

The DNA of Innovation

Big ideas begin with fundamental new insights.

The spectacular success of Silicon Valley is a subject of fascination for people around the world. As University president, I have found this to be especially true for those from countries seeking to create a system of technology transfer from research institutions to the commercial sector. This fascination is not limited to one part of the globe—I am just as likely to be questioned about the Silicon Valley model by journalists from Italy, Korea, Qatar and Mexico as by those from the United States.

Stanford, with its historic role in the creation of Silicon Valley and its ongoing relationship with many Valley companies through our alumni and faculty, is often seen as possessing some “secret” of a successful mix of research capacity, teaching skills and a spirit of entrepreneurialism that breeds innovation fueling the Valley’s growth.

I was asked to reflect on this during a recent interview by a columnist for a Japanese business journal. What were the keys to Stanford’s role as a wellspring for Silicon Valley? How does the University support innovation?

Like most people, this journalist was implicitly linking the word “innovation” to the business sector and new products and technologies. And yet, according to the Oxford English Dictionary, that connection is a relatively recent one, introduced in 1939 in an article on business cycles by J. A. Schumpeter. The much earlier uses of the word in the 16th century refer broadly to the introduction of a novel approach or way of thinking.

This is perhaps the first point I make in discussing innovation and the University’s role: universities should not take a short-term focus that aims to deliver a “better mousetrap,” but rather focus on fundamentally new approaches to eliminating the problem of mice as pests. This point is eloquently made in the opening essay of Lewis Thomas’s *The Lives of a Cell*, in which he discusses the importance of basic research in conquering polio. He compares the efforts devoted to building iron lungs and similar therapeutic devices to alleviate polio symptoms to innovations from many years of work that led to Jonas Salk’s vaccine, which halted the scourge of polio. I still remember receiving the new

vaccine as a youngster to the great relief of my parents, who had grown up with the threat of polio outbreaks during the summer.

Thomas’s key point is that the research community should focus on the search for discontinuous innovations that represent a major step forward. This is the approach we have followed at Stanford, and it underscores the importance of research that seeks to discover fundamental new insights and apply those insights.

Of course, many universities would endorse the importance of taking the long view as the key to the most important innovations, so there must be more to Stanford’s success in this regard. Although there is no “secret sauce,” as some people call it, I would cite three key features that have been central to both Stanford’s spirit of innovation and its ability to maximize the impact of these innovations.

The first is people—a diverse mix of talents and approaches. While you need faculty with deep reservoirs of knowledge and broad experience, you also need young people who look at the world differently and ask surprising—sometimes even off-the-wall—questions. The insights that led to the search algorithm behind Google came from two young PhD candidates revisiting an old problem—searching libraries—and willing to look for a new approach.

The second requirement is an environment that promotes risk-taking and innovative thinking. To achieve truly great things, one must be willing to risk failure. Stanford is willing to sustain an environment where people undertake bold, if risky, endeavors. The key is not accepting risk for its own sake, but realizing that it is a natural byproduct of promoting innovation.

Finally, a university must be adept at transferring knowledge to organizations that have the ability to convert that knowledge into something with broader impact. If good ideas stagnate within university walls, there is less impetus, given the limited impact of the discovery, to try bold approaches. Such transfers of innovation happen through multiple routes: new companies, patent licensing, publication, and advisory roles to nonprofits or government agencies, among others. The key to successfully transferring bold innovations has always been people, and our faculty and graduates have become the carriers that spread many of Stanford’s most important breakthroughs.

Although these principles may be consistent with the entrepreneurial culture crucial to Silicon Valley’s phenomenal growth, they are central to the University’s excellence on a more basic level. They fuel a way of thinking that extends across boundaries and produces creative thinking and vibrant scholarship. Such thinking will be crucial if universities are to play major roles in finding solutions for society’s greatest challenges. ■

