



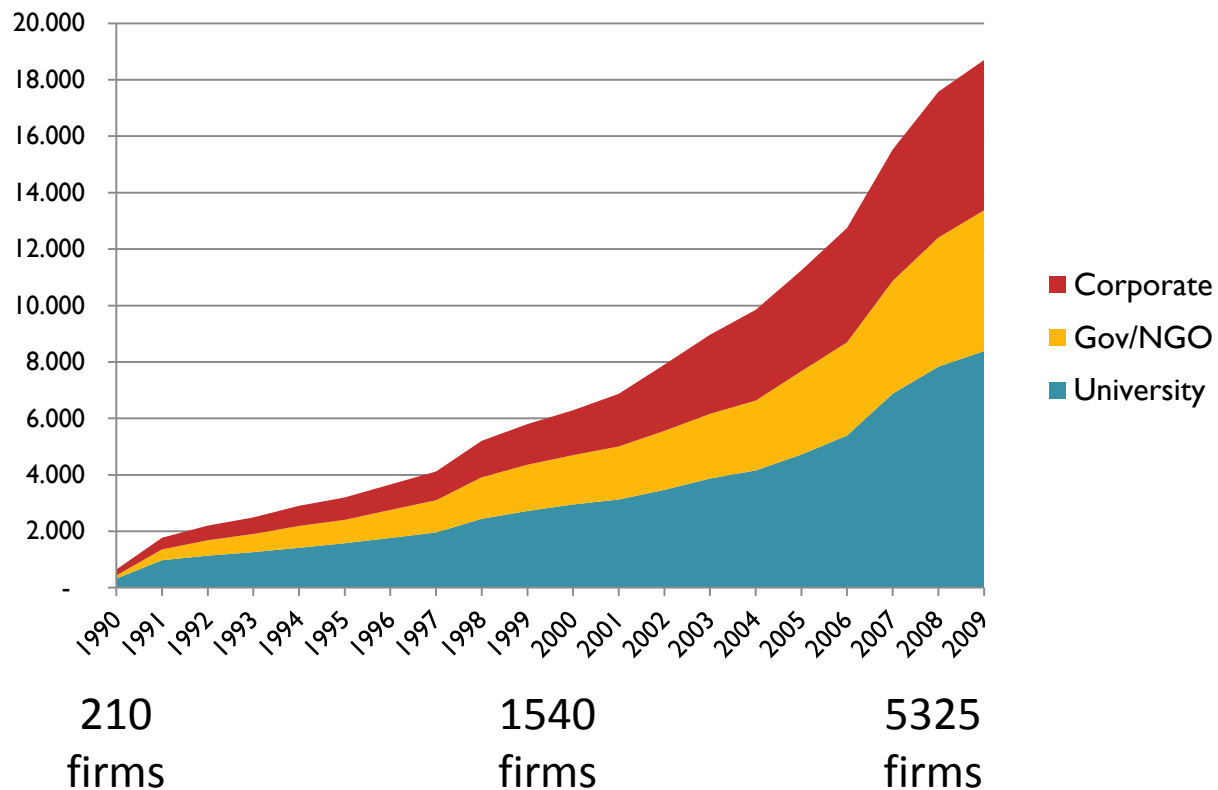
# Acquiring Nanotechnology Capabilities: Mergers and Acquisitions in the Nanotechnology Ecosystem

Jan Youtie, Georgia Institute of Technology, USA

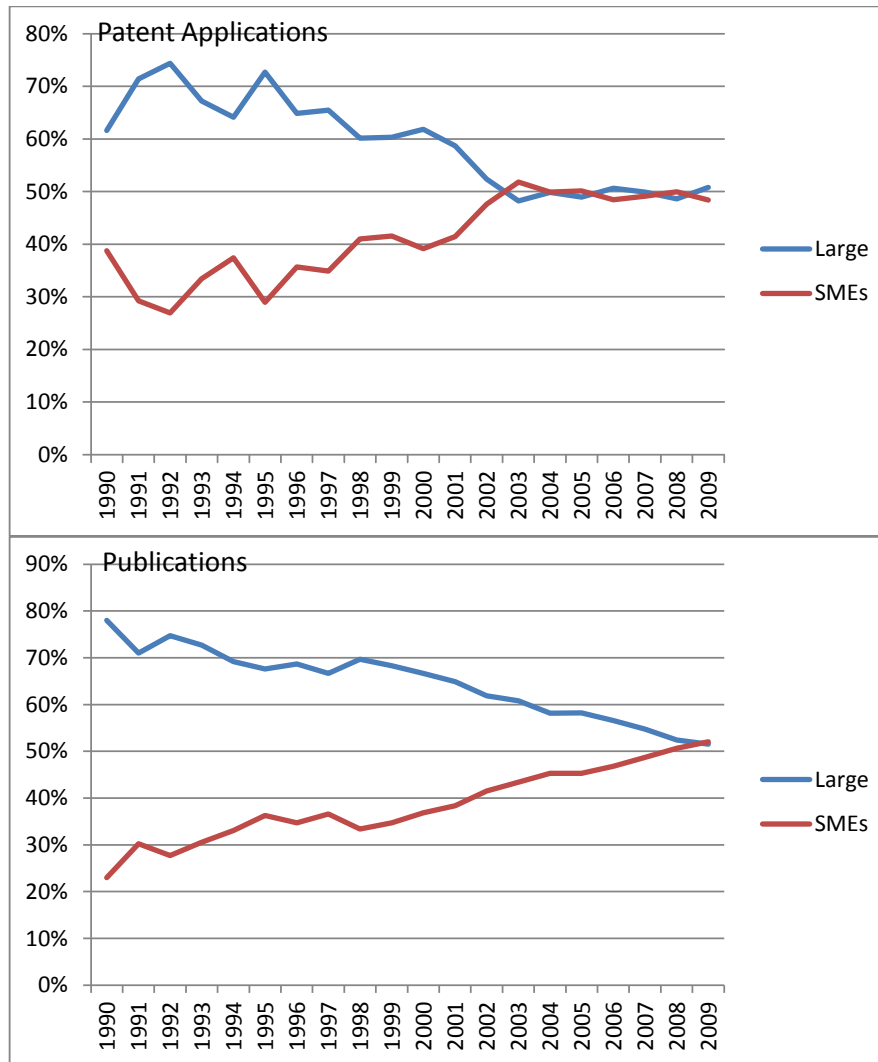
Luciano Kay, University of California at Santa Barbara,  
USA

# Ecosystem Perspective - Nanotechnology

- Companies are fastest growing entity



# Small companies - increasing roles in nano ecosystem



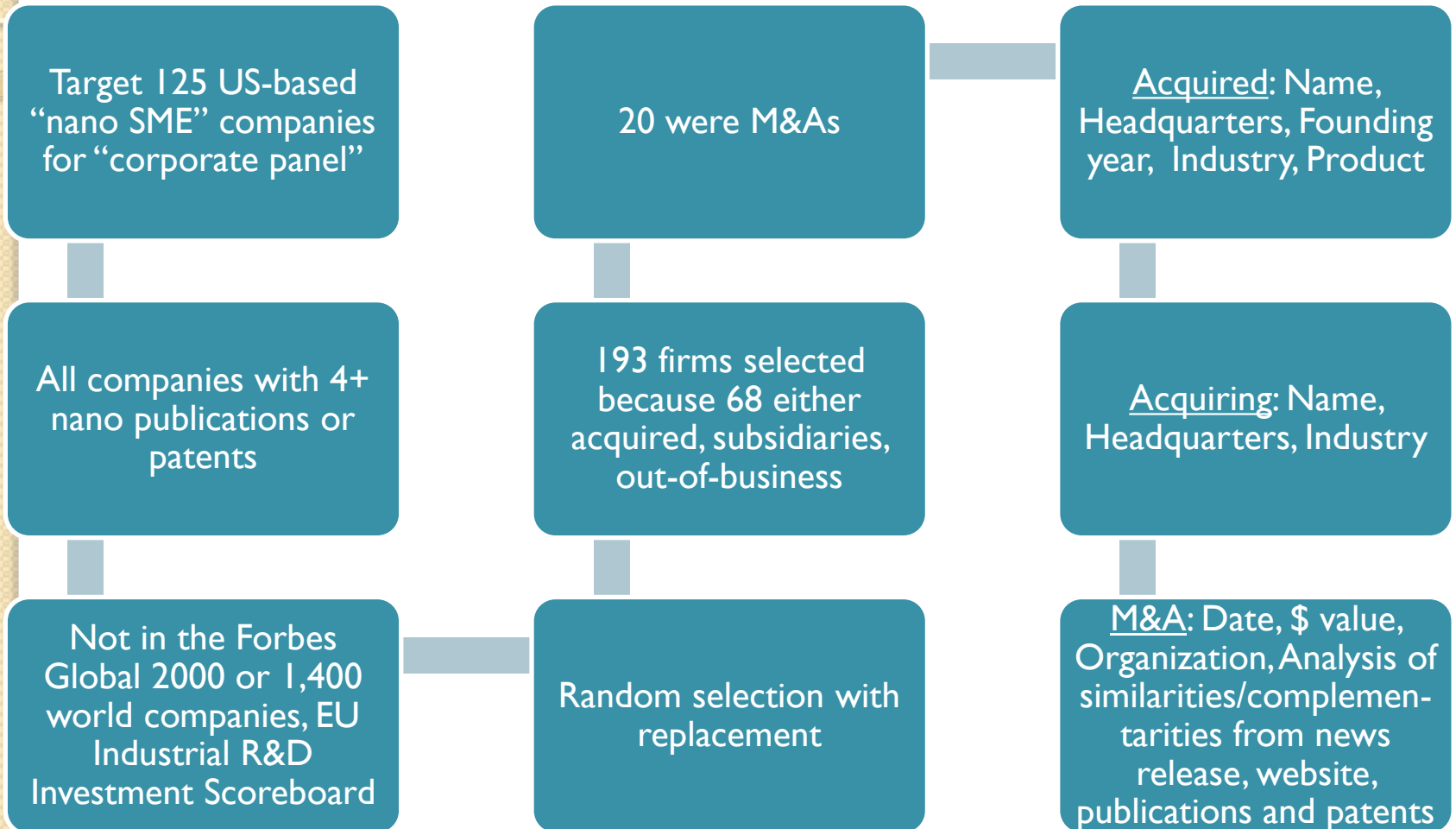
# Research Proposition

- The evolution of nanotechnology can be explained not only by R&D, commercialization of active firms but also by patterns of M&A of nano SMEs.
- Acquired firms in the nano domain are posited to provide complementary capabilities (rather than excess capacity)
- Mediating Factors
  - Whether or not the acquiring firm is US-based

# M&A and Science-based Entrepreneurial Firms

- Acquisition aims: new competencies, markets, product line, reduce overcapacity (Bowers 2001)
- **Acquisitions preferred over alliances** to acquire new competencies (Villalonga and McGahan 2005)
- Acquisitions with complementary patent portfolios have a positive effect on the acquiring firm's performance to a point, then becomes **curvilinear** (Cloudt et al, 2005)
- **Post-merger patenting is higher 3-5 years** after M&As with complementary technologies (Makri et al., 2010)
- Complementary M&As more likely **retained in the host country** than those with similar characteristics (Miozzo et. al., 2011)
- Contribution:
  - Focus on mature technology-based industries (using SICs), biotech.
  - No studies of M&A dynamics in nanotech. Yet M&A activity is an important feature of the nanotech commercial ecosystem.

# Method



# Acquired and Acquiring Firms

- Epion
- Conductus
- New Wave Research
- NZ Applied Technologies
- Picolight
- Matrix Semiconductor
- Reactive Nanotechnologies
- Digital Instruments
- Nanodevices
- Molecular Probes
- Molecular Simulation
- Polymer Technology Group
- Millennium Pharmaceuticals
- Immune Complex Corp.
- ImaRx Therapeutics
- Visigen Biotechnologies
- Callida Genomics
- Triton Biosystems
- Geo-Centers
- Systran



- Tokyo Electron
- Superconductor Technologies
- Electro Scientific Industries
- Corning
- JDS Uniphase
- Sandisk
- Indium
- Veeco, now Bruker
- Veeco
- Invitrogen, now Life Technologies
- Accelrys
- DSM Pharma Chemicals
- Takeda Pharmaceuticals
- Apovia AG
- Cerevast Therapeutics
- Life Technologies Corporation
- SBH Genomics
- Aduro BioTech
- SAIC
- Curtiss-Wright Controls

# Industry of Acquired Firm

Biotech more represented in M&A than in nano ecosystem

*Nanobiotech comprises 1 in 4 publications, 1 in 9 patents in nano R&D domain, but nearly half of all M&As*



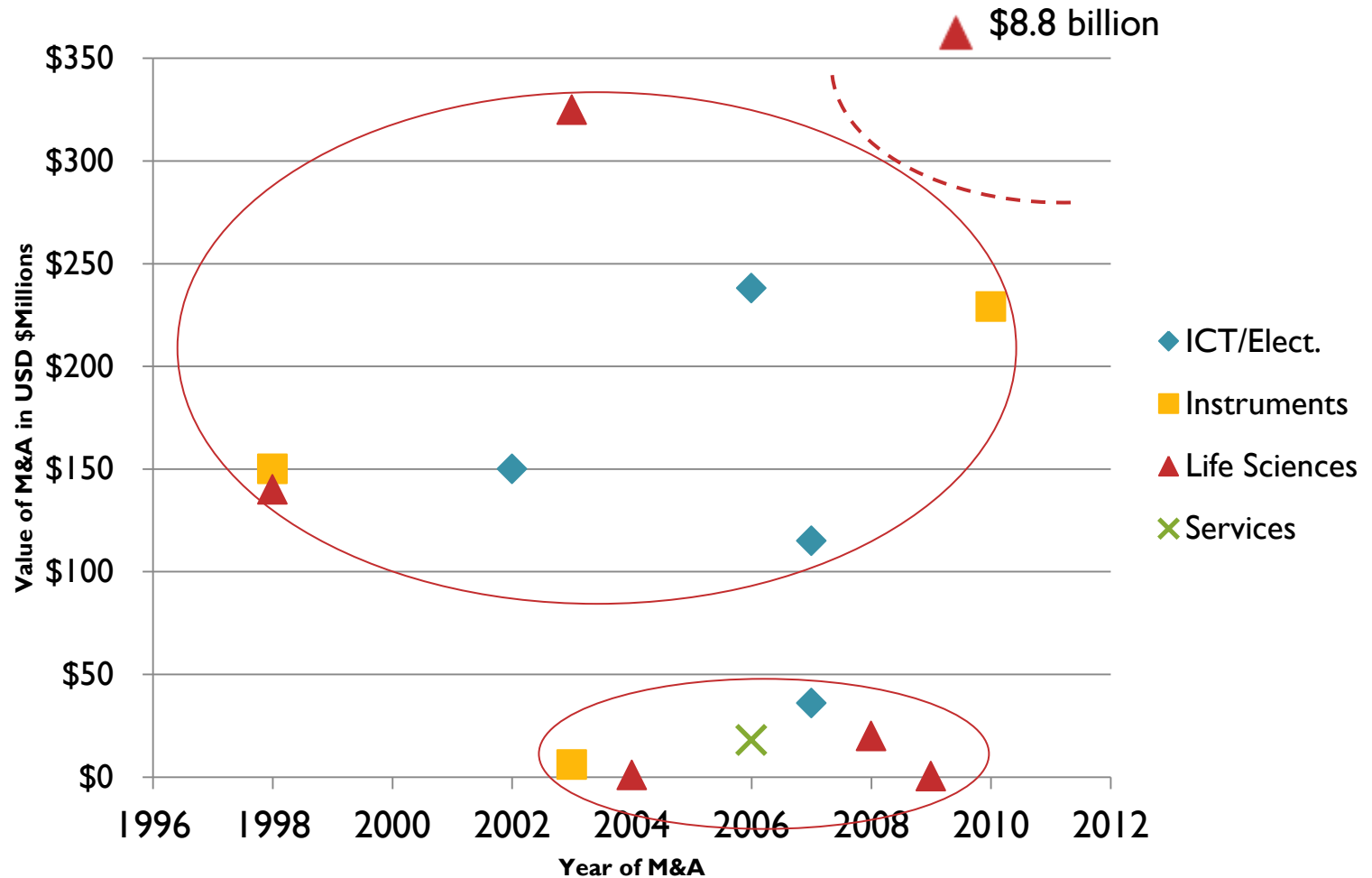
*but not as nano intensive:  
(% all pubs. in nano)*

- *Instruments: 73-75%*
- *Electronics: 8-80%*
- *Life Sciences: 8-24%*

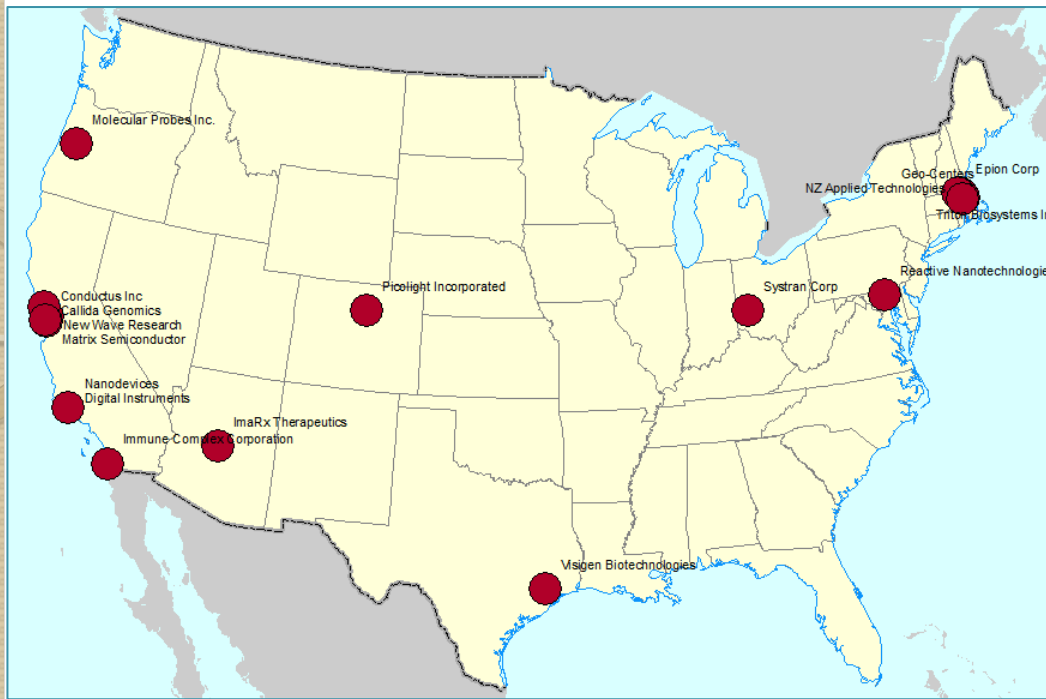


# Value of M&A (USD \$millions)

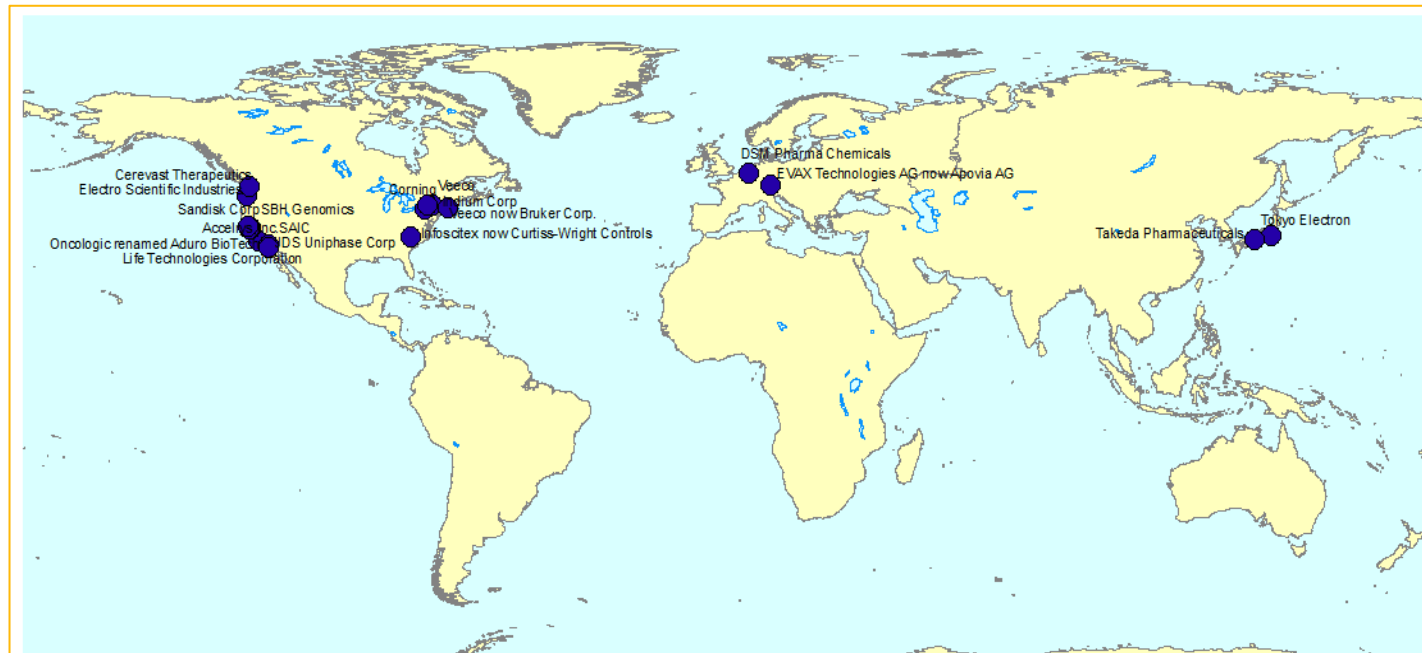
Smaller than average M&A (\$700 million in 2005\*)



\*Charles Schwab Corporation, 2012.

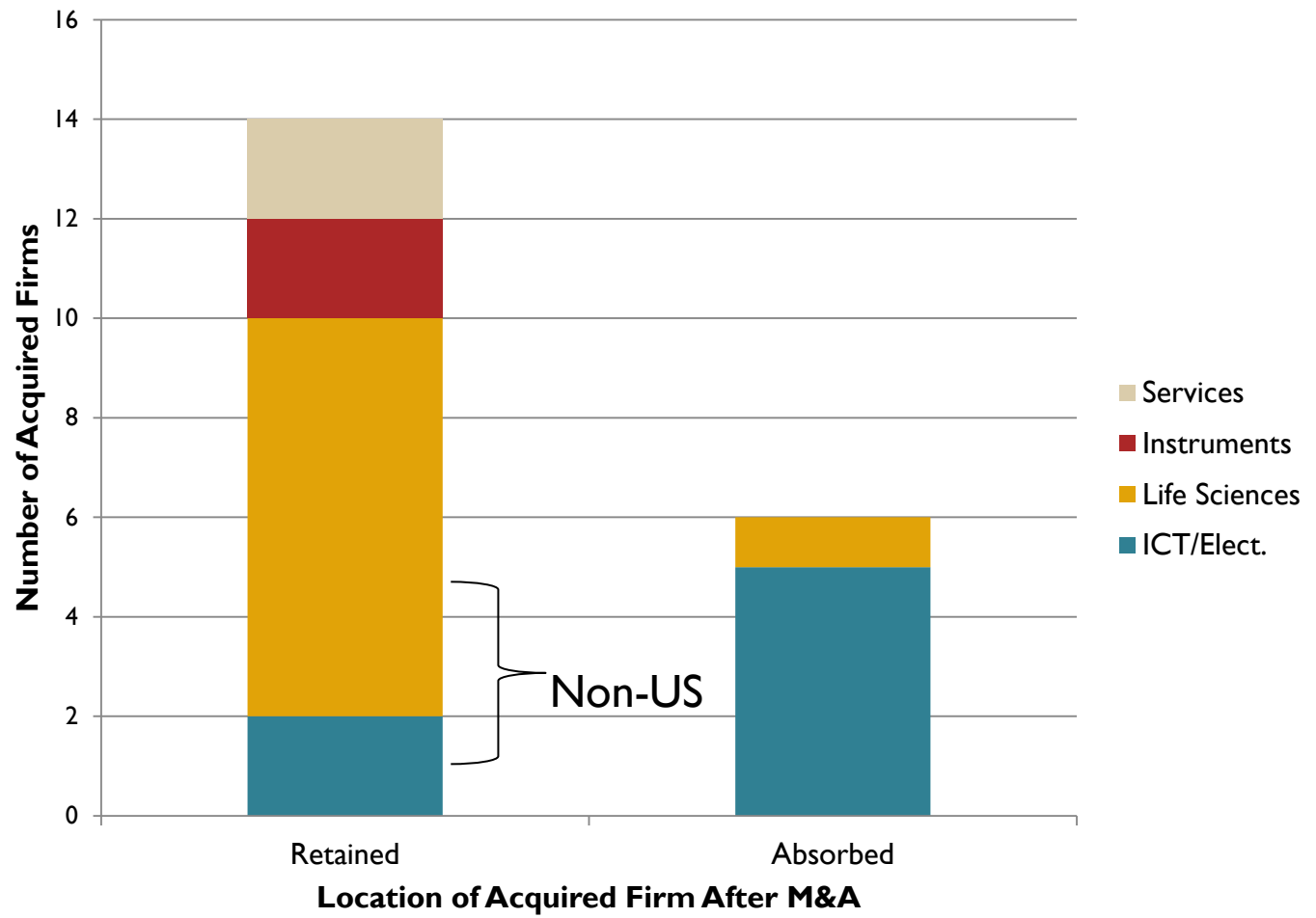


## Acquired Firms

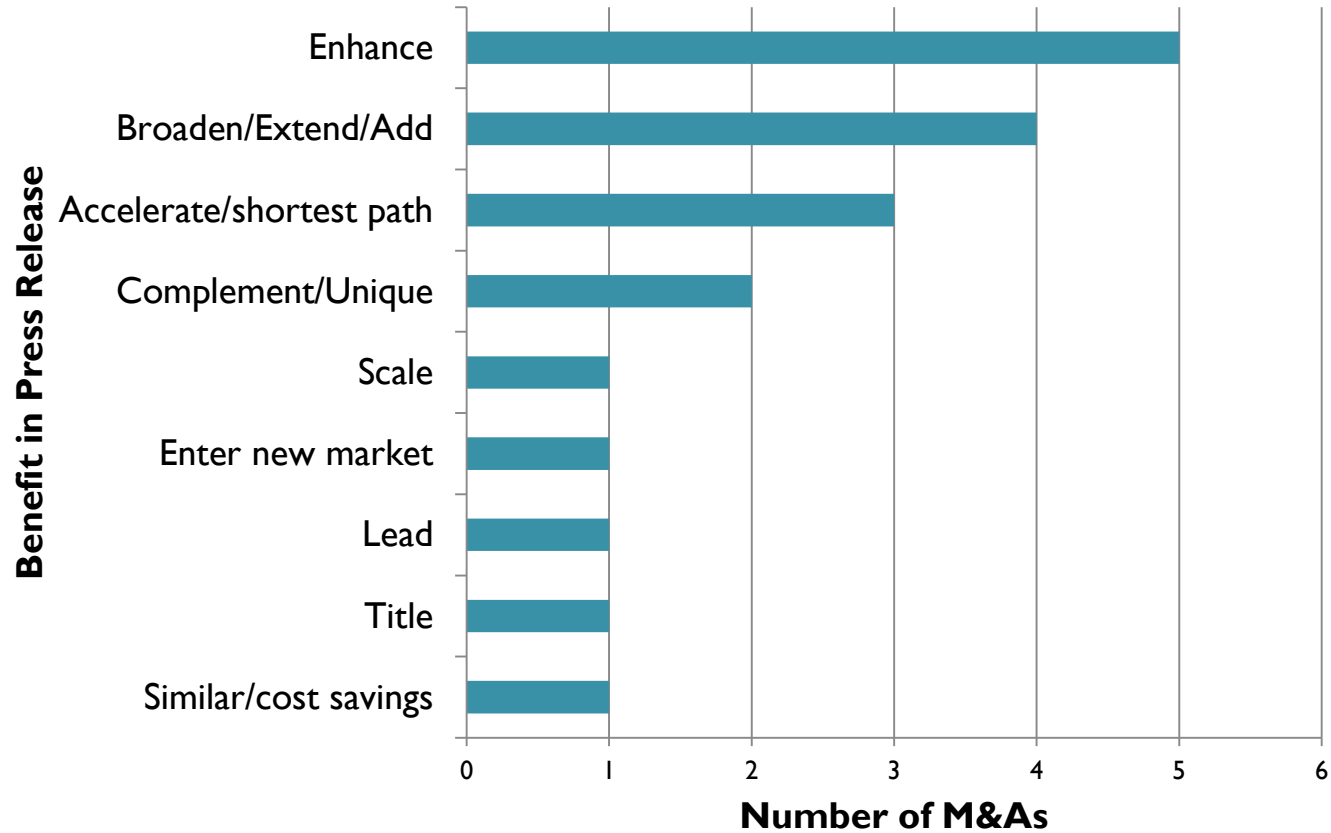


## Acquiring Firms

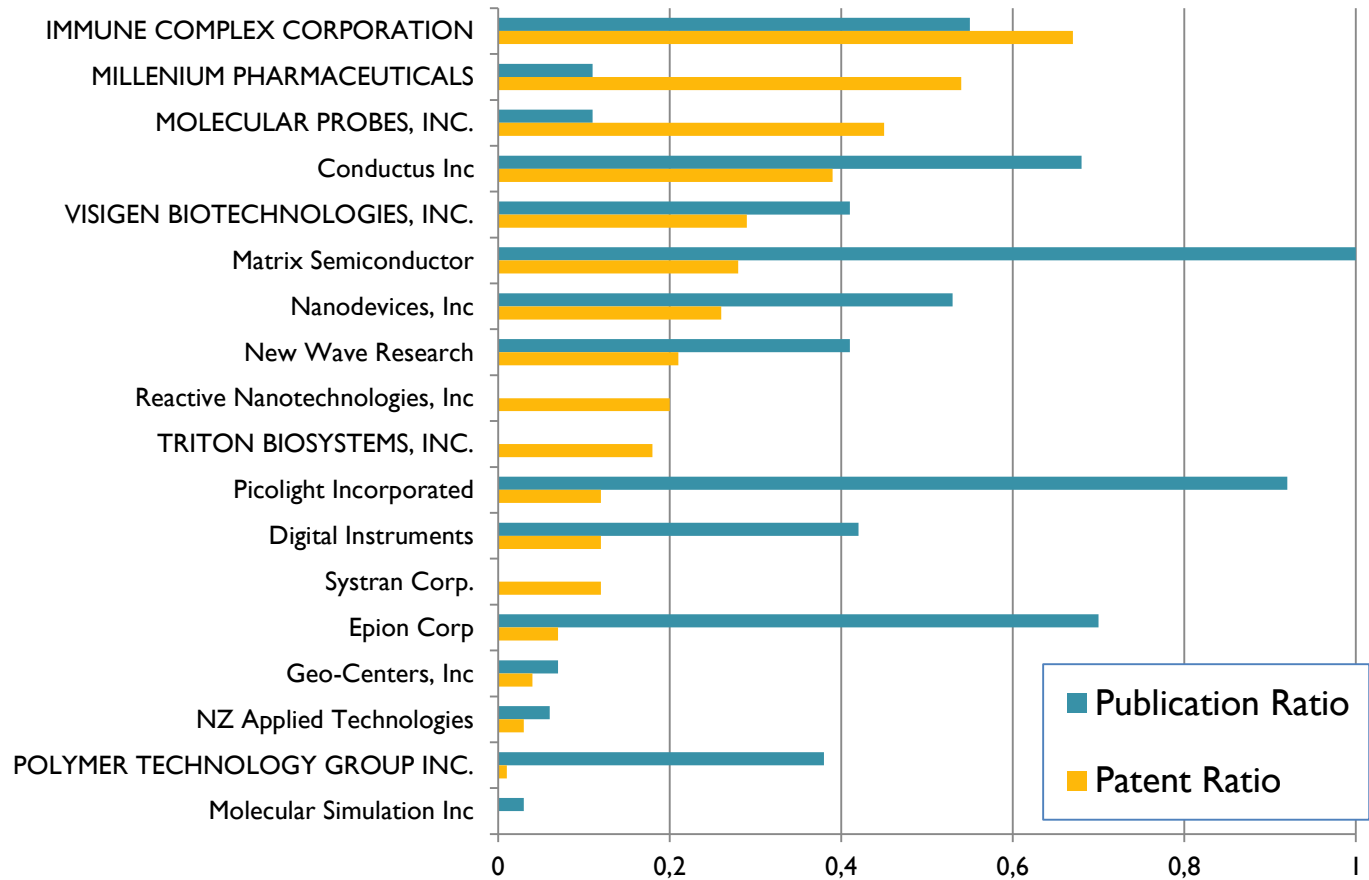
# Acquired Firm Geographic Location



# Complementarities/Similarities in M&A News Releases



# Complementarities greater in patents than publications



Median Publication Ratio = 0.40  
Median Patent Ratio = 0.19

# Summary

- SMEs account for rising share of nano corporate entry
  - SMEs may serve as innovation source for larger nano firms via M&A rather than excess capacity
- Acquired firms make distinctive contribution
  - Locational distinctiveness (except electronics/IT, which often need integration)
  - Patent portfolio complementarities
  - Benefits in enhancing, broadening, accelerating, complementing
- Future pathways – larger sample, less descriptive