

Welcome and MTO Introduction

Whitney Mason

Director, Microsystems Technology Office
Defense Advanced Research Projects Agency

Spark Tank

July 24, 2025





Welcome



**MTO Spark Tank
July 24-25**

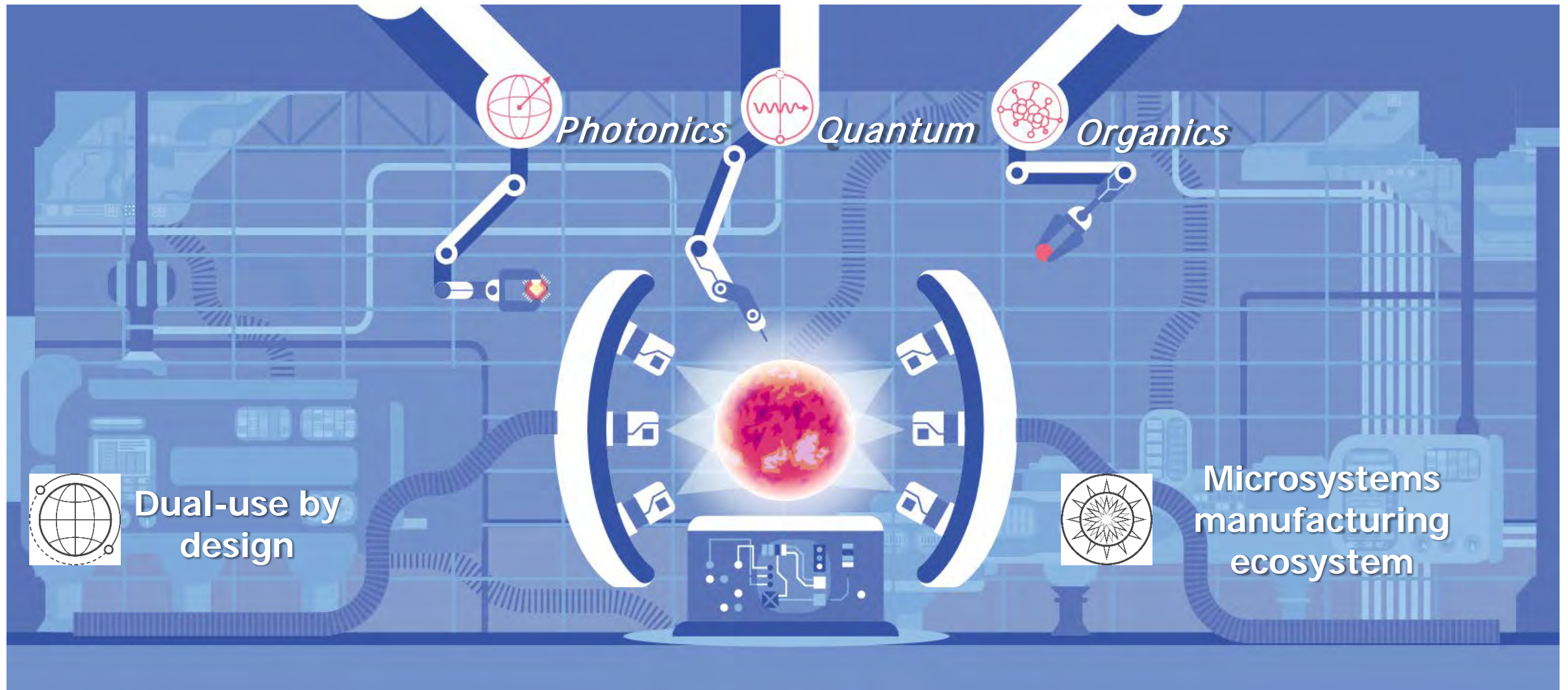


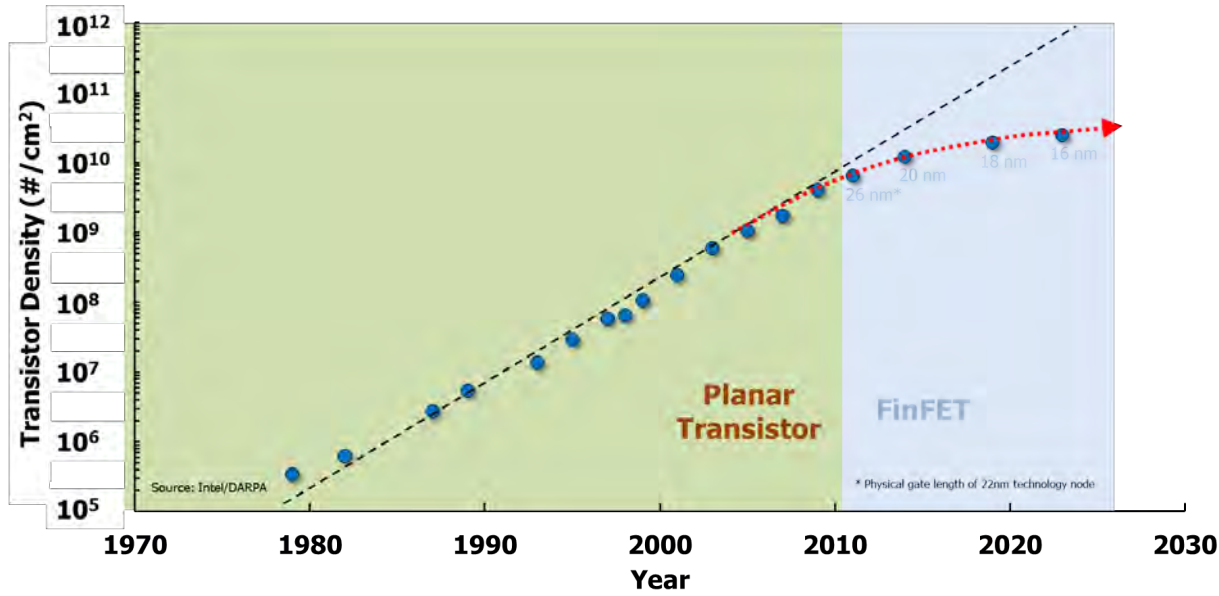
Dominate the microsystems ecology militarily
and economically





MTO Thrust Areas





The semiconductor industry is ‘near its limit,’ - Jensen Huang, Nvidia CEO in 2022

#/cm²: number per centimeter squared
 FinFET: fin field effect transistor
 CEO: Chief Executive Officer
 AI: Artificial Intelligence
 GW: gigawatt



Source: MIT, Gerville/iStock

If exponential growth in chip supply continues, AI data centers will need 68 GW in total by 2027 — almost a doubling of global data center power requirements from 2022 and close to California's 2022 total power capacity of 86 GW. – RAND, January 2025

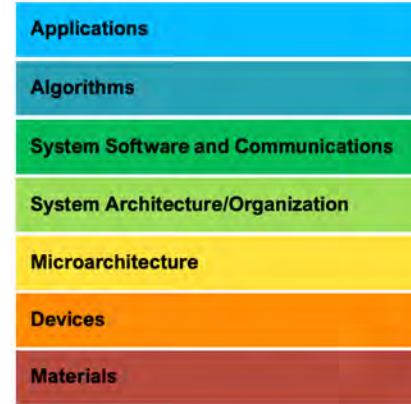
The digital cliff is an opportunity for massive displacement

Reversible



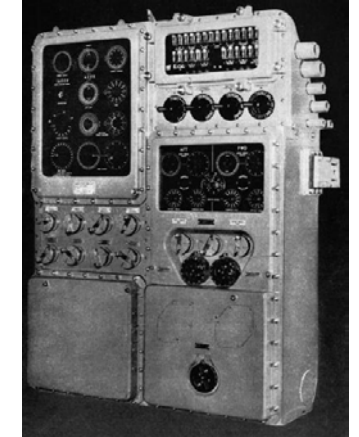
Source: IEEE Spectrum

Stochastic



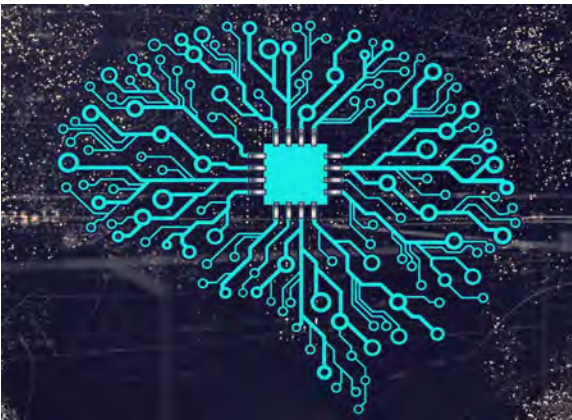
Source: DARPA ISAT STORM Study

Analog



Source: Wikipedia, Torpedo Data Computer and Slide Rule

Neuromorphic



Source: QuAIL Technologies

Quantum



Source: HR Daily Advisor

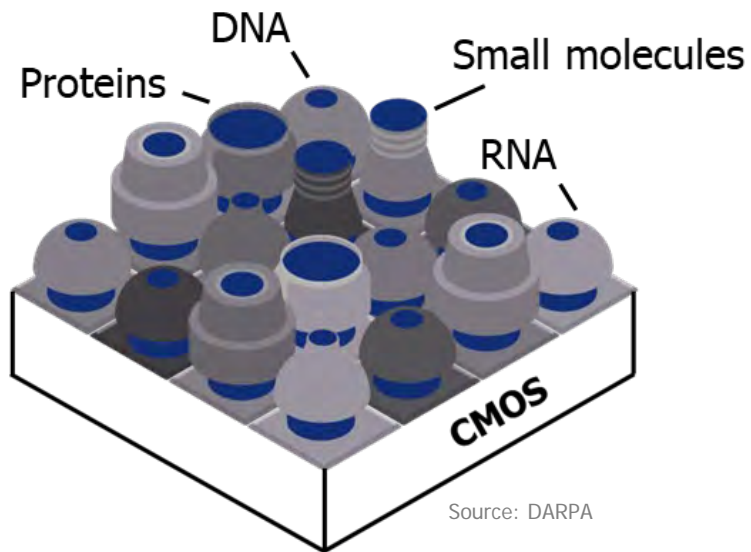
Organic



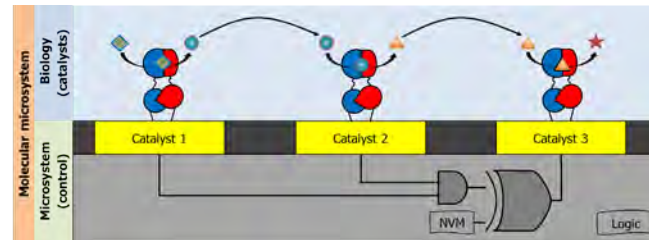
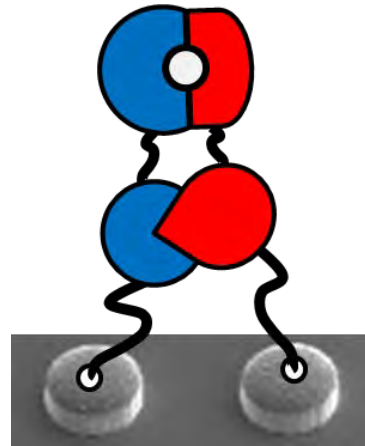
Source: Popular Science

We must think of new technologies to avoid the “digital cliff”

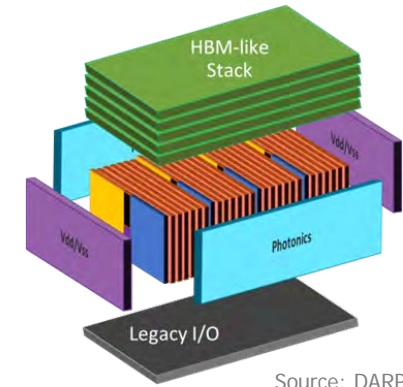
Sensing



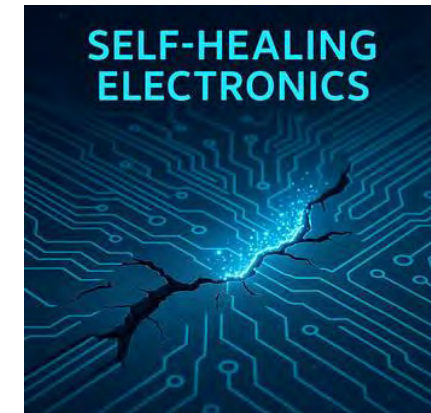
Catalysis



Assembly



Self-healing



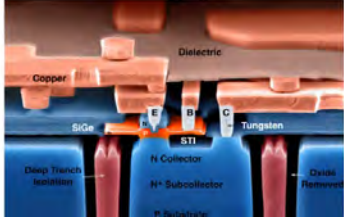
Program attributes include material limitations, manufacturing, integration, power requirements, scalability, control, stability, and reliability



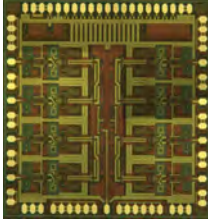
Commercially Catalyzed Defense Deployment



Conventional Dual Use

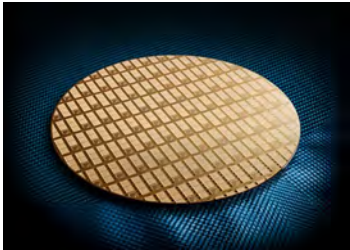


Source: DARPA

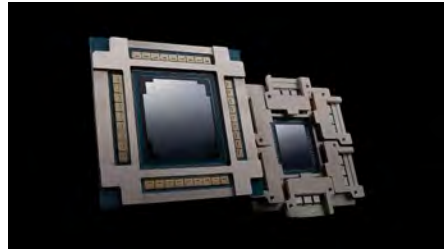


Source: Starlink

DARPA integration efforts set stage for mobile commercial satcom terminals



Source: Ayar Labs



Source: NVIDIA

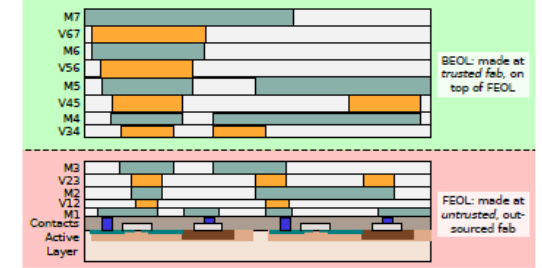
DARPA integrated photonics efforts lead to billion-dollar silicon photonics industry

DoD research investment offers a commercial use case

MTO Dual Use By Design



Source: GlobalFoundries



Source: IEEE

Split manufacturing in ICs is a technique for adding security to commercial and defense chips



Source: ChatGPT



Source: Motor Trend

Can we make a Super Pursuit Mode for DoD?

DoD will leverage commercial performance and then add feature advantages

Take advantage of commercial scaling and economic drivers to build superior defense capabilities



Become a PM

Whitney Mason
Office Director



Mike Geertsen
Deputy Director



Doug Bryant
MTO Recruiter
(dbryant@nssrpo.com)



Come chat with us!



Hear from the PMs

Daniel Ridge
Novel Hardware



Mike Sangillo
*Breakthrough Additive
Manufacturing*



Huanan Zhang
Nanofabrication and Tools



David Meyers
*Advanced Materials and
Packaging*



Julian McMorrow
Materials and Reuse



Yogendra Joshi
Thermal Engineering



Anna Tauke-Pedretti
*Advanced Photonics/
Circuits and Interconnects*



Justin Cohen
*Integrated Photonics and
Quantum Concepts*



Thomas Schratwieser
*Energy Delivery and
Quantum Science*



Jonathan Hoffman
Quantum Sensing



John Hoffman
*Biological and Organic
Microsystems*



Today's Spark Tank Agenda

A few more things

Whitney Mason
MT0 101



Brian Nuckols
DARPA Contracting



Mike Geertsen
Day 1 Wrap Up



To set expectations.



Take Time to Interact



Source: Huffington Post, The 5 Steps to Successful Networking

Thursday, July 24, 2025

7:30am-9:00am **Networking Breakfast**

10:15am-10:45am **Morning Networking Break**

12:00pm-1:30pm **Networking Lunch**

2:15pm-3:00pm **Afternoon Networking Break**

5:00pm-6:00pm **Networking Social Reception**

Friday, July 25, 2025

7:30am-9:00am **Networking Breakfast**

10:15am-10:45am **Morning Networking Break**

11:45am-1:00pm **Networking Lunch**

2:00pm-2:30pm **Networking Break**





www.darpa.mil