



Building Cross-Sector Partnerships to Increase Semiconductor Manufacturing Competitiveness

Grace Wang

**Executive Vice President
The Ohio State University**



THE OHIO STATE UNIVERSITY
ENTERPRISE FOR RESEARCH, INNOVATION
AND KNOWLEDGE

June 29, 2022

Research Enterprise at Ohio State



1,922

Contracts
Executed

-- FY 2021



\$1.2 Billion

in Total Annual
Research
Expenditures

– FY2021

Top 5

Consistent Ranking
in Industry-
Sponsored Research

– Among all universities
(\$150.2M, FY2020)

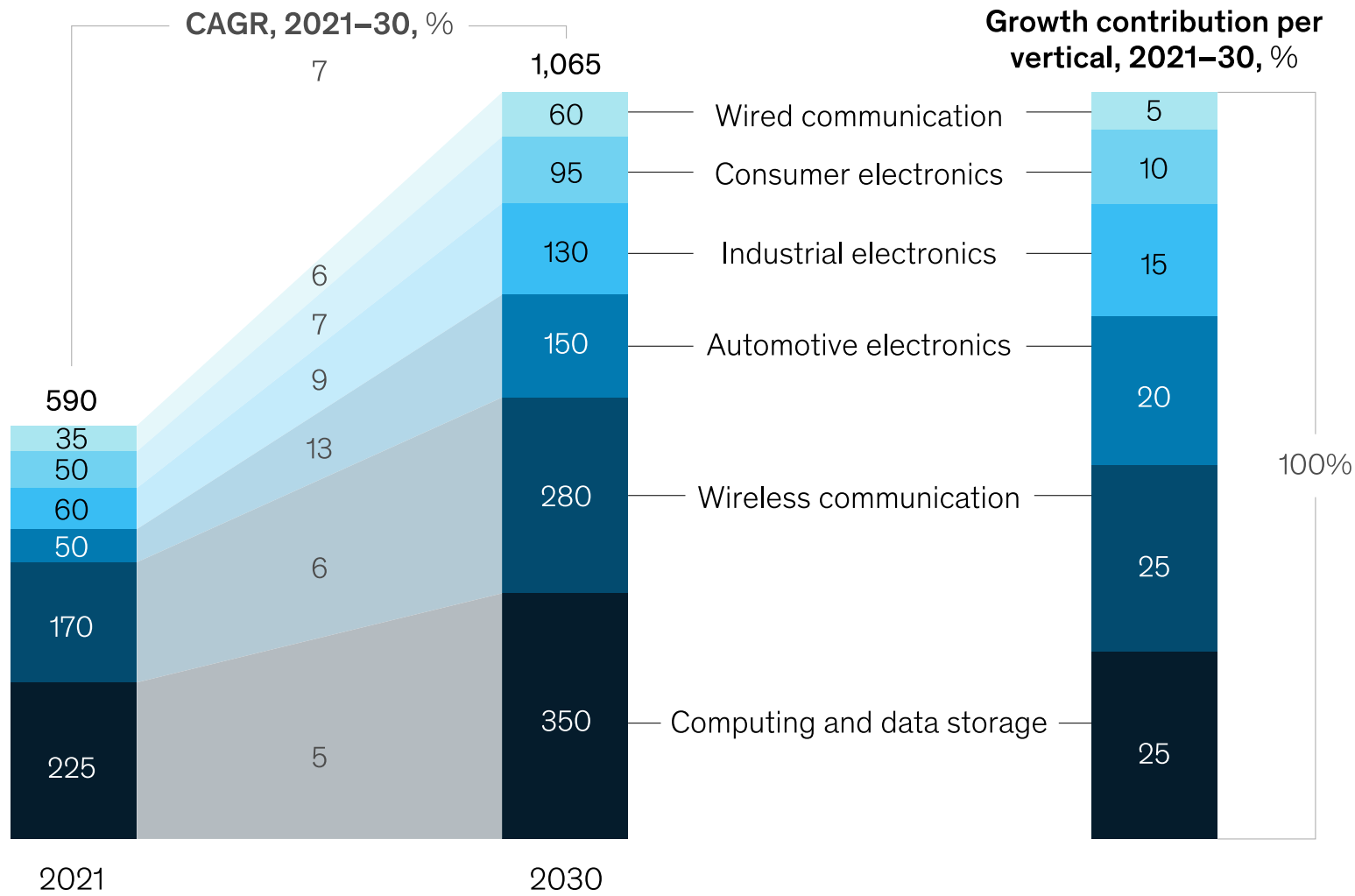


THE OHIO STATE UNIVERSITY

ENTERPRISE FOR RESEARCH, INNOVATION
AND KNOWLEDGE

Global Semiconductor Industry Is Projected to Continue Growing in Critical Areas of the Digital Economy

Global semiconductor market value by vertical, indicative, \$ billion



Note: Figures are approximate.

Source: The Semiconductor Decade: A Trillion-Dollar Industry, McKinsey & Company

Pressing Need of Growing Semiconductor Workforce

U.S. semiconductor companies account for **47%** of global chip sales, but only **12%** of global manufacturing is done here.

To meet the capacity needs for only the critical semiconductor applications, the U.S. needs to add about **5.5%** of the global production. This would mean about **70,000 to 90,000** total fabs jobs in U.S.

Source: How the US Can Reshore the Semiconductor Industry, Eightfold AI.



THE OHIO STATE UNIVERSITY

ENTERPRISE FOR RESEARCH, INNOVATION
AND KNOWLEDGE

Stiff Competition to Advance Technologies

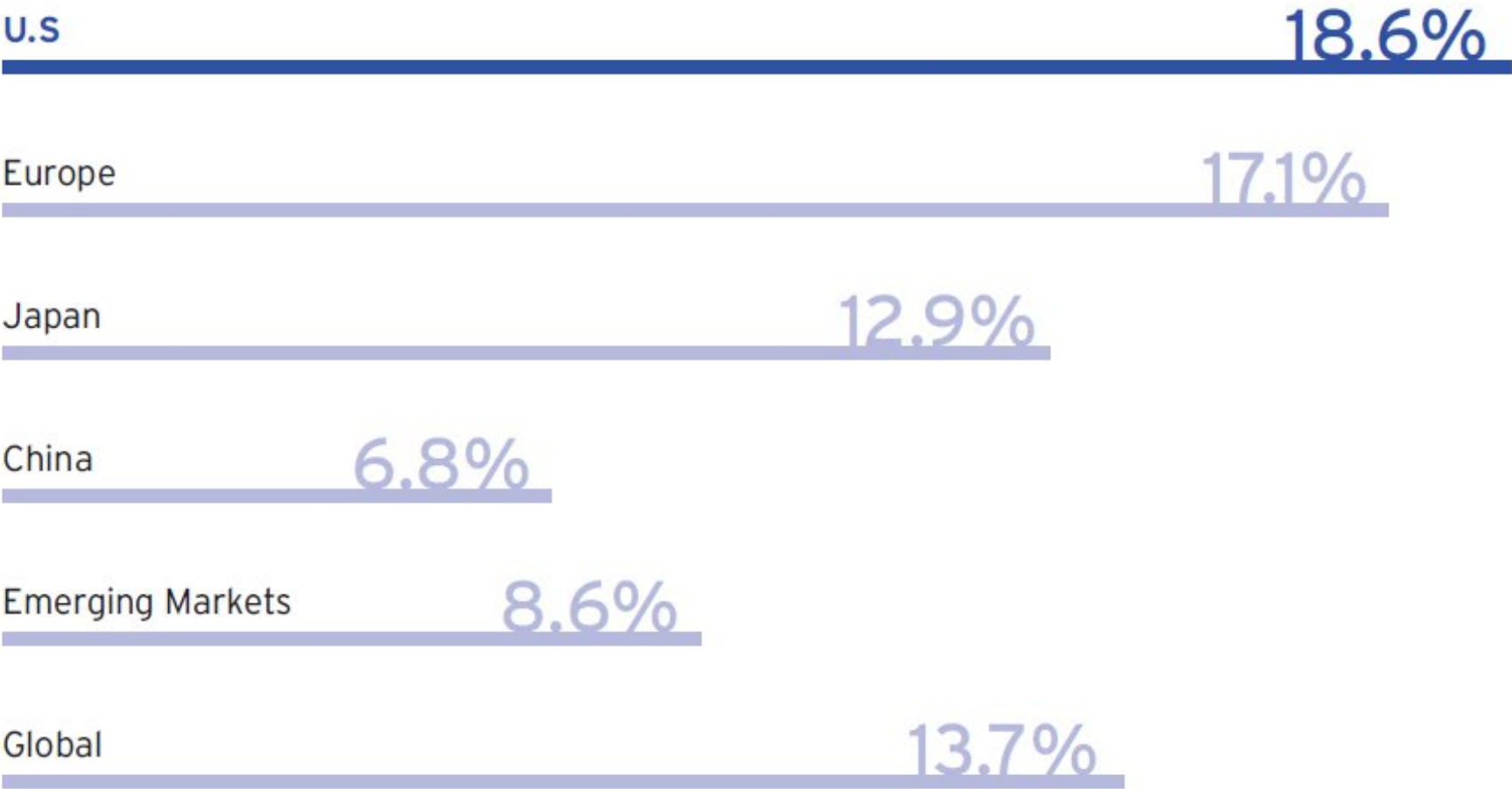
Logic/Foundry Process Roadmaps (for Volume Production)

	2016	2017	2018	2019	2020	2021	2022
Intel	14nm+	10nm (limited) 14nm++		10nm	10nm+	10nm++	7nm EUV
Samsung	10nm		8nm	7nm EUV 6nm EUV	18nm FDSOI 5nm	4nm	3nm GAA
TSMC	10nm	7nm 12nm		7nm+ EUV	5nm 6nm	5nm+	4nm 3nm
GlobalFoundries			22nm FDSOI 12nm finFET		12nm FDSOI	22nm+ FDSOI 12nm+ finFET	
SMIC				14nm finFET	12nm finFET		8-10nm finFET
UMC		14nm finFET			22nm planar		

Note: What defines a process "generation" and the start of "volume" production varies from company to company, and may be influenced by marketing embellishments, so these points of transition should only be seen as very general guidelines.

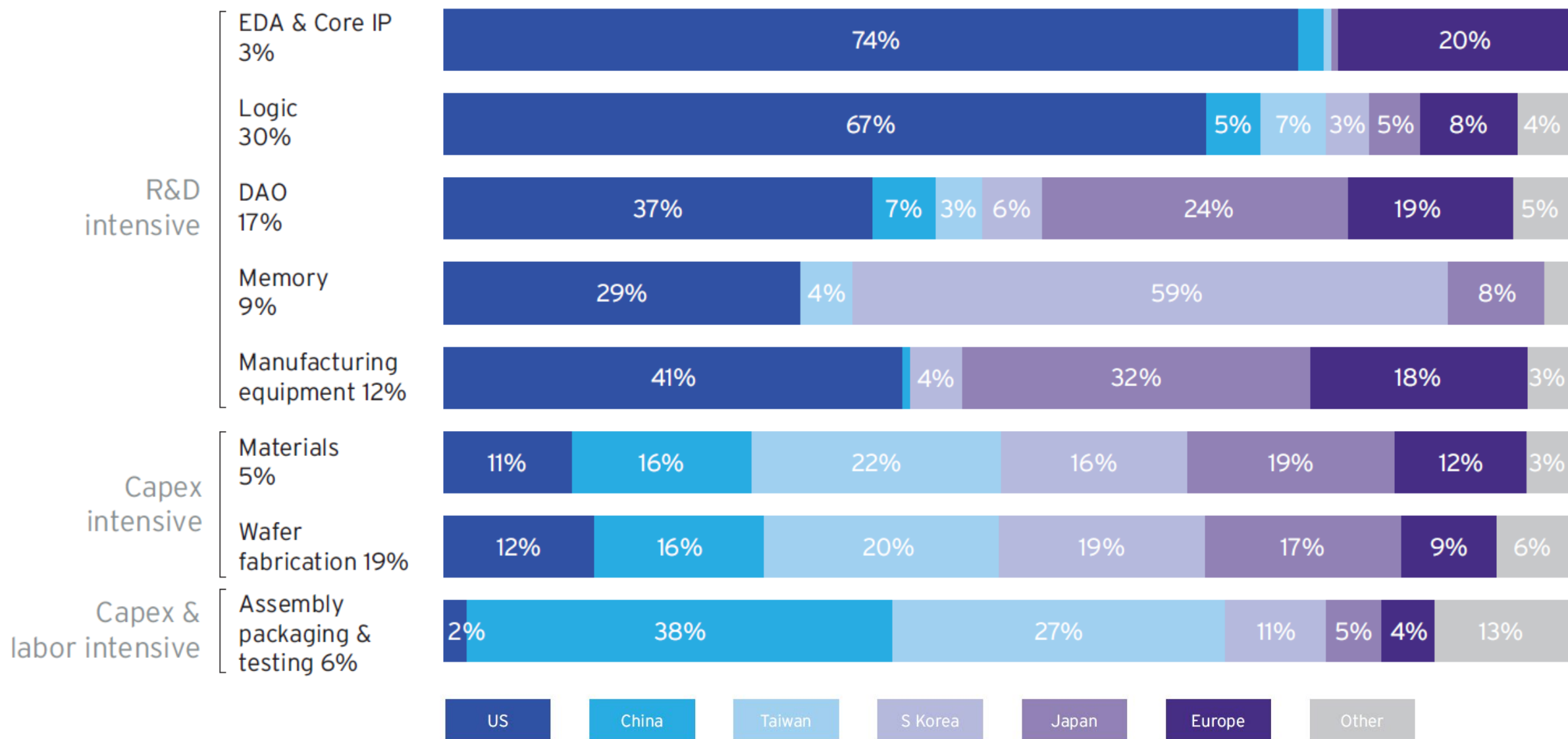
Sources: Companies, conference reports and IC Insights

SEMICONDUCTOR R&D EXPENDITURES AS A PERCENTAGE OF SALES BY COUNTRY



Source: 2021 State of The U.S. Semiconductor Industry, Semiconductor Industry Association.

SEMICONDUCTOR INDUSTRY VALUE ADDED BY ACTIVITY AND REGION 2019 (%)



Source: 2021 State of The U.S. Semiconductor Industry, Semiconductor Industry Association.

Critically Important to Grow & Strengthen the Ecosystem

TALENT

Investors



LEADING R&D

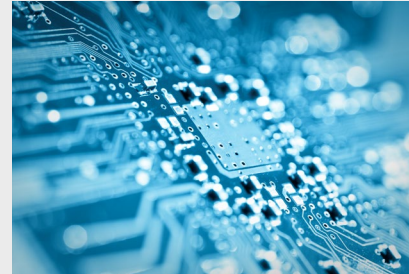
Universities &
Colleges



Government



Semiconductor
Manufacturers



Startups



MANUFACTURING
CAPACITY

Suppliers & OEMs



A ROBUST SUPPLY
CHAIN SYSTEM



THE OHIO STATE UNIVERSITY

ENTERPRISE FOR RESEARCH, INNOVATION
AND KNOWLEDGE

Build on Our Experience in Cross-Sector Partnerships

- ✓ Governance Structure
- ✓ IP
- ✓ Research Agreements/Contracts
- ✓ Financial Support

To Grow the Ecosystem,

- ✓ Grow Talent Pipeline at Scale
- ✓ Increase the Density of Co-located Partners
- ✓ Enable a Highly Connected Network



THE OHIO STATE UNIVERSITY

ENTERPRISE FOR RESEARCH, INNOVATION
AND KNOWLEDGE

Partnerships to Grow Talent Pipeline at Scale

Example: Ohio State's Partnerships for Semiconductor/STEM Workforce Development

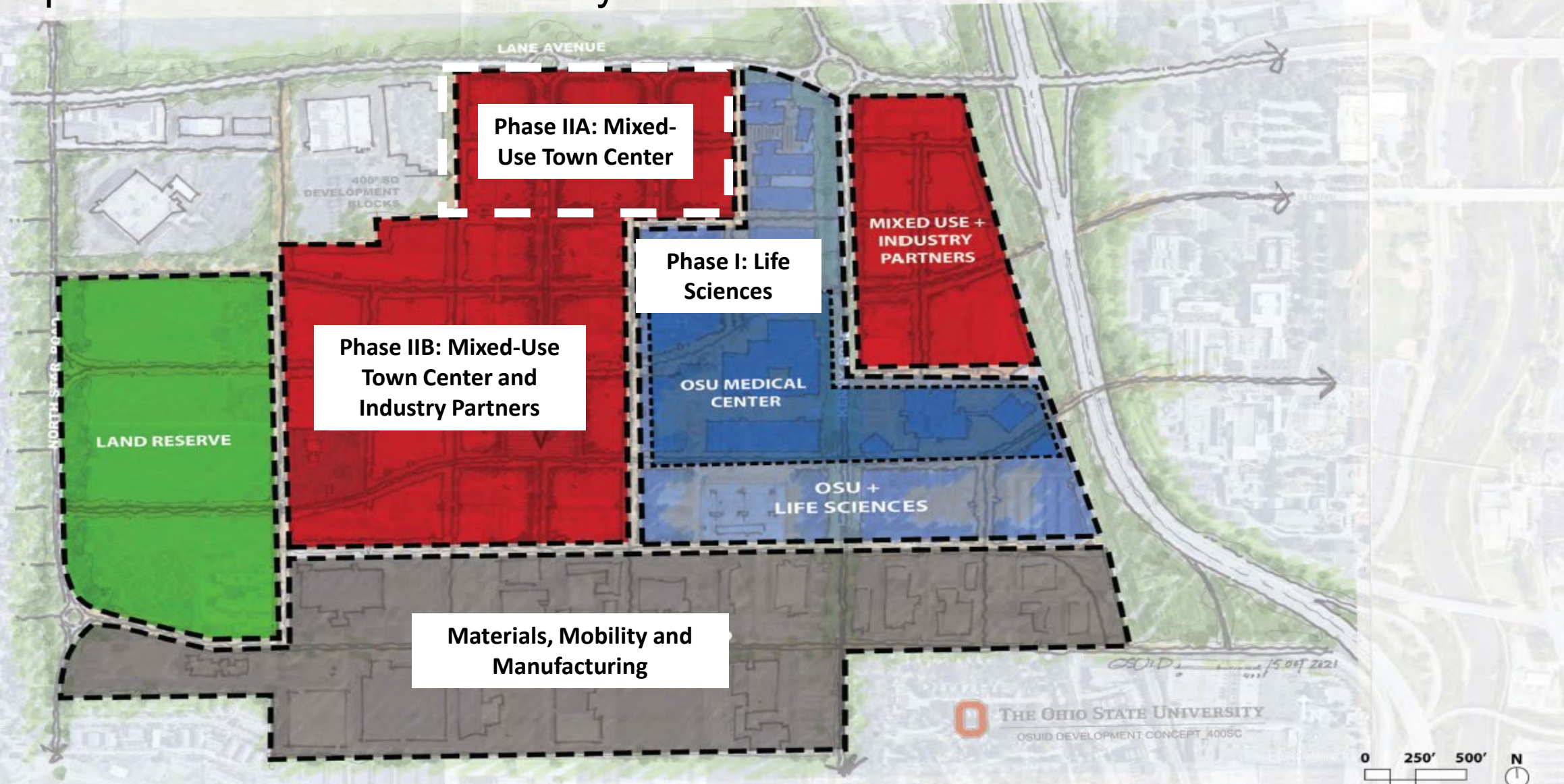


THE OHIO STATE UNIVERSITY

ENTERPRISE FOR RESEARCH, INNOVATION
AND KNOWLEDGE

Increase the Density of Co-located Partners

Example: The Ohio State University Innovation District

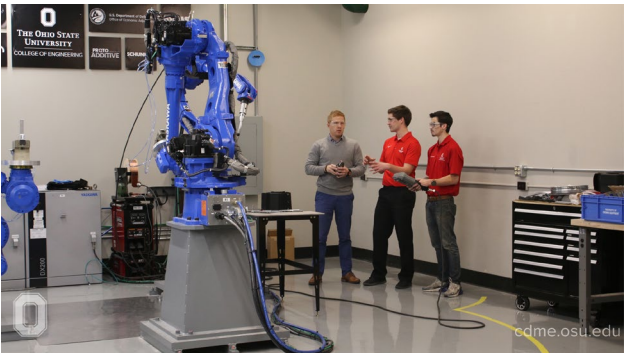


Increase the Density of Co-located Partners



ESL: RF, Devices and Packaging

CDME: Manufacturing and Automation



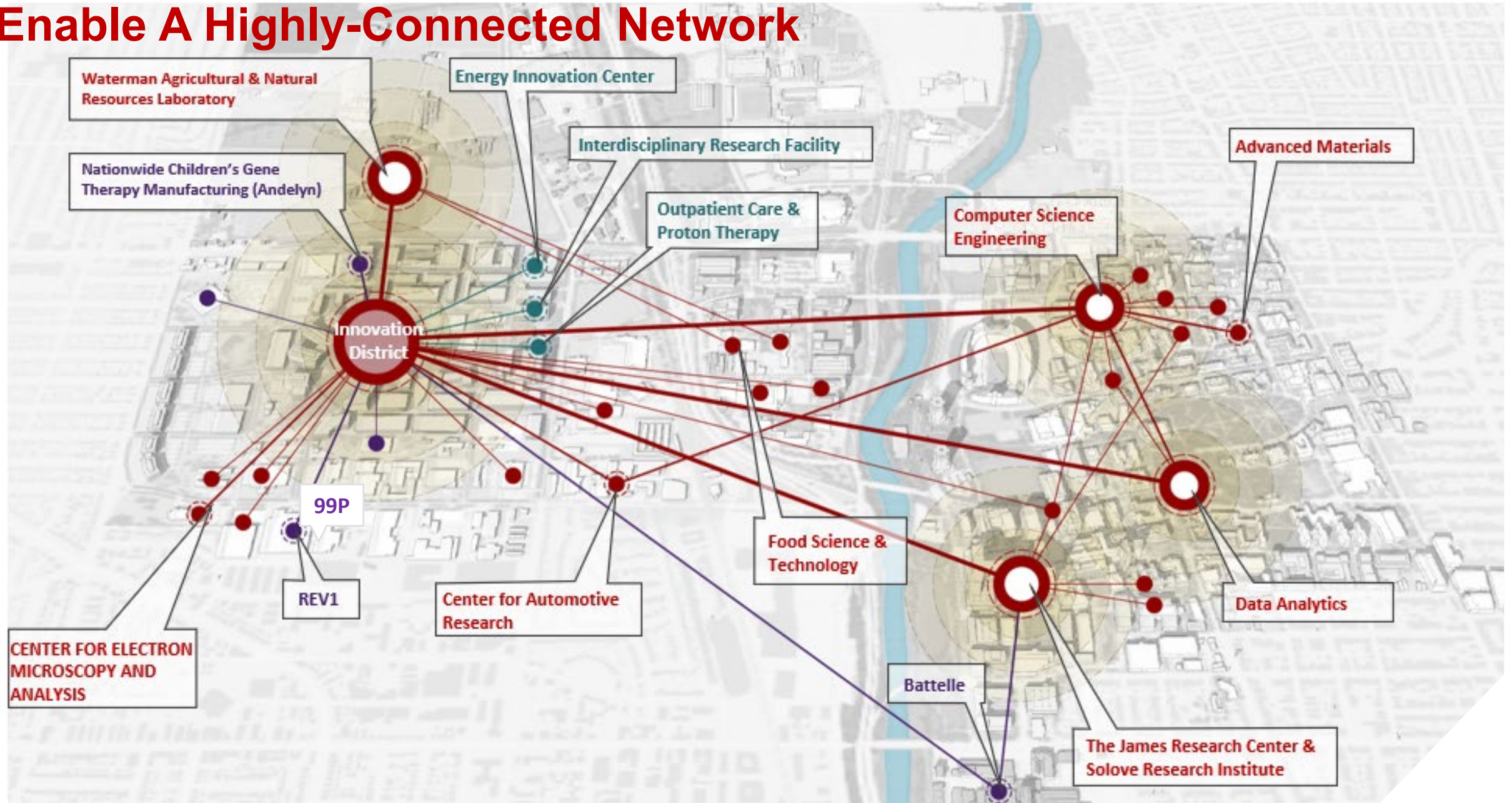
NanoTech West: Semiconductor Materials and Devices



CEMAS: Electron Microscopy and Analysis



Enable A Highly-Connected Network



Evolving Cross-Sector Partnership Models



Time

- ✓ Talent
- ✓ Projects
- ✓ Licensing
- ✓ Startup Acquisition

- ✓ Talent
- ✓ Projects
- ✓ Licensing
- ✓ Startup Acquisition
- ✓ **Co-location**

- ✓ Projects
- ✓ Licensing
- ✓ Startup Acquisition
- ✓ **Talent Pipeline at Scale**
- ✓ **High Density of Co-located Partners**
- ✓ **Highly-Connected Network**



THE OHIO STATE UNIVERSITY

ENTERPRISE FOR RESEARCH, INNOVATION
AND KNOWLEDGE



Thank You!