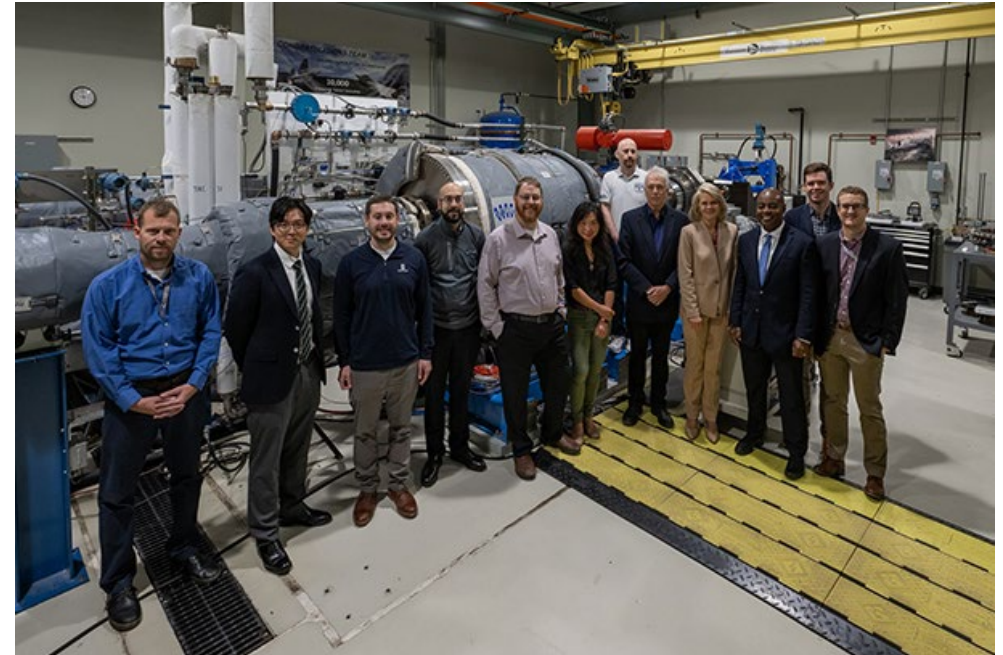


3. Strategic Partnerships – cont'd

- With Sponsors

Example: START Lab – Creating Solutions for Sustainable Power and Propulsion

- Public-private partnership with Department of Energy, Pratt & Whitney, and the Federal Aviation Administration
- \$26M awarded over 5 years, expanding an existing 12-year relationship
- Led by Karen Thole, Penn State Distinguished Professor of Mechanical Engineering



Representatives from Pratt & Whitney, the Federal Aviation Administration, the U.S. Department of Energy, and Penn State in the START Lab, Penn State, Oct 2022. Photo credit: Kelby Hochreither/Penn State



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3. Strategic Partnerships – cont'd

- With Donors

Defining the Future of Industrial BioTech

Research + Students + Faculty + Facilities + Industry = Success



“For CSL Behring, this represents an opportunity for us to support our talent pipeline that will bring some of Penn State’s brightest minds to our efforts in developing life-saving medicines.”

- Paul Perreault, CEO CSL Behring



- Biopharmaceuticals, biobased chemicals, fuels, food biotechnology, and cell therapeutics
- Developing the future workforce
 - 7 colleges, 31 departments
- Facility expansion with equipment from industrial partners CSL Behring and Sartorius
- Serving research and industry partners



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4. Strategic Positioning

- To Drive the National Conversation

- The White House Office of Science and Technology Policy and Penn State's Evidence-to-Impact Collaborative (EIC) co-hosted the final Evidence Forum of the Biden-Harris Administration's Year of Evidence for Action on Wednesday, Feb. 22, 2023 at the White House
- Max Crowley, director of Penn State's Evidence-to-Impact Collaborative, moderated the event
- Event explored the state of research and the use of scientific evidence in government settings, with a particular focus on addressing issues of equity across the evidence ecosystem



President Neeli Bendapudi joined Second Gentleman of the US Doug Emhoff at EIC forum, Feb 22, 2023

The image shows the cover of a fact sheet. At the top left, it says "THE WHITE HOUSE" next to the White House logo. Below that, the date "APRIL 07, 2022" is printed. The main title is "FACT SHEET: Biden-Harris Administration Launches Year of Evidence for Action to Fortify and Expand Evidence-Based Policymaking". At the bottom, there is a dark red banner with the Penn State logo on the left, the EIC logo in the center, and the text "Evidence-to-Impact Collaborative" and "EVIDENCE FORUM" below it.



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4. Strategic Positioning – cont'd

- To Anticipate Opportunities on the Horizon

Example: Awarded \$32.7M Semiconductor Packaging and Heterogeneous Integration Center in advance of the CHIPS Act

- One of seven centers funded from DARPA through the Semiconductor Research Corporation
- Focusing on efficient and effective integration and packaging of semiconductor devices, chips, and other components.
- Led by Madhavan Swaminathan, head of electrical engineering and William E. Leonhard Endowed Chair in Penn State College of Engineering's School of Electrical Engineering and Computer Science



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4. Strategic Positioning – cont'd

- To Prepare Our Students to be the Next Leaders

Training Students for National Security Positions



Program included visits to the CIA and the Pentagon

35 students (out of 500) from 14 Universities participated in the Applied Research Lab's SOAR program



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Summary

- Drives progress across the state, the nation, and the world, as a major innovation center
- Attracts leading faculty: innovators, knowledge discovery, and creativity
- Attracts students: provides experiences for students that enable career successes
- Attracts industry: helping companies anticipate and solve their challenges
- Crucial for standing among AAU, Big Ten, and other world-class institutions
- Standing is a major factor in student applications, faculty recruitment, retention, and industry partnerships
- Research impacts state and local economies, knowledge and discovery, students and the workforce

*Universities have become major innovation centers for the nation.
Investments are an imperative.*



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Panel Discussion

Lora Weiss,
Senior VP for Research
Panel Moderator



Panel Members



Jose D. Fuentes
John T. Ryan, Jr.
Faculty Fellow
Professor of Meteorology



Bruce Logan
Director, Institutes of
Energy and the
Environment
Evan Pugh University
Professor
Kappe Professor of
Environmental
Engineering, Civil and
Environmental
Engineering



Cassie Mansfield
Professor of Art
History, Head of the
Department of Art
History



Andrew Read
Director, Huck
Institutes of the Life
Sciences
Evan Pugh Professor
of Biology and
Entomology Eberly
Professor of
Biotechnology



Marty Sliwinski
Professor of Human
Development and
Family Studies
Director, Center for
Healthy Aging



Susan Trolier-
McKinstry
Evan Pugh University
Professor Steward S.
Flaschen Professor of
Engineering, Professor
of Electrical
Engineering.



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Panel Questions

1. What aspects of the university position us well to excel in research?
2. What aspects of the university are holding us back from reaching our fullest potential?
3. What are some potential strategic opportunities that we should consider?
4. How do we compare with our research collaborators and competitors, and in particular, others in the Big 10?



Thank you!

