

Where will the world's primary centers of innovation be?

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Building an innovation nation

The global recession is commanding most of the attention of business executives and government leaders. But they should not lose sight of innovation: managers know that the future of their businesses depend on it, and government leaders understand that the long-term growth prospects of cities and nations are tied to it. Even—perhaps especially—in times of economic turbulence, innovation remains the most important differentiator separating economic winners from also-rans.

McKinsey has partnered with the World Economic Forum to create an “Innovation Heat Map,” by identifying factors that are common to successful innovation hubs. As part of this effort, we have examined the evolution of hundreds of such clusters around the world and analyzed over 700 variables, including those driving innovation (business environment, government and regulation, human capital, infrastructure, and local demand) along with proxies for innovation output (for example, economic value added, journal publications, patent applications) to identify trends among the success stories. In the process, we have found patterns that

suggest the critical ingredients required to grow, nurture, and sustain innovation hubs. At the same time, we have compiled thousands of data points that may be used to identify bottlenecks and benchmark the performance of cities, regions, and countries by measuring how they are evolving.

Creating a cluster: Of fundamentals and focus

Our analysis identified a set of fundamentals that are needed to establish a minimum infrastructure base. Criteria such as the quality of the physical infrastructure (for example, electrical, transportation, and telecommunications) and governance indicators (for instance, rule of law and government stability) are essential for a location to “earn the right to play.” Meeting this minimal threshold is an important prerequisite. Further improvements to this base, interestingly, are associated with only incremental growth in innovation capacity.

Once a base is established, innovation hubs must then develop a specific sector focus. Our analysis of the world's most successful

clusters shows that they have first established themselves as world-class players in an emerging specialty before expanding. This focus allows locations to concentrate limited resources, such as labor and capital, on developing competence and credibility. When successful, the result of these first two steps is the emergence of what we call an “innovation hot spring”: a small and fast-growing hub that relies on a small number of companies to establish itself as a relevant world player in a narrow sector. Our analysis indicates that these early innovation hubs have historically followed one of three primary paths.

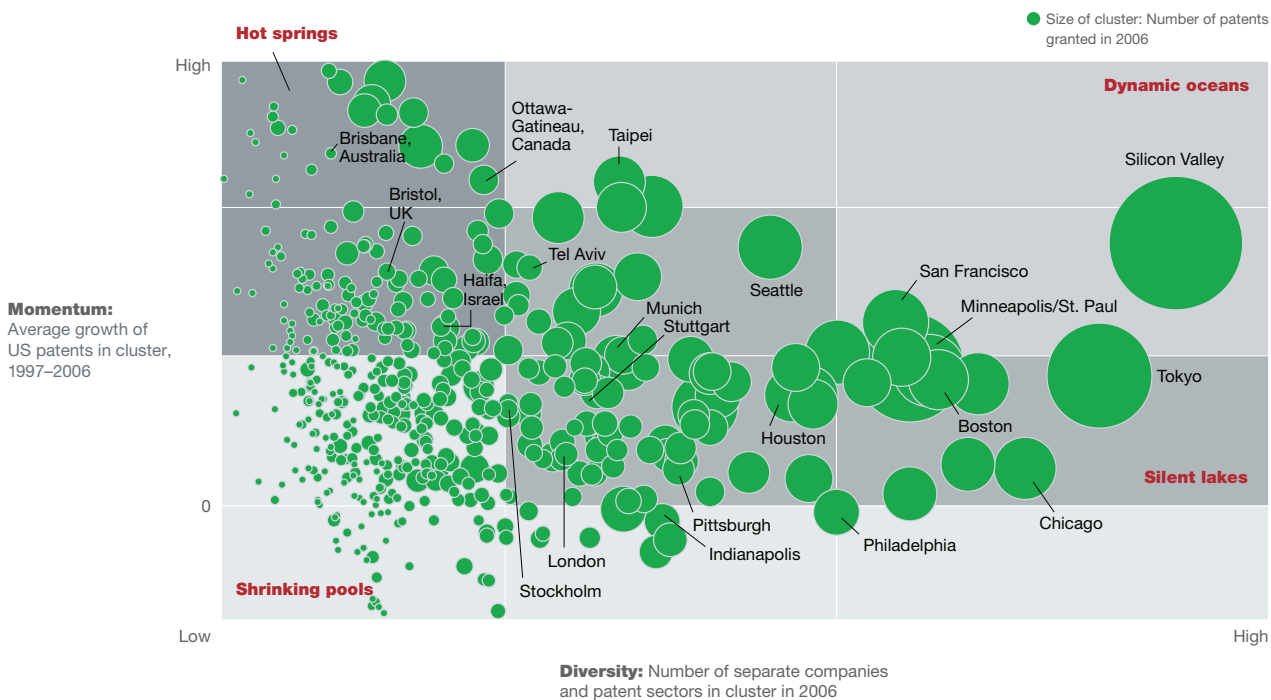
> **Heroic bets:** large, government-led, targeted investment efforts that focus on a specific promising sector and provide substantial initial support in the form of subsidies, tax holidays, and direct investments, to name a few. While this has been an attractive

option for many locations, it has historically been a challenging path: governments are often ill equipped to identify the right sectors, to define nondistorting incentive structures, and to ensure an effective path out of the initial support phase.

> **Irresistible deals:** regions that are able to attract established companies (often foreign players) who want to capitalize on a significant local advantage, such as low cost of qualified labor or access to large local markets. When done effectively, the location can build on this base to add greater value over time, moving, for example, from manufacturing to basic engineering to design and innovation. To be successful, regions need to create mechanisms that encourage the effective transfer of knowledge to the local ecosystem, as well as tools and processes to raise the skills of the local labor pool.

Mapping innovation clusters

Innovation clusters around the world can be classified based on their growth and diversity dynamics: ‘hot springs’ are small, fast-growing hubs on track to become world players; ‘dynamic oceans’ consist of large and vibrant ecosystems with continuous creation and destruction of new businesses; ‘silent lakes’ are older, slower-growing hubs with a narrow range of large established companies; ‘shrinking pools’ have been unable, so far, to expand beyond their start-up core and so find themselves slowly migrating down the value chain.



> **Knowledge oases:** locations with a critical mass of highly specialized talent (for instance, a large research university or government R&D lab). These hubs capitalize on breakthrough technical advances for commercial success. This path is less frequently successful, however. It requires that locations attract the capital and entrepreneurial skills needed to bridge the chasm between idea creation and commercialization.

While innovation clusters may grow quickly in the short term, only a small proportion of these promising hot springs stand the test of time. Most hit a ceiling of limited resources that severely constrains their growth.

Nurturing the cluster: Securing the talent base

Our work has shown that critical drivers of innovation vary from sector to sector. The local regulatory environment, for example, is a critical determinant for some sectors; for others, the availabil-

able to draw from a very large demographic pool, need to train a larger proportion of their population to reach world-class levels. They also must increase the attractiveness of their hubs to better compete for top global talent. While simply meeting basic infrastructure needs is sufficient to sustain initial growth, a region must establish itself as an attractive destination for global talent in order to establish itself as an innovation hub.

Sustaining the cluster: Sowing the seeds of reinvention

While focus is critical for emerging innovation hubs, as they mature, they need to broaden their portfolios of businesses and sectors. This diversification is vital to the long-term survival of an innovation hub—it allows the hub to survive the unavoidable downturns that affect specific sectors and provides the impetus for continuous reinvention. New innovators typically emerge in adjacent industries, or as hubs attract nonlocal players that want to capitalize on the local infrastructure and available talent. Our

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ity of venture capital or the presence of a demanding local customer base are key. However, the single common factor that drives—or, indeed, constrains—innovation across all sectors is the availability of a well-qualified and specialized talent pool. While a hub’s initial success can often be fueled by relying primarily on local talent, the importance of attracting, developing, and retaining a vibrant base of world-class talent increases as clusters mature and grow in complexity.

While the need for talent is the same all over the world, different locations are currently facing very different challenges. Japan and Western Europe must overcome a severe demographic challenge—their fast-aging populations and growing number of retirees need to be replaced or their labor efficiency further enhanced. North America is struggling with the challenge of replacing a large number of highly specialized immigrants who are now choosing to stay or return home. Emerging Asian economies, while

data indicates that, depending on the strategy, mature innovation clusters will evolve toward one of the following categories:

> **Dynamic oceans:** large and vibrant innovation ecosystems with continuous creation and destruction of new businesses. Leading innovators and primary sectors change organically as the hub frequently reinvents itself through significant breakthrough innovations.

> **Silent lakes:** slow-growing innovation ecosystems backed by a narrow range of very large established companies that operate in a handful of sectors. These clusters are frequently the source of a steady stream of “evolutionary” innovations and step-wise improvements.

> **Shrinking pools:** innovation hubs that are unable to broaden their areas of activity or increase their lists of innovators

and so find themselves slowly migrating down the value chain, as their narrow sector becomes less innovation driven and increasingly commoditized.

The data-driven methodology of the Innovation Heat Map sheds new light on the innovation process and allows for an objective

diagnosis of both innovation output and local bottlenecks. Going forward, we look to built upon this approach to evaluate conventional wisdom about the drivers of innovative environments and thus bring new perspectives to this vitally important topic. •

Another take



What's next in the knowledge economy?

Irving Wladawsky-Berger on knowledge creation. Think Venice and Florence in the transition from the Middle Ages to the Renaissance, or think London and New York in the transition from the agricultural age to the industrial one. Throughout history, certain cities and the regions around them have been the major centers of innovation in a variety of different fields, as a result of their unique accumulation of talent and wealth.

What we had then, and now, is largely the workings of *network effects*—that is, the more talented people you have in close proximity, the more their ideas and their work influence each other and stimulate them to innovate. While talent is necessary to becoming an innovation hub, you need wealth in order to support the talented people and bring their work to market. You also need an open culture that values a diversity of ideas and experiences. Eventually, these innovation network effects become formidable barriers to entry for competing regions.

Given the prominence of information technologies in the transition from the industrial to the knowledge age, over the last 30 years we have seen the rise of Silicon Valley and a few other technology-based innovation hubs, like Boston, built around the great engineering universities in their midst—think Stanford University, the University of California at Berkeley, and the Massachusetts Institute of Technology (MIT).

But something interesting is now happening. While information technology is very much the engine driving the knowledge age, the bulk of future innovation and ensuing economic growth is less likely to be driven by the technologies and products coming from labs than from their applications outside the laboratory. Activities that involve people, either as providers or consumers of services, will be particularly significant.

This means that the biggest opportunities for innovation, productivity, job creation, and economic growth can now be found as we apply the huge advances in IT, the Internet, and related technologies to address problems in the marketplace and society at large, in industry after industry, from health care to finance distribution, entertainment, and media. I believe that such IT-based marketplace and societal transformations are going to be the essence of the knowledge economy.

In principle, cities like London and New York—with strong talent bases and economic positions in key industries that IT is now transforming—should do quite well, if they welcome technology and engineering into the mix. And it may be Silicon Valley, the Boston area, and other key technology-based innovation hubs that have to play catch-up. While their open cultures and ability to generate a culture of opportunity will continue to attract talented people and investors from all over the world, they may need to become more *urban-like*—more complex and diverse in their cultural and industrial base—in order to capture the kinds of innovation that will be driving the most growth and societal benefit in the years ahead.

In other words, it may not be enough to build social networks of techies and entrepreneurs. The economic and cultural palette may need to be broader.

This essay comes from the personal blog of Irving Wladawsky-Berger, (irvingwb.typepad.com), chairman emeritus of the IBM Academy of Technology.