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Introduction

Nearly fifty percent of all nanotechnology funding is provided by government worldwide. The National Nanotechnology Initiative proposed a nanotechnology research and development budget of \$1.8 billion for the year 2011. The federal government has requested that the Center for Nanotechnology in Society at UCSB (CNS-UCSB) provide concrete data about nanotechnology industries to aid federal and state nanotech Research and Development (R&D) assessment.

This research project focuses on California as a region of particular interest due to the state's prominence in nanotechnology development. The California Council on Science and Technology in January 2010 reported that California receives 42 percent of US venture capital and houses 25 percent of US nanotechnology companies. It has also been estimated that these industries have the potential to create between 90,000 to 200,000 jobs by the year 2015, but there is to date no comprehensive source of data on the industry in California. In the United States, large industry provides approximately half of nanotechnology funding.

The results of this research will provide a basis to validate the value of research being conducted at California academic and research institutions and this, in turn, can result in continued funding by government agencies through the NNI.

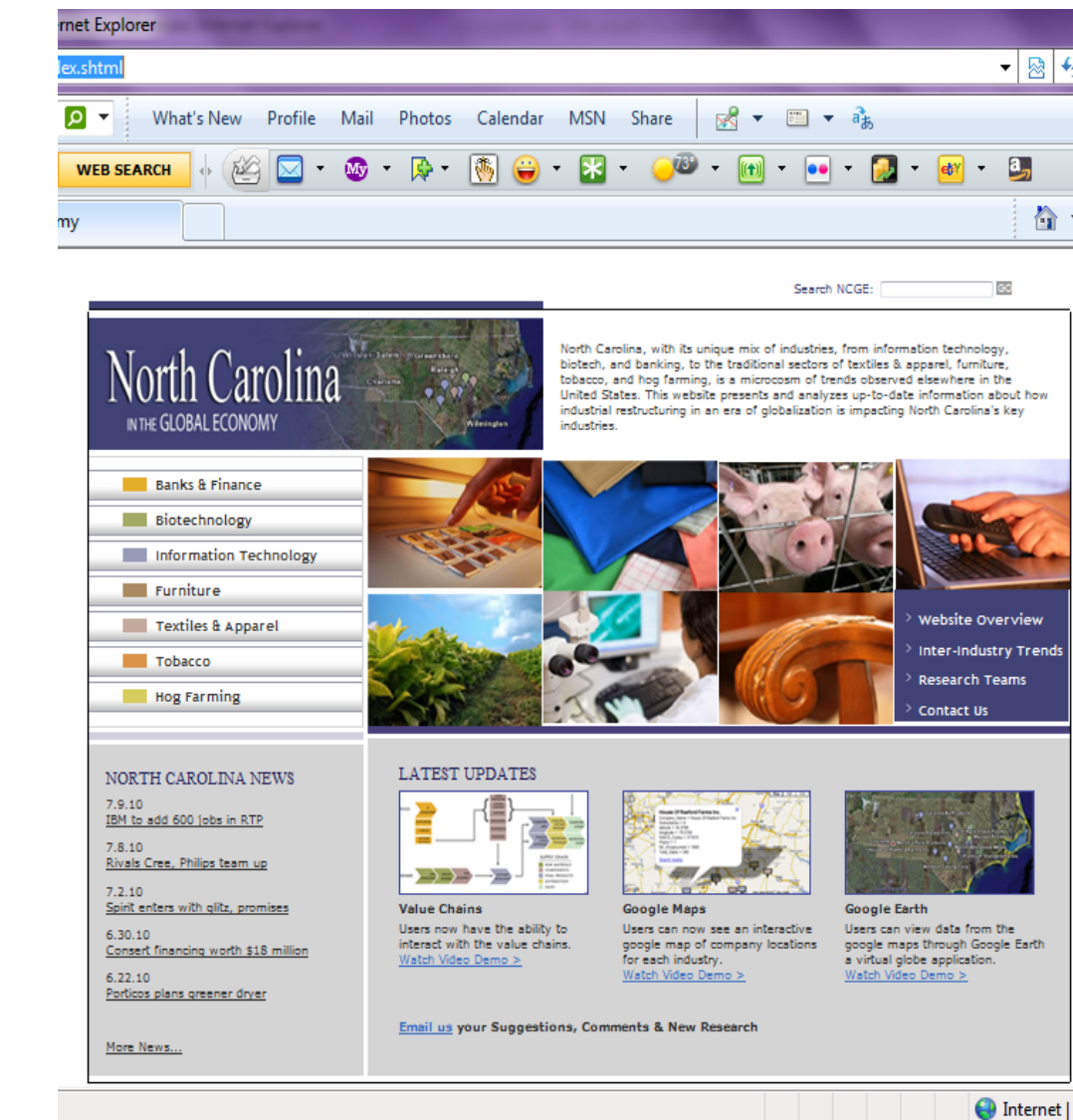
Research Goals and Objectives

The ultimate goal for the Center for Nanotechnology in Society is to create a comprehensive website which will provide open access to details about all aspects of the Nanotech Enterprise in California.

Immediate summer goals were to:

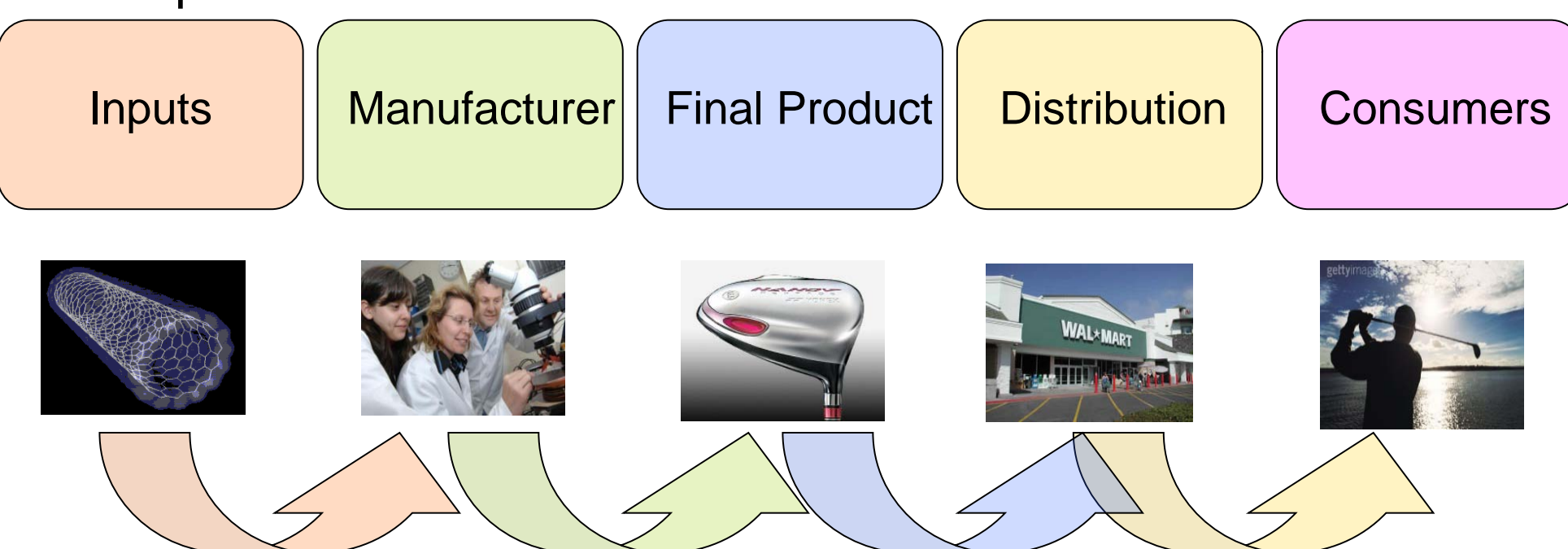
- Begin to build a global value chain (GVC) to map California nanotechnology industries
- Create more accurate data about these industries

Left: A screen shot of a similar project completed for North Carolina industries by CNS collaborators Gereffi et al. This project will serve as a model for the CNS Nano in California website. (http://www.soc.duke.edu/NC_GlobalEconomy/index.shtml)



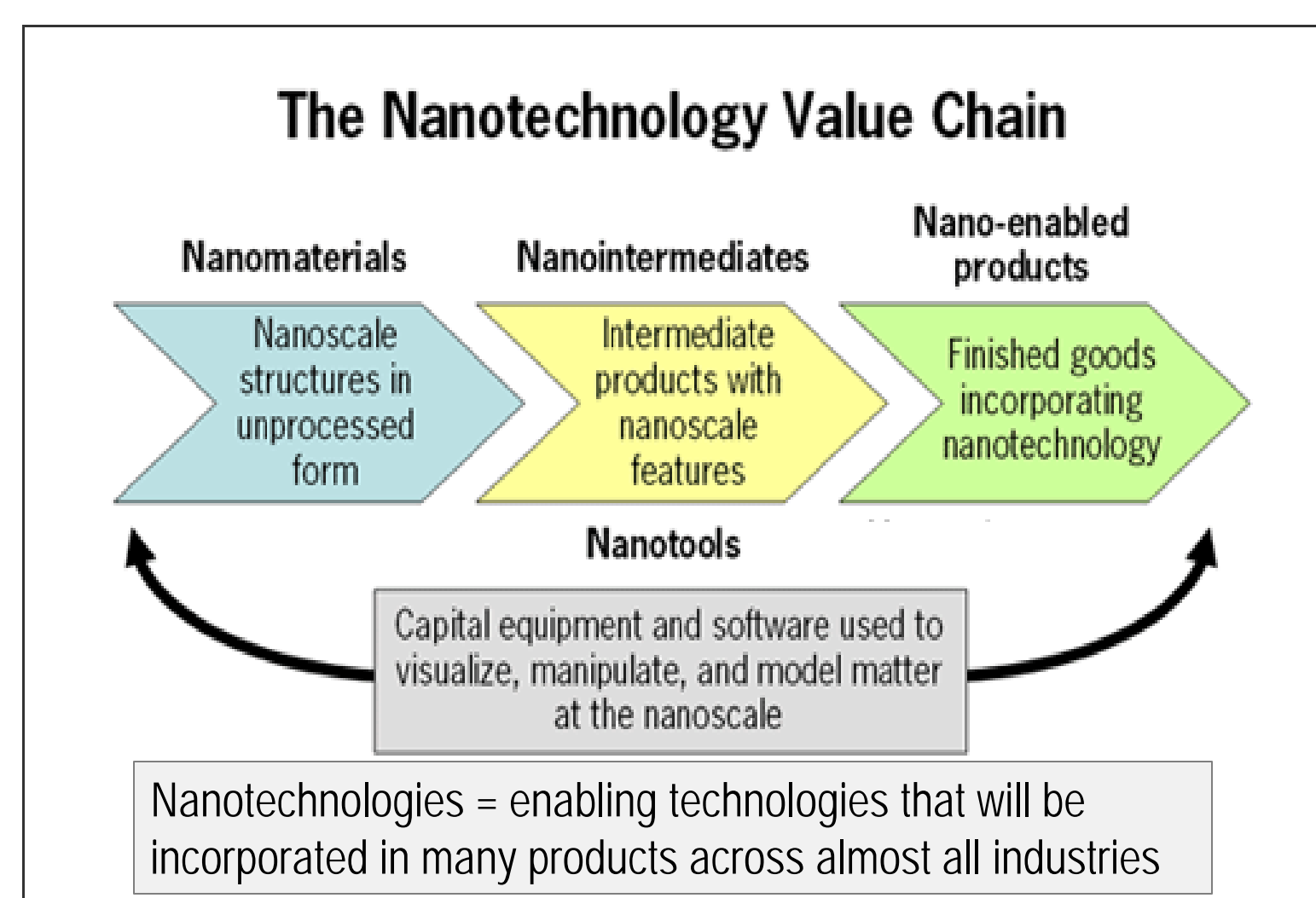
Nanotechnology and The Global Value Chain

The GVC is a graphical representation of the interconnections between firms and the added value in a global marketplace.



Left: This GVC demonstrates how a raw material, like carbon nanotubes, is manufactured into a final product, in this case a golf club, which is distributed to consumers for its end use—each step of the process adds value to the chain. (Graphic: CNS Intern Ryan Shapiro, 2009)

Nanotechnology involves the creation, exploration and manipulation of materials measured in the billionths of meters, from 1-100 nms. As "enabling" technologies, nanotechnologies have a wide variety of applications in many materials and products and market sectors. The many uses of these technologies can be mapped and described by GVCs. The figure on the right shows this more generically—the nanotechnology value chain for a single product is likely to be distributed across the globe. Lack of regulation of the production or use of these novel materials in the US or abroad makes tracing that GVC difficult, but it is essential to understand what role California has in nanotechnology.



To better understand this role, we must first identify the companies that engage in nanotechnology.

Research Methods

Firms were identified through the following databases:

- Plunkett Online Research
- Nano Science and Technology Institute (NSTI)
- Lux Research, 5th ed.
- Woodrow Wilson

- Data Analysis included:
- Firm location
 - Market
 - Products and Services
 - Supply Chain Position

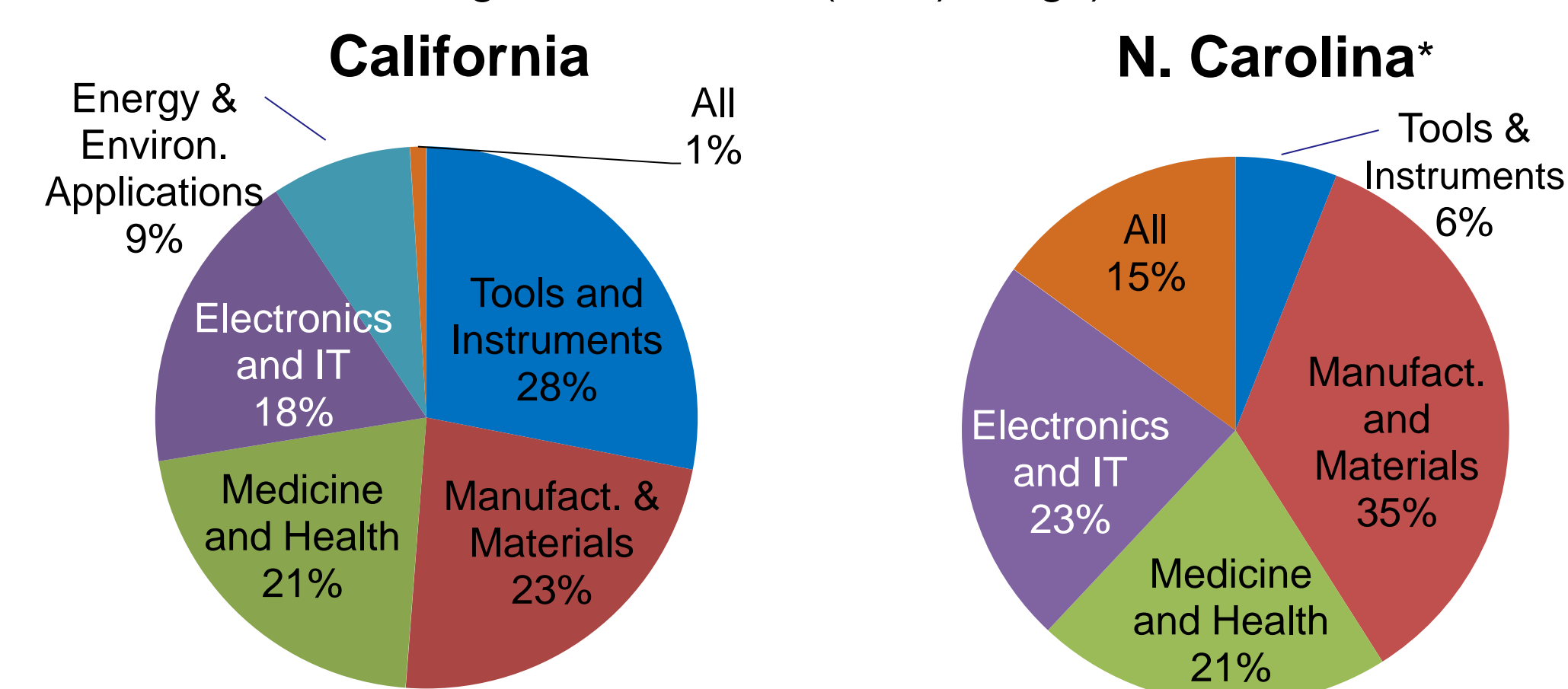
Santa Barbara Nanotechnology

- A 2008 study named Santa Barbara as the 10th most prolific metro areas in terms of nanotechnology publications (Shapira 2008).
- We identified 7 nanotechnology companies in Santa Barbara:
 - Anasys Instruments
 - Atomate
 - IMT Inc.
 - Multiprobe Inc
 - Ngen Partners Inc
 - Superconductor Technologies
 - Nanoethics Group
- Proximity to elite materials and nanotech university research centers and user facilities (MRSEC, CNSI, NNIN, DARPA, NIH, UC CEIN, CNS-UCSB)
- Government-funded research is contributing to new nanotech spinoff firms
- Most are venture capital-funded start-ups mainly focused on tools

Most interestingly illustrates a GVC even within such a small community!

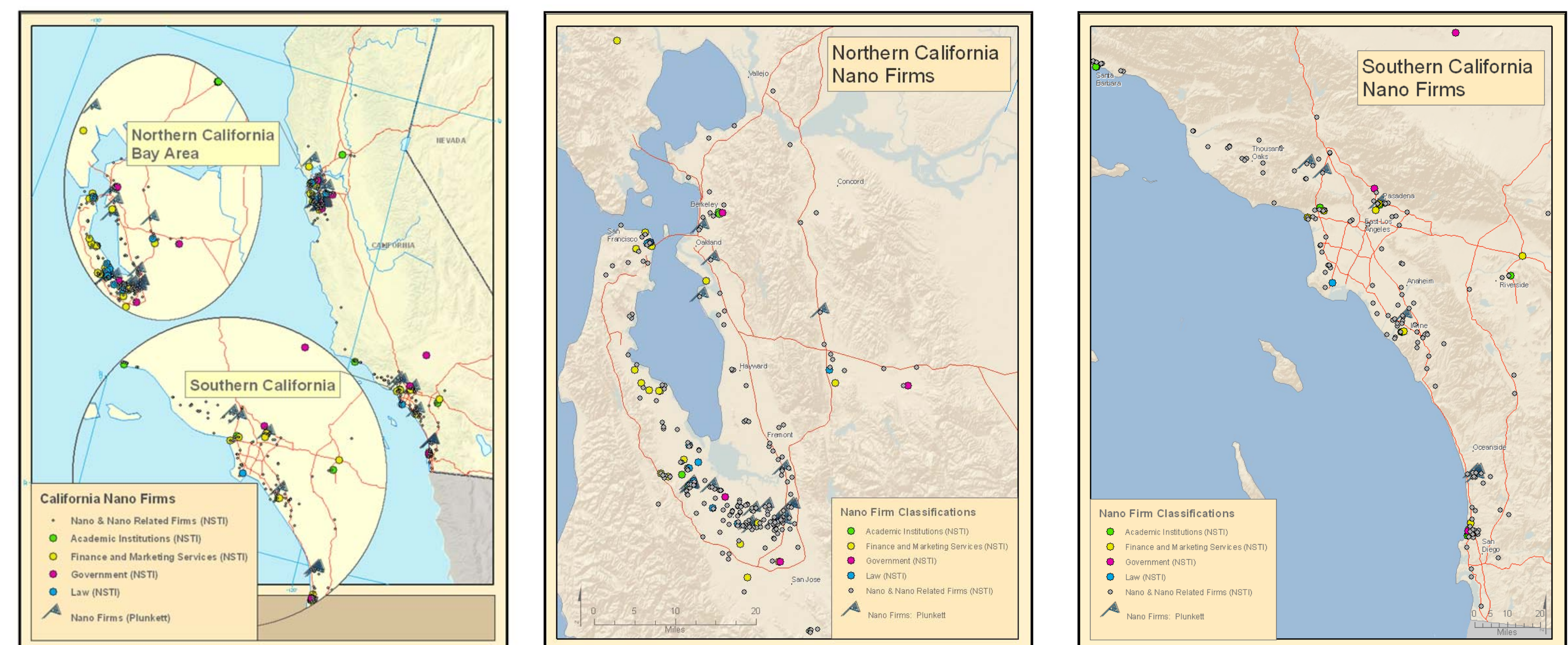
Data and Results

From the databases used, 203 firms have been analyzed to date from the entire Plunkett, Woodrow Wilson and Lux Research databases as well as a subset from the NSTI (those with over 500 employees and available Securities & Exchange Commission (SEC) filings).



*courtesy of Gary Gereffi and Stacey Frederick

The above data indicates the California firms have a strong role in tools and instruments. Given the large numbers of academic and research institutions in the state, as well as pre-existing regions like Silicon Valley already engaging in specialized technologies, such a finding is expected. It is also indicative of strong ties between research institutions and industries.



Above: These maps show the locations of approximately 500 companies identified through Plunkett Online Research and the NSTI databases.

Previous studies on nanotechnology industries suggest two influences on the development of nanotechnology companies: where the infrastructure for high levels of technology are already prevalent, and around research/academic institutions. As the maps show, there is a strong base of nanotechnology in Silicon Valley and to a smaller degree in the Los Angeles area, as well as around research institutions like UCSB (Wang 2007).

Conclusions

Preliminary analysis indicates:

- Strong relationships between academic/research institutions and spin-off small firms
 - Continued research will be beneficial to government, industries, researchers, and the public
- Continued analysis of data already collected:
- How these firms are connected
 - Exploration of other available nanotechnology databases (NanoVIP, Nanowerk, others?..)
 - A closer look into the roles CA institutions have on the nanotechnology GVC
 - How the nano GVC may change in the future

References

1. P Shapira and J Youtie. 2008 – "Emergence of Nanodistricts in the United States: Path Dependency or New Opportunities?" Economic Development Quarterly, 2008.
2. Wang, Jue. 2007. "Resource Spillover from Academia to High-Tech Industry: Evidence from New Nanotechnology-Based Firms in the U.S. Doctoral dissertation, Atlanta, GA: GA Institute of Technology."
3. Gereffi, Gary & Miguel Korzeniewicz, Eds. 1994. /Commodity Chains and Global Capitalism/. Westport, CT: Greenwood.

Acknowledgements

This material is based upon work supported by the National Science Foundation under Grant No. SES 0531184. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

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