UF Herbert Wertheim College of Engineering
UNIVERSITY of FLORIDA

Introduction of Central Florida Semiconductor Innovation Engine based on Public Private Partnership

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NATIONAL SCIENCE FOUNDATION (NSF)

- NSF Act, 1950 (Public Law 81-507):

  Mission: "To promote the progress of science; to advance the national health, prosperity, and welfare; to secure the national defense..."

- FY **2025** Budget Request to Congress: **$10.183 B**

- **2020 Pandemic**
  - **Supply chain disruption**
  - **Economic and societal risk**
  - **Currency inflation**

- **US Government**
  - **IRA: Tax increase**
  - **Investment: BBB, CHIPS/Science Act**

NSF Regional Innovation Engines (**NSF Engines**)

Goal:

- Supporting multiple flourishing **regional innovation ecosystems** across the US
- **Spurring economic growth in regions** that have not fully participated in the technology boom of the past few decades

- Launched by ***NSF Technology, Innovation, and Partnerships (TIP) (2022)***
- Established in ***the CHIPS and Science Act of 2022***

Funding: Each Engine gets up to **$160 M** for 10 years

Focus: (1) Use-inspired R&D, (2) translation-to-practice, (3) entrepreneurship, and (4) workforce development with national, societal, and geostrategic impact. **Emphasis: Public-Private-Partnership (PPP)**

NSF Engines by the Numbers

679
Concept outlines submitted

58
NSF Engines Development Awards

10
NSF Engines Inaugural Awards

18
States receiving NSF Engines funding

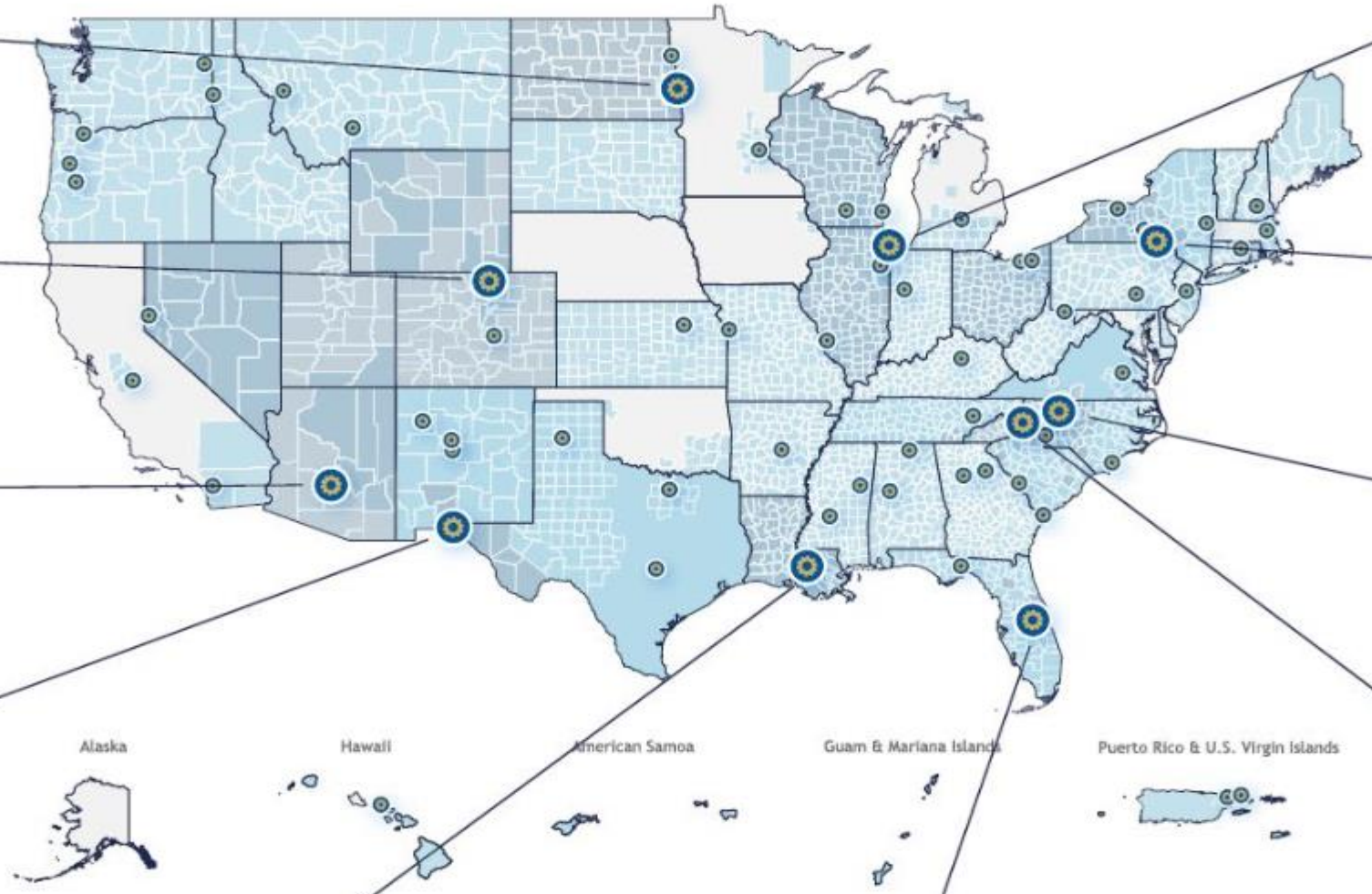
10
Key technology areas from the CHIPS & Science Act represented in the portfolio

450+
Organizations partnering with NSF Engines Award recipients

2:1+
Match of NSF funds from corporate, philanthropic, and government sources.

40%
Lead orgs that are first-time NSF award recipients

10 NSF Engine Inaugural Award (~$160M for 10 years)



North Dakota Advanced Agriculture Technology Engine
Agriculture

Colorado – Wyoming Climate Resilience Engine
Climate Resilience

Southwest Sustainability Innovation Engine
Sustainability

Paso Del Norte Defense & Aerospace Innovation Engine
Aerospace

Louisiana Energy Transition Engine
Energy Transition

Central Florida Semiconductor Innovation Engine
Semiconduct

Great Lakes Water Innovation Engine
Water

Upstate New York Energy Storage Engine
Energy Storage

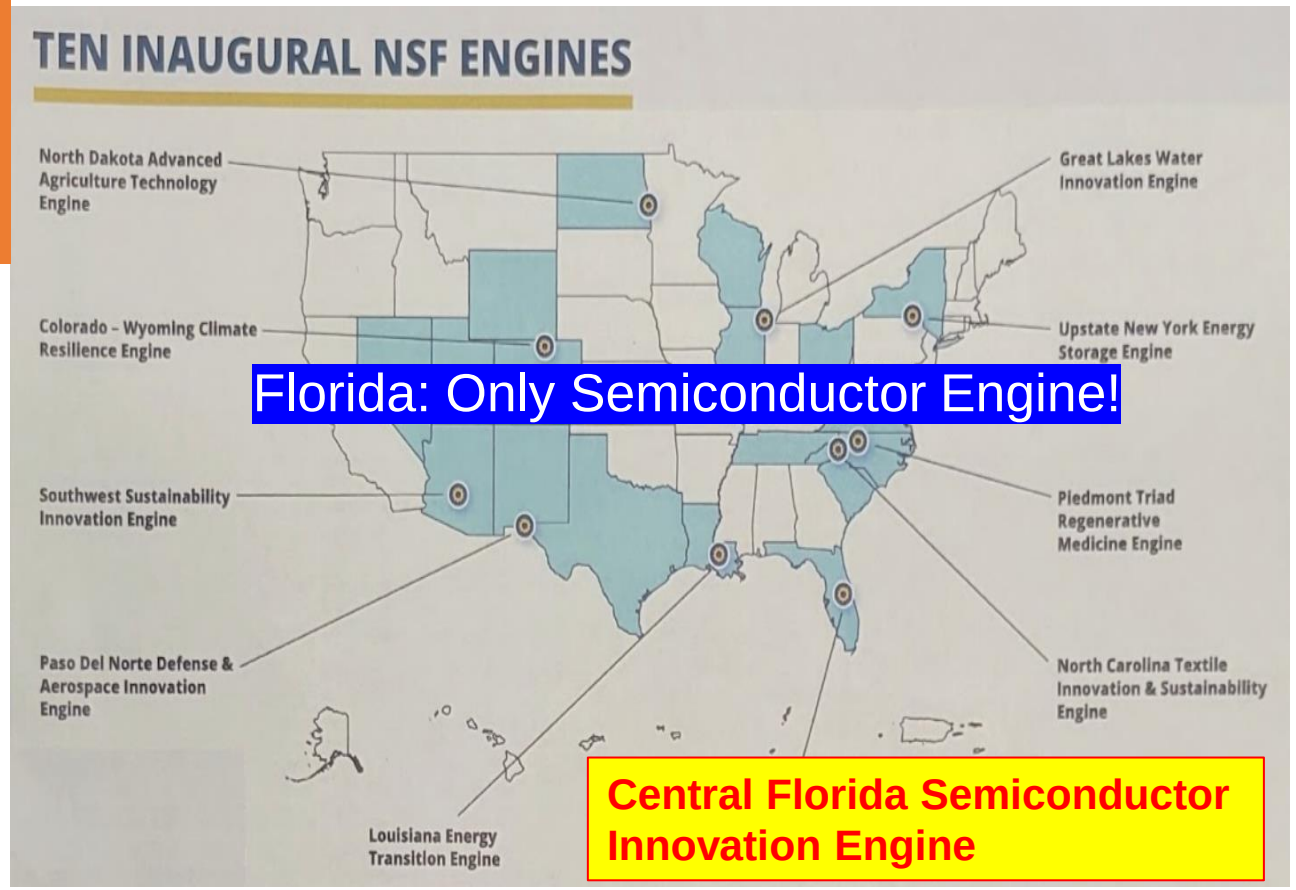
Piedmont Triad Regenerative Medicine Engine
Regen Medicine

North Carolina Textile Innovation & Sustainability Engine
Textile

Credit: NSF

Semiconductor

Florida on Semiconductor



(from left) G. Bochenek, J. Allgair, **Y. Yoon**, J. Dewitt, E. Gianchandani, D. Soto, J. Galbraith, A. Herr, J. Battista, and C. Shows (in NSF Engine Kickoff Meeting on March 6, 2024)

PI: John Allgair

UF-Lead: Yong Kyu Yoon

Use Inspired R&D: Advanced Packaging (NSF Engine)

Data Center

Super Comp

5G/6G Comm

Issue

High Speed Broadband Connectivity

Solution

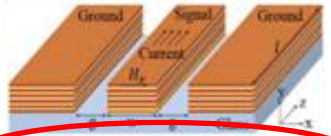
Advanced Packaging

3D Integration

Goal: High Efficiency, Compactness, Speed

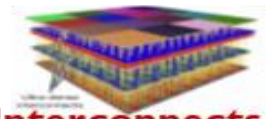
❑ Meta-Interconnects and Security

❑ Digital Twin / Modeling

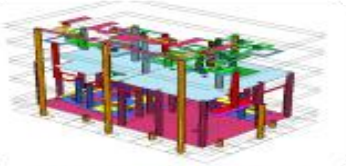


Metaconductors

Inductor



Interconnects



EDA design

Cu/Co MC

UF

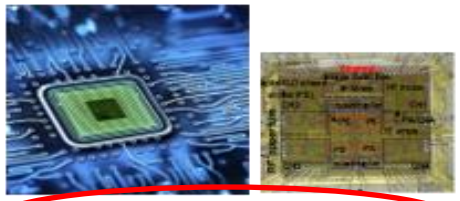
UCF

BRIDG
OC/FHTC/Val
/OEP/CSCF

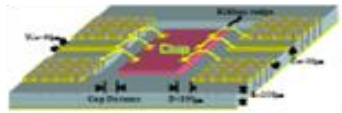
IMEC

TSV

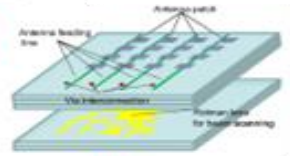
Simulation



Hardware security



Chip bonding

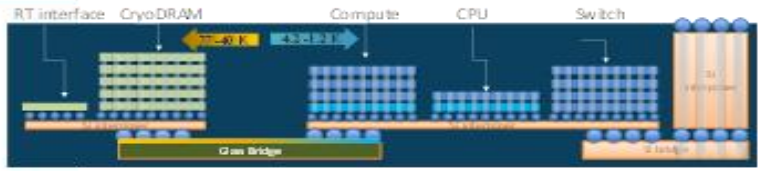


Array Antenna

❑ Cryogenic Electronics & Beyond 5G

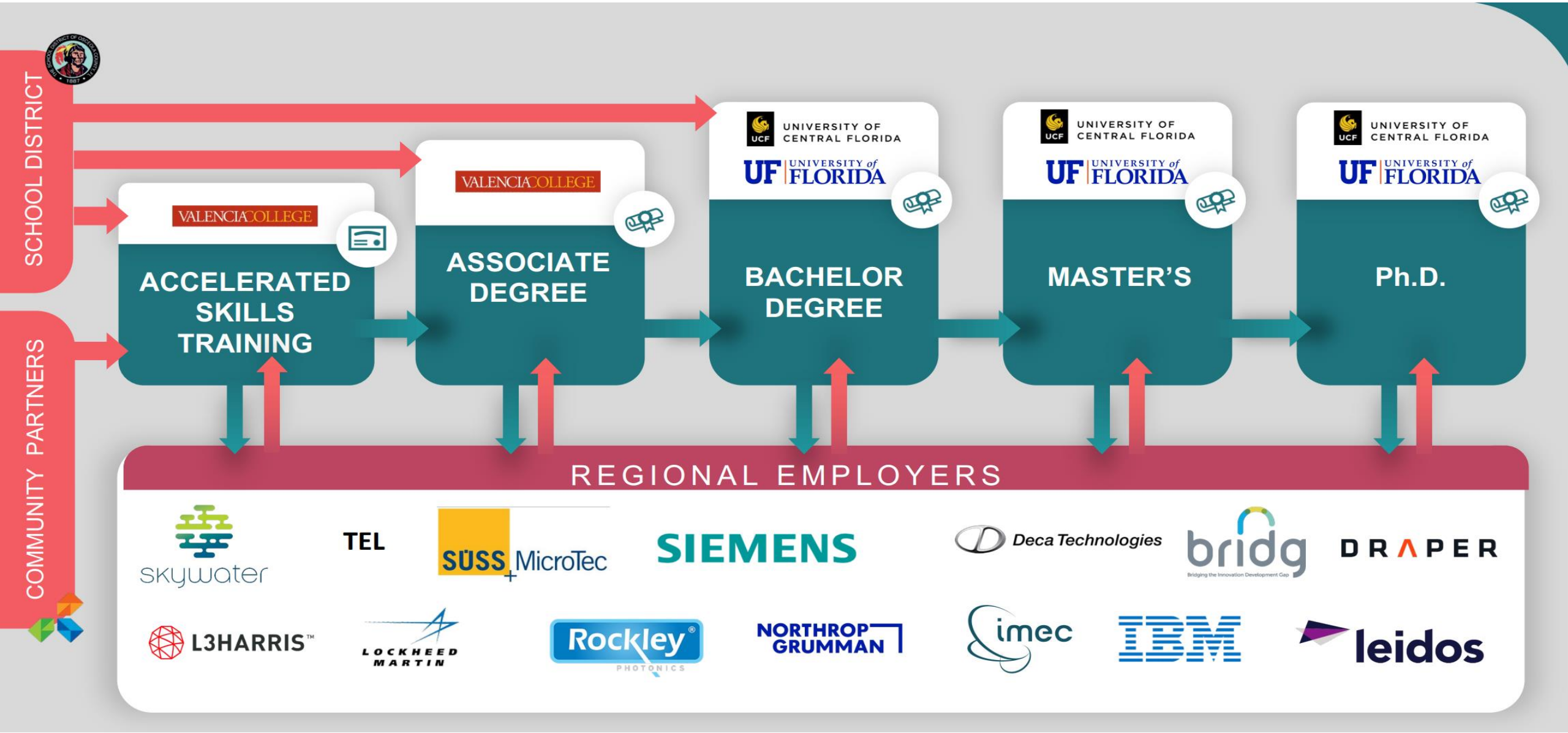
20 ExaFlop
500 kW
3 racks
@10% TCO

Cryo-processor



Superconducting and Digital technology

Workforce Development and Educational Ecosystem



Florida's Semiconductor Ecosystem

UF | UNIVERSITY of FLORIDA

FLORIDA SEMICONDUCTOR INSTITUTE

UF

USF

UCF

Workforce Development

Proposed R&D and Manufacturing Facilities

KSC

Credit: Arnold

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Summary

- **NSF Engine** based on **Public Private Partnership (PPP) in TIP**
  - State and local governments
  - Federal agencies
  - Philanthropy
  - Private industry
  - Academia
- **Regional Innovation** and **Economic Impact**
  - Use inspired R&D
  - Translation
  - Entrepreneurship, and
  - Workforce Development
- 10 Inaugural Engines
- Each engine: $160M for 10 years
- Florida on **Semiconductor**

Acknowledgment

NSF Award # 2315320
Central Florida Semiconductor Innovation Engine:

- BRIDG
- Career Source Central Florida
- imec
- FL High Tech Corridor
- Osceola County
- Orlando Economic Partnership
- University of Central Florida
- University of Florida
- Valencia College