Semiconductor Research Corporation

Microelectronics Manufacturing USA Institute Information Webinar

April 13, 2023

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What's in the CHIPS Act: $52B for Semiconductors

Signed into law Aug. 2022

Includes authorization and funds for up to 3 institutes

Semiconductor Manufacturing Incentives and Research Investments (CHIPS Act of 2022)

PROGRAM	FY22	FY23	FY24	FY25	FY26	FY27	FY28	Subtotal
Department of Commerce Grants for Semiconductor Manufacturing	$19 billion *incl. $2B for mainstream nodes *Up to $6B may be used for direct loans and loan guarantees	$5 billion	$5 billion	$5 billion	$5 billion	--	--	$39 billion
Department of Commerce National Semiconductor Technology Center (NSTC)	$2 billion	$2 billion	$1.3 billion	$1.1 billion	$1.6 billion	--	--	$11 billion
Department of Commerce Advanced Packaging	$2.5 billion							
Department of Commerce NIST & Manufacturing USA Institute	$0.5 billion							
Department of Commerce Workforce and Education Fund	--	$0.025 billion	$0.025 billion	$0.050 billion	$0.050 billion	$0.050 billion	--	$0.2 billion
Department of Defense CHIPS Defense Fund	--	$0.4 billion	$0.4 billion	$0.4 billion	$0.4 billion	$0.4 billion	--	$2 billion
Department of State International Technology Security Fund	--	$0.1 billion	$0.1 billion	$0.1 billion	$0.1 billion	$0.1 billion	--	$0.5 billion

TOTAL $52.7B

Origin of Microelectronics Manufacturing USA Institute (MMI)

CHIPS Act authorized in NDAA* Jan. 2021

- Authorized creation of MMI by NIST
  - Authorization ≠ Appropriation

Evaluate SRC's role

- Should SRC run it?

- If so, then win

One Hundred Sixteenth Congress
of the
United States of America

AT THE SECOND SESSION

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

(f) CREATION OF A MANUFACTURING USA INSTITUTE.—Subject to the availability of appropriations for such purpose, the Director of the National Institute of Standards and Technology may establish a Manufacturing USA institute described in section 34(d) of the National Institute of Standards and Technology Act (15 U.S.C. 278s(d)) that is focused on semiconductor manufacturing. Such institute may emphasize the following:
  (1) Research to support the virtualization and automation of maintenance of semiconductor machinery.
  (2) Development of new advanced test, assembly and packaging capabilities.
  (3) Developing and deploying educational and skills training curricula needed to support the industry sector and ensure the United States can build and maintain a trusted and predictable talent pipeline.

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+ https://www.congress.gov/116/bills/hr6395/BILLS-116hr6395enr.pdf Page 1472
* NDAA = National Defense Authorization Act

# Executive Team Description

Industry: SRC GRC Large Sponsors

- **AMD:** Mike Ignatowski
- **IBM:** Timothy Chainer
- **Intel:** Henning Braunisch
- **Texas Instruments:** Jim Wieser

Academia Leading Packaging Center

- **Purdue U.:** Carol Handwerker, Ganesh Subbarayan
- **SUNY Binghamton**: Kanad Ghose, Bahgat Sammakia
- **Georgia Tech:** George White

SRC: David Henshall, Victor Zhirnov, Todd Younkin

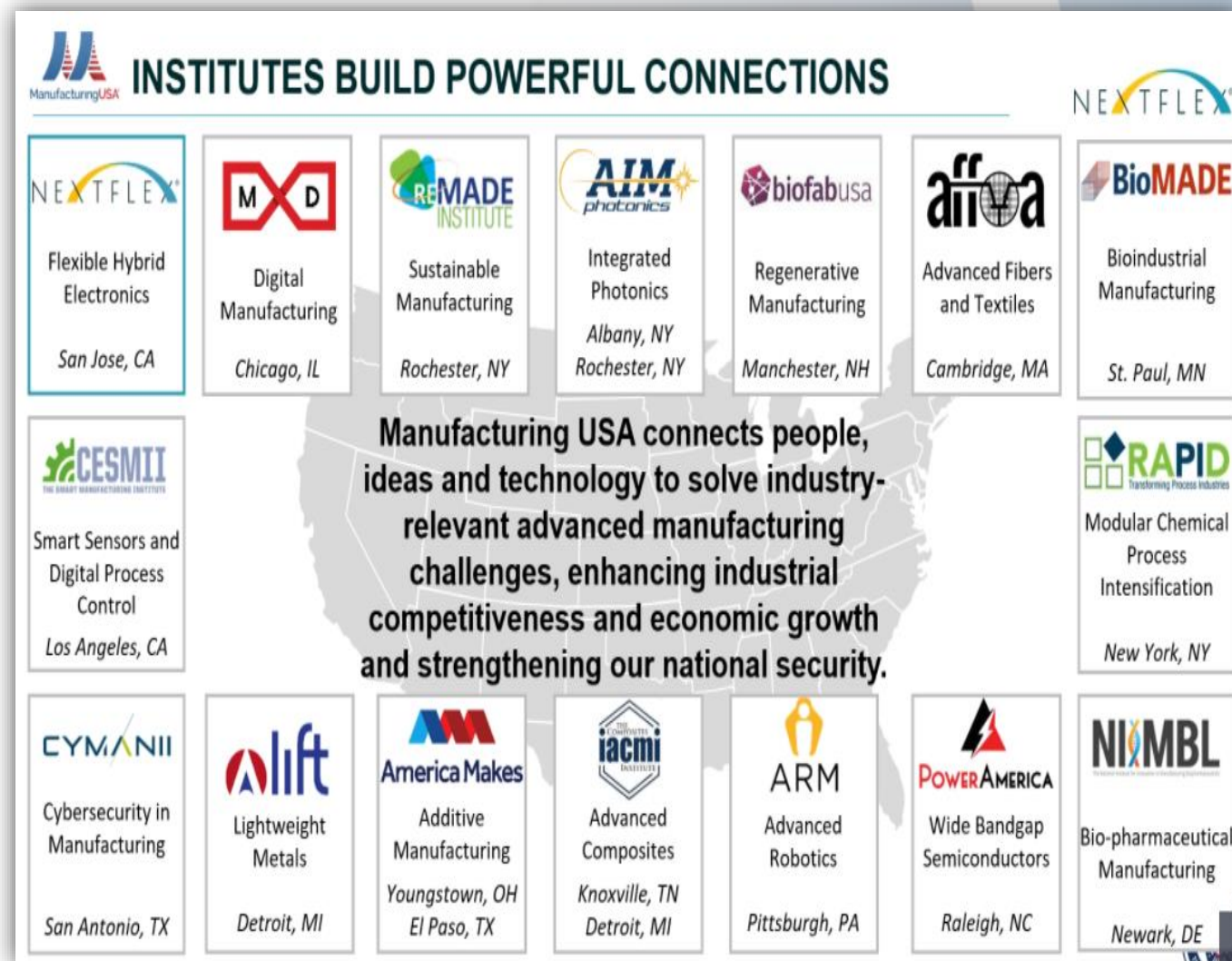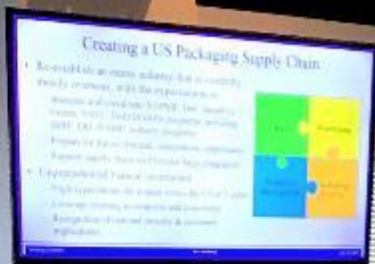**KB Science:** Kristin Bennett, Scott Boyce
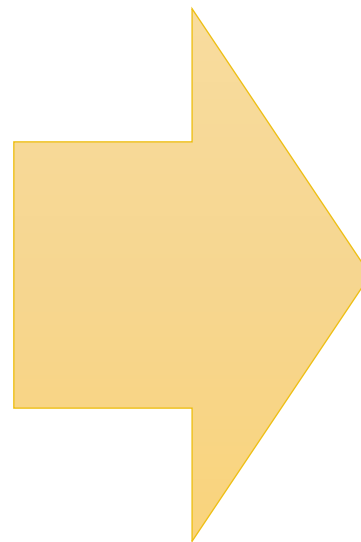
Meeting regularly for past 2 years to:

- Determine feasibility of institute
- Outline technology scope and operational model
- Prepare proposal

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Exec Team's Findings About Manufacturing Institutes

1. Manufacturing Institutes <u>do not manufacture</u>. They are created to:
   - Restore manufacturing jobs in the U.S.
   - Use the vast resources in academia to research industry-relevant tech using shared infrastructure
   - "Overcome technical hurdles, share state-of-the-art facilities, and train tomorrow's workforce"*

2. Existing institutes
   - 16 Manufacturing Institutes in past ~10 years
   - ~$45M/yr., includes >1:1 cost share
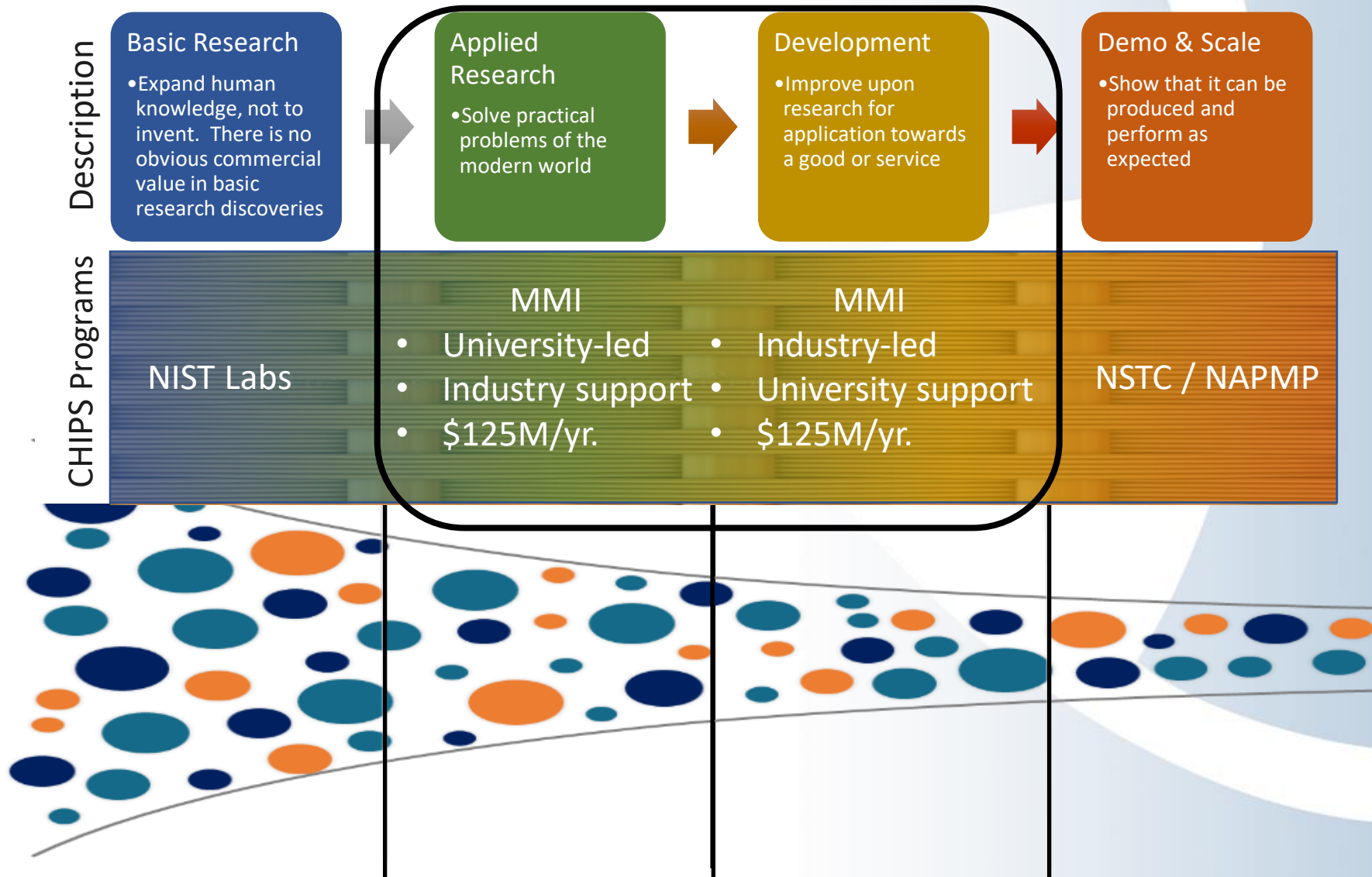   - Focus on pre-competitive R&D, TRL 3- 6[#]

INSTITUTES BUILD POWERFUL CONNECTIONS

NEXTFLEX — Flexible Hybrid Electronics — San Jose, CA

MXD — Digital Manufacturing — Chicago, IL

REMADE INSTITUTE — Sustainable Manufacturing — Rochester, NY

AIM photonics — Integrated Photonics — Albany, NY / Rochester, NY

biofabusa — Regenerative Manufacturing — Manchester, NH

affoa — Advanced Fibers and Textiles — Cambridge, MA

BioMADE — Bioindustrial Manufacturing — St. Paul, MN

CESMII — Smart Sensors and Digital Process Control — Los Angeles, CA

RAPID — Modular Chemical Process Intensification — New York, NY

Manufacturing USA connects people, ideas and technology to solve industry-relevant advanced manufacturing challenges, enhancing industrial competitiveness and economic growth and strengthening our national security.

CYMANII — Cybersecurity in Manufacturing — San Antonio, TX

lift — Lightweight Metals — Detroit, MI

America Makes — Additive Manufacturing — Youngstown, OH / El Paso, TX

iacmi — Advanced Composites — Knoxville, TN / Detroit, MI

ARM — Advanced Robotics — Pittsburgh, PA

PowerAmerica — Wide Bandgap Semiconductors — Raleigh, NC

NIIMBL — Bio-pharmaceutical Manufacturing — Newark, DE

Intel Texas Instruments AMD
NXP IBM Purdue SUNY
Binghamton Georgia Tech

July 23, 2021 Workshop at SRC

Exec Team held in-person workshop in response to the passage of USICA by Senate and Endless Frontiers by House.

https://www.src.org/about/decadal-plan/src_workshop_white_paper_mmi_final.pdf

CHIPS 9906 c-f Describes Innovation Pipeline

1. Create new capabilities designed concurrently to establish entire ecosystem

2. Convening epicenter with inclusive membership

3. Industry-led with Microelectronics and APT together
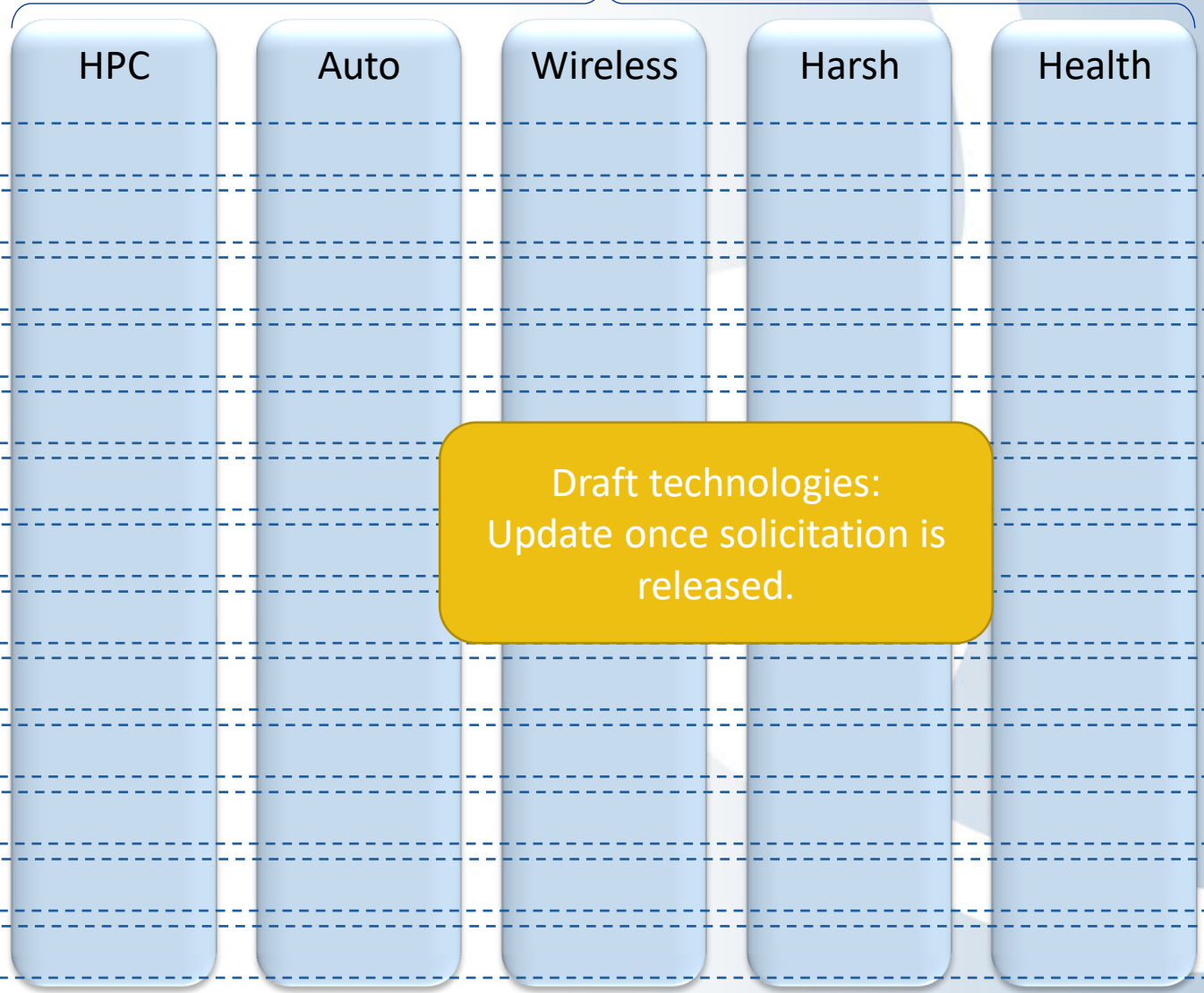
4. Resources require 2X-5X typical institute size

Description

Basic Research
- Expand human knowledge, not to invent. There is no obvious commercial value in basic research discoveries

Applied Research
- Solve practical problems of the modern world

Development
- Improve upon research for application towards a good or service

Demo & Scale
- Show that it can be produced and perform as expected

CHIPS Programs

NIST Labs

MMI
- University-led
- Industry support
- $125M/yr.

MMI
- Industry-led
- University support
- $125M/yr.

NSTC / NAPMP

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MMI Concept: Evolution from existing Global Research Collaboration (GRC) program & expansion of Packaging

Development (applications, industry led)

| HPC | Auto | Wireless | Harsh | Health |

Applied Research (GRC-like, academic led)

Microelectronics
- **Nanomaterials & Processing**
- **Logic & Memory Devices**
- **Analog Mixed-Signal**

Both
- Metrology
- **Environ., Safety, & Health**
- **CAD & Test**
- **AI Hardware**
- **Hardware Security**
- Communications
- Workforce Dev.

APT*
- Materials & Substrates
- Thermal Mgmt.
- Assembly & Integration

Draft technologies:
Update once solicitation is released.

* Advanced Packaging Technology
https://www.src.org/about/public-documents/src_rfi_response_to_nist_2022.pdf

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Exec Team's Concept: Described in Manuf. USA RFI Response

RESPONSE TO REQUEST FOR INFORMATION

Department of Commerce

National Institute of Standards and Technology

Submitted via: MfgRFI@nist.gov

In response to:

Request for Information: Manufacturing USA Semiconductor Institutes

SRC Manufacturing Consortium List of Contributors

Jim Wieser, Texas Instruments	Kristin Bennett, KB Science
Tim Chainer, IBM	Scott Boyce, KB Science
Raja Swaminathan, AMD	Karen Di Spigna, SRC
Henning Braunisch, Intel Corporation	Jacqueline Hall, SRC
Kanad Ghose, SUNY Binghamton	David Henshall, SRC
Bahgat Sammakia, SUNY Binghamton	John Oakley, SRC
Carol Handwerker, Purdue University	Marcus Pan, SRC
Ganesh Subbarayan, Purdue University	Todd Younkin, SRC
	Victor Zhirnov, SRC

1. Create new capabilities designed concurrently to establish entire ecosystem

2. Convening epicenter with inclusive membership

3. Industry-led with Microelectronics and APT together

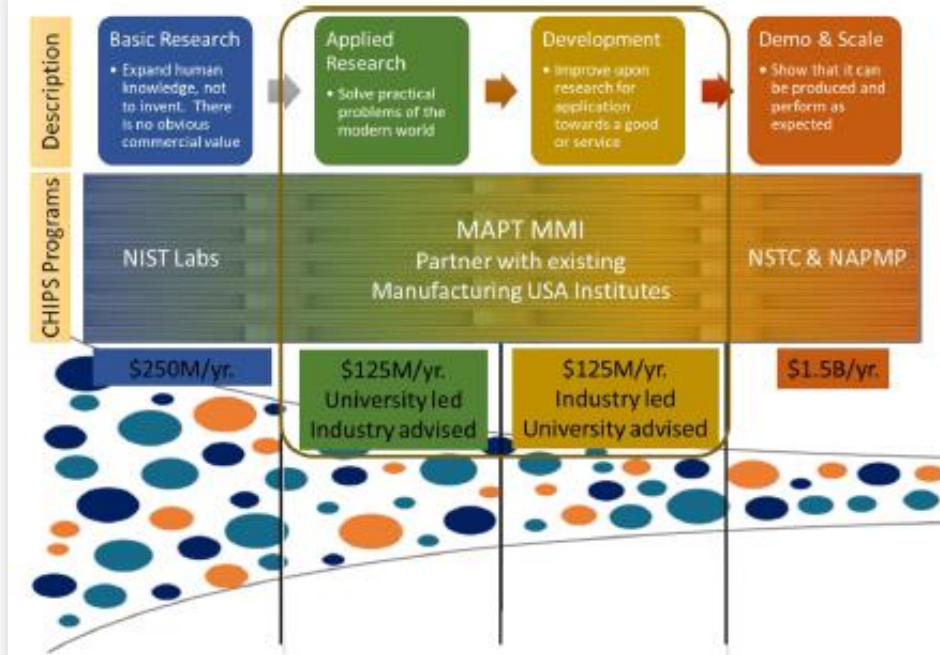4. Resources require 2X-5X typical institute size

Figure 1. Microelectronics and Advanced Packaging Technology (MAPT) as a topic for a Microelectronics Manufacturing USA Institute (MMI) to bridge the Lab-to-Fab gap vision

Coordinated messages with several other submissions

https://www.src.org/about/public-documents/src_rfi_response_to_nist_2022.pdf

Q1 2023 First CHIPS Solicitations Released

A. OPPORTUNITY OVERVIEW

Project Title	Microelectronics Commons
Project Sponsor	Office of the Under Secretary of Defense for Research and Engineering (OUSD R&E)
Contracting Activity	Naval Surface Warfare Center (NSWC), Crane Division
Questions Deadline	27 January 2023 at 12:00 PM EST
Response Deadline	28 February 2023 at 12:00 PM EST
Anticipated Project Budget	First year $350,000,000/yr. (Fiscal Year (FY) 2023) Years 2-5 $320,000,000/yr. (FY 2024-FY 2027). Total Project Value of $1.63 Billion

CHIPS *for* AMERICA

VISION FOR SUCCESS:
COMMERCIAL FABRICATION FACILITIES

CHIPS Incentives Program
February 28, 2023

CHIPS *for* AMERICA

- DOD released Microelectronic Commons

- $1.6B build R&D/ pilot network for DOD R&D

- NIST released solicitation for Leading Nodes

- Manufacturing Incentives $39B

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https://nstxl.org/opportunity/microelectronics-me-commons/

https://www.nist.gov/system/files/documents/2023/02/28/CHIPS-Commercial_Fabrication_Facilities_NOFO_0.pdf

SRC's Approach to MMI

Today

After NIST's Selection

1. Proposal Participant

- Open & welcoming approach
- Target 50 Proposal Participants
- Technology comes from MAPT Roadmap
- Membership model for diversity
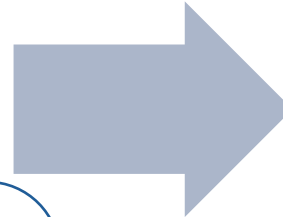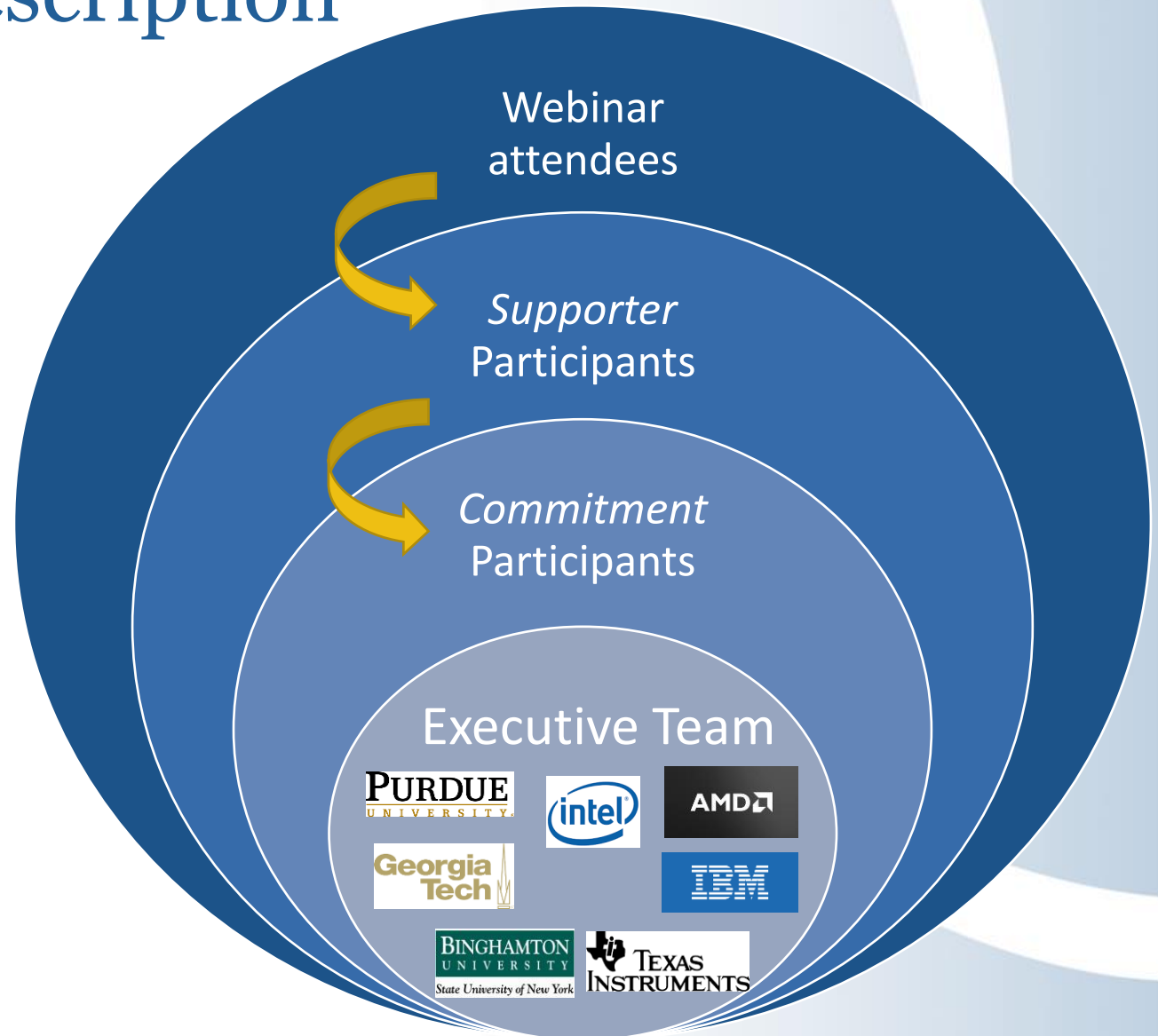
2. Institute Member

- SRC's GRC program is foundation for institute
  - Use GRC's funding as cost-share
  - Use most of GRC's operational model
  - Scale depending on NIST's solicitation

Note there may be other Institute solicitations from NIST or others unrelated to this effort

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Estimated Timeline

Create team, write proposal

Contracting with NIST

Q2-Q3 2023 | Q4 2023, Q1 2024 | Q2 2024 | Q3 2024

Await selection

Operate Institute

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Proposal Participation Description

- Webinar attendees (MAPT Roadmap volunteers+) are invited to become Supporter Participants

- Supporter participants will be invited to become Commitment Participants

- This is for proposal prep only, Institute membership model TBD

Webinar attendees

Supporter Participants

Commitment Participants

Executive Team

PURDUE UNIVERSITY

intel

AMD

Georgia Tech

IBM

BINGHAMTON UNIVERSITY
State University of New York

TEXAS INSTRUMENTS

Today's Invitation: Become Supporter Participant

- Letter of Support due 5/11

- Supporter participants will be invited to Commitment Participant info webinar

- Current SRC GRC members are already committing funds

Scope of today's webinar

	Supporter Participant	Commitment Participant	Executive Team
Org. included on Institute proposal	yes	yes	yes
Submit R&D proposal(s) to BP1	1	>1?	Unlimited?
Help refine governance, IP rights, membership model	yes	yes	yes
Proposal Selection Committee	Observer	Voting	Voting
Final editing rights, MMI participant selection	no	no	yes
Criteria	Letter of Support	Letter of Commitment*	Exclusivity & financial contribution

Submitting a LOS gets invite to Commitment Participant meeting

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* Commitment requirements TBD before next meeting

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Next Steps

1. 3 upcoming info sessions. These are open "office hours" where you can ask questions and get more info (all dates/ times EDT)
   - 4/19 9:00 AM- 11:00 AM
   - 4/20 1:00 PM- 3:00 PM   Link will be sent to all attendees shortly
   - 4/24 7:00 PM- 9:00 PM

2. Send signed Letters of Support to Dil Dilcia.Paguada@src.org by 5/11
   - Sample Letters of Support can be downloaded from the registration website

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https://src.webex.com/weblink/register/rb74aa04674f68f7e9b99930fbc409008

More info: David.Henshall@src.org