CHIPS for America
Research and Development Program

Presented by Jason Boehm and Eric Lin
October 2022
WELCOME

• We look forward to your questions. Click the Q&A button, type your question, and click “Post Question” to submit.
• We will answer as many questions as possible today.
• Visit CHIPS.gov
  • Get the strategy paper
  • Sign up for email updates
CHIPS for America Vision

Jason Boehm
Chief of Staff
National Institute of Standards and Technology
Chips are the foundation of the modern world
Chips were invented in America

But most chips are made outside of the U.S.
The CHIPS and Science Act of 2022

One Hundred Seventeenth Congress of the United States of America

AT THE SECOND SESSION

Begun and held at the City of Washington on Monday, the third day of January, two thousand and twenty-two

An Act

Making appropriations for Legislative Branch for the fiscal year ending September 30, 2022, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SECTION 1. TABLE OF CONTENTS.

The table of contents for this Act is as follows:

Sec. 1. Table of contents.
Sec. 2. References.

DIVISION A—CHIPS ACT OF 2022

Sec. 101. Short title.
Sec. 102. Creating helpful incentives to produce semiconductors (CHIPS) for America fund.
Sec. 103. Semiconductor incentives.
Sec. 104. Opportunity and inclusion.
Sec. 105. Additional GAO reporting requirements.
Sec. 106. Appropriations for wireless supply chain innovation.
Sec. 107. Advanced manufacturing investment credit.
CHIPS for America Vision

Economic Security
This act enables us to build more resilient supply chains for important components.

National Security
This act enables us to bring the most sophisticated technologies back to the U.S.

Future Innovation
Chips are key to the technologies and industries of the future, so we need to be at the forefront. This act will ensure long-term U.S. leadership in the sector.
CHIPS for America Incentives

$39 billion for manufacturing

Two component programs:
1. Attract large-scale investments in advanced technologies such as leading-edge logic and memory
2. Incentivize expansion of manufacturing capacity for mature and other types of semiconductors

$11 billion for R&D

- National Semiconductor Technology Center
- National Advanced Packaging Manufacturing Program
- Manufacturing USA institute(s)
- National Institute of Standards and Technology measurement science

Together with CHIPS initiatives from other agencies, including DOD, State, NSF, and Treasury

Workforce development
Manufacturing incentives will spur:

- Large-scale investments in leading-edge logic and memory manufacturing clusters
- Manufacturing capacity for
  - Mature and current-gen chips
  - New and specialty technologies
  - Suppliers to the industry
R&D funding will spur:

- A domestic infrastructure for research and prototyping innovations
- R&D collaborations between academia and industry
- Workforce development and training
Guiding Principles

1. Meet economic and national security needs
2. Ensure long-term leadership in the sector
3. Strengthen and expand regional clusters
4. Catalyze private sector investment
5. Generate benefits for a range of stakeholders and communities
6. Protect taxpayer dollars
CHIPS & Science Act of 2022 passed into law and signed by President Biden

A Strategy for the CHIPS for America Fund released

Manufacturing Incentives Funding application process released; Rolling applications begin

Potential for first awards to be made (small projects)

CHIPS for America launched

IAC members announced, first meeting

NSTC white paper released

We are just getting started…

Manufacturing USA RFI

CHIPS webinars and briefings

CHIPS Program and R&D Offices founded, senior leadership announced
# Accountability

- Projects must be economically viable and compatible with strategy
- Beneficiaries must meet performance, reporting, audit, and oversight requirements
- Beneficiaries may not send funded technology abroad or engage with countries of concern
- Workers on funded construction projects to earn prevailing wages
- Priority to programs that engage a diversity of participants
- Public funds cannot be used for stock buybacks or dividend payments
- Funds to be returned if taxpayer funds are misused
CHIPS for America Research and Development

Eric Lin
Interim Director
CHIPS R&D Office
R&D Ecosystem Gaps

- Facilities and equipment
- Advanced packaging and testing
- Metrology and characterization
- Advanced manufacturing
- Workforce development
Research & Development

• To strengthen and advance U.S. leadership in R&D
• An integrated ecosystem that drives innovation
• In partnership with industry, academia, government, and allies
• Informed by the Industrial Advisory Committee
NATIONAL SEMICONDUCTOR TECHNOLOGY CENTER

- A center of excellence to drive semiconductor innovation
- Public-private consortium to include academia
- Program areas to include:
  - Research and prototyping
  - Investment fund
  - Workforce development
NATIONAL ADVANCED PACKAGING MANUFACTURING PROGRAM

• To expand and grow U.S. capacity in advanced packaging
• Capture available market share in packaging revenue
• Pilot facility for testing and integration of new processes
• A network of public private partnerships with universities, industry, and other government agencies focused on a range of issues including:
  • Substrate technology
  • Heterogeneous integration
  • Wafer and panel-based approaches
  • Tooling and automation
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

# Metrology Grand Challenges

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<th>Challenge</th>
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<td>1</td>
<td>Metrology for materials purity and properties</td>
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<td>2</td>
<td>Future microelectronics manufacturing</td>
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<td>3</td>
<td>Advanced packaging</td>
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<td>4</td>
<td>Security of devices across the supply chain</td>
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<td>5</td>
<td>Modeling and simulating semiconductor materials, designs and components</td>
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<tr>
<td>6</td>
<td>Improve the manufacturing process</td>
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<tr>
<td>7</td>
<td>Standardize new materials, processes and equipment</td>
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MANUFACTURING USA INSTITUTE(S)

- At least one new public-private partner institute in the Manufacturing USA network
- To advance research and commercialization of semiconductor manufacturing technologies
- Pre-competitive collaboration among researchers and manufacturers
- Virtualization, simulation, and automation
- Workforce training
Institutes Address the “Scale-Up” Gap

Market Failure in Pre-Competitive Applied Manufacturing R&D

Funding/Investment

High

Government and Universities

Private Sector

GAP

Low

Manufacturing-Innovation Process

Basic manufacturing research
Proof of concept
Production in laboratory
Capacity to produce prototype
Capacity in production environment
Demonstration of production rates

Readiness Levels (1-10)

Source: GAO analysis of data provided by Manufacturing USA institutes. | GAO-22-103979
Manufacturing USA Network Today
Manufacturing USA Semiconductor Institutes

A Notice by the National Institute of Standards and Technology on 10/13/2022

RFI Informational Webinars

Three public webinars scheduled

- October 20, 2022 1:00 PM - 2:00 PM ET
- November 2, 2022 11:00 AM - 12:00 PM ET
- November 16, 2022 2:00 PM - 3:00 PM ET

Register at https://www.nist.gov/oam/manufacturing-usa-semiconductor-institute-rfi
Manufacturing USA: We Want Your Input

RFI open from Oct. 13, 2022 – Nov. 28, 2022

Provide comments at www.regulations.gov
enter NIST-2022-0002 in the search field

Email us at MfgRFI@nist.gov
“RFI Response: Manufacturing USA semiconductor institutes” in the subject line
INDUSTRIAL ADVISORY COMMITTEE

ADVISES THE SECRETARY OF COMMERCE ON

• The science and technology needs of the nation’s domestic microelectronics industry
• The national strategy on microelectronics research
• The research and development programs and other advanced microelectronics activities funded through CHIPS for America
• Opportunities for new public-private partnerships

DOES NOT ADVISE ON

• The CHIPS incentives program
### IAC Members

#### Industry
- **Mike Splinter**  
  Chair  
  MRS Business and Technology Advisors
- **Susan Feindt**  
  Vice-Chair  
  Analog Devices
- **Ahmad Bahai**  
  Texas Instruments
- **Deirdre Hanford**  
  Synopsys
- **Ann Kelleher**  
  Intel Corporation
- **Mukesh Khare**  
  IBM Research
- **Om Nalmasu**  
  Applied Materials
- **Debo Olaosebikan**  
  Kepler Computing
- **Susie Armstrong**  
  Qualcomm
- **Ken Joyce**  
  Brewer Science
- **Meredith LaBeau**  
  Calumet Electronics
- **Alex Oscilowski**  
  TEL America
- **Anthony Yen**  
  ASML Technology Center

#### Ecosystem/Customer
- **Daniel Armbrust**  
  Silicon Catalyst
- **Bill Chappell**  
  Microsoft
- **Charles Gray**  
  Ford Motor Company

#### Academia/Other Stakeholders
- **James Ang**  
  Pacific Northwest National Laboratory
- **Carol Handwerker**  
  Purdue University
- **Tsu-Jae King Liu**  
  University of California Berkeley
- **Brandon Tucker**  
  Washtenaw Community College
- **H.S. Philip Wong**  
  Stanford University
- **Michael Fritze**  
  Potomac Institute for Policy Studies
- **Rajarao Jammy**  
  MITRE Engenuity
- **Willy Shih**  
  Harvard Business School
- **H.S. Philip Wong**  
  Stanford University
Stay Engaged

• R&D next steps
  • NSTC White Paper expected no sooner than February 2023 (6 months from enactment)
  • Additional steps to be shared after that

• Learn more
  • Visit CHIPS.gov
  • Read the Implementation Strategy
  • Join our mailing list
Question and Answers
Q&A function on the righthand side of your screen.
Click the Q&A button, type out your question, and click “Post Question”.

![Diagram showing Q&A process](image-url)
Thank you for attending