



DoD Microelectronics Commons

Creating a Collaborative Approach to CHIPS Act Objectives for Education and Innovation

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[HTTPS://WWW.CTO.MIL](https://www.cto.mil)

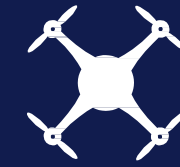
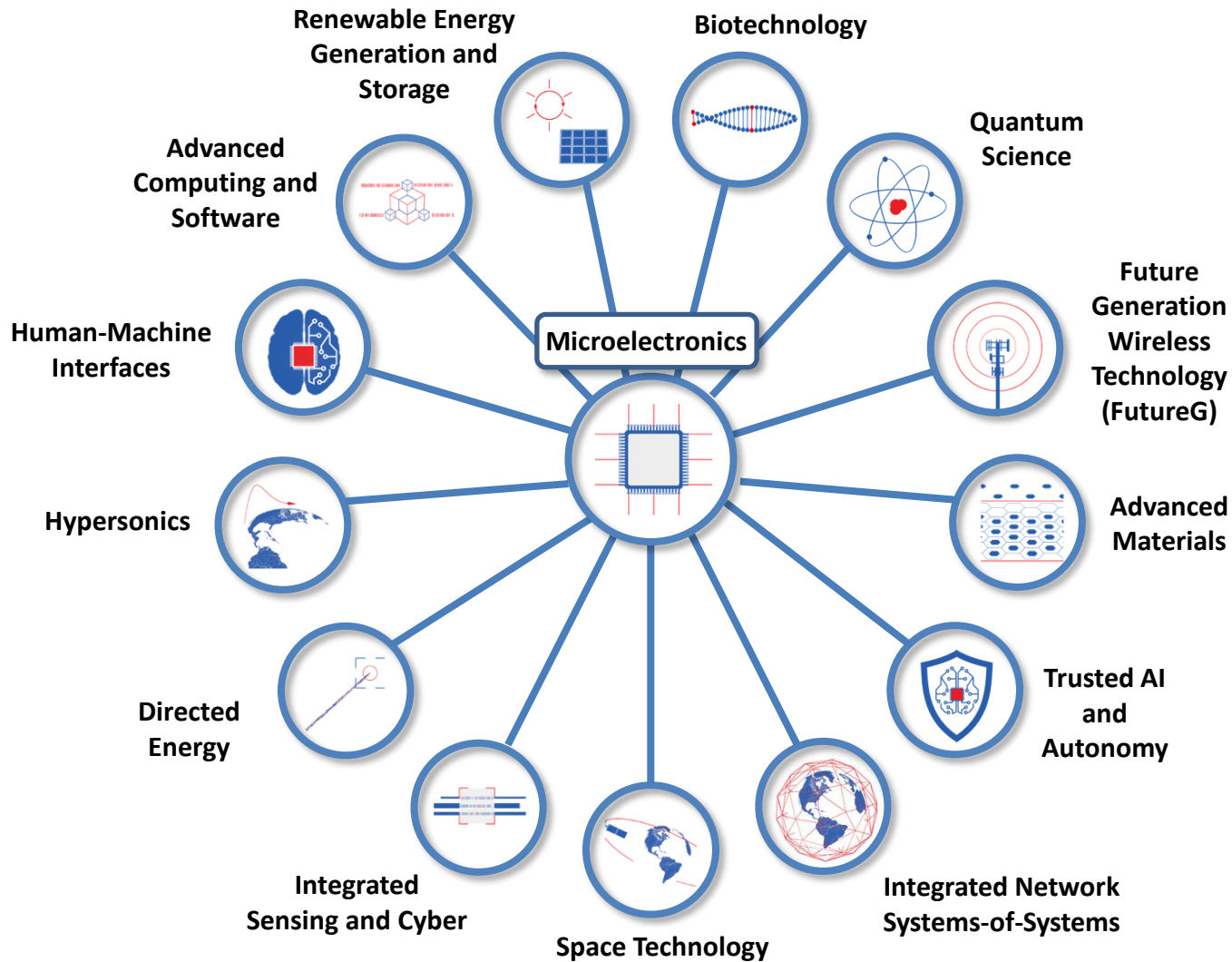


@DODCTO

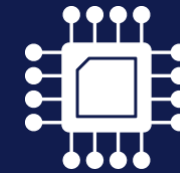


@OUSDRE

CRITICAL TECHNOLOGY SYNERGIES: MICROELECTRONICS



Autonomous Drones



AI Chips



Self Driving Vehicles



Energy Efficiency For Edge Computing



Military Applications

Microelectronics a “Must-Win” Technology for DoD

Semiconductors are essential to national security as they are fundamental to the operation of virtually every military system, including communications and navigations systems and complex weapons systems such as those found in the F-35 Joint Strike Fighter.

DoD will accelerate the process of turning ideas into capabilities by creating new pathways to rapidly experiment with asymmetric capabilities and deliver new technologies at scale. Doing so requires bridging the valley of death between prototypes and full-scale production.

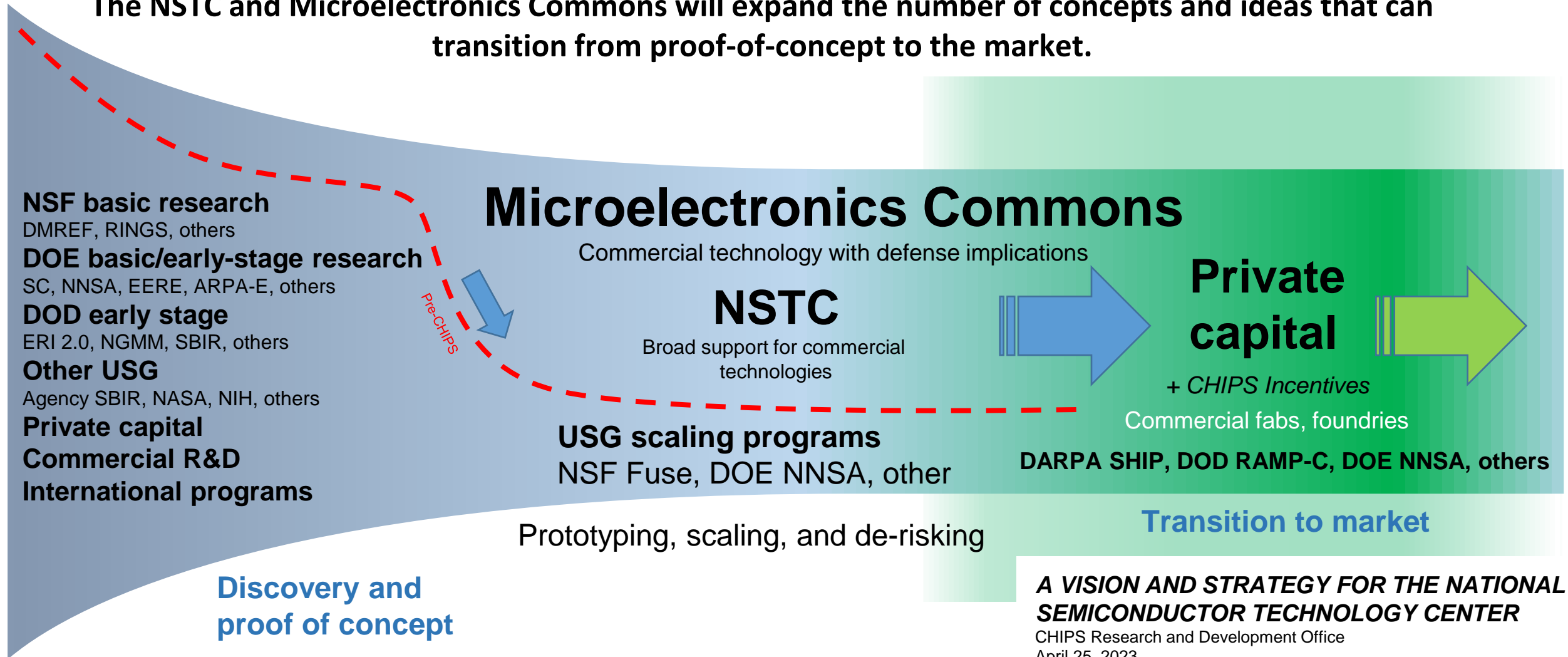
The NSTC will be able to support technologies emerging from the Commons and will collaborate closely with DOD to ensure program coordination and sharing of resources as part of the broader whole-of-government approach in alignment with the national strategy.



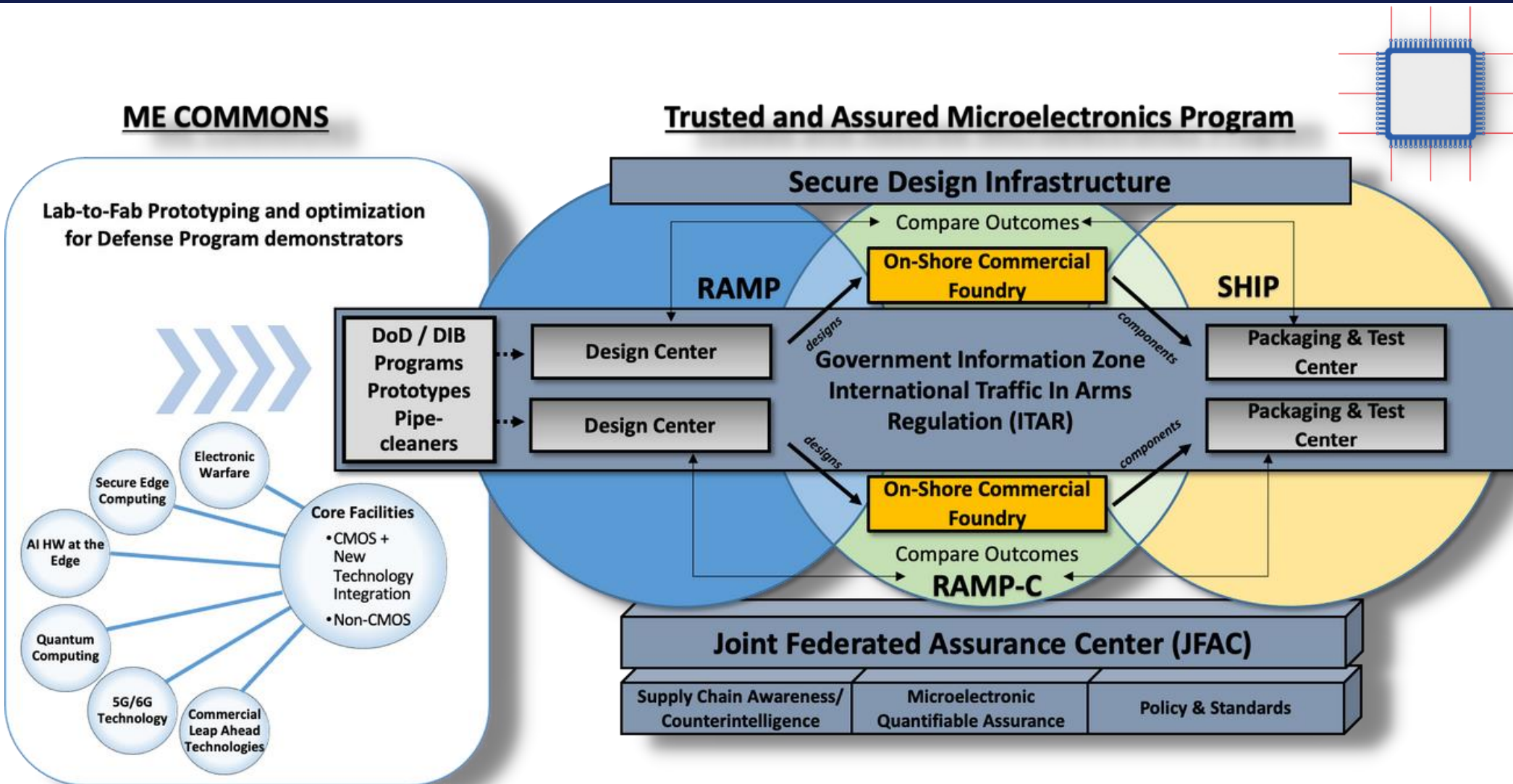


CHIPS Offers a Whole of Government Approach

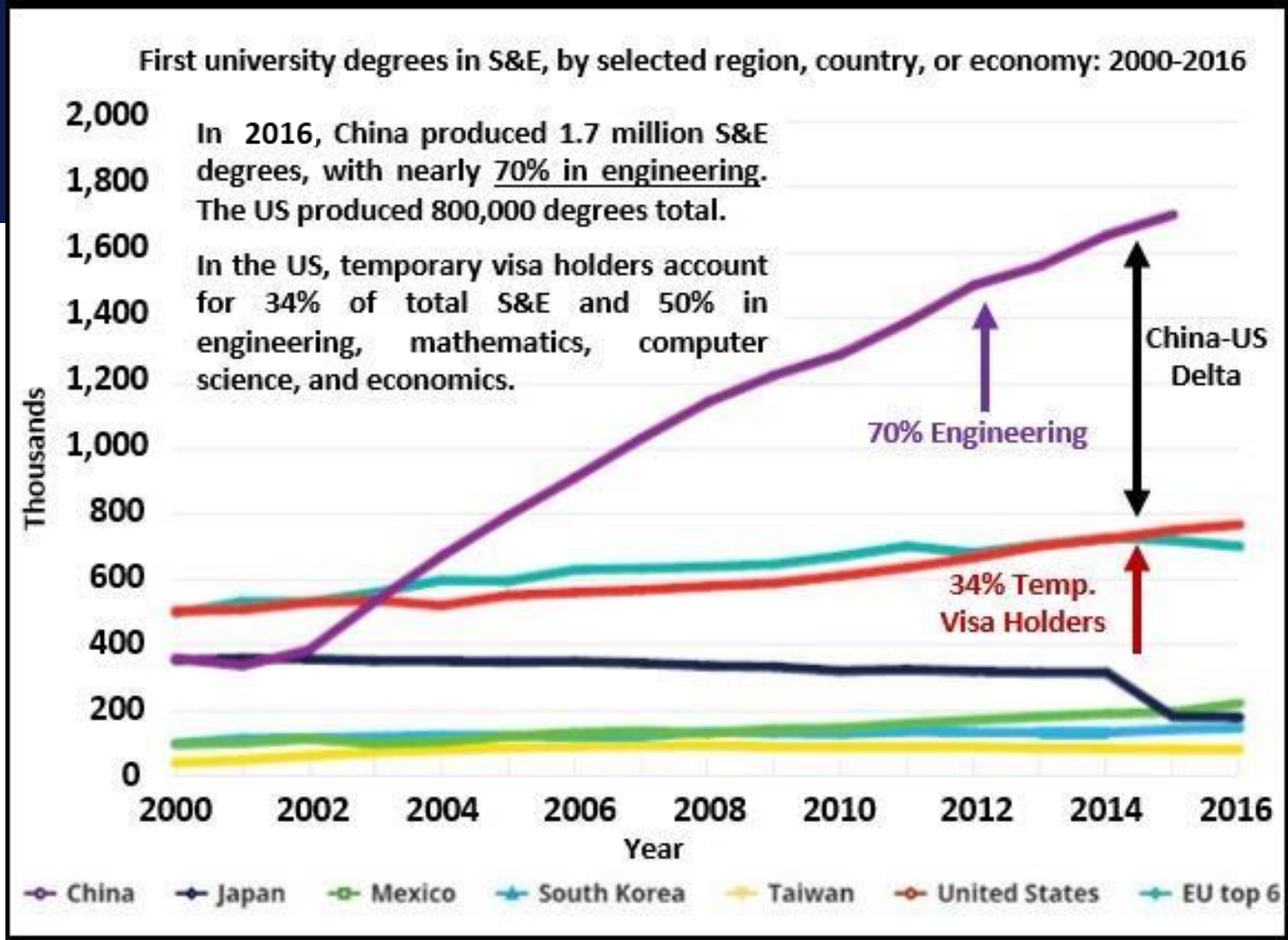
The NSTC and Microelectronics Commons will expand the number of concepts and ideas that can transition from proof-of-concept to the market.



T&AM Program Enabling Access to State of the Art (SOTA)



STEM Talent Crisis



As much as emerging technologies will define future conflict, ***the war for talent will likely play the central role*** in the outcome of long-term technological competition.

The National Security Innovation Base (NSIB) struggles to attract, recruit, and retain a workforce willing and able to tackle tough challenges and find innovative solutions. Universities are confronting a dearth in American talent generation and retention. Much of that shortfall is filled with foreign students, a large share of them from China.

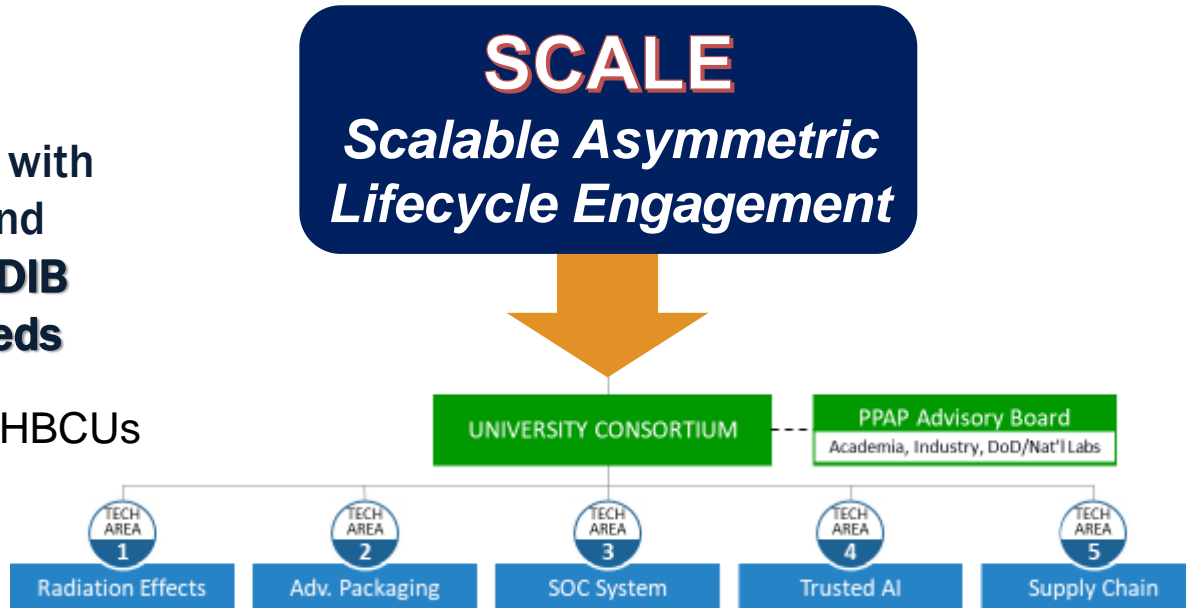
Scalable Asymmetric Lifecycle Engagement



*Develop meaningful program for **US citizen students** to establish relationships with potential employers, which lead to employment after graduation with the US Government and/or DIB*

Matching STEM students with specialized curricula and relevant KSAs to Gov't/DIB technical workforce needs

Includes Participation from HBCUs (Morgan State University)



Public-Private-Academic Partnership



A Ready Workforce

- Scalable:** Extend the program across multiple universities.
- Replicable:** Extend the program across other technology areas.
- Asymmetric:** Produce clearable, knowledgeable workforce
- Nationally coordinated and regionally executed:** network of stakeholders and universities.

SCALE Measures of Success

Scalable Asymmetric Lifecycle Engagement (SCALE)

A Public-Private-Academic Partnership (PPAP) Approach to Workforce Development

Metric	FY20	FY21	FY 22	FY23 (11/17/22)
# SCALE Students	25	104	280	395
# Gov't/DIB Partners	15	26	52	64
# University Partners	6	9	16	17
# Internships	40	105	164	-
# Courses	1	4	10	14
# Students Reached through Courses	25	2740	5530	8780

#s are cumulative

# Cumulative Students	395
# Active Students	338
# Students Graduated	57

Attract, Develop, and Maintain a Ready Workforce



Lab-to-Fab Transition of Microelectronics Technologies



Research Universities, Start-ups have facilities for Lab prototyping but face barriers to demonstrating manufacturability in a Fab.

Core Facilities or Foundries/Fabs provide access to early-stage Fab prototyping.

Microelectronics Commons aims to enable lab-to-fab prototyping– evolve microelectronics laboratory prototyping to foundry/fab prototyping – in domestic facilities



The Microelectronics Commons: Innovation from Lab-to-Fab

Innovation Barriers

Misalignment of research entities with existing government processes

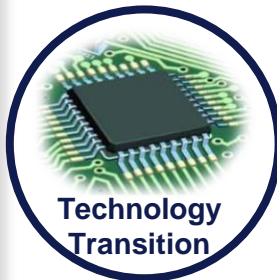
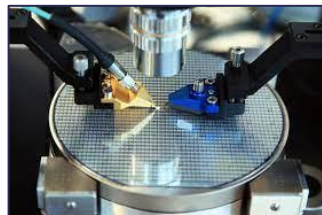
Lack of access to existing fabs for lab-to-fab prototyping

High capital costs for process and metrology tooling to support manufacturing of ME technologies

High Intellectual Property (IP) and Electronic Design Automation (EDA) design license costs

Lack of domestic access to chip carriers, and packaging materials to support integration of electronics

Lack of workforce talent and expertise to support technology transition



End State

Sustained partnerships between emerging technology sources, manufacturing facilities, and interagency partners

Rapid transition of early-stage microelectronics research to proven technology in domestic foundries

Expand domestic microelectronics fabrication capability

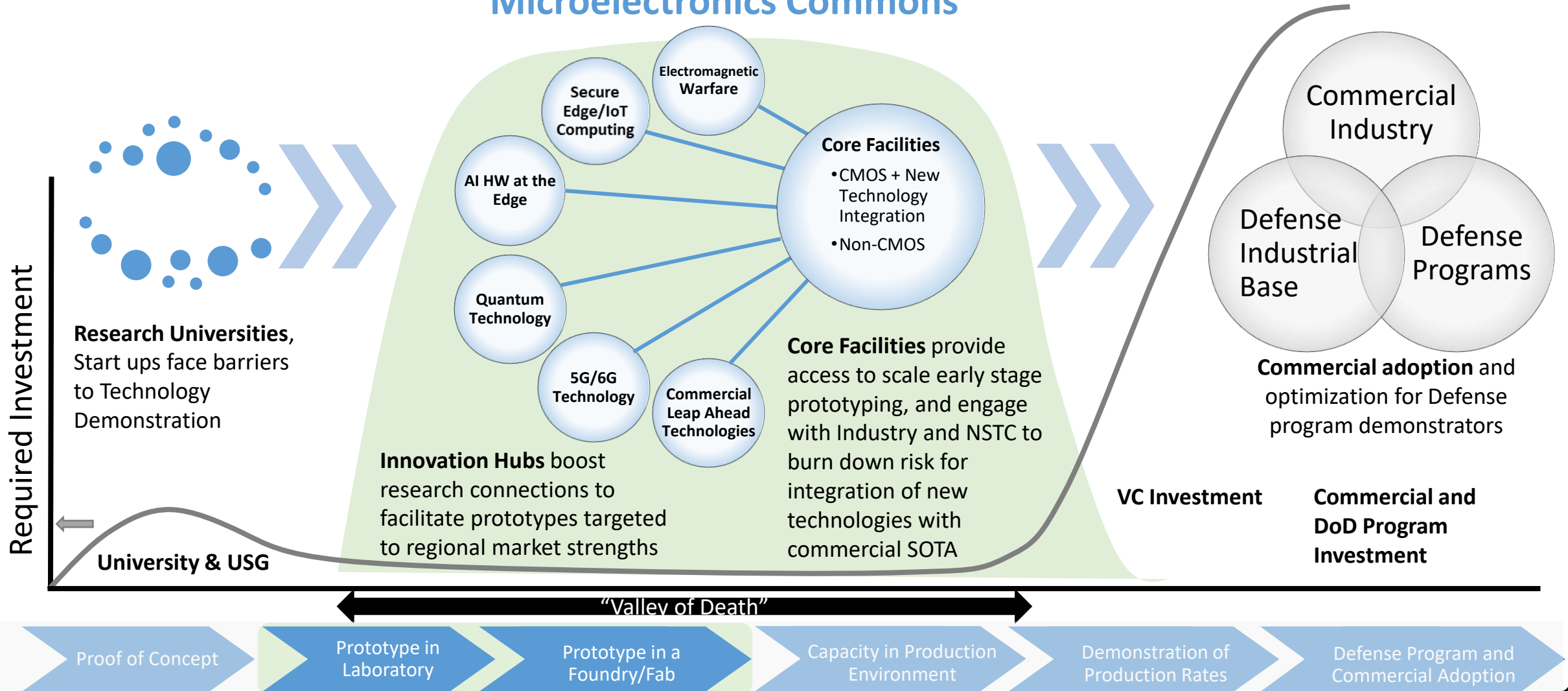
Enhance microelectronics education to bolster the microelectronics engineering workforce

Develop a pipeline of talent to bolster local semiconductor economies and contribute more broadly to the growth of a domestic semiconductor workforce



Microelectronics Commons Addresses the Valley of Death

Microelectronics Commons





Microelectronics Commons Awardees



The responses to the RFS represented the innovation of a combined membership network of 642 unique organizations

Applied Research Institute

*Silicon Crossroads
Microelectronics Commons
(SCMC) Hub*

Arizona Board of Regents on behalf of Arizona State University

Southwest Advanced Prototyping (SWAP) Hub

The Board of Trustees of the Leland Stanford Junior University

California-Pacific-Northwest AI Hardware Hub (Northwest-AI-Hub)

Massachusetts Technology Collaborative

Northeast Microelectronics Coalition (NEMC) Hub

Midwest Microelectronics Consortium

Midwest Microelectronics Consortium (MMEC) Hub

North Carolina State University

Commercial Leap Ahead for Wide-bandgap Semiconductors (CLAWS) Hub

The Research Foundation for SUNY, acting on behalf of SUNY Polytechnic Institute

Northeast Regional Defense Technology Hub (NORDTECH)

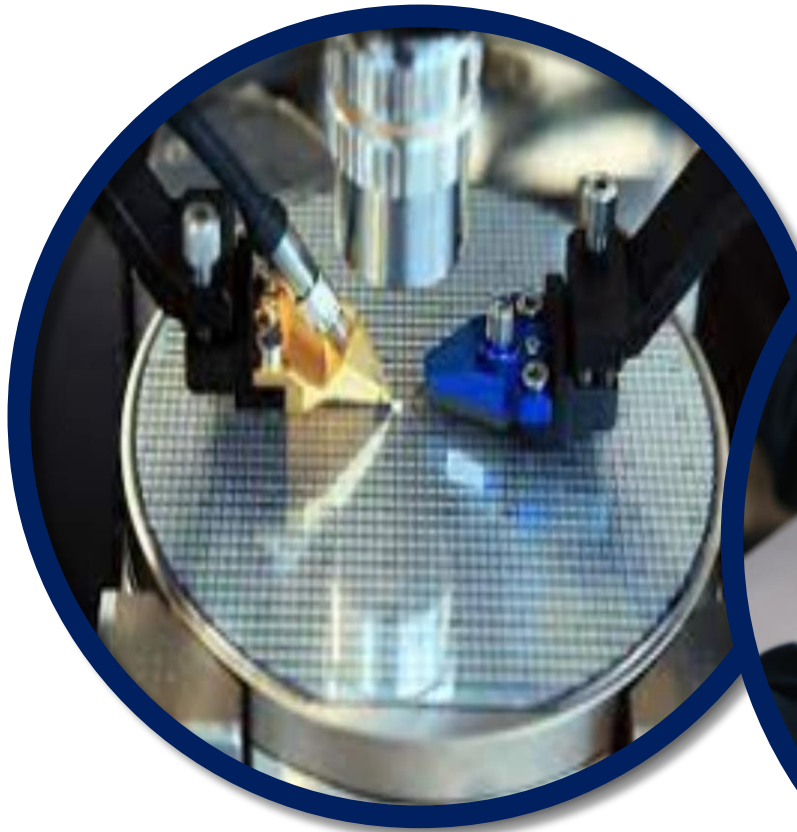
University of Southern California

California Defense Ready Electronics and Microdevices Superhub (California DREAMS)



Commons Will Support Infrastructure

Human Infrastructure ...



Physical Infrastructure ...



Digital Infrastructure ...

Infrastructure is foundational to the success of the Microelectronics Commons



Microelectronics Commons by the Numbers

8 Hub Leads

Microelectronics Commons
381 Unique Organizations



This map is provided by NSTXL based on data provided by the Microelectronics Commons Hubs as of September 15, 2023.

~\$240M

Funding
to Hubs

Member Location

35 States

+ District of Columbia and
Puerto Rico

430+

Hub
Members

381

Unique
Members

215+

Members Located
Outside of Their Hub
Lead's State

100+

Colleges &
Universities



Microelectronics Commons Accomplishments



Establishment of Microelectronics Commons Program

(U) Microelectronics Commons Request for Solution (RFS)

- The Microelectronics Commons RFS was released on November 30, 2022. Solutions were received and the RFS was closed on February 28, 2023
- Source Selection Determination Completed

(U) Industry Days and Upcoming Commons Meeting

- Industry Days were successfully conducted on December 7 - 8, 2022. The event saw both senior leadership and significant interagency participation. There were **more than 900 participants in attendance** at this hybrid event held at the Ronald Reagan Building and International Trade Center in Washington, D.C.
- The **Inaugural Microelectronics Commons Meeting** was held on 17-18 October 2023 in Washington, DC

The Microelectronics Commons is Now a Reality

(U) The Deputy Secretary of Defense announced 8 Hub Award Winners on 20 September 2023

- Arizona State University led Southwest Advanced Prototyping or SWAP Hub – \$39.8 million
- Midwest Microelectronics Consortium (MMEC) Hub – \$24.3 million
- North Carolina State University led Commercial Leap Ahead for Wide Bandgap Semiconductors (CLAWS) Hub – \$39.4 million
- The Applied Research Institute led Silicon Crossroads Microelectronics Commons Hub – \$32.9 million
- Stanford University led California-Pacific-Northwest AI Hardware or Northwest AI Hub – \$15.3 million
- The Massachusetts Technology Collaborative led Northeast Microelectronics Coalition Hub – \$19.7 million
- The State University of New York led Northeast Regional Defense Technology or NORDTECH Hub – \$40 million
- The University of Southern California led California Defense Ready Electronics and Microdevices Superhub (DREAMS) Hub – \$26.9 million