Mapping the Microsystems and Nanotechnology Industry and Educational Needs

www.scme-nm.org

University of New Mexico

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Background

The Southwest Center for Microsystems Education (SCME) develops microsystems educational materials. These include microsystems and nanotechnology based learning modules and a series of animations and collaborative films on microsystems related subjects. In addition to these classic learning modules, SCME has developed a series of hands-on classroom kits to bring microsystems cleanroom fabrication processes and concepts to the classroom.

The SCME acts as a one stop shop for technician educators and industry trainers wanting to incorporate multidisciplinary microsystems and nanotechnology materials into their program and facilitates professional development opportunities for educators. These include a series of recorded webinars, training workshops on these units as well as a 4-day intensive cleanroom experience. We have successfully trained over 300 educators and have determined approximately 60% continue to use the materials in their STEM classes on a regular basis.

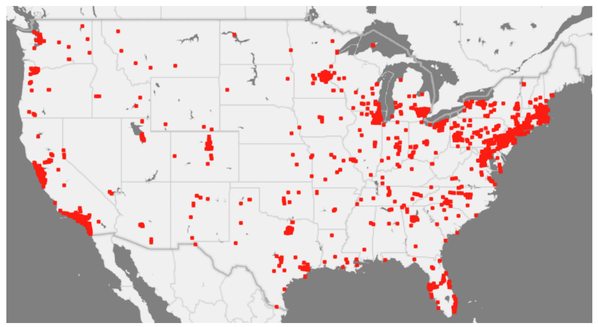
It is well known that the microsystems (MEMS) industry has experienced strong growth over the last 10 years and is projected to grow at 13% compound annual growth rate, leading to a $24B market by 2019. Yole Développement estimates this industry to have been $12B at the end of last year. According to Yole, the amount of microsystems produced for consumer applications is expected to grow by 20%. Certain MEMS sectors are growing at much higher rates (BioMEMS, Inertial Sensors). It is also established that the United States produces approximately half of all microsystems. These estimates do not include the numerous companies producing the supplies and equipment required to create nanotechnology and microsystem projects. In addition, there are many small and start-up companies in the nanotechnology and microsystems sectors poised to rapidly grow which will be in need of technicians as they move to high volume production.

Identifying where microsystems education is needed

A goal of the SCME is to work with community colleges nationwide to establish relevant nanotechnology and microsystems- based technician training programs. The SCME is uniquely positioned to offer curriculum, training, and support necessary to quickly establish such a program. To demonstrate the relevance of such a program, a mapping project is undertaken to identify where the micro and nanotechnology enabled industry is clustered. This project also aims to predict the needed skill sets of this industry through categorization of the companies.

This project followed these steps:

1. Acquire mapping software with capabilities of viewing and analyzing areas from the entire country to small regions.
2. Acquire a list of all community colleges in the United States
3. Build a list of Microsystems and related companies that would hire community college tech graduates having the sorts of knowledge and skills taught through the use of nanotechnology and SCME microsystems educational materials.
4. Combine the information and target specific industry clusters for more in depth research. Through this research, estimate their educational needs and potential growth.
5. Assess educational infrastructure and identify community colleges in these regions that could potentially create or strengthen relevant programs.
6. Contact industry and educational officials in analyzed regions to catalyze the process with the goal of providing the region's nanotechnology and microsystems enabled industry with educated and well prepared technicians.
7. If gaps are identified based on a regions specific needs, SCME will collaborate to create additional educational materials to fill these gaps.



Locations of known Micro-Nano Tech companies in the United States.

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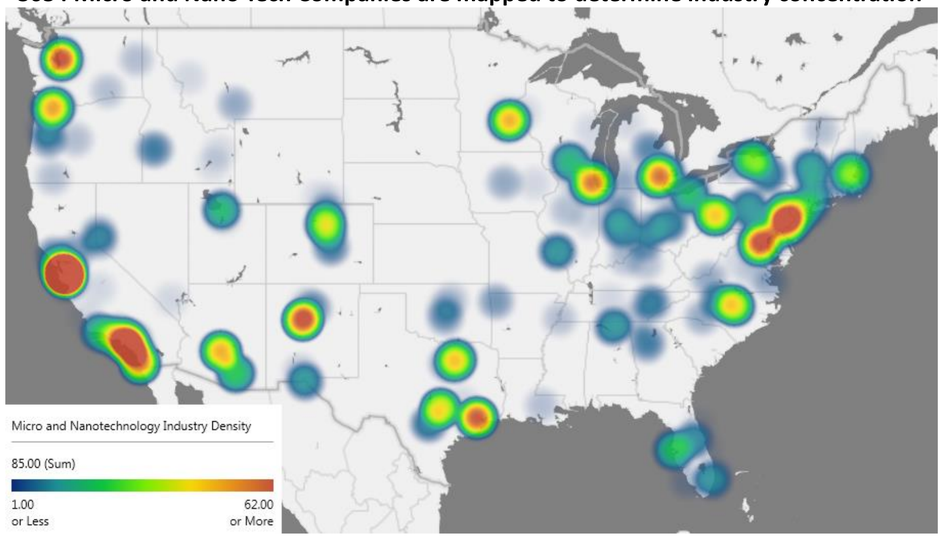
- Scott Bryant – Nano Network of New Mexico
- Dr. Steven Walsh (UNM Anderson School of Management)
- AACC – Community College Data

3034 Micro and Nano Tech Companies are mapped to determine industry concentration



1500 out of the 3034 companies are categorized based on their business and skill sets needed for their technologies

Category	Description	Number of Companies	Percentage of 1500
Materials / Chemicals / Nanomaterials	Any company mainly producing specific materials and chemicals that make use of nanoscience or are used in nanotechnology	194	13%
MEMS including Bio-MEMS and Microsensors	Any company engaging in the design and fabrication of microelectromechanical systems (MEMS) for diverse applications	277	18%
Electronics / Electronic Components	Companies specializing in the manufacture of electronic hardware and components utilizing microsystems	217	14%
Semiconductors	Companies fabricating components made from semiconductors, often for electronics and optoelectronics	104	7%
Research and Development / Laboratory Analysis Services	Companies specializing in nanoscience research, micro and nanotechnology development, or laboratory analysis	182	12%
Optics and Photonics	Any company specializing in the fabrication of optics or photonics based components and products that operate using photonics	189	13%
Tools and Capital Equipment	Any builder of specialized machinery and parts for nanoscale research or the manufacture of micro and nanotechnologies	337	22%

Top States

California	Washington
Pennsylvania	Florida
Texas	Massachusetts
New York	Minnesota
Illinois	New Mexico
Michigan	Arizona

Metro Areas of Highest Concentration

Silicon Valley	Portland
Los Angles / Orange County	San Diego
Minneapolis / St. Paul	Philadelphia
Seattle / Tacoma	Albuquerque
Washington / Baltimore	Ann Arbor

The SCME is a National Science Foundation funded Advanced Technological Education Center of Excellence. We are located at the University of New Mexico, Manufacturing Training and Technology Center in Albuquerque. We can help you set up a Microsystems tech program at your school and advise you on your region's need for Microsystems Technicians.
For more information, go to www.scme-nm.org – Learn about MEMS, download educational materials, see our next events, and link to other sites and our partners.

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