

Excerpted from *Innovation Nation* by John Kao. Copyright © 2007 by John Kao.  
Reprinted by permission of Free Press, a Division of Simon & Schuster, Inc.

ONE

# BRINGING INNOVATION TO INNOVATION

**Do something. Do something to that, and then do something to that. Pretty soon you've got something.**

—Jasper Johns, painter

Not long ago, while prepping to deliver a speech at Google headquarters in Mountain View, California, I decided to eat the company's cooking and Google the word "innovation." Though I expected to see a lot of hits, I had no idea just how popular the word would be in the Googly universe of "all the world's information at your fingertips." Wham, the search came back—330 million references to innovation.

Those of you who, like me, constantly scan the new arrivals in the business section at your local bookseller may be aware of a similar phenomenon. Innovation—or at least the notion of innovation—is hot. The titles tell the story: *Open Innovation*, *The Art of Innovation*, *Fast Innovation*, *Customer-Driven Innovation*, *The Innovator's Dilemma*, *The Innovator's Solution*, *Dynamics of Innovation*, *Seeds of Innovation*, and so on. New titles appear nearly every month in an endless proliferation of arguments, a debate about innovation that is itself symptomatic of our core problem with innovation.

I'm not exaggerating when I say that the biggest obstacle to developing a national innovation agenda is not how many Ph.Ds or how much venture capital or how much wireless capacity we have. Rather, it's our level of knowledge about innovation that counts. And the ways we currently define it do not, for the most part, fit new global realities. Neither comprehensive nor specific enough, the plethora of definitions actually masks an underlying lack of consensus. In short, we know everything and nothing about innovation.

I know firsthand that there is confusion about innovation because I constantly receive calls from people—some quite nervous at first—who identify themselves as some version of a new “innovation process owner,” meaning they are in charge, somehow, of innovation in their organization. My first question is typically, “What do you mean by innovation?” The variety of responses I've received over the years would fill a very long list, but it would be as short in internal consistency as it is abundant in quantity.

Neither is experience a guarantee of expertise. When I teach senior executives about innovation, I sometimes use a slide showing a number of management terms scattered across a page. Innovation is among them, as are strategy, creativity, transformation, and leadership. I ask the executives to define innovation and describe how the various concepts relate to one another. Their responses are typically as scattered as the words projected on the screen. Is strategy part of innovation or innovation part of strategy? How far in the future should innovation initiatives be targeted? Is innovation about being creative or is creativity about being innovative?

I believe we are in what might be called a pre-Copernican period with regard to innovation. It's as if we don't yet know which heavenly bodies revolve around which others. We don't even know where all the planets are located, nor do we have a viable theory of planetary motion. We rely on metaphors and images to express an as yet imprecise and unsystematic understanding.

Little wonder that one of the first tasks I set in my teaching days was to ask my students to define innovation, prompting more than a few of them to mutter under their breaths about “semantic hell.” No matter. The importance of being as clear as possible about the journey on which you are embarking, whether as an inventor in your garage or a scientist in a federally funded lab, can scarcely be overstated. Your understanding shapes, in turn, how you measure innovation and what you decide to do about it. If innovation is equated with intellectual capital, you’ll count patents; if it’s an educated workforce, you’ll count Ph.D.s; if it’s infrastructure, you’ll count broadband networks and bits per second; if it’s culture, you’ll count pieces of public art and symphony orchestras.

Many of us assume that the tools and methods of innovation are mature, simply waiting to be deployed. The truth is otherwise; we have few if any mature standards for how to practice innovation and measure the effectiveness of our efforts, let alone for how to train people to become master practitioners.

In contrast, consider the mature discipline of accounting. The need for audits became necessary as organizations became more complex, and a management technology was developed in response. If you wanted to know where a company’s money came from and where it was deployed, you could find the answers by going to the accounting department, talking with the chief financial officer, looking at online financial data, consulting Generally Accepted Accounting Principles (GAAP), and scanning annual reports and 10Ks. But when it comes to innovation, most organizations lack anything like a comparable level of tangibility or management method.

What is more, there is an aura around innovation that clouds our perspective and often introduces an emotional component to the rational. Hmm, over in this corner is the sexy, expeditionary, wealth-generating, cool stuff, while over here is the structured, bureaucratic, legacy stuff. Which of these is more *moi*? We can safely assume that nobody wants to be known as un-innovative. But if innovation is seen as just another management mantra, another synonym for “good,” then the cause is lost. The truth of the matter is that innovation is hard work, and it has passed through many incarnations and many attempts to explain it over the years.

Probably, the most widely shared misconception about innovation is that it's all about science and high tech. The rise of microlending, one of the most powerful innovations in recent years, shatters that notion.

Economist Muhammad Yunus came up with the idea of micro-credit in 1974, after giving a woman in the village of Jobra, Bangladesh, \$27 from his own pocket to help her make bamboo furniture. Previously, women in a village like Jobra either had no access to capital or they had to pay usurious rates to local loan sharks. Realizing that poor women were actually excellent credit risks and that giving them small loans could transform an entire local economy, Yunus formed Grameen Bank in 1976 to institutionalize what he called microcredit. The bank has now loaned more than \$6 billion to more than 7 million borrowers, and Yunus took home a Nobel Peace Prize in 2006 in recognition of his innovative efforts.

Microlending is not the only social innovation of recent years. We can also cite the advent of impartial consumer testing of products, carpool lanes on busy highways, carbon-offset schemes, and a thousand other examples.

Nontechnological innovations abound in business as well. The classic example is Herb Kelleher and what he's accomplished at Southwest Airlines. Built on the simple idea of short-hop flights, no-frills service, and a clear, low-cost fare structure, Southwest has achieved phenomenal success and changed U.S. air travel in the process. Or how about John Bogle, who invented the index fund for individual investors and built the Vanguard Group of investment companies? Dov Charney proved with American Apparel that clothing could be manufactured in the United States by workers enjoying good wages and benefits. And what about W Hotels? Who would have thought a hotel chain could be hip?

These examples are not intended to discount the vital role of science and technology. Indeed, breakthrough technologies regularly set the stage for staggering waves of innovation. We're in the early stages of one of these transformations now that has been enabled by Internet-related technology. It is also easy to agree with analysts who reckon this century will see explosions of innovation, thanks especially to the revolutions in life sciences, nanotechnology, and clean technology. And there is an increasing amount of discussion on the innovation potential of our fast-evolving understanding of the brain and consciousness.

The point is not that technology isn't crucial—it is—but that we must think more broadly. My own definition of innovation is both integrative and aspirational. I define it as the ability of individuals, companies, and entire nations to continuously create their desired future. Innovation depends on harvesting knowledge from a range of disciplines besides science and technology, among them design, social science, and the arts. And it is exemplified by more than just products; services, experiences, and processes can be innovative as well. The work of entrepreneurs, scientists, and software geeks alike contributes to innovation. It is also about the middlemen who know how to realize value from ideas. Innovation flows from shifts in mind-set that can generate new business models, recognize new opportunities, and weave innovations throughout the fabric of society. It is about new ways of doing and seeing things as much as it is about the breakthrough idea.

Seen in this way, innovation is always in a state of evolution, with the nature of its practice evolving along with our ideas about the desired future. That is why innovation has meant different things at different periods in our nation's history, a state of flux that has made it difficult to fashion a consensus around any one meaning of innovation itself.

Version 1.0 of our national innovation capability, for instance, featured individual visionary inventors. Central casting gave us Benjamin Franklin and his kite, what we might call the artisanal model of innovation.

Geniuses in their workshops and garages, men like Thomas Edison and Henry Ford, later came up with inventions that inspired large-scale enterprises, ushering in version 2.0—the industrial model of innovation. Business requirements gave rise to mammoth, centralized corporate research groups that reached their zenith in such venerable institutions as Bell Labs, HP Labs, and the Xerox Palo Alto Research Center (PARC).

In the days before CEOs obsessed about shareholder value and financial metrics, some of these centers were true hotbeds of innovative R & D. Engineers and scientists were encouraged to follow their instincts, budgets were loosely scrutinized, and indulgent managers protected talented visionaries from cost-cutting bean counters. A story told of Bill Hewlett—who, along with Dave Packard, founded Hewlett-Packard—describes the creative atmosphere that once prevailed. Upon finding a locked storeroom at HP Labs, Hewlett is said to have returned with bolt cutters to destroy the lock. He wanted his engineers to be able to wander at will and make serendipitous discoveries, no authorization and voluminous forms needed.

In the public sector, the move to large-scale, organized innovation was expressed by the creation of the National Science Foundation, the National Institutes of Health, and other centralized edifices of government that provided national funding and administrative functions.

Version 3.0 deinstitutionalized innovation and featured the innovator-entrepreneur, financed by venture capital and devoted to the “just-in-time” organization. In this world, while corporate giant Xerox PARC developed the graphical user interface, upstart Apple Computer commercialized it. Big pharmaceutical companies got out of basic research, preferring to innovate by buying upstart biotech companies with valuable technology. In other words, it was innovation by merger and acquisition, not by R & D. And in another twist, Procter & Gamble, historically a bastion of proprietary knowledge, announced a plan to find the majority of its innovations from outside its corporate walls. More recently, Version 3.0 has seen the rise of entrepreneurial communities and open networks enabled by the Internet and new kinds of digital collaboration tools, such as Groove, MySpace, and the explosive expanse of social networking in all its forms.

Version 4.0, where we are today, is fast evolving—in beta, as techies are fond of saying. Many of the most important contributors to the process, however, reside outside the United States. Indeed, 4.0 is fundamentally about adapting to new innovation business models that may originate anywhere. It is driven by a global diffusion of innovation capability that has ended America's monopoly. For China, the key innovation model today may be a kind of brute force that comes from increasingly sophisticated massed minds working together. For Singapore, it is competitive specialization—for now in biotech, digital media, and environmental technology—as its vehicle to ride the rising tides of globalization. For India, it is building on the booming outsourcing industry. And oil-rich nations have a time-limited opportunity to buy into the game.

Countries everywhere are seeking their own sources of comparative advantage in the innovation landscape. And the logic of self-interest is clear. Robert Solow won the Nobel Prize in economics for, among other things, demonstrating that as much as 80 percent of GDP growth comes through the introduction of new technologies. And the Boston Consulting Group, in a study conducted for *BusinessWeek*, concluded that innovative companies achieved median profit margin growth of 3.4 percent as compared with 0.4 percent for the median S & P Global 1200. Furthermore their annualized stock returns of 14.3 percent were a full 3 percent better than the S & P 1200 over the same decade.

So innovation pays. As we struggle to get a fix on the ways in which our innovation processes must evolve in this rapidly globalizing world, experts are eager to step forward with a plethora of new ideas about the latest and greatest keys to innovation: S-curves, chasm crossing, customer-driven innovation, anthropological and design-driven approaches, and taxonomies of roles in the innovation process. Each concept has its merits, but one of my favorites was put forth by Clayton M. Christensen, a Harvard Business School professor, in his 1997 book, *The Innovator's Dilemma*. Christensen made a vital distinction between innovation that simply improves what is and innovation that defines what could be.

When management theorists started looking at innovation in the 1960s and '70s, they concentrated on the kind of stepwise product development best suited to an era of centralized, industrial, hierarchical business models. (You may recall that, when I started at Harvard Business School, I was told there was “nothing more to say” about innovation.) But upstarts began to challenge the incumbents with startling success. Two kids started Apple Computer. A Harvard dropout became the world's richest man. The iconic Xerox was nearly destroyed by Canon. A merchant from Bentonville, Arkansas, capitalized on the world's low-price infatuation and became its biggest retailer. And on and on. Clearly, more was at work here than nice, steady progression.

Innovation for improvement is a carefully limited and controlled kind of risk taking. Oreo sandwich cookies, for example, begat Oreo minis, which begat mint-flavored Oreos, which begat limited-edition white fudge-covered Oreos, Easter Oreos, Halloween Oreos, and so on. There are currently forty Oreo brand extensions on the market, including Oreo piecrust and ice-cream cones. If the incremental approach doesn't work, no problem. We'll simply adjust it.

There's nothing wrong with incremental innovation. In fact, it's essential for ordinary progress: Semiconductors get faster every year; medications become more effective; cars become more stylish and, is hoped, more fuel efficient; government makes itself more efficient (or not).

Game-changing innovation, however, requires one to assume a far higher level of risk. You really don't know how things are going to turn out, so all those linear, predictive models just don't apply. Forget the Oreo, let's launch a personal music device called a Walkman, or let's transform the computer industry by making computers personal, or let's make it possible for people to sell their stuff online. This is the sort of change I will be focusing on, because the mastery of disruptive innovation on a national scale is required to revitalize America's innovation capability.

China, India, Singapore, and the European Union (EU) will all ramp up their own models to benefit from their particular comparative advantages. It is my proposal that the United States specialize in a more comprehensive, transformational style of innovation, one that allows for placing big bets on the future, deploying its enormous resources, carrying out ambitious and mold-breaking experiments, reinventing the way we educate our young, aligning our federal, state, and local agendas, and recharging the magnetism of openness and opportunity that has historically attracted the world's talent to our shores.

By adopting this innovative approach to innovation, I believe the United States can step up to a revitalized national idea. What would it be like as a nation to be able to continuously innovate in service of ambitious, compelling, world-changing goals? We are not speaking of the pedestrian innovation described in business textbooks—a way to maximize return on investment, prime the product pipeline, or squeeze a little more performance out of R & D. No, I envision a concentrated application of our vast resources to innovate on a huge scale for human benefit. In short, I want America to be in the wicked problems business.

Various pundits have proposed a global priority list of wicked problems, including climate change, environmental degradation, communicable diseases, education, water quality, poverty, population migration, and energy sufficiency. Such wicked problems also hold the keys to making the most consequential breakthroughs of the twenty-first century. They interest me because they become opportunities when flipped on their heads. Innovation applied to a wicked problem can realize an enormous amount of social and economic value by setting new commercial standards, creating new businesses, and generating new sources of value. For a country that aspires to become an Innovation Nation, the search for opportunities to do good and still do well will allow it to exercise its innovation muscle.

The term “wicked problem” isn’t new—although I have a different take on it. In 1973, the journal *Policy Sciences* published an article entitled “Dilemmas in a General Theory of Planning.” Its authors, Horst W. J. Rittel and Melvin M. Weber, two scholars from the University of California, Berkeley, sought to describe planning problems—building a highway through the middle of a city, for example—that involved social issues so complex as to be virtually unsolvable. “At best,” they wrote, the problems “are only re-solved—over and over again.”

The wicked problems of our time rarely have clear-cut solutions that can be unlocked by a single discipline. They are complex and ambiguous. Issues such as climate change, health care, and national security are, at once, political and psychological, financial and technological. They require breakthrough business models and new ways of thinking about how to change the status quo. Above all, they require integrative approaches that blend necessary perspectives into a new way of doing the actual work of innovation.

But this is hard work without a road map. Every effort to find a solution to a wicked problem can trigger obdurate opposition from vested interests with different perspectives. You say the sheer weight of development is destroying the world supply of clean water? It's appalling, yes, but are we really willing to pay the political and economic price of water conservation? How do we define, let alone agree on, the relevant issues and measures? Are builders willing to halt expansion, farmers to limit crops, industries to cut emissions, politicians to alienate campaign donors—all to cope with someone else's creeping desert or toxic swamp?

The common answer, or so the political record suggests, is neither a flat yes or no, but something on the order of a shrug of maybe. The problem is just too big, too amorphous—just too wicked.

In contrast, we are accustomed to dealing with tame problems, ones that are easily defined and have clear boundaries that lend themselves to orderly, linear thinking. Buying a car, for instance, is relatively straightforward. We know we need a new car because the old one is wearing out. So we comparison shop, analyze the variables involved, narrow our choices, and make a decision. In short, we begin by defining the dilemma and then proceed in a straight line through a statement of options, the winnowing of possibilities, and the selection of the optimum product. *Voilà*, closure!

There's nothing simple about a wicked problem. In fact, just working on it may change its nature or make other wicked problems even worse. Finding an economical way to extract oil from shale, for instance, might reduce America's energy dependency and power the world for another century—but at the cost of new eruptions of greenhouse gases and potentially faster climate change. It's not even possible to say for sure that a wicked problem has been solved. How can we know for certain that we've won the so-called global war on terrorism or achieved a satisfactory level of health in society?

Or take the development of new disease-busting drugs. A variety of stakeholders populate the field. Some are entrenched in established business models—call them big pharma or national laboratories. Others are the insurgents—call them venture-backed start-ups. Patient groups, academics, policy think tanks, advocacy groups, and an entire ecosystem of other industry stakeholders also must be considered, because all have a vested interest in the outcome—whether it be economic, political, or social—and anyone can throw a wrench into the works by raising objections in a public forum or by getting legislators involved. The latter is almost a given because, like myriad issues in our society these days, the question of drug discovery has, unfortunately, become highly politicized. It is hard to see how the system for drug discovery can ever be improved when the possibility of creating consensus seems elusive at best.

The energy agenda is emerging as a key wicked problem of this generation. We may not be able to say why certain forms of energy are “alternative” or certain technologies “clean.” But that has not stopped the challenge from rising to the top of the pile, as seen in calls for an agency modeled along the lines of the Defense Advanced Research Projects Agency (DARPA) and the rise of venture capital investment in green technologies. The bellwether *New York Times* columnist Thomas Friedman has even gone so far as to call green the “new red, white, and blue,” redefining environmentalism in terms of patriotic self-interest. If our national energies are redirected toward green and clean technology, the logic goes, our global image will be overhauled, our economy will get an enormous boost, and the planet will get a critically needed clean-up.

However, global civil society has difficulty getting traction on such wicked problems because it lacks the wherewithal to bring together the diverse group of stakeholders from various disciplines that is needed to forge even a partial solution. To have a chance of success, we will need new approaches that blend facilitation and collaboration processes, new kinds of places, technology, tools, knowledge management practices, and more into a different way of working. It is not an overstatement to say that much of what follows in this book is a national toolbox for tackling wicked problems.

In succeeding chapters, I'll take you on a tour of innovation hot spots around the world to find emerging best practices. It will be a look at what might be called the new geography of innovation and the requisite new tools for innovation on a national scale. First, though, let's examine the troubling erosion of our innovation capacity at home.