

# The 4th generation university initiative: its impact and relevance for CRIS systems

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2025

EuroCRIS

# Agenda – The 4th generation university initiative: its impact and relevance for CRIS systems

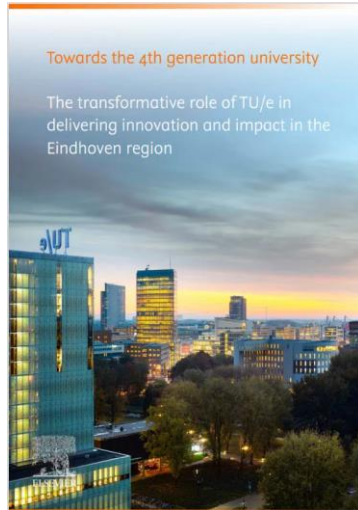
1. What is the 4<sup>th</sup> Generation University? \* Background
2. What can be the role of CRIS systems? \* Case study NSF TIP
3. Recap: 4GU needs & CRIS opportunities



# 1. What is the 4<sup>th</sup> Generation University?

\* Background

# What is the 4<sup>th</sup> Generation University? - Background



- **Project initiated by TU/e President Robert-Jan Smits** who approached Elsevier in February 2023 noting that traditional university rankings do not effectively measure what universities are trying to achieve.
- **Worldwide universities have experienced head winds** and increasingly need to demonstrate value
- A **4th Generation University** orchestrates their **regional** innovation ecosystem with a focus on achieving **societal and economic impact** through **partnerships** with industry, government, and civil society.



\* "The Fourth-Generation University: The New Era of Open Innovation and Ecosystem Thinking" by Marcel Bogers and Maarten Steinbuch.



**TU/e** EINDHOVEN  
UNIVERSITY OF  
TECHNOLOGY

## TU/e towards two thousand semiconductor master's students by Beethoven

JULY 16, 2024

Brainport region gets 275 million euros for education in chip sector.



The NanoLab research lab at TU/e. Photo: Rien Boonstoppel

# Why care about INNOVATION ECOSYSTEM impact?

## Because university stakeholders are asking for it!

### Government

Local availability of key technologies is a national priority (in most countries)



Dutch national technology strategy (January 2024)

### Industry

Industry is actively looking for collaborations and eager to innovate



Brainport collaboration region Eindhoven. [Brainport eindhoven.com](https://www.brainport eindhoven.com)

### Students

The current generation of students is impatient to make a difference



Nours group: Student experience study 2023

### Universities

Universities think out loud how to serve their constituents in a better way



EUA study: "Universities in regional innovation ecosystems" (2018)

# Evolution of universities

**1<sup>st</sup> Gen**  
Education



**2<sup>nd</sup> Gen**  
Research



**3<sup>rd</sup> Gen**  
Knowledge transfer



4th Generation  
University

A 4th Generation University **orchestrates regional innovation ecosystems**, achieving societal and economic impact through partnerships with industry, government and civil society.

# The concept of the 4<sup>th</sup> generation university ('4GU')



	3rd Generation		4th Generation
<b>Goal</b>	Education, research and knowledge transfer	▶	Mission-driven (challenge-based) education, research and valorization
<b>Role</b>	Create value	▶	Enable societal value creation
<b>Method</b>	Interdisciplinary research	▶	Transdisciplinary research and multi-actor innovation
<b>Human capital</b>	Researchers, professionals and entrepreneurs	▶	Researchers, professionals, entrepreneurs, artists, customers, ecosystem participants
<b>Orientation</b>	Global orientation	▶	Ecosystem orientation
<b>Organization</b>	Institutes, centers	▶	Innovation spaces
<b>Interaction</b>	Industrial partnerships	▶	Integration in global and local ecosystems
<b>Technology integration</b>	Digital instruments	▶	Advanced technology and AI integration

**Table 1**

*Key characteristics (selection) of the 4th Generation University as compared to the 3<sup>rd</sup> generation university model.*

*Source: (Marcel Bogers and Maarten Steijnbuch<sup>2</sup>)*

# 4th generation university, key elements of the analyses

## 4<sup>th</sup> Generation University

- Mission-driven
- Ecosystem focus
- Transdisciplinary



## 4 key processes

1. Educate talent
2. Research
3. Transfer knowledge
4. Ecosystem governance



## Proximity

- Partners at cycling/driving distance
- Alumni at cycling/driving distance



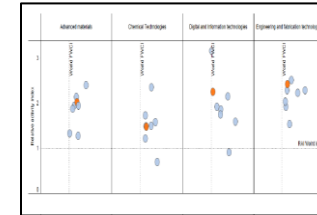
## Innovation ecosystem

- Public & private partners
- Ecosystem organization



## Technology fit

- Position on strategic key technologies for ecosystem

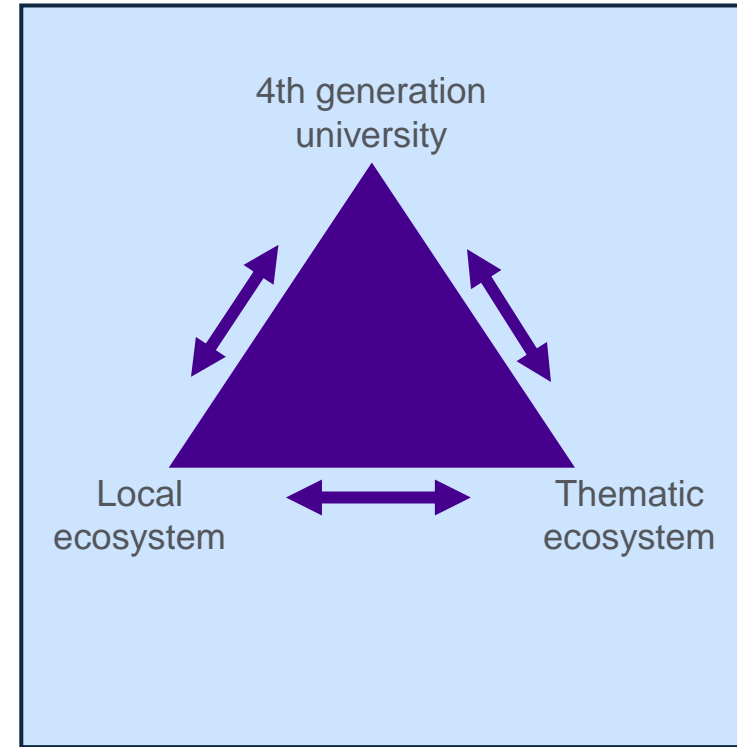


## The 4th generation university has the local ecosystem embedded in its mission.

- It engages actively with the local ecosystem as it does with global thematic ecosystems
- It takes the local ecosystem into account when setting strategic priorities, such as discipline focus decisions

### Example:

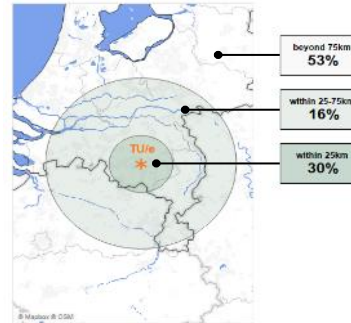
- Eindhoven's local ecosystem is part of the global (thematic) semiconductor ecosystem that comprises actors and knowledge
- TU/e prioritises semiconductor technologies in investment and objective setting for its departments, programs and schools



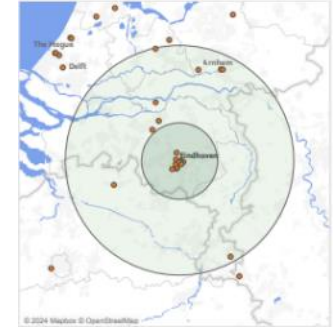
# We need new **indicators** and **visualizations** to understand impact and demonstrate success

Dimension	Indicator
Education	% of <b>alumni</b> within the innovation ecosystem AND % of alumni with location data
Research	<p>% of papers <b>co-authored with the industry</b> within the innovation ecosystem</p> <p>% of papers with <b>dual academic and industry affiliation</b> within the innovation ecosystem</p> <p>% of <b>grants won together with industry</b> within the innovation ecosystem</p> <p>% of <b>papers in key technologies</b> co-authored with organizations within the innovation ecosystem</p>
Impact: Valorization and influence	<p>% of <b>patents co-owned with industry</b> within the innovation ecosystem</p> <p>% of <b>papers cited by 3rd party patents</b> owned by organizations within the innovation ecosystem</p> <p>% of <b>companies founded by alumni</b> within the innovation ecosystem</p> <p>% of papers co-authored with organizations within the ecosystem <b>cited by policy documents</b></p>
Governance	<p>University <b>strategy</b> is focused on the ecosystem</p> <p>University has sufficient <b>capabilities</b> to execute the strategy</p> <p>University has sufficient <b>level of valorisation/influence</b></p>

## 1. Education - Alumni



## 2. Research - Industrial partners



## 3. Valorisation - Patents

Portfolio Size per 1000 Publications	Portfolio Size
0.9	15
Market Coverage	Technology Relevance
1.43	1.20

## 4. Governance

Brainport Development is the strategy-setting organization and implementing agent in the Eindhoven Brainport region, with the TU/e as core member of the Executive Board, responsible for setting agendas and ensuring delivery

# We need new indicators and demonstrate

Dimension	Indicator
Education	% of <b>alumni</b> within the innovation ecosystem with location data
Research	% of papers <b>co-authored</b> within the innovation ecosystem
	% of papers with <b>dual academic</b> within the innovation ecosystem
	% of <b>grants won together</b> within the innovation ecosystem
	% of <b>papers in key technologies</b> within the innovation ecosystem
Impact: Valorization and influence	% of <b>patents co-owned</b> within the innovation ecosystem
	% of <b>papers cited by 3rd parties</b> within the innovation ecosystem
	% of <b>companies founded</b> within the innovation ecosystem
	% of papers co-authored within the innovation ecosystem <b>cited by policy makers</b>
Governance	University <b>strategy</b> is focused on innovation
	University has sufficient <b>budget</b> for innovation
	University has sufficient <b>talent</b> for innovation

**Towards the 4th generation university**

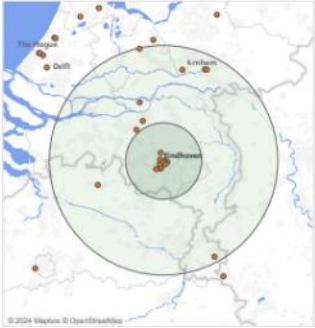
The transformative role of TU/e in delivering innovation and impact in the Eindhoven region

Download now

Impact  
Report!



## Research - Industrial partners



### 4. Governance

Brainport Development is the strategy-setting organization and implementing agent in the Eindhoven Brainport region, with TU/e as core member of the Executive Board, responsible for setting agendas and ensuring delivery.

# Summary: activities & achievements thus far

- **1 close collaboration** with TU/e > REPORT
- **12 development partners** to further develop > INDICATORS
- **53 sign ups** to our > COMMUNITY
- **Many, many events** driving > AWARENESS:
  - THE summit – ScienceBusiness round table – UIIN – CESAER - Falling Walls – E-ARMA – NL-ARMA – EuroCRIS – EuroTECH - Campus Matin – HEPI - Cambridge Enterprise – UIDP - 4GU webinar - Pure Conference - ...



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So, what about  
our products?

## 2. What can be the role of CRIS systems?

\* Case study NSF TIP

# What are some elements of 4GU analytics? Can they be implemented in CRIS systems?

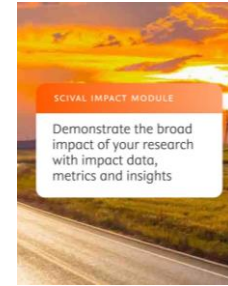
## Geolocation

Where are our partners with whom we acquire funding, publish, patent?



## Outcomes

What are we achieving?



## Mission led

Are we teaching & researching the rights topics?



## Education

Don't forget value creation by your teachers and courses.



# The plans for TU Eindhoven's CRIS > W.I.P.



Help & FAQ



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Facility/Lab/Equipment

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Type

**/d.search Lab**

Rouvroye, J. L. (Manager)

Facility/equipment: Facility

**(Cryo)microtome RM21665 /  
LN21 for semi-thin sectioning**

Friedrich, H. (Manager)

**(Cryo) ultramicrotome: Leica  
UC7/FC7**

Friedrich, H. (Manager) & Spoelstra, A.



## About TIP

As codified in the "CHIPS and Science Act of 2022" the Directorate for Technology, Innovation and Partnerships (TIP) advances use-inspired and translational research in all fields of science and engineering, giving rise to new industries and engaging all Americans — regardless of background or location — in the pursuit of new, high-wage jobs in science, technology, engineering and math (STEM).



## About NSF

The U.S. National Science Foundation is an independent federal agency that supports science and engineering in all 50 states and U.S. territories.

NSF was established in 1950 by Congress to:

- **Promote** the progress of science.
- **Advance** the national health, prosperity and welfare.
- **Secure** the national defense.

**NSF annual budget:**           ~10Bn USD

**TIP annual budget:**           ~1Bn USD

**In short: money > research > innovation > jobs**

# How can we help NSF TIP?

## 1. NSF TIP has requested our help, to demonstrate to:

- NSF leadership
- American (local) politicians and their constituents
- Academia and industry

## 2. ...that TIP money has been spent well:

- Equitably across jurisdictions > states, territories, congressional districts, counties, MSAs
- Across the many strategic TIP programs
- On the most promising Key Technology Areas (KTAs)

## 3. ...to achieve maximum **local economic** benefits with federal money





## Discover NSF TIP Awards and Principal Investigators



Advanced search

Accelerating research to impact with  
investment from the U.S. National  
Science Foundation

[Explore the Map](#)



Awards



Organizations



Principal Investigators

### TIP Investments pilot

Welcome to the pilot visualization and search capability for the U.S. National Science Foundation Directorate for Technology, Innovation and Partnerships (NSF TIP).





Filter

AWARDS

4,902

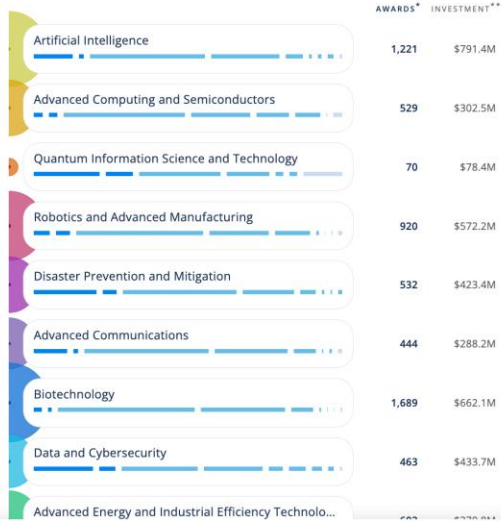
LOCATED IN

US

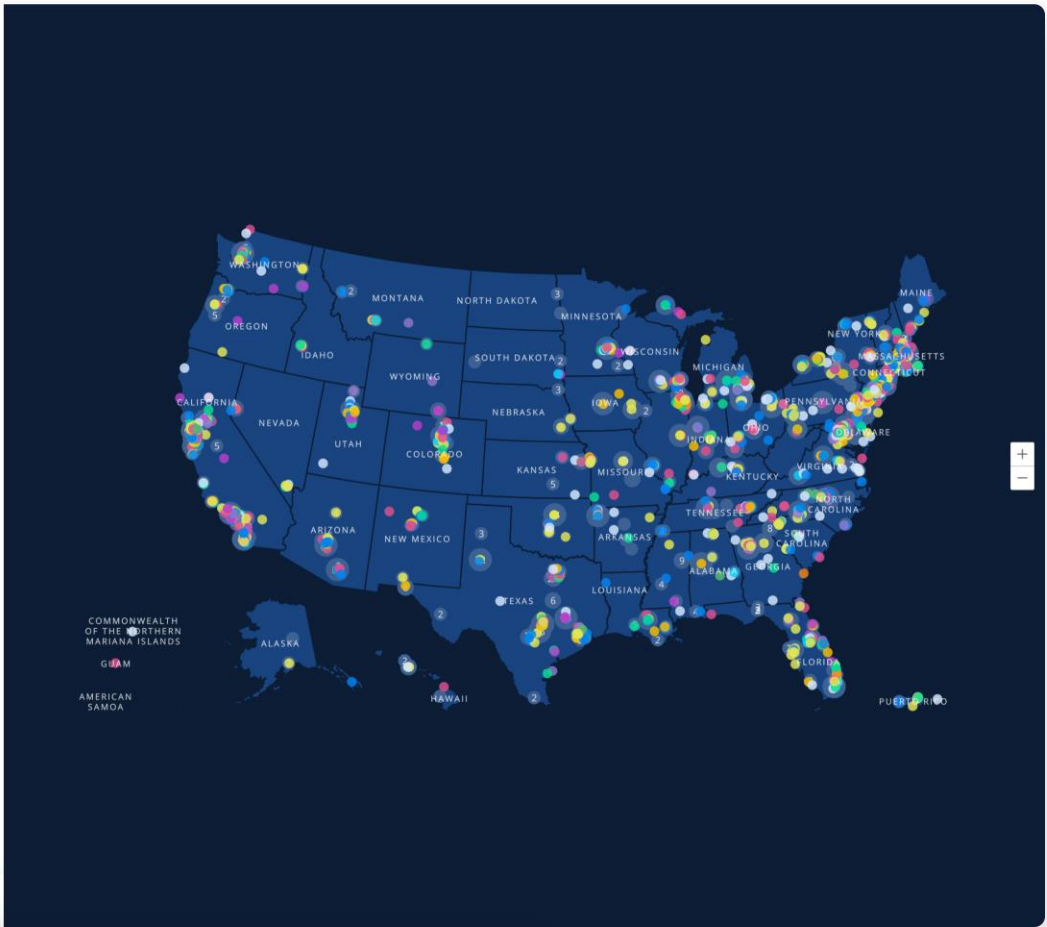
VIEW BY

Key Technology Area

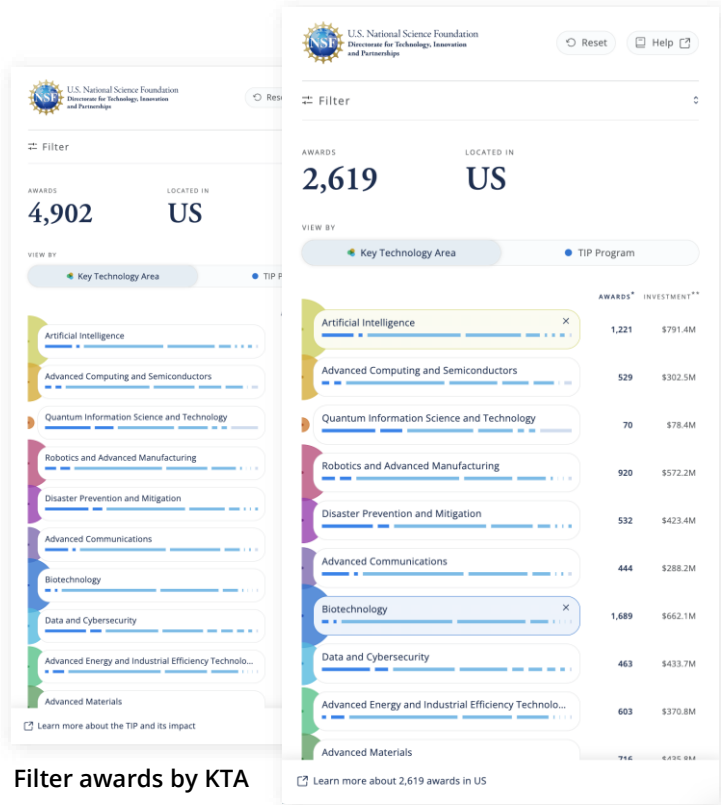
TIP Program



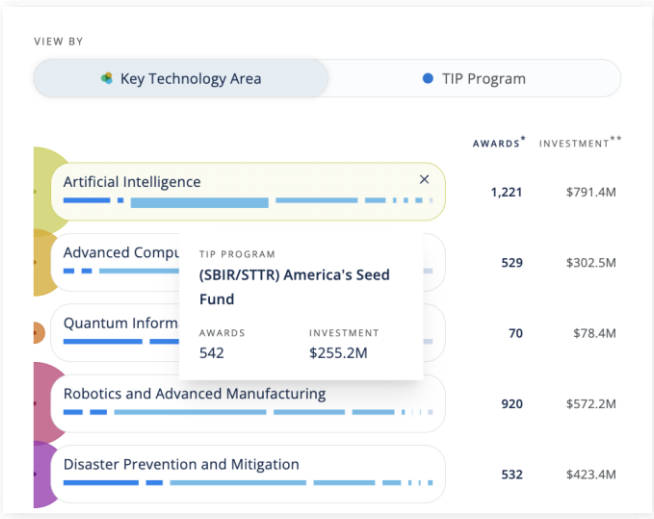
Learn more about the TIP and its impact



# Explore TIP Investment By Key Technology Area

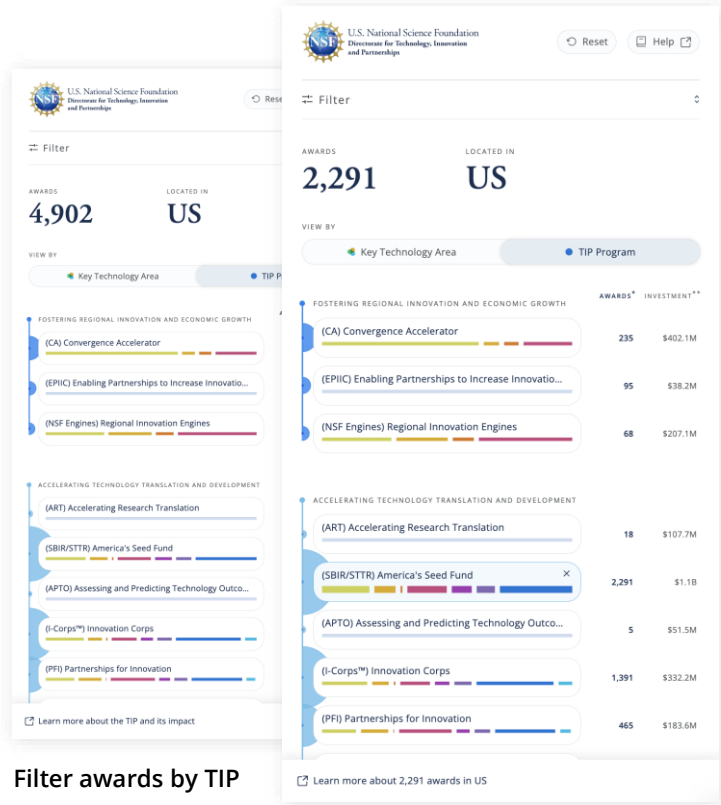


Filter awards by KTA

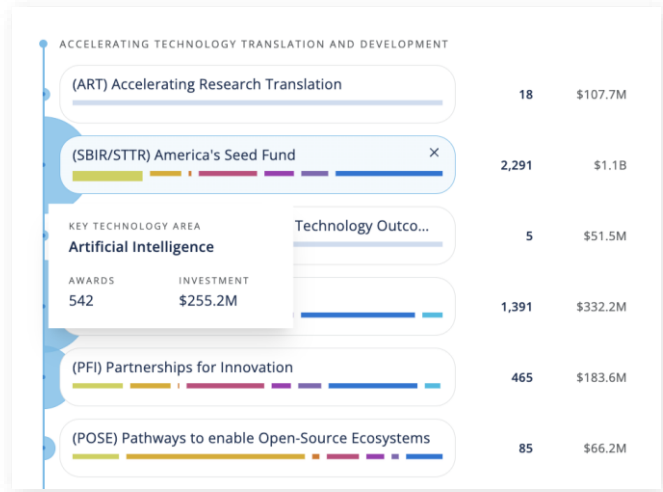


Explore TIP programs within a KTA

# Explore Key Technology Area by TIP Programs

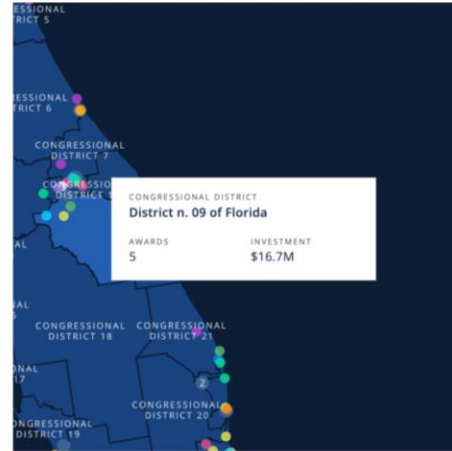
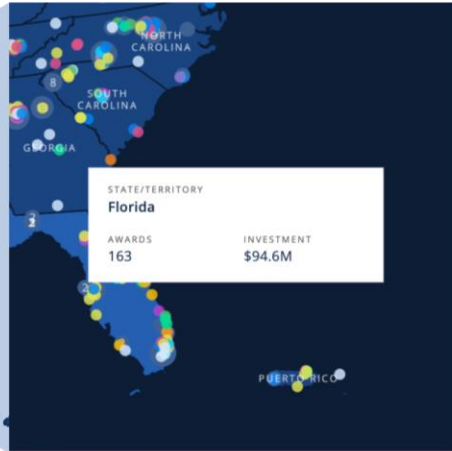
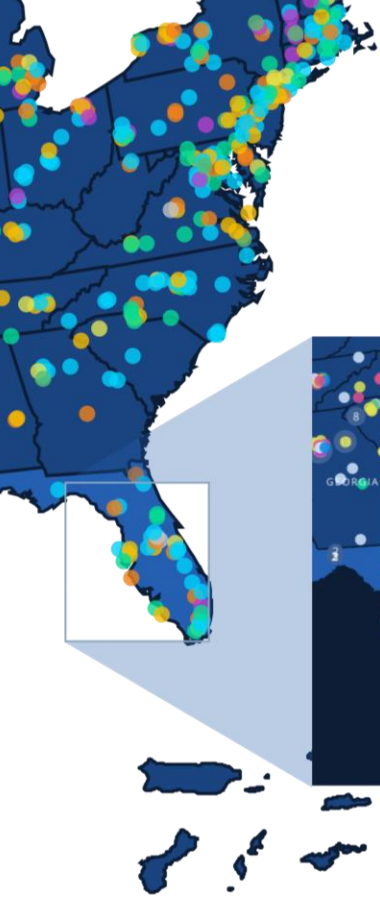


Filter awards by TIP



Explore KTAs within a TIP Program

# Explore TIP Investment By State, CD, Organization





## NSF Engines: Central Florida Semiconductor Innovation Engine

Allgair, John (PI), Olore, Tawny H (PI), Allgair, John (CoPI), Olore, Tawny H (CoPI)

Regional Innovation Engines (NSF Engines), ICAMR, INC.

*Project: Research*

**Overview** Fingerprint

### Abstract & Details

#### Description

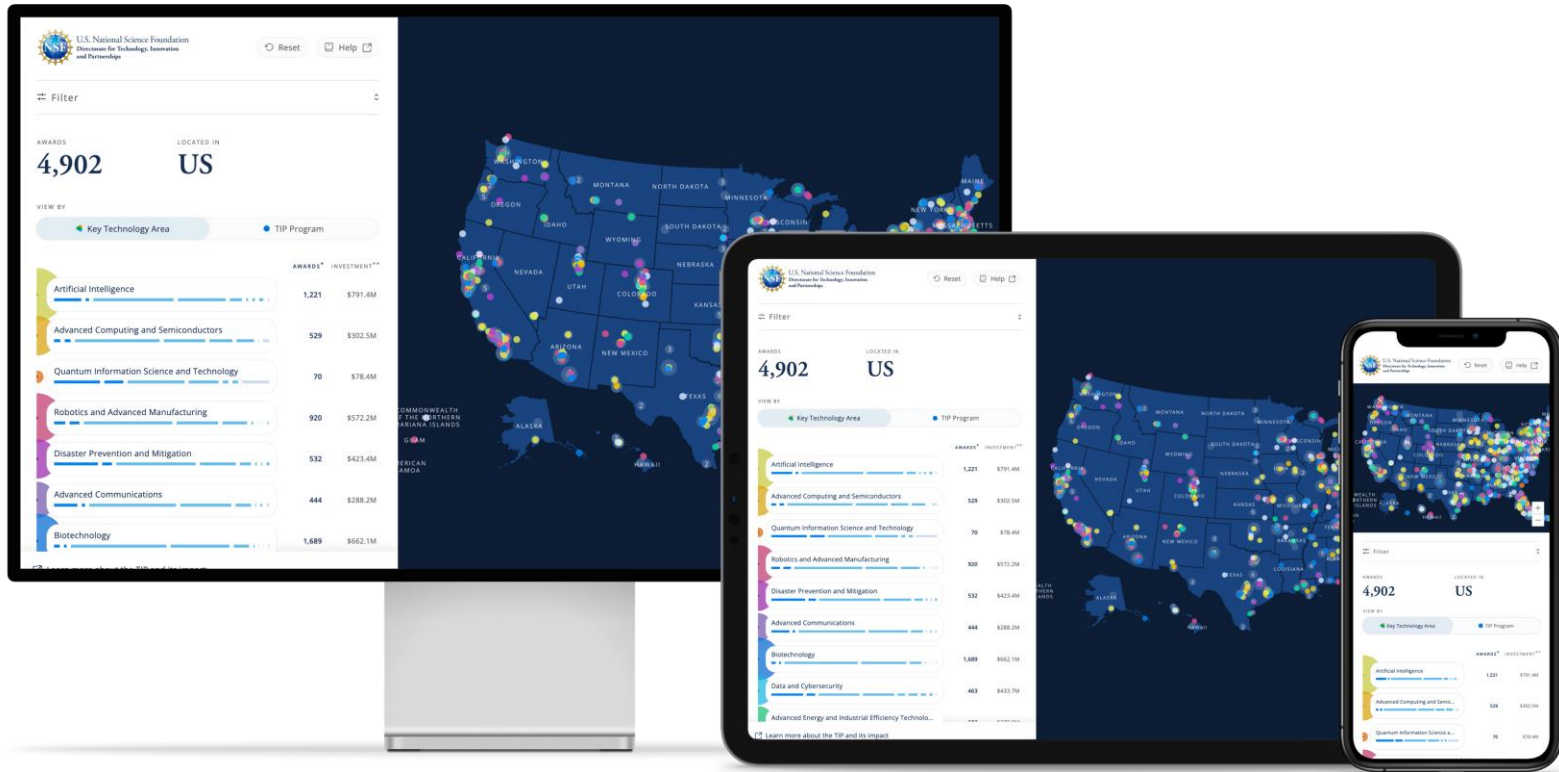
Award ID: 2315320

This NSF Engines award to the Central Florida Semiconductor Innovation Engine will play a critical role in bolstering our nations production capacity of semiconductors, particularly in the emerging advanced semiconductor packaging sector. Advanced semiconductor packaging is increasingly an essential process to achieving the performance demands of many of the emerging applications that are now at the forefront of technological innovation for example, fifth-generation (5G) wireless communication, autonomous vehicles, artificial intelligence and machine learning, advanced sensors, and virtual/augmented reality. Currently, the United States does not have a meaningful onshore semiconductor advanced packaging manufacturing sector, as less than 3% of semiconductor advanced packaging manufacturing occurs in the United States; the nation is overwhelmingly reliant on offshore foundries, primarily in Asia. As the limits of Moores Law are reached and packaging becomes a more complex and important part of the semiconductor manufacturing process, this NSF Engine is positioned to capture the economic growth, drive key technological advances in a rapidly-changing sector, and secure our national defense by rooting a vital industry on American shores. In addition to the significant national impacts, the NSF Engine has the potential to create thousands of good-paying jobs in a highly dynamic and innovative technology space. The NSF Engine has already created flagship upskilling and retraining programs that have created ladders into economic opportunity for workers from all educational backgrounds. If successful, the concentration of semiconductor talent, existing physical infrastructure, and

#### Access Award

[https://www.nsf.gov/awardsearch/showAward?AWD\\_ID=2315320](https://www.nsf.gov/awardsearch/showAward?AWD_ID=2315320)





# 3. Recap

# Recap: 4th Generation University & CRIS opportunities



4GU needs	CRIS opportunities
Real impact	Include outcome proxy data
Mission led	Classification of content
Local vs global	Geolocation of partners, funders, impact
Talent needs	Integrate education outcomes

# Thank you !

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[linkedin.com/in/maxdumoulin/](https://www.linkedin.com/in/maxdumoulin/)

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