



NNCI: Southeastern Nanotechnology Infrastructure Corridor (SENIC)

2023 NNCI Annual Conference



Georgia Tech
Institute for Electronics
and Nanotechnology

SENIC: 3 Universities – 2 Locations – 1 Site

Partnership of two major & modern nanotechnology centers in the southeastern US:

- **Institute for Electronics and Nanotechnology (IEN)**, an Interdisciplinary Research Institute at the Georgia Institute of Technology (GT)
- **Joint School of Nanoscience and Nanoengineering (JSNN)**, an academic collaboration between North Carolina A&T State University (NC A&T) and University of North Carolina, Greensboro (UNCG)



GT-IEN Marcus Nanotechnology Building

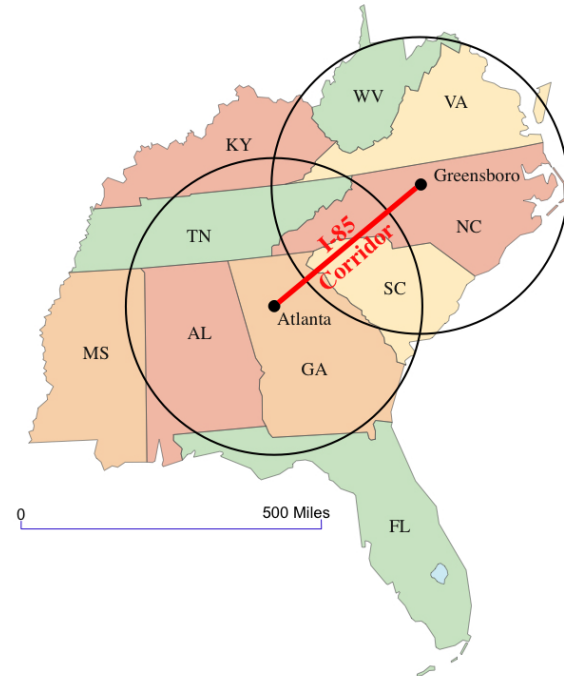


JSNN Building

SENIC Vision & Strategic Goals (Years 6-10)

Vision Statement

To be a premier nano-fabrication and nano-characterization resource to southeastern US user communities from academia, small and large companies, and government organizations, providing tools, staff expertise, E&O activities, as well as SEI of nanotechnology programs.



Strategic Goals

1. Develop and Serve Diverse User Base
2. Develop Strong Synergies between Partners
3. Expanding Capabilities based on Future Research Trends
4. Develop E&O and SEI Programs Targeting the SE
5. Assist NNCI Network in Becoming More Than the Sum of its Parts

SENIC Team & Management Structure



Oliver Brand



David Gottfried
(GT, PI)



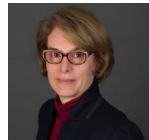
Shyam Aravamudhan
(NCA&T, co-PI)



Sherine Obare
(UNCG, co-PI)



Mikkel Thomas
(GT, E&O)



Diana Hicks
(GT, SEI)



Dan Herr
(UNCG, E&O)



Amy Duke
(GT, Program
Manager)



Walter Henderson
(GT, MCF)



Gary Spinner
(GT, Cleanroom)



Stephen Crawford
(JSNN, Core
Facilities)



Leslie O'Neill
(GT, E&O)

SENIC and New Initiatives

What successful examples of programs, activities, and relationships in the current NNCI could be adapted or expanded for multiple sites in a future network?

1. Tracking our users and where they land with regard to employment
2. Responding to the education needs of rural and underserved communities
3. Strengthening industry and national lab engagement



Examining Career Paths of Former Nanotechnology Research Facility Users: A Case Study and Toolkit

Diana Hicks and Sergio Pelaez



Examining Career Paths of Former Nanotechnology Research Facility Users: A Case Study and Toolkit

OBJECTIVES

- Analyze career outcomes of past users of SENIC facilities to understand workforce impact.
- Create a toolkit for this analysis to be replicated with new data.
- Strengthen the case for multiuser facility funding.
- Inform user facility management.

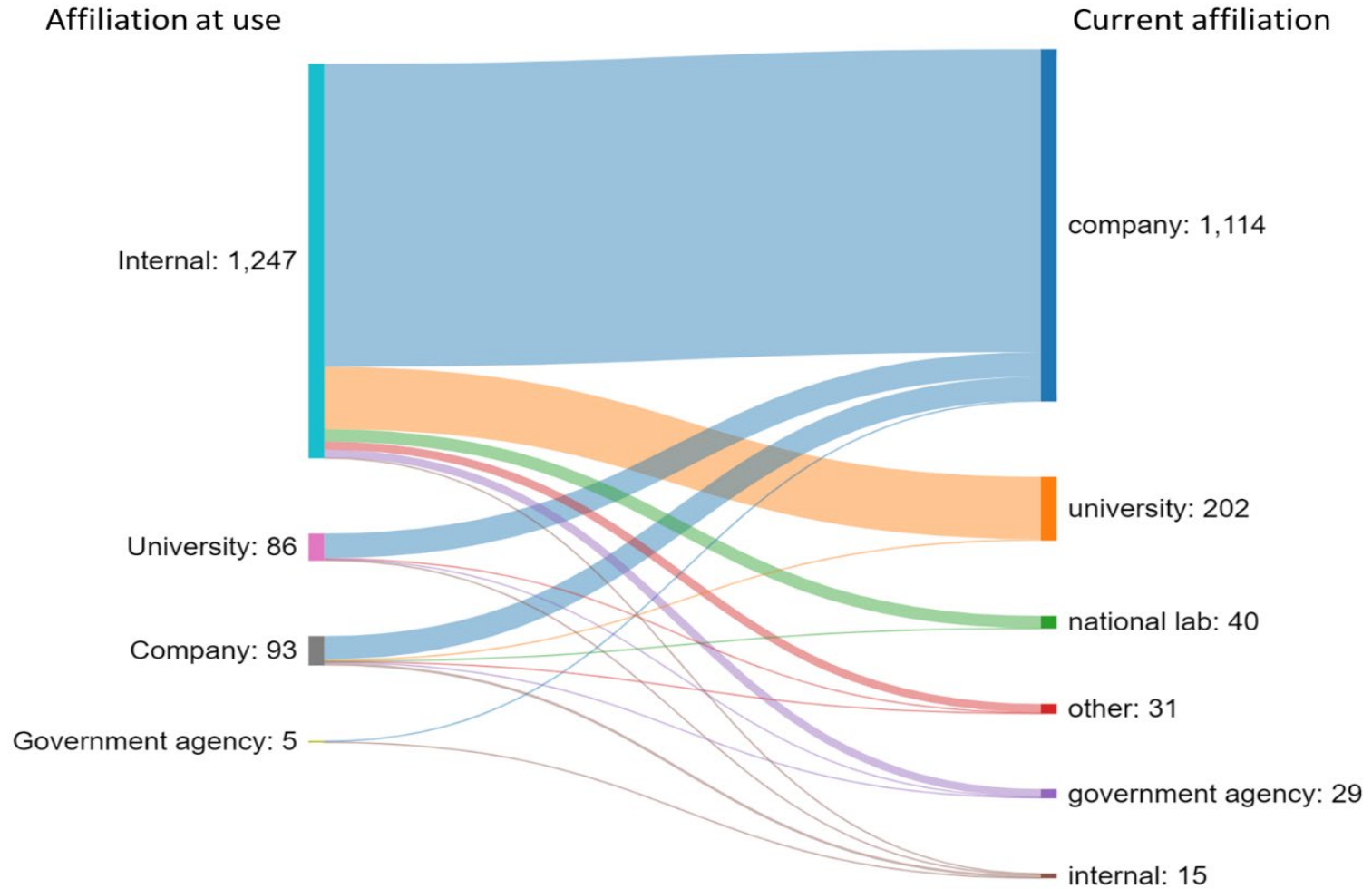
METHODOLOGY

- Collected name, affiliation, email of past SENIC users.
- Searched LinkedIn to find current employer, timeline, job title, location.
- Qualitative coding of sectors using Global Industry Classification Standard (GICS), transition paths, and job types.

3271 TOTAL USERS:

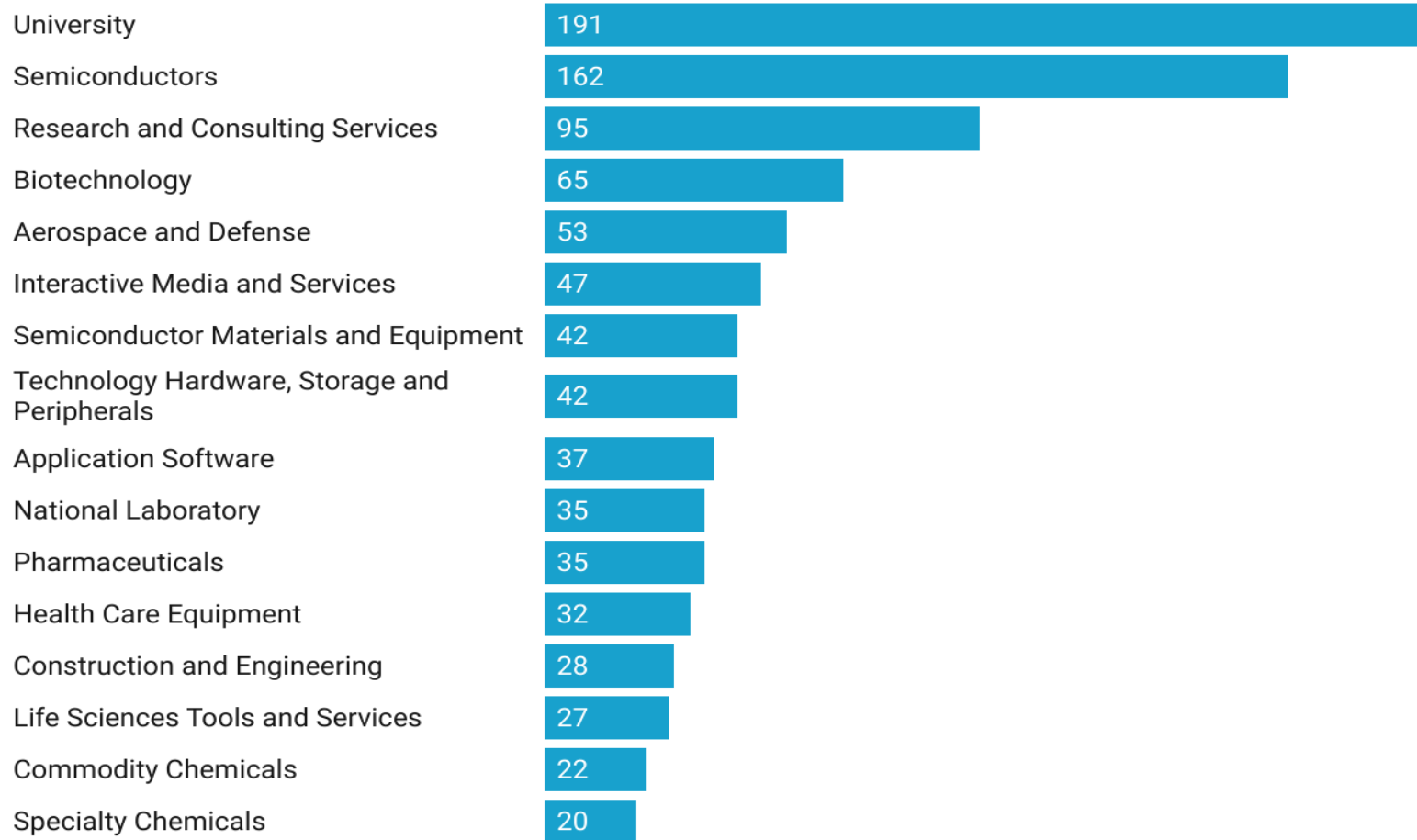
72% (2360) identified and tracked

Destination of SENIC users



Made with SankeyMATIC

Sectors in which past SENIC users are currently employed



Source: : Own elaboration with data gathered from LinkedIn, NetAdvantage, and IEN and JSSN lists • Created with Datawrapper

Top employers of SENIC alumni

- Findings reveal SENIC's contribution to a skilled, highly-demanded nanotech workforce.
- Making visible this knowledge transfer to critical national industries strengthens the case for funding of multiuser facilities.
- Can inform facilities' strategic planning to maximize career prospects for users.

Company	People
Intel Corporation	84
Apple	26
Meta	20
Google	18
Sandia National Laboratories	17
Applied Materials	16
Amazon	14
Georgia Institute of Technology	12
Exponent	9
Micron Technology	9
Northrop Grumman	9
Qualcomm	9
Amgen	8
L3Harris Technologies	7
Lam Research	7
Lockheed Martin	7
Qorvo Inc	7
Duke University	6
IBM	6
KLA	6
Lawrence Livermore National Laboratory	6
McKinsey & Company	6
NIST	6
Sila Nanotechnologies Inc	6
Tesla	6
TSMC	6

Strengthening our Engagement with National Labs



Education and Training Initiatives

Industry-Guided Education

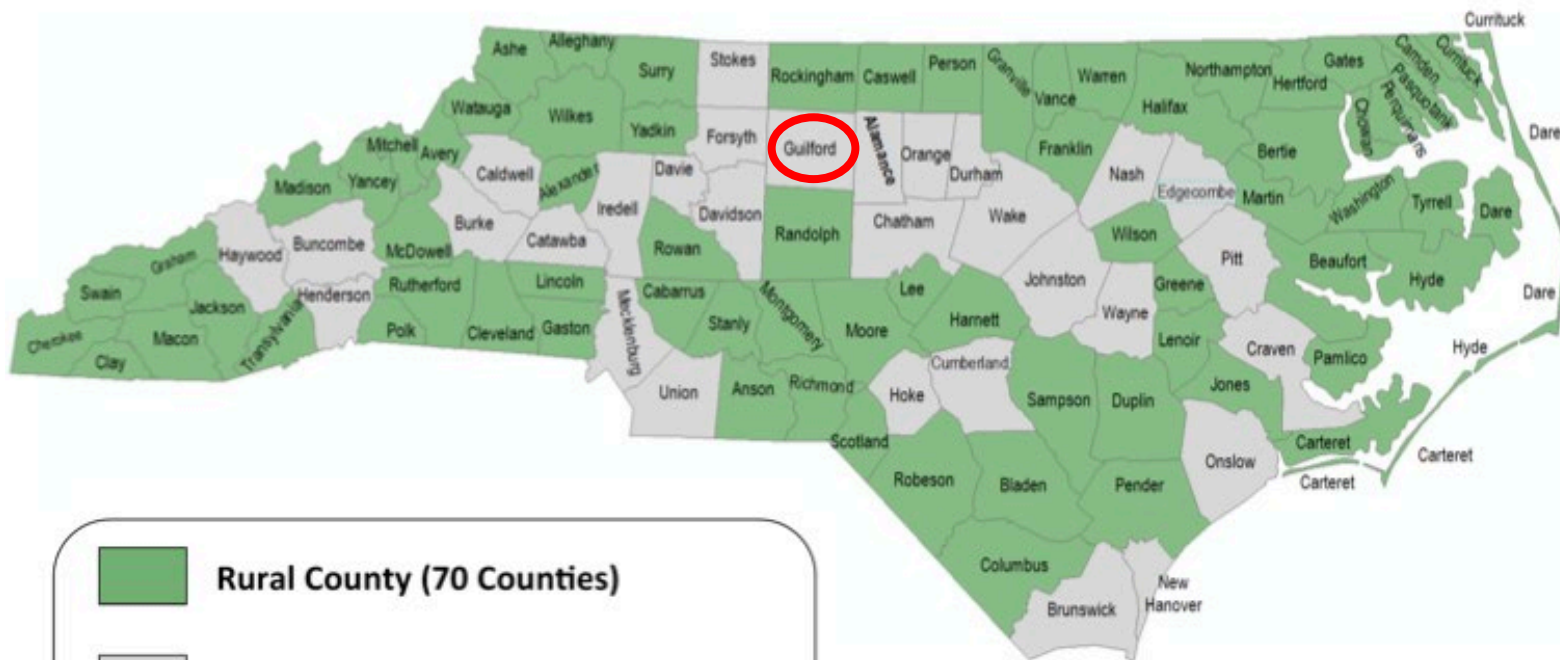
- Understanding the cleanroom environment
- Techniques for nano- and micro-fabrication
- Cleanroom Safety Training
- Introduction to Experimental Design and Statistical Process Control
- Hands-on experience in Thin-Film Deposition and Characterization
- Introduction to Vacuum Systems, Process/Metrology Equipment and Fabrication Processes
- Microelectronics and Semiconductor Technology

Teacher Development

- Nanoscience Summer Institute for Middle School Teachers (Nano SIMST)
- Curriculum is based on the nano@Stanford program and adapted for 4 hours of virtual instruction per day for 5 days.
- Organized by JSNN with GT support
- 3rd cohort: 15 teachers from NC (53% teach in a Title I school) and 15 teachers from CA
- Intentional involvement of teachers from rural and underserved communities.

Nanoscience Summer Institute for Middle School Teachers

North Carolina Rural and Urban Counties



Legend:

- Rural County (70 Counties)**
- Urban County (30 Counties)**

Notes:

- Rural is defined as a non-metropolitan or outlying metropolitan county.
- Urban is defined as a central metropolitan county.
- Data from Federal Office of Management and Budget

Intel Sponsorship to Establish a Microelectronics Training Program

Twelve (12) undergraduate/graduate students are participating in the JSNN-Intel program that aims to strengthen talent pipelines in support of Intel's IDM2.0 workforce growth in the key areas of interest for workforce development.

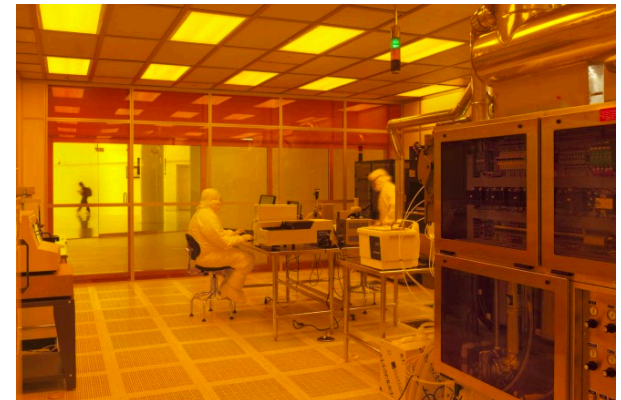
8 Week Program [06/05/2023 – 07/28/2023]

Program Goals:

- (1) To provide hands-on experiential learning opportunities for graduate and undergraduate students, and 2-year community college students;
- (2) To broaden semiconductor research and training opportunities for science and engineering students from HBCUs and MSIs; and
- (3) To deepen training of (with an aim to retain and nurture) diverse graduate students and to provide upskilling and experiential opportunities for community college educators.



Shyam Aravamudhan



Micron Chip Camp



Mikkel Thomas, PhD

- Three-day camp for middle school students
- IEN hosted the third day of the camp
- Sixty-six students participated at the event at Georgia Tech
- Campers were exposed to hands-on nano demos, the cleanroom, MCF, and the Invention Studio (student run maker space) at Georgia Tech



Future Opportunities

- Understanding workforce demands and strategies to best prepare students for participation.
- Strengthening partnerships with social scientists and educators to create innovative ways of connecting with communities and industry to create a future workforce involving rural and underserved communities.
- Engaging industry and national lab partners to collaboratively develop programs to meet their current and future demands.



Thank You!

<http://www.nnci.net>

<http://senic.gatech.edu>

<http://www.iem.gatech.edu>

<http://jsnn.ncat.uncg.edu>



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