Judy Estrin (MS ’77 EE) is well known in Silicon Valley and business circles as an innovator and entrepreneur, having founded multiple companies in the data networking field and having served as the CTO of networking giant Cisco Systems and on the board of directors of The Walt Disney Company and FedEx Corporation. At Stanford, she studied with then-Professor and Internet pioneer Vint Cerf.

In a new book, Closing the Innovation Gap, she takes a look at the big picture of innovation in the United States and is worried by what she sees. A short-term focus, both in business and culture in general, combined with misguided policy and leadership have undermined the long-term investments needed to produce the foundation for future innovations, she says.

Below she talks about the inspiration for the book, how the innovation gap came to be, and what can be done.

**Chapter two of your book starts right out with Stanford-inspired metaphor.**

I am an avid Dish walker. I have done some of my best thinking about the book, and bouncing ideas off of people walking the Stanford Dish. People tend to only think about innovation in terms of something that becomes a product or service on the market. I use the concept of an Innovation Ecosystem to explain the broader context of innovation. Research is such a fundamental part. If you don’t have the furthering of understanding or the training of students, you don’t have the discoveries or talent critical to development of new products or services. Those people and companies that apply new medicines, or new technology, are also a critical part of that ecosystem.

**So, continuing on that sort of ecosystem/natural world metaphor, would you say that innovation in the Valley is extinct? Endangered? Threatened?**

I would say that it’s not extinct, but in the Valley and in the country it is disturbed. In that section on The Dish, I describe the fire that wiped out part of the ecosystem last year, and how through nourishment, it came back. I feel like we’ve had a fire in the ecosystem in the Valley. People want to point to all of the innovation around us and have tendency to say, “Look, Judy, just because your historic industry, i.e. the networking industry, has matured, that doesn’t mean that there’s not a lot of innovation going on.” Here is the problem: We have an innovation deficit in that we are reaping the benefits of seeds that we planted years ago, but we’re not planting the seeds at the same rate now. The Internet, the Web—that research began 30 to 40 years ago. It’s the same thing when you think about the discovery of DNA or the transistor. We stopped investing in the same way in the ’70s and ’80s, in the amount of research that goes to academia and the allocation of those funds changed. Now more goes toward smaller grants with demonstrable milestones, and less goes for long-term funding for the high-risk, high-return type of research. The Bayh-Dole Act, which was intended to free up intellectual property to allow it to flow out into the world, has in many cases backfired, causing some universities to look at patents and licensing as revenue opportunities, which could have a tendency to force shorter term research. The culture tends to be that anything that is not instantly applicable is a waste, which is just not true. Basic science just comes to fruition in a timeframe that people are not used to thinking about.

The same way an ecosystem needs to be in balance to sustain life, the innovation ecosystem needs to be in balance between the different time horizons and the different communities. We’ve become too short-term focused. If you look at government investment in research in the ’80’s through 2000 time frame, it was skewed. It was very good for life sciences, good for IT, but not enough funds went to engineering, physical sciences, or environmental sciences, and if you look today at the problems we have, rebuilding the country’s infrastructure, climate change, alternative energy, what do we need? We continue to need new breakthroughs in healthcare, but we also need physical sciences, environmental sciences, and engineers, and yet, 20 years ago, we weren’t investing. If you are not investing in research, not only do you not get the ideas and discoveries from the research community, but you’re not attracting students into those fields because it’s too hard to get funding in those fields.

**If you look at the venture/entrepreneurial ecosystem, it’s broken. After the bubble burst, for the most part, the VC community became much more risk-averse. You go to them for money and they want more data, more validation of the market. As a result, the longer-term, higher-risk projects have a harder time getting funded. The one exception to that, I think, is in clean tech. I just hope they have the patience to see it through.**

The environmental factors that impact the innovation ecosystem are leadership, funding, policy, education, and culture. Nationally we’ve had a problem with leadership that has not respected science, has not inspired the country to participate in solving the challenges we face. We’ve had a problem...
with funding, because so much money has gone to the war. Research and education, which are the two cornerstones of what we need to be investing in for innovation, come out of discretionary funds that have not come through. Many of our policies such as immigration have created disincentives for innovation. Legislation like Sarbanes-Oxley put in more rigid controls that don’t necessarily help to the degree that they want. Meanwhile, we’re not doing enough to update our education system, and, frankly, our culture has become extremely short-term focused, with everyone wanting instant gratification. It almost seems like there is a trend toward anti-science, anti-intellectualism, being smart works against you – which will hurt the country.

If you look back at the middle of the century, when we had some major challenges like Sputnik, the country’s leadership used the threat to challenge the nation. More important even than putting a man on the moon was what it did to rally the country and the citizens and kids, inspiring someone like Sally Ride, who then went on to be an inspirational leader in her own right. Over the last eight years we have been led through fear which closes the mind and stifles innovation. We need leadership who will use the challenges we face to bring out the leadership in each of us and to change the psyche of the country.

What inspired you to write the book? One hypothesis might be that it’s an election year.

I was reasonably apolitical going into the writing of this book. I was very concerned about Silicon Valley and the business community, which was the world I lived in. For 25 years I was so focused on building companies and raising my son, that I was pretty naïve about what was going on overall in the country. I started writing the book because I was so concerned about the short-term focus that I saw around me in Silicon Valley and the business world, and it happened to coincide with my son being in high school and starting to think about college. That made me think about the world that he was about to go into.

The parts of the book that apply to business were already pretty much in my head, because I had been giving presentations about innovation. The parts of the book that I really needed to expand my horizons in order to write were the chapters that focus on the national ecosystem and our education and culture. I really hadn’t spent much time thinking about those things, and so through over 100 interviews, reading, and research, my perspective changed about how bad things had gotten, and what we needed. I had never really thought about how much of an impact who was in the White House could have on things like the culture of innovation, until looking at the past eight years and what kind of impact it’s had on innovation and on science overall.

You also talked about the ‘70s and the ‘80s so it seems like there’s been a decay that’s not entirely in the last eight years.

There are three historical chapters in the book. One of them is called Inspirational Innovation, that talks about the ‘50s and the ‘60s; one of them is called Narrowing Horizons, that talks about the ‘70s and ‘80s, and then one of them is called Losing Our Balance, which talks about since 2000.

In the ‘50s and ‘60s, everything was nicely aligned for short- and long-term innovation. In the ‘70s and ’80s start-ups were thriving, but the horizons in the research community and large corporations started to narrow; they became more short-term focused. The environmental factors were positive from a VC perspective, and Silicon Valley was thriving, but some of the things that were happening from a national leadership perspective, such as the Mansfield Amendment, or trends in research funding had an impact. Then, once you get to the late ‘90s we started to follow the money, and became more and more short-term focused as we accelerated out of control into the bubble. People stopped focusing on building companies and started focusing on quick turns and business models that made no sense. After 2000, the bubble burst; that, combined with the reaction to the corporate scandals, and the tragedy of 9/11, created an environment that just completely undermined the ecosystem.

What do we need to do to fix it? We have to look at our challenges not as things to be afraid of, but as opportunities to rally the nation to solve. We need to re-look at our commitment to funding research and updating our education system. These are big, hard problems, and we have to realize that it’s going to take a lot of time to solve them. We have to stop looking for just band-aid solutions. We need more cooperation between government, business, non-profit and academia, and the right type of collaboration. I am talking about real collaboration between the experts in these different segments, to look at how we make the necessary trade-offs and compromises, and who funds what. You can’t just look to government to solve these problems, but government has to be involved. I interviewed some people who said, “Judy, the market will take care of it. It’s all cyclic.” And I just don’t believe that. I believe that you can’t leave this up to government to solve, solely. But the markets have become so short-term focused you need government and nonprofits involved.

Tell us about your experience as a participant in this ecosystem.

I grew up in an academic world. Most of my career was as an entrepreneur. But in parallel with that, I’ve been on the board of Fed Ex since 1989 and Disney since 1998, and for two years I worked as CTO at Cisco when the company bought one of my companies. So, I have experienced innovation in all three of those segments (academia, entrepreneurship, and large companies), which I think is what caused me to want to look at innovation more broadly.

My companies were involved in helping create the networking industry, but the environment was there to help that to happen. When we first started Bridge Communications, it was the type of risk that today would probably have a hard time getting funded. I wrote this book partly because it is clear that unless we start making changes, our kids won’t have the same environment to innovate in that I was able to. These things are going to take a long time to actually fix. We’re going to be in real trouble.

The innovation gap is the difference between where we are today and where we were, and where we are today and where we should be. Let’s learn the lessons of America, because I think we have a very unique culture. We have a unique set of circumstances that have allowed us to lead in innovation. I use this analogy called root rot, where the tree is beautiful, everything looks wonderful, but all of a sudden it dies. The roots have been sick for awhile, but you don’t know about it. And these problems of slow decay are the worst type, because human nature leads us to not pay attention to them. So the whole idea of writing the book was to try to escalate the dialogue around the issue. Try to identify that there’s not just one answer, but there’s a set of complex things going on here, much like a biological ecosystem, that all interrelate.

Everybody can have an impact, through helping make your organization more innovative or through working with non-profits on problems we face. As parents or mentors you can influence the next generation of innovators and as voters we all have a say. Just thinking about the impact of your decisions on the Innovation Ecosystem and not just what is right for today but also how your actions will influence future generations, is a start.