Understanding Regional Innovative Capacity

Project Goal

"Understanding Regional Innovative Capacity" is a study of regional innovative capacity with a research team at George Mason University whose members are experts in regional economics, innovation policy, and graphical information systems. This study examines inter-regional variations in innovative capacity at different phases of the innovation process using state-of-the-art visualization techniques borrowed from critical infrastructure mapping work for the Department of Defense. This project aims to improve our understanding of how differences in regional innovativeness are connected with the ability to foster early stage technology development and will result in a method for identifying emerging technology regions and will. In examining patterns of regional innovative capacity via sophisticated mapping techniques ATP will gain a better understanding of the impact of its investment and of opportunities for more effective partnerships between public and private actors to build and sustain regional innovative capacity. This project may prove useful to other Federal programs and policymakers interested in learning new approaches to allocating firm-level technology development funding that can enhance nascent regional technological capabilities.

Motivation for the Research

Population, industrial production, and innovative activity all have a tendency to agglomerate. In and of itself, this fact is not particularly useful in the formation of policy. Formulating a *regional innovation policy* requires going further to seek answers to the following questions:

- Where an innovation-based economy does exist, how does government act (or refrain from acting) to support its continued growth? Where one does not exist, what can be done to encourage one to develop?
- How can policymakers identify contemporaneously emerging geographical regions of technological activity that would be particularly responsive to public support? What types of programs should local, state, and federal government fund? How much should the programs receive? How should their success be measured?

Innovation is not only concentrated in different regions, but it is also geographically specialized. Yet persuasive theoretical arguments and some empirical evidence suggest that specialized industry "clusters"—e.g. automobiles in Detroit, venture capital in Silicon Valley, biotechnology in the Boston metropolitan region, and carpets in North Carolina—generate sustained regional growth only if participants and institutional arrangements are flexible and capable of adaptation. For this, a certain degree of economic diversity is also necessary.

Formulating policies in support of such *regional clusters* requires going further to seek answers to the following questions:

- In an era when technologies, products, and services are increasingly developed upon shared platforms, with networks of research centers, suppliers, and customers linked in complex ways across industry boundaries, to what extent does regional specialization increase the likelihood of locally capturing the economic gains from globally generated innovations?
- To what extent are policies encouraging "clustering" effective at certain spatial scales or temporal stages in development, but not others?

Finally, few informed observers question that technology entrepreneurship requires a variety of complementary capabilities, and that barriers to entry in any capability may hurt the entrepreneurial "ecosystem" as a whole. Countries or regions with rigid regulatory structures for investment entities will find themselves disadvantaged way beyond what we would expect from a purely first order analysis. Formulating policies in support of such **technology** *entrepreneurship* requires going further to seek answer to the following questions:

- What are the critical links in a particular regional innovation network? What opportunities, if any, exist for partnerships between governmental bodies operating at different scales or in neighboring jurisdictions and various actors in the innovation system?
- To what extent should policy at different spatial scales be directed toward nurturing the development of particular region-specific, technological capabilities?

Effective policy formulation and program design require at minimum (1) accurate, current and comprehensible information regarding the characteristics of regional innovation systems over time, and (2) indicators that assist in understanding the potential complementarities of public policy and private incentives resulting in desired social outcomes.

Early Findings from Research to Understand Regional Innovative Capacity

1. On a national scale, ATP awards are concentrated geographically, reflecting the innovative capacity of particular regions (see Figure 1). From the consumer side, benefits of new technologies developed with ATP funding are distributed nationally and globally.

2. Not surprisingly, other "inputs" into technology based economic development are also concentrated geographically (such as patents.) The concentration is also evident from other programs such as the Small Business Innovation Research Program. Population, industrial production, and innovative activity all have a tendency to agglomerate. However, as compared with patents, for example, ATP awards do appear to be more concentrated geographically.

3. We can begin to identify emergent technology regions by looking at the rate of growth of technological capabilities. Doing so yields a much different—and more balanced—picture of the nation's technological capabilities, focusing on current momentum rather than past success (see Figure 2). Model building and application of statistical techniques will add further insights.

Project Team:
Philip Auerswald, George Mason University
Lewis Branscomb, Harvard University
Jerald Coughter, George Mason University
Sean Gorman, George Mason University
Rajendra Kulkarni, George Mason University
Laurie Schintler, George Mason University

Highlights from ATP's Economic Studies

Economic Assessment Office

Figure 1 is a map of the contiguous United States illustrating the distribution of companies that were awarded ATP grants by metropolitan statistical area, normalized by population. This approach highlights areas that have a large number of ATP awards in relation to their population. The same agglomerations on the East and West coast remain and are if anything more prominent. A second prominent agglomeration is seen in the area around Detroit, although Detroit itself is much smaller when population is controlled for. A few new areas appear including Austin, Tallahassee, Albany and Minneapolis.

Figure 1. Bar chart of the distribution of ATP funded companies (1990-present) per 100K population.
Data sources: Economic Assessment Office, Advanced Technology Program; U.S. Bureau of the Census (2000).

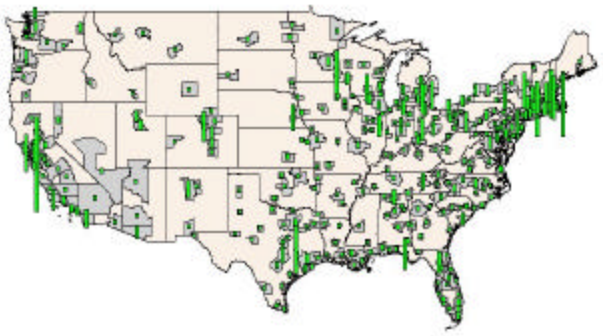
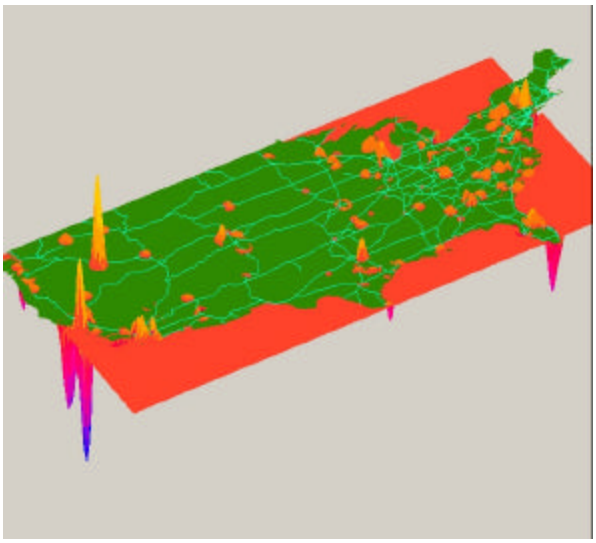


Figure 2 shows the difference between the spatial distribution of the nextgen patent clusters (defined as current patents that build on hot spots technology patents) between year 2002 and 1998. Again, positive peaks indicate the high levels of nextgen activity in 2002 compared to 1998 while the negative peaks indicate the opposite. Similar to the hotspot activity shown in Figure 20, parts of San Francisco Bay area and the Boise, ID show higher levels of nextgen patents in 2002 while much of southern Florida show negative levels. The Los Angeles area seems to have recovered in terms of nextgen activity compared to the hotspots in 2002. On the 13other hand parts of Texas (Houston), Northwest (Seattle) and much of the region comprising Bay area show negative activity. Smaller peaks in the the Northeast and Midwest show relatively moderate levels of positive nextgen activity.

Figure 2. 1998 and 2002 NextGeneration patents
Data sources: CHI Research Inc.



Factsheet 1.C6. (March 2005 by Connie Chang)