MISD Literature Unit 8.4—Reflective Inquiry—Linking Text
THEME: To thrive often requires creativity and innovation.

Closing the Innovation Gap: Reigniting the spark of creativity in a global economy

By Judy Estrin October/November 2008

Short-term thinking and fear of risk are jeopardizing America's future, says the author of an important new book that offers solutions to revive national prosperity in the global economy

Say the word Pixar and what comes to mind? Kids of all ages think of *Toy Story, A Bug's Life, Monsters, Inc., Finding Nemo, The Incredibles, Cars* and *Ratatouille*. All of these films create magical worlds in which toys, bugs, monsters, fish, superheroes, and cars come to life, and a rat can become a gourmet chef. Even after my son was too old to want to go to the theater with me, I eagerly awaited the release of each new Pixar film—not only to watch what great story would unfold, but also to see how the company's brilliant animators pushed technology to make their onscreen characters even more engaging. At Pixar, the technology inspires the art and the art challenges the technology. It's a two-way street.

I remember my first visit to Pixar headquarters in Emeryville, California, when Disney was in the process of acquiring the company. The lobby opens into a giant atrium surrounded by conference rooms, gaming spaces, and a cafeteria, inviting employees to play, meet, eat, and create. Scooters and skateboards are used to zip around the building, encouraging people to get out of their offices and move around. The openness of the building immediately conveys the openness of the environment.

Behind Pixar's incredible creative and financial success is leadership that has a deep understanding of the importance and process of innovation. Launched with $10 million by Ed Catmull and John Lasseter in 1986, the company was sold to Disney for over $7 billion in 2006. Catmull is now the president of Disney and Pixar Animation Studios.

The genesis of the company was an example of innovation at work. What is now Pixar began in 1979 when George Lucas, of Star Wars fame, set up a group to explore new techniques for digital printing and audio and video editing. He hired Catmull, a leading researcher in computer graphics, who has always had a passion for filmmaking. After several years, they agreed to set up the group as an independent company. Following months of discussions with venture capitalists and corporate partners that led nowhere, they finally negotiated a deal with Apple founder Steve Jobs, who was attracted by the talent of the team. Their passion was to make full-length computer-generated animated films. But recognizing that neither the technology nor the market was ready, they sold advanced imaging systems to medical-imaging firms, government agencies, and other movie studios, including Disney. Never giving up on their long-term vision, a small group led by Lasseter developed animated short films that helped drive the technolgists and incubated what would eventually become Pixar's main business.

From 1986 to 1991, Pixar went through several variations of its business strategy. "We were grasping for a workable model. We sold the hardware business and started to sell software. Then we started making TV commercials," Catmull recalls. "Throughout, we struggled. Steve stuck with us as we were losing money. Then Disney gave us the opportunity to do a feature film."

Appendix #2b1

If the team had been less passionate and tenacious, there would be no *Toy Story* or *Cars*. If the company had been backed by typical venture capitalists instead of a visionary entrepreneur like Jobs, it would never have survived its various transitions. Although he is not usually thought of as a patient personality, Jobs provided patient capital for the company. He trusted the smart people on the team, recognizing that their attempts to create various business models were not fatal failures, but steps toward success. When Disney approached Pixar in 1991 to work together on a set of 3D computer-animated feature films, the company and its technology were ready.

How has the company managed to always stay out ahead of the competition, each film amazing audiences more than the one before? Part of the answer is that the technology organization is always working on three time horizons simultaneously. Pixar developers who are dedicated to the next film in the lineup work side by side with the directors, writers, and animators to apply and extend the current technology. Other developers work on the next generation of animation tools so that the characters and environments in future films are even more real—enabling water to flow, shiny cars to reflect light, and fur to look soft to the touch.

Pixar's internal culture encourages creativity through questioning, openness, and a healthy attitude toward failure. Self assessment is ongoing—not only when there's a problem, but also when things seem to be working well. Everyone is encouraged to comment on one another's work.

THE BASIC INGREDIENTS

Sustainable innovation does not happen in a vacuum. It is not just a flash of brilliance from a lone scientist, nor is it simply the result of a group going offsite to brainstorm and play team-building games. People often overestimate the aha! factor in the invention process. That process starts with creating the right kind of environment. "The rare thing is not coming up with ideas. It is creating that soup where lots of people are coming up with ideas, and having a system that translates them into something effective," says Danny Hillis, a former Disney imagineer and cofounder of Applied Minds, an R&D consulting firm that calls itself the "little Big Idea company." The soup starts with some common ingredients, a set of human attitudes and beliefs that are so critical that I call them the five core values of innovation: questioning, risk taking, openness, patience and trust.

If pushed to an extreme, any one of these values can actually stifle innovation. Trust without questioning is blind. Too much patience can create an environment in which nothing happens. Risk-taking must be tempered by questioning so that it does not become reckless. Questioning without trust can become merely judgmental. When all five values are in balance, they work together to create the capacity for change that enables innovation to thrive.

Questioning

Innovators naturally ask why or how something works, or if something can be done in a new way. This curiosity is encouraged by giving them room to explore. "My folks would be at home working on technology whether I paid them or not," says Miley Ainsworth, IT director for FedEx Labs. "They have a natural hunger for new stuff. Technology happens to be their job, but it's also their hobby."

In the early days of the ARPANET—the predecessor of the internet—the focus of development was on creating network that would allow computers in disparate geographical locations to communicate. But Bob Metcalfe, then at Xerox, became curious about the data being exchanged between computers in

the same building, which had been nicknamed "incestuous traffic." Out of this curiosity came the development of Ethernet, the foundation of local area networks that enable individuals to share information with their coworkers, friends, and family.

David Culler, a computer science professor at UC Berkeley, describes this kind of inquisitiveness as "stubbing my toe on the same spot often enough that I say, 'What is this?' Then I look down and find that what I'm tripping on is just the tip of a very big rock below the surface."

The way that leaders ask questions affects motivation and behavior, setting the tone for the whole organization. Questions can be inquisitive or judgmentaL They can convey interest or impatience. Asking, "Why did you…?" conveys judgment, not trust. Similar information can be gleaned by asking, "Can you explain…?" The types of questions that are critical to managing an ongoing project—"When will this be done? What are the milestones to measure progress or success?"—can also suppress new ideas. Research projects often consist of a set of open-ended questions or hypotheses that are being investigated without a clear outcome or end date. That doesn't mean that you shouldn't ask what the researchers are working on and how they plan to move forward. Leaders also need to be open to being questioned by others and themselves.

As we mature, we're more prone to take situations as givens and forget to question the status quo or ourselves. With more to lose, we may be less willing to take risks. The same thing can happen as companies, industries and fields of science mature and innovation becomes more incremental. But just as midlife can be viewed as a time of positive change, mature companies, industries, and scientists should continue to question their assumptions and pursue bold, broad-ranging innovation. Change may be more difficult at that stage, but curiosity and assessment should not stop with age or growth.

Risk

Failure is an inherent part of innovation. "When you start a project, you don't know enough about the competition or the customer needs. You haven't developed the best ideas or the best technology," says Curtis Carlson, CEO of SRI International, an independent nonprofit R&D organization. "So it's the nature of the game that in the beginning, most of what you're going to do is going to be a failure."

Trust

People need to trust that they will not be labeled as career flops if they have done their jobs well and understand why their ideas or projects did not succeed. Failures should not be personalized unless they result from poor execution or lack of effort. Aim for accountability without finger-pointing and blame.

Openness

Innovation requires an open mind and an atmosphere that encourages people to imagine, think broadly, collaborate, capture serendipity and have the freedom to create. Curiosity needs to be coupled with the ability to critically evaluate data, accept input, and be ready to adapt to change. Lack of imagination kills many a project. At Zilog in the late 1970s, we developed a networked computer system that was years ahead of its time, nearly the equivalent of a PC running Microsoft Word. We demonstrated one of these machines to the management of Exxon, Zilog's main investor. Exxon, however, had also poured millions of dollars into typewriter companies that were developing dedicated word processors.

Appendix #2b3

Our group had a vision of the future, but Exxon's management couldn't imagine why anyone would want a general-purpose personal computer. As my former boss, Joe Kennedy, recalls, "They had already invested in these typewriters that they were calling word processors and said, 'Why do we need another one?' If Exxon had taken the time to understand what we had, Zilog could have beaten both Microsoft and Apple to market." Instead, Exxon passed, and many Zilog employees left to start their own companies.

There's a natural tension between openness and focus in all areas of innovation, especially in the development of products or programs. It's possible to be too open, always changing direction or specifIcations so that nothing gets done. But too much focus can overly constrain innovators. At the beginning of a project, when you are looking at needs, framing questions, and coming up with ideas, you want to encourage broad thinking and experimentation. Once a specifIc path has been agreed upon, it's time to execute and not constantly reformulate the solution or add "just one more" feature.

Patience

Patience is a mandatory condition if innovation is to thrive, and it doesn't have to be a passive process. Innovators need to be comfortable with abiding ambiguity for a time instead of jumping on the first idea or solution that comes along. They also require active patience: the tenacity to overcome technical obstacles and to champion their bold new ideas in the face of disbelief.

Because of the persistence of Genentech's scientists, a drug called Avastin received FDA approval for treatment of colorectal cancer in 2004—15 years after the initial research began. You can have patience and still do business with a sense of urgency. If a new technology requires a major change in infrastructure, the time and money that will be needed for it to become pervasive are substantially increased. "The automobile remains a plaything until you have a highway system. The telephone system didn't work unless we strung a million miles of wires," says former HP Labs director Joel Birnbaum. In such cases, it is particularly important to spend the time up front on research and experimentation so that the infrastructure is built around solutions that are right for the long term.

Leaders and financial backers need to have the patience to let ideas ripen. If they sense impatience, employees either will not take the time to try something new or will take the quickest path rather than the best. Projects and companies that might have produced great products and profits can be shut down as a result of lack of patient capital As a company leader or financial backer, you must trust your people and the innovation process. Only with this foundation will employees and executives allow themselves to be vulnerable, take risks and have the freedom to create. When trust erodes, horizons get pulled in as innovative potential is sacrificed to meet demonstrable milestones.

http://www.innovation-america.org/archive.php?articleID=466

Appendix #2b4