

Project Overview

This project will take a snapshot of California's current nanotechnology capacity and assess its future nanotechnology potential.

- Nanotechnology Firms
- Certification and Degree Programs in Nanotechnology offered by California's educational institutions

Two separate databases were compiled for higher educational programs and nanotechnology firms. Data was collected via web searches, phone interviews and e-mail questionnaires.

We found that there are three main industry sector groups that are distributed among the nanotechnology enterprise:

- electronics & energy
- materials and manufacturing
- health, medical & life sciences

The few number of firms at the higher stages of the value chain have higher employment than those firms at the lower stages.

There are three main areas where nanotechnology firms and universities geographically cluster:

- The Bay Area
- Los Angeles
- San Diego

Theory: Value Chain

Below is a simple diagram of a value chain. It starts from the raw materials stage and ends at the nano-enabled final product stage. Each stage represents a step in the manufacturing process of a product and who the firms involved are along the line.

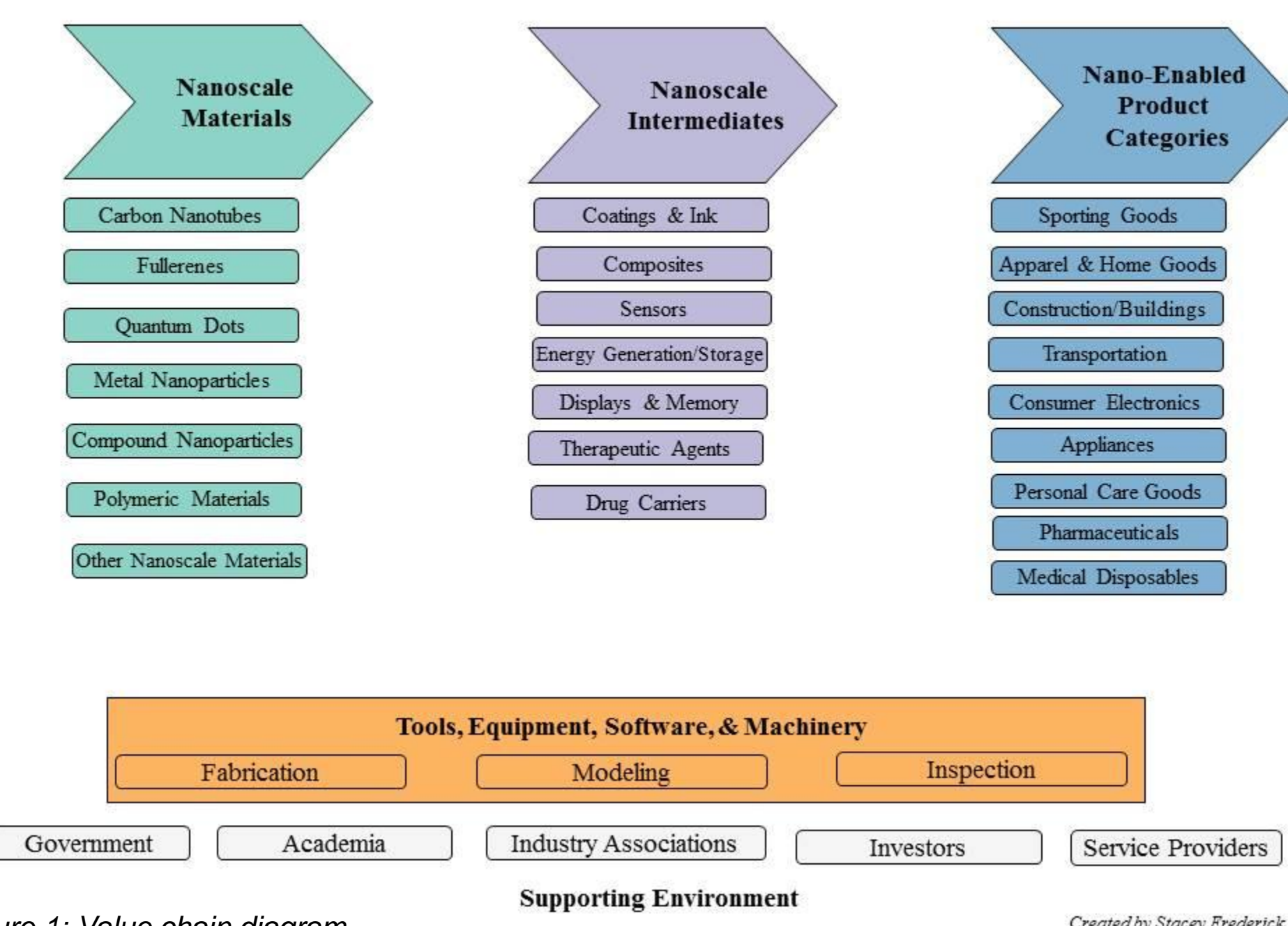


Figure 1: Value chain diagram

Created by Stacey Frederick

Research Methods

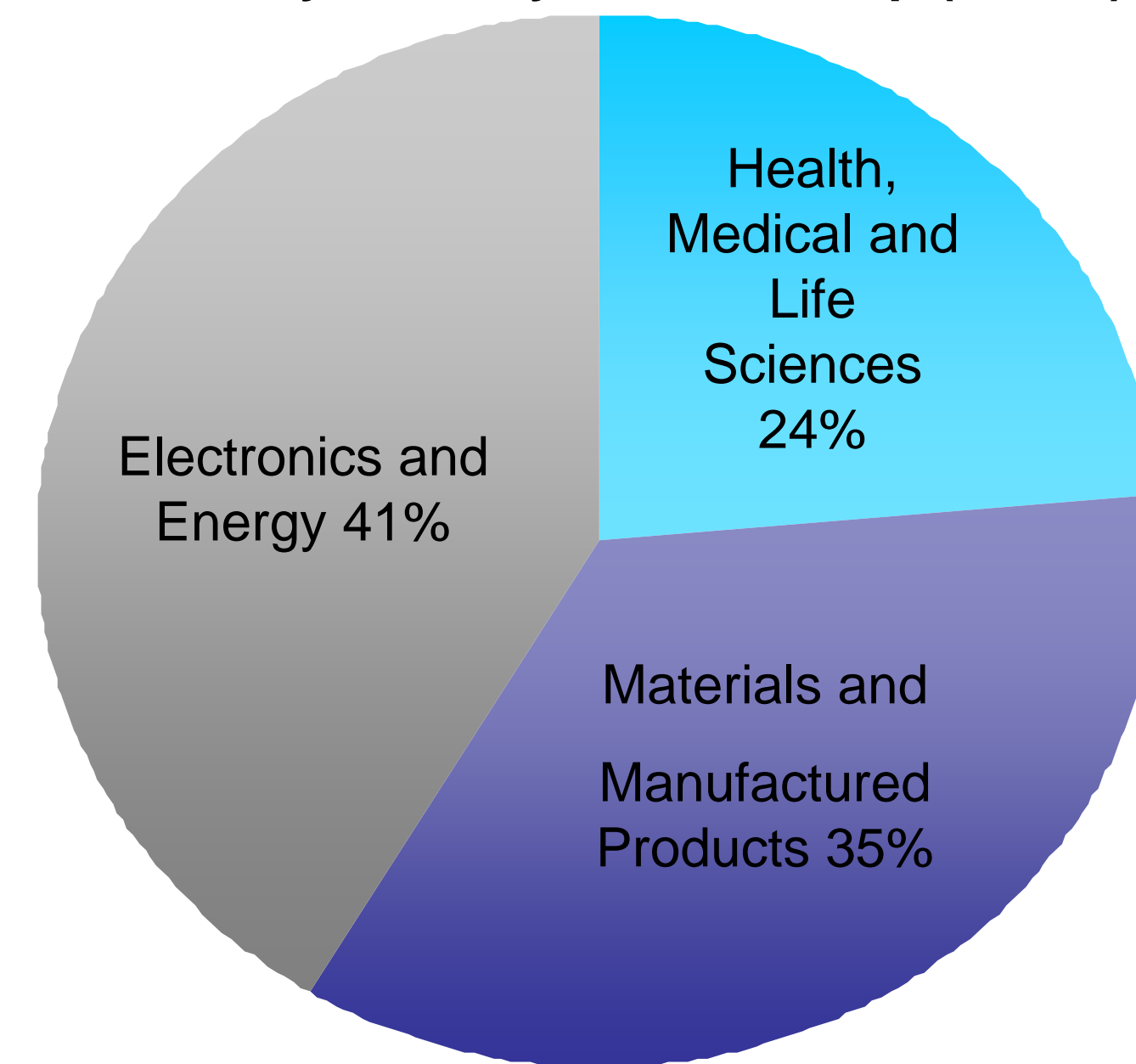
- Created a database of company profiles that contains information about:
 - Company Location
 - Products they make
 - Value-chain stage
 - Number of employees

- Created a database of higher educational institution profiles that contains information about:
 - School Location
 - Nano Degrees offered
 - Type of institution

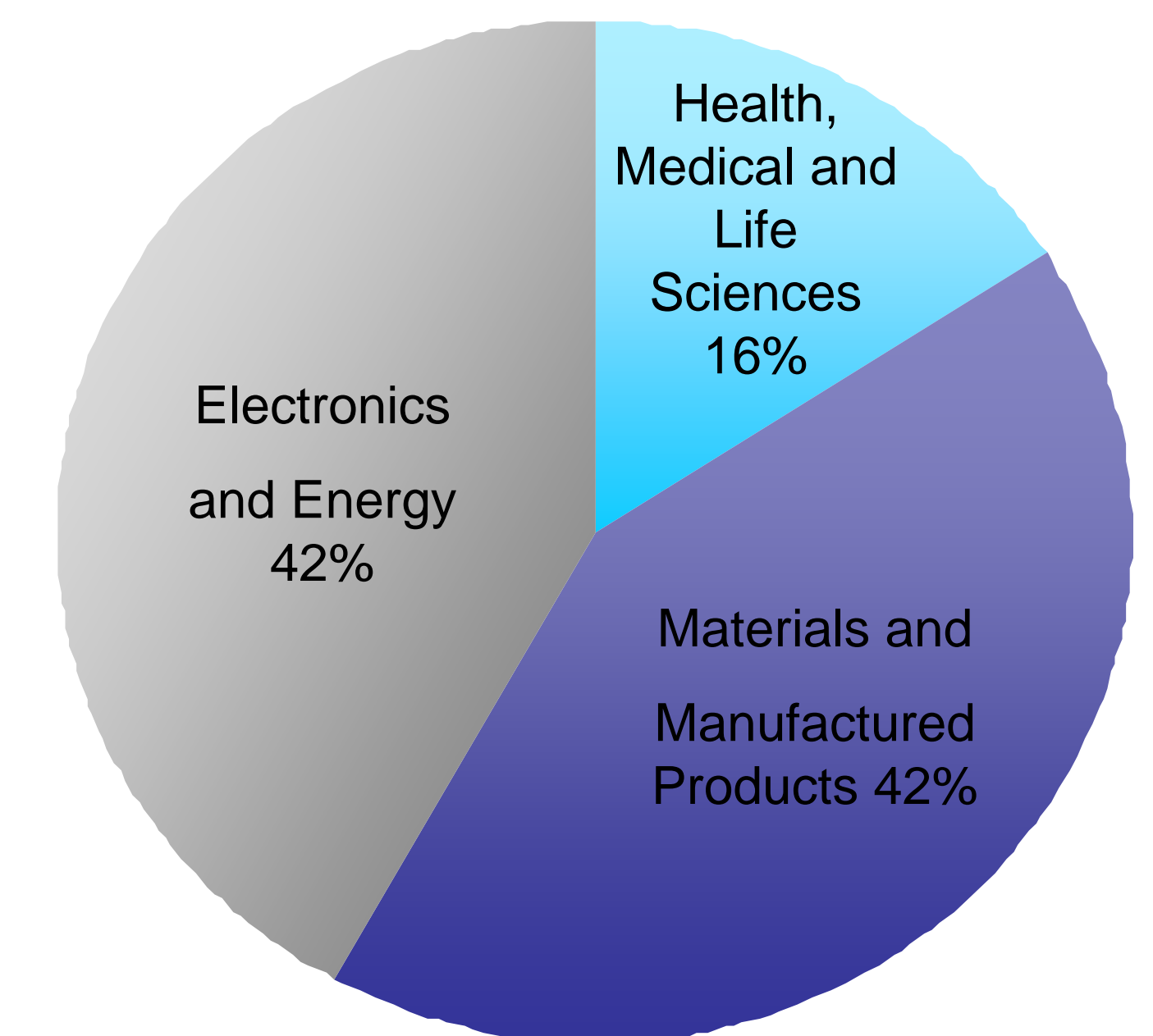
Data was collected via web searches for annual reports and press releases, phone interviews with universities and companies and e-mail questionnaires.

Results

Firms by Industry Sector Group (n=650)



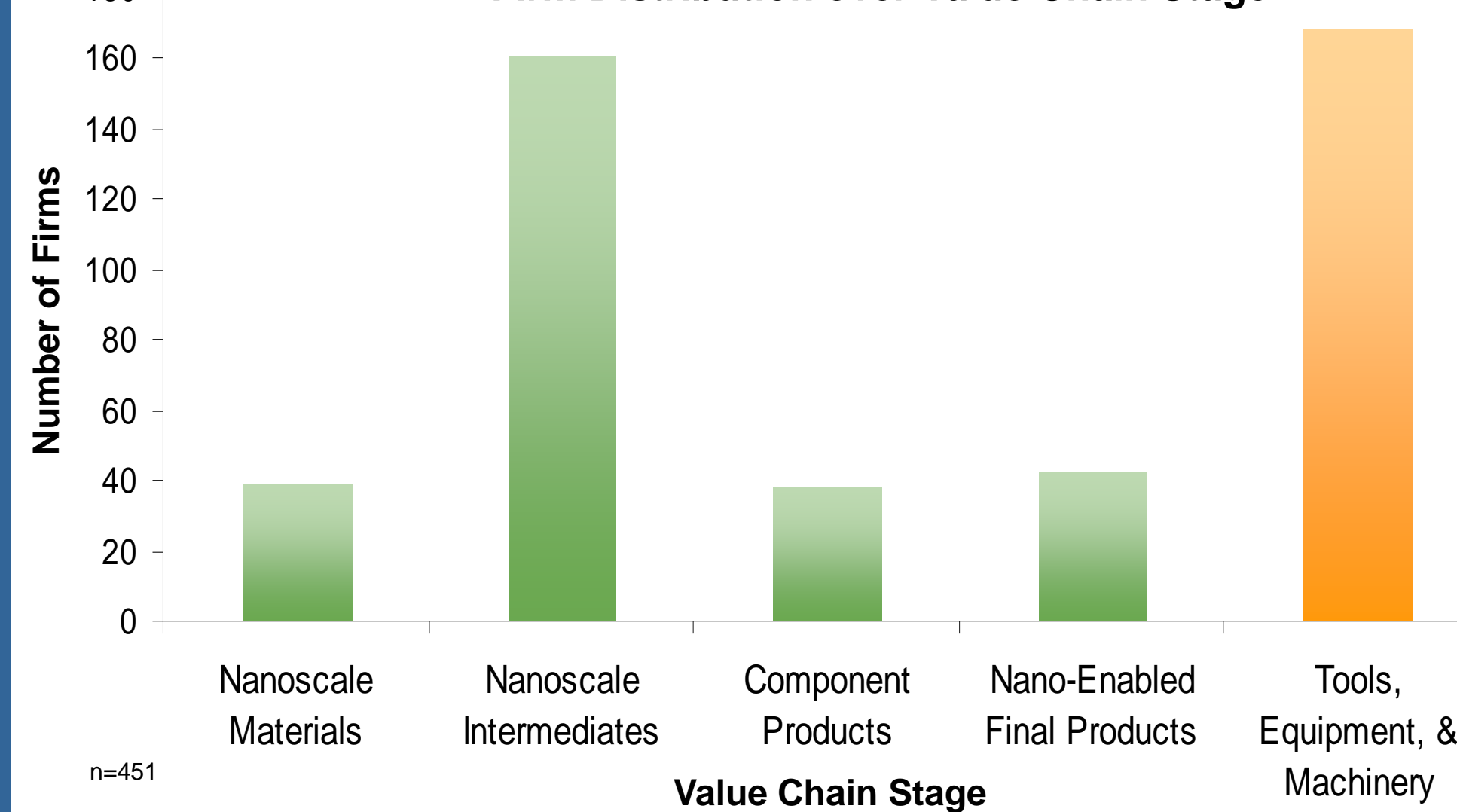
Employees by Industry Sector Group (n=116,603)



- 3 main industry sector groups:
 - Electronics & Energy
 - Health, Medical & Life Sciences
 - Materials & Manufacturing
- Lower employment in health, medical & life sciences
- California's nanotech firms are found mostly in the Electronics & Energy and Materials & Manufactured Products sector groups

No one industry sector is dominant with regard to both numbers of firms and employees.

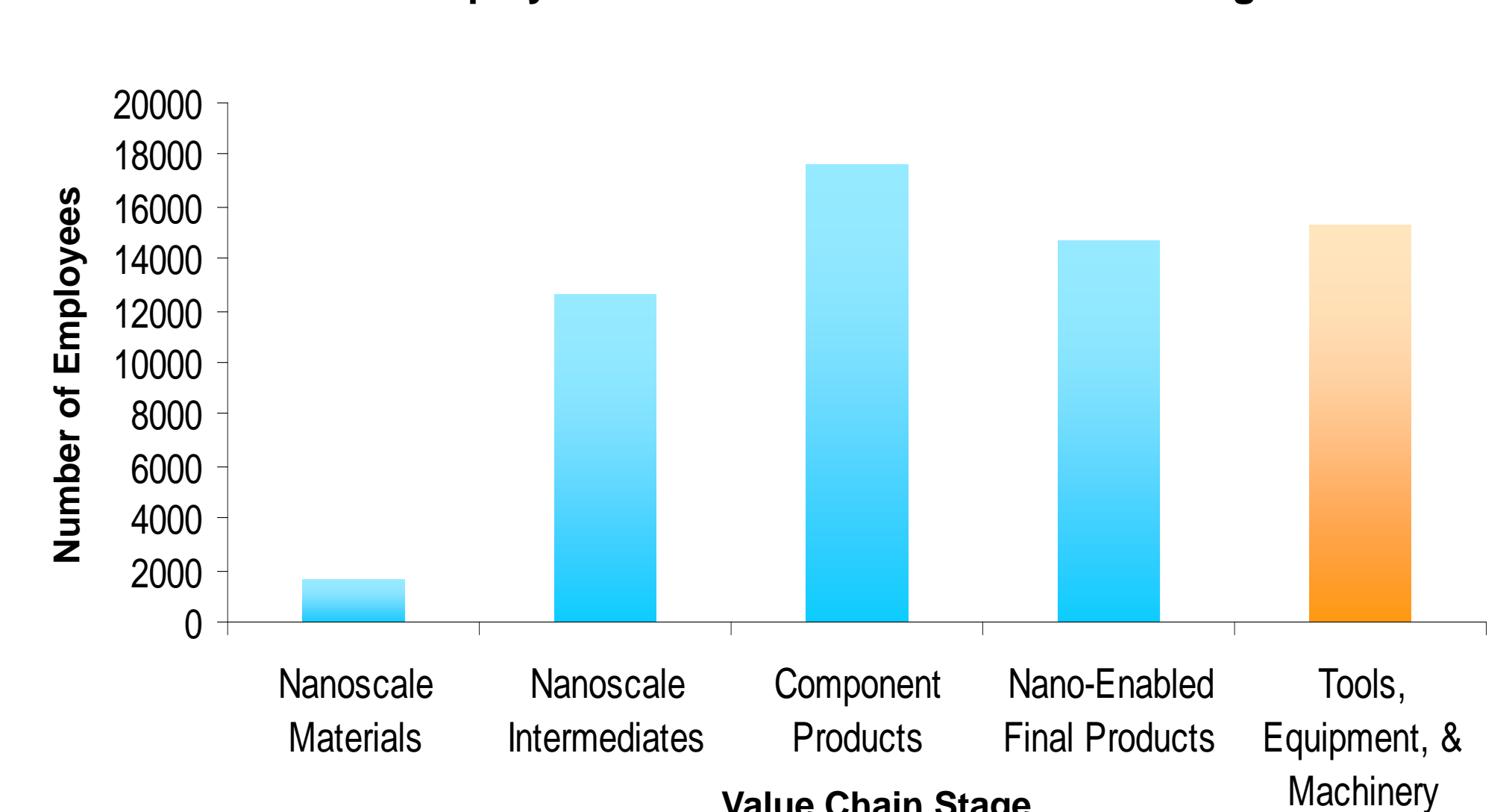
Firm Distribution over Value Chain Stage



More employment toward the higher end of the value chain

- Larger Firms
- More sophisticated products require additional design and development

Employee Distribution over Value Chain Stage



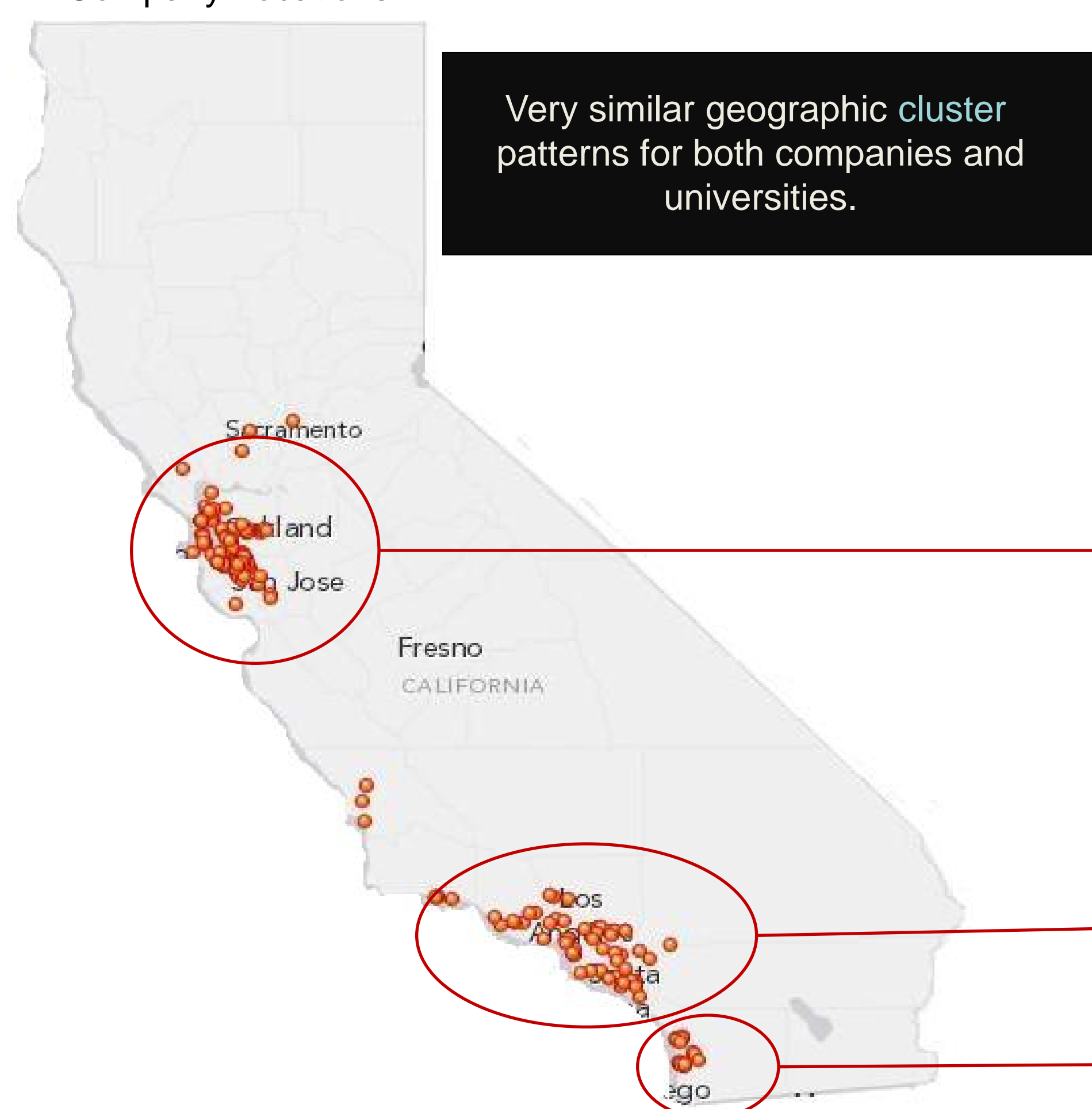
More firms are at the middle of the value chain

- Small firms
- Specialized Products

California's firms contribute significantly to the supporting stages of the nanotech value chain.

Jobs are concentrated in the relatively small number of companies at the higher end of the value chain.

Company Locations



Very similar geographic cluster patterns for both companies and universities.

University Locations



Conclusions

- We have yet to see one industry sector significantly take lead over the others in California's nanotechnology enterprise.
- California's firms are highly involved in the middle stages of the value chain, whereas there is greater employment near the end stages.
- The few firms that lie at the higher stages of the value chain have the most employees.

- The success of California's nanotechnology isn't entirely dependent on the success of one major industry sector.
- Employment can be maximized by increasing the number of firms at the end stages of the value chain.
- California has several regions with university/business clusters, which could grow into a nanotechnology boom in the state. This provides an opening for state law makers to encourage this growth.

Future Work

1. How closely do companies and universities work together?
2. How localized or globalized are the value chains for specific products?
3. How innovative are the California nanotechnology products?



Figure 1: California in the Nano Economy website home page

Literature cited

Frederick, Stacey. NanoTechConnect website; Value Chain Mapping; <https://sites.google.com/site/nanotechconnect/home/vc-mapping>

Acknowledgements

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