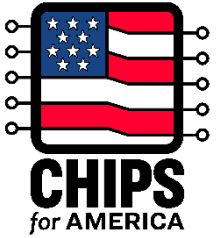


# Update on CHIPS Research and Development

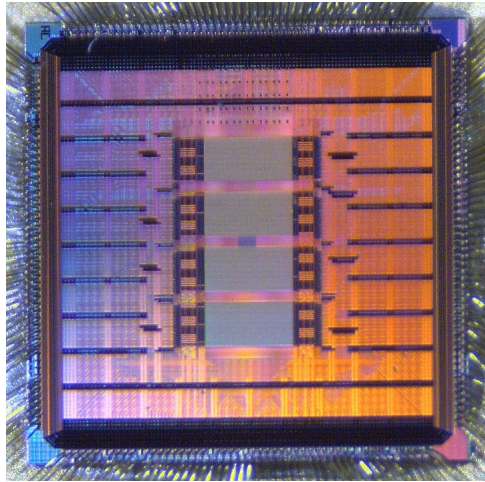
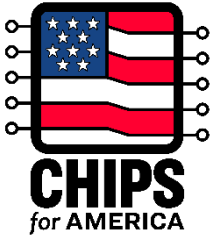


Eric Lin  
Interim Director  
CHIPS Research and Development Office

February 7, 2023



# CHIPS R&D Vision



## U.S. Technology Leadership

The U.S. invents, develops, and deploys the foundational semiconductor technology of the future.



## Accelerate Ideas to Market

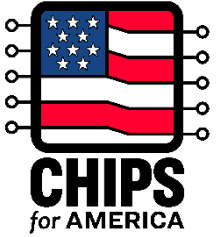
A thriving ecosystem that is focused on getting the best ideas to commercial scale as quickly and cost effectively as possible.



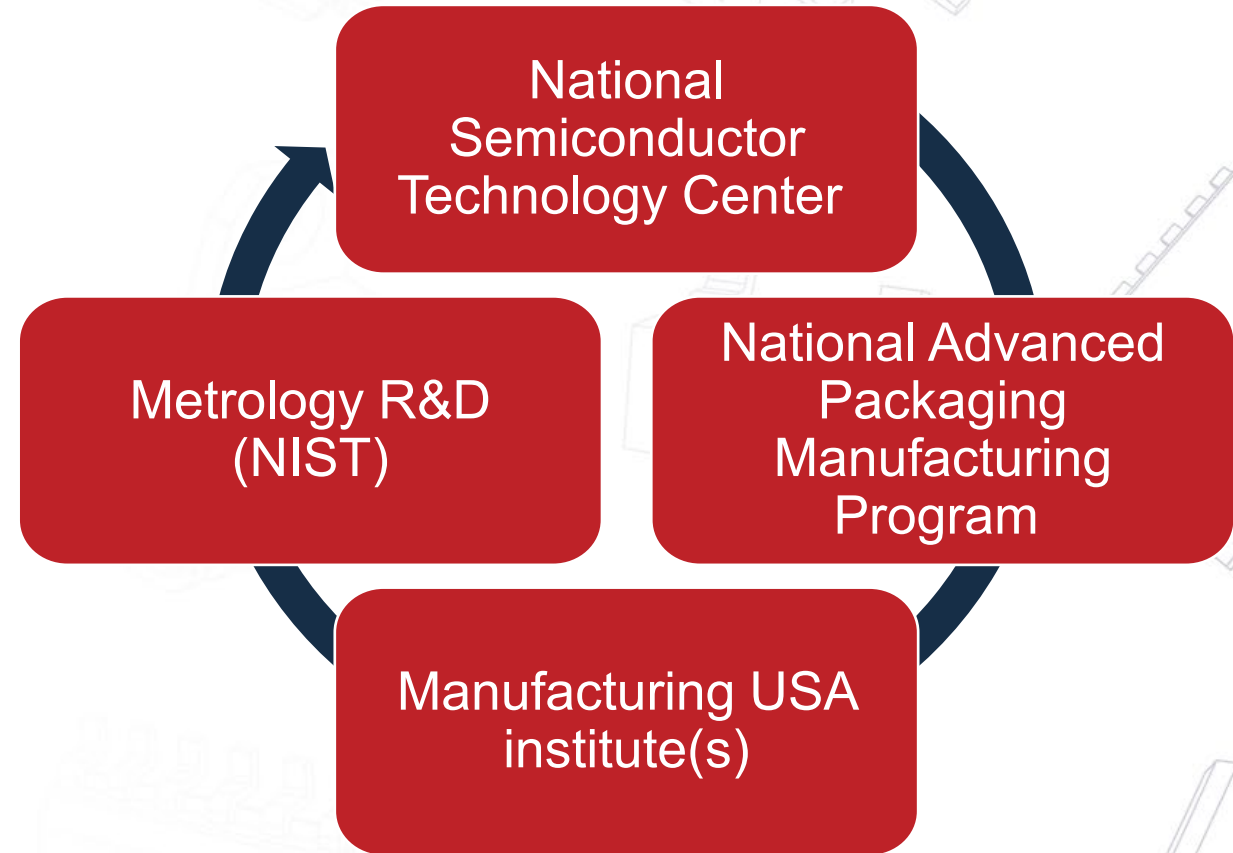
## Talent

A new generation of skilled workers, inventors, designers, researchers, technicians, and others able to build and sustain semiconductor manufacturing in the U.S.

# Research & Development



- Strengthen and advance U.S. leadership in R&D
- An integrated ecosystem that drives innovation
- In partnership with industry, academia, government, and allies
- A strategic view of R&D infrastructure, participant value-proposition, and technology focus areas
- Informed by the Industrial Advisory Committee



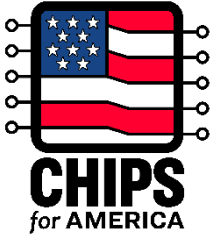
# Program Development Approach

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- Build a national-scale innovation ecosystem
- Build and connect programs in stages
- Invest in the interfaces
- Invest in people



# Program Development Timeline



Q1Y23

Q2Y23

Q3Y23

Q4Y23

National  
Semiconductor  
Technology  
Center

White paper

Establish NSTC

National Advanced  
Packaging  
Manufacturing  
Program

Outline program strategy

Manufacturing  
USA institute(s)

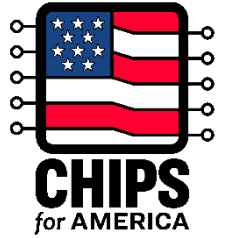
RFI Summary

Select topic(s); begin proposal process

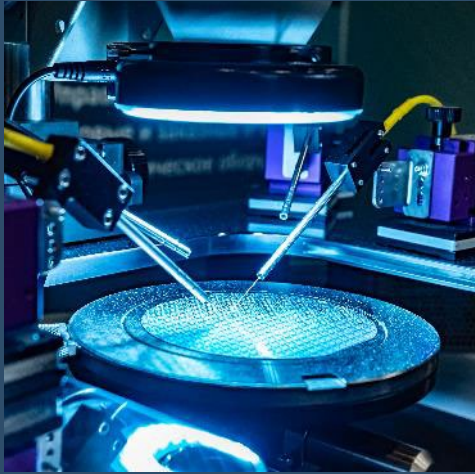
Metrology R&D  
(NIST)

Internal investment

Select programs to begin



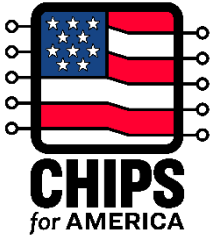
# National Semiconductor Technology Center



**Vision:** Will serve as the **focal point** for research and engineering throughout the semiconductor ecosystem, advancing and enabling disruptive innovation to provide U.S. leadership in the industries of the future.

**Structure:** A public-private consortium as an independent entity with a governing board informed and advised by industry, academia, government, and key stakeholders.

# National Semiconductor Technology Center

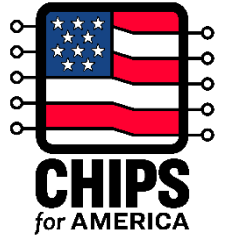


## Elements:

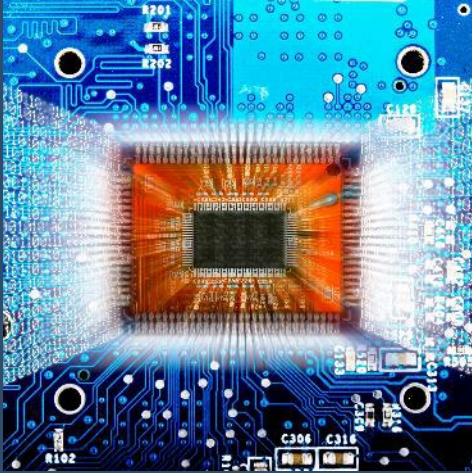
- Core of centrally operated, in-house research, engineering, and program capabilities combined with a network of directly funded and affiliated entities.
- Includes applied research, prototyping of devices and processes in a real-world environment, challenges related to scaling, start-up company support, or development of advanced manufacturing tools and processes.
- Focus research and engineering on challenging projects with a time horizon beyond 5 years.
- The NSTC will serve as a key convening body for the ecosystem.

## Process:

- NSTC white paper, 1<sup>st</sup> quarter 2023.
- Summarize the results of a landscape analysis, outline a governance structure, and describe a preliminary operating and financial model.



# National Advanced Packaging Manufacturing Program



- Strengthen semiconductor advanced test, assembly, and packaging capability in the domestic ecosystem
- Leverage public-private partnerships, that can include support for facilities managed by the NSTC and MUSA
- Broad range of technologies:
  - Heterogeneous integration
  - Wafer and panel-based approaches
  - Tooling and automation
  - Substrate technology



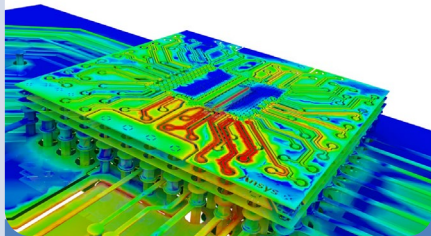
# NAPMP Target Areas

Technology innovation

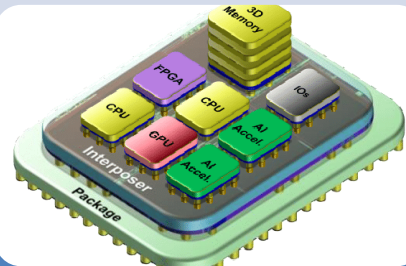
Create an R&D environment advancing the state-of-the art in advanced packaging.

Ecosystem support

Investments to bolster the growth in domestic capacity and enhance capabilities for competitive edge.



Co-design and simulation



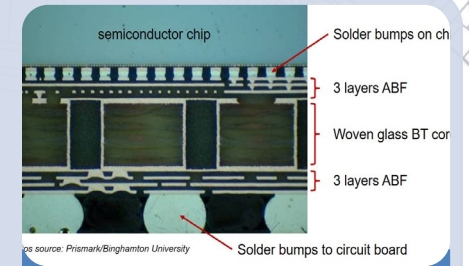
Chiplets



Pilot packaging facilities

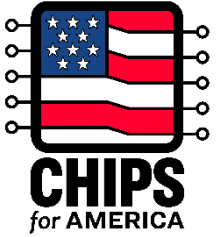


Tooling and automation



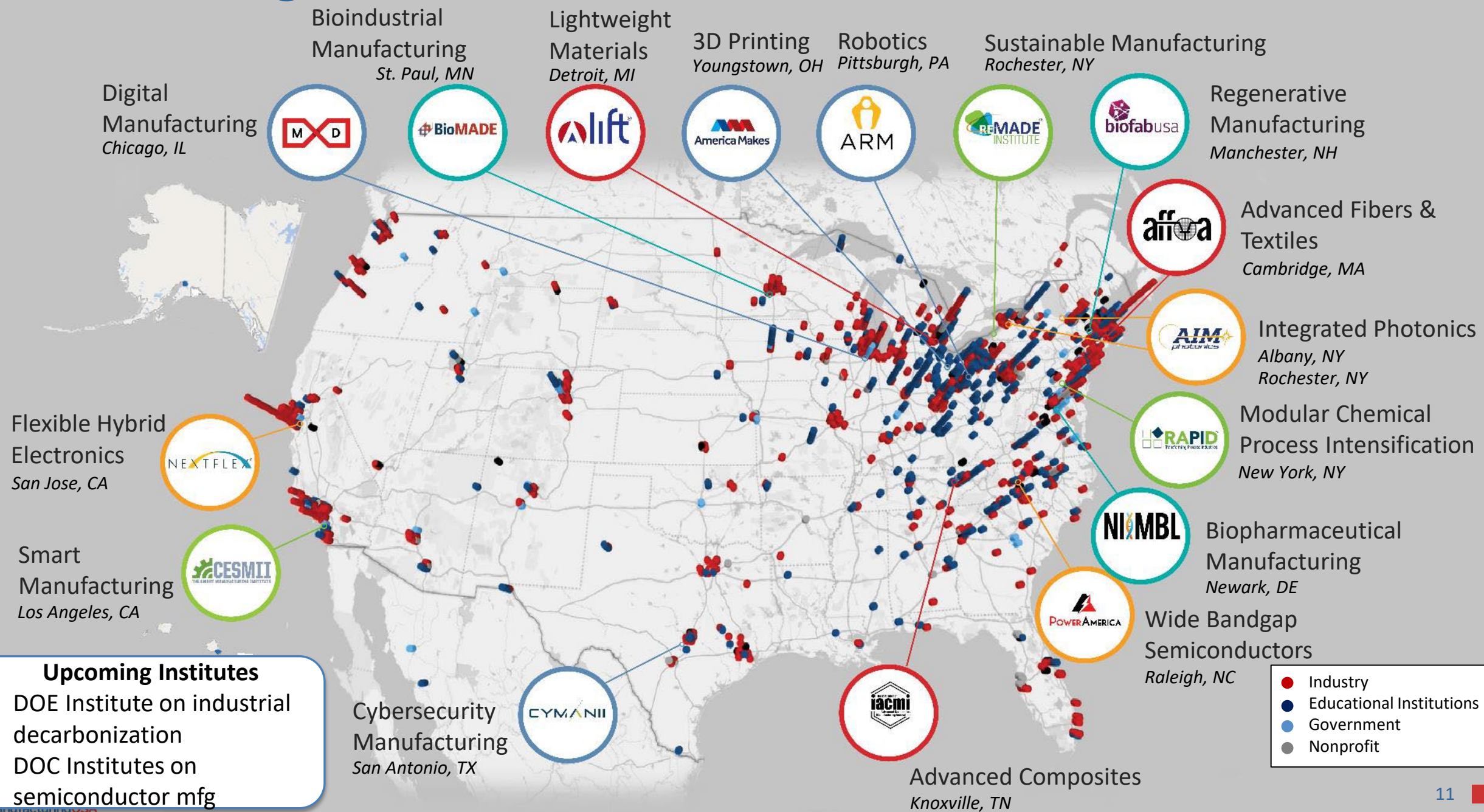
Materials and substrates

# Manufacturing USA Institute(s)

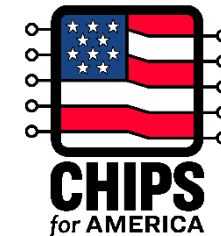


- Up to three new public-private partnership institutes in the Manufacturing USA network
- To advance research and commercialization of semiconductor manufacturing technologies
- Pre-competitive collaboration among researchers and manufacturers
- Ex: Virtualization, simulation, and automation; packaging
- Workforce training

# Manufacturing USA Institute Network



# RFI for Manufacturing USA Semiconductor Institutes



Purpose: inform design of up to three Manufacturing USA semiconductor institutes authorized by CHIPS Act

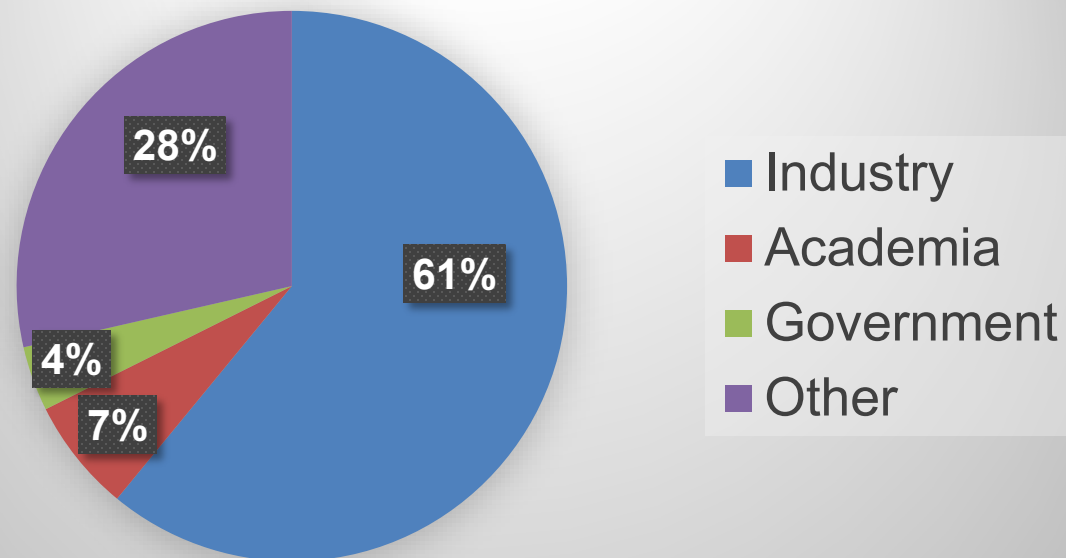
Three public webinars held with 463 registered participants

Public comment period Oct. 13 – Dec. 12, 2022

93 comments received\*

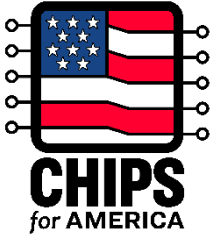
Public report to be submitted for clearance early March

RFI Responders



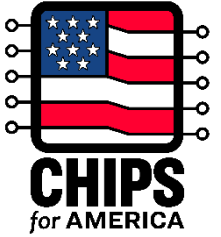
\*all comments received are publicly posted at <https://www.regulations.gov/docket/NIST-2022-0002/comments>

# NIST Metrology R&D



- Measurement science for new materials and packaging
- Physical metrology for next-generation microelectronics
- Computation and data
- Virtualization and automation
- Reference materials and data, and calibrations
- Standards for processes, cybersecurity, and test methods

# NIST Metrology Director

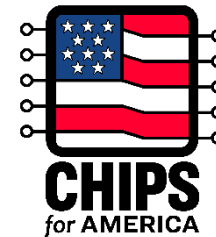


## Dr. Marla L. Dowell

- Director, Communication Technology Laboratory (CTL)
- CTL promotes the development and deployment of advanced communications technologies through leading edge R&D
- Fellow of SPIE, SPIE Women in Optics
- Arthur S. Flemming Award, DOC Silver Medal
- Ph.D. Physics, MIT; B.S. Physics, University of Michigan; M.B.A. University of Colorado Boulder



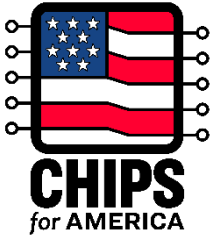
# Interagency Coordination



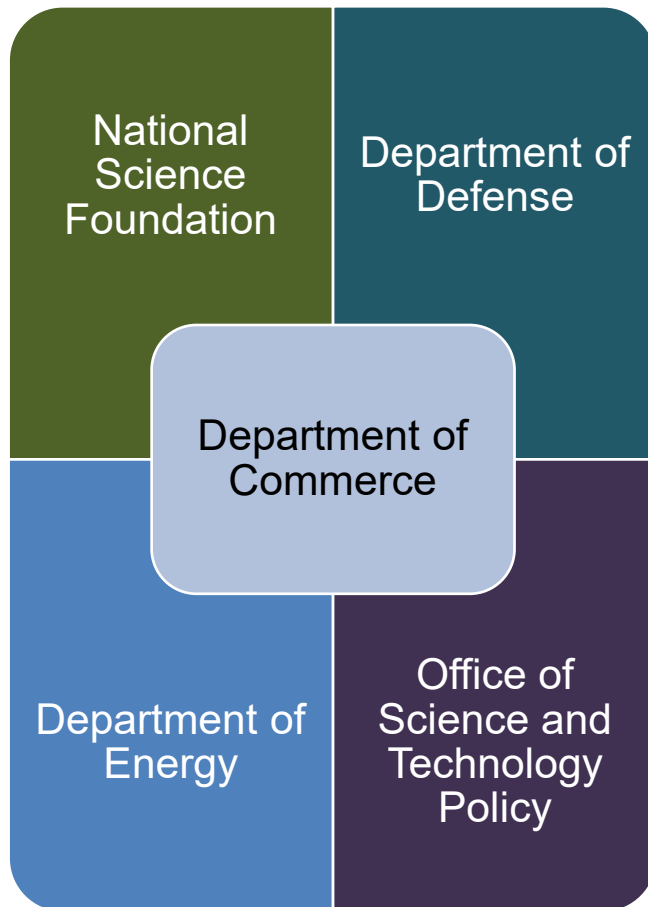
The impact of the CHIPS R&D program is maximized when integrated with programs across the USG.

We are working closely with DOD, NSF, DOE, and other agencies to realize this integration with guidance and support from the White House and OSTP.

# Interagency Coordination

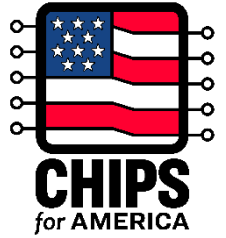


## GOALS



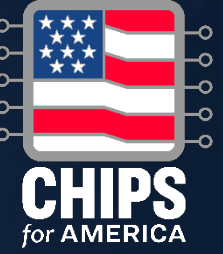
- 1 Unified messaging on agency roles and responsibilities
- 2 Program coordination across agencies
- 3 IP and unique capability access across agencies
- 4 Fluid partnering with other agencies
- 5 Fluid partnering with federally funded institutions





# Next Steps

- Coming soon
  - NSTC White Paper in 1<sup>st</sup> Quarter 2023
  - Additional steps to be shared afterwards
- Learn more
  - Visit [CHIPS.gov](https://www.chips.gov)
  - Read the Implementation Strategy
  - Join our mailing list



# Questions and Answers