Introduction

A couple months ago in a business magazine I was reading, this headline caught my attention: “A hero for the information age.” The lead paragraph was the following: “an emerging nation looks increasingly confident as a player on the world stage, thanks to a mixture of commercial prowess and deft diplomacy. In its capital and in coastal cities, you can feel the excitement as small manufacturers, retailers and middlemen find new partners across the sea. But the country’s masters face a dilemma: the very technology, communications and knowhow that are boosting national fortunes also threaten to undermine the old power structure.” Oh, I thought, just another article on China, its communist power structure, and so on, and I almost went on to other things. But I read a bit more. It wasn’t about China at all. It was an article on Tudor England, and the year was 1523. The hero was a man named William Tyndale who arrived in London with an innovative idea for changing the basic relationship of ordinary people and the written word.

William was actually poorly equipped to be an entrepreneur, much less a revolutionary entrepreneur. He was at root an idealistic scholar, but his linguistic gifts were astounding and his driving passion was to produce a version of the Old and New Testaments that, as he put it, even “the boy that driveth the plough” could understand and appreciate.

The problem was this put him in the middle of high religious politics and the struggle between church and state. It threatened the hegemony of the church. And King Henry VIII as well. Ultimately, Tyndale sought refuge on the continent. He ended up in Antwerp where he completed his work, but also met his demise when he was betrayed by a secret agent of King Henry. He was strangled and burned at the stake. But his Bible was published a year later and was a decisive influence on the King James version of the Bible. All in all it is an intriguing story but I only wish to use it today as a launching point for a better understanding of what innovation, technology and entrepreneurship are all about; how they relate to one another.
The Basics - Technology

At the root of economic change and progress is technology. What exactly is “technology.” The word has become so bastardized that these days it is little more than a synonym for computers or computer-like things. But the actual definition is the literal one: “know-how,” or the practical application of knowledge.

So technology is more ubiquitous than P.C.s or even cell phones and the internet. In that little scenario of five hundred years ago Tyndale’s dream, his passion, was built on two technologies: linguistics and the movable type printing press. Linguistics was an ever evolving body of knowledge. Language itself is as old as man, the know-how, however, to render the arcane and esoteric language of the Holy Scriptures into something meaningful to ordinary English folk was a wonderful technology.

The other technology was movable type and its incorporation in the innovation of a printing press was at that point little more than 50 years old. That, by the way, is about the same age of the great innovation of our day - the Internet.

The Basics - Innovation

I just mentioned the printing press is an innovation. But again what is “innovation.” Innovation, like “technology,” is a much overused and misused term. In the media we mostly hear about innovations that are novel physical objects, that is, things. But innovation actually covers a much broader range of outputs from human ingenuity. In particular, many of the most revolutionary innovations are process innovations. Process innovations are wonderful drivers of economic change and growth. A few examples: Nucor Steel revolutionized the U.S. steel industry with a process innovation that allowed it to make high quality sheet metal steel from scrap iron. FedEx innovation in information technology and its hub and spoke network out of Memphis, TN revolutionized overnight letter and package delivery. Dell, with its marketing approach of selling computers direct to the consumer, went from a standing start to number one in the P.C. world. Nucor was a fabrication process innovation, FedEx a logistics process innovation and Dell was a marketing process innovation.

But what exactly is innovation? It is more than creativity. It is more than mere novelty and it is certainly more even that mere invention of “things.” Innovation is best thought of as “problem solving.” It means using technology, perhaps new technology, but more often old technology to find a new, better, cheaper or
faster way; to meet a need more effectively than ever before. The passion of innovators is very simply: “There’s gotta’ be a better way."

The Basics - Entrepreneurship

The third piece of the scenario of economic growth is Entrepreneurship. Entrepreneurship, very simply, means making marketplace reality out of innovation. It’s all well and good to have a new and better way to meet a need, but if nobody makes use of it, it was just an interesting exercise.

Ken Iverson, the CEO of Nucor, could hardly be viewed as a typical entrepreneur. But he had the one essential ingredient of entrepreneurship: a willingness to take calculated risk. He also was a genuine innovator in employee training, compensation and management. Most important, he had a keen eye for external innovations and what they could mean to his business.

In 1986 Ken Iverson was 61 years old and had over 20 years experience in running the steel operations of the company that had become Nucor in 1972. He was aware of the innovative Continuous Strip Production (CSP) process for casting the slabs of steel that had been developed by the SMS Company in Germany. CSP had been uniformly rejected by traditional steel companies. Iverson bet his company that he could make it work. They did that, and within 10 years became one of the top 3 U.S. steel makers. CSP was a disruptive technology in the true sense. The innovative production process that was based on that technology changed the economics of steel making.

Michael Dell is a classic entrepreneur. His eye for innovation was in marketing. His idea of selling computers by direct marketing was spurned by all the entrenched P.C. manufacturers and resellers. But it catapulted Dell Computer to a number one market position in less than a decade. Dell of course was also assiduous in pursuit of low cost operations, but it was the margin obtained by not having distributors in the marketing chain that made the big difference.

Radical innovations based on disruptive technologies, coupled with entrepreneurship, thus allowed breakthrough success in industries as diverse as steel and computers. In hindsight it all seems so simple, but is it really?
If innovation is about using technology to meet challenges in novel ways and entrepreneurship is about assuming the risk to make a business of innovation, it is worth our while to look a bit more closely at the nature of those challenges and risks. The risks the entrepreneur takes on are three: technological risk, market risk, and money (Economic Risk).

Technological risk means very simply, will it work? The technology involved, as I have said, may be brand new or it may be old. It's important to appreciate that either way the technology is known. If it is old technology it has been used in some way. Even if the technology is new it has at least been proven in the laboratory. In 1986 the “new” CSP technology had been demonstrated in SMS’s laboratory for several years. And there was nothing new about the chips and other devices that went into a Dell Computer.

The technological risk is will it still work when scaled up or used in a new environment? This is not hypothetical. The CSP technology in fact worked so poorly in Nucor’s first plant that there was a tragic accident that cost one life, several injuries and evoked OSHA investigation. Dell Computer’s new market approach was at first rejected by consumers, and fought bitterly by traditional competitors.

"Will it work?" It is the entrepreneur who bets that it will.

Market Risk, however, is by far the greatest challenge to the entrepreneur. Market Risk, more plainly put, is the risk of Creating Demand. The fact that an innovation is faster, less costly or simply more attractive does not mean that people will buy it.

At the root of this dilemma is that innovations require change in habits, changes in the way we do things. Changing the way we do things is tough. It requires education: Educating potential customers - as to why they should change.

There is no more powerful illustration of this than the integrated circuit. Fairchild and Texas Instruments filed patents on integrated circuits in 1958-59. Three years later there was still no commercial market for chips. In 1961, however, President John Kennedy announced the famous “man on the moon” goal and that single stroke generated some market pull for integrated circuits. The government remained the sole market for IC’s until 1964 and the principal one as late as 1968. Still it took a leap of entrepreneurship for Gordon Moore, Bob Noyce and their colleagues to found Intel. Their initial idea was to use integrated circuits as memory devices for computers. But educating computer designers -- who at that point were still using ferrite magnetic cores as the principal computer memory technology -- required prodigious effort. Intel
not only had to produce design tools to help engineers use the new memory device, they had to send design specialists to sit with their customers. Intel went so far as to build a computer, a forerunner if you will of the P.C., and give it to design groups to demonstrate the effective use of integrated circuit memories.

The ways we try to educate people are:

   a) Brute force one-on-one [Intel]
   
   b) “Try it, you’ll like it” [Intel]
   
   c) Demonstration [SMS and CSP]
   
   d) reference sell [The Boehm Porcelain story]

No matter what combination of these things you try - and entrepreneurs typically try them all - they all take time and money. Underestimating the time and money required is the most common entrepreneurial failing. The time to market acceptance is always longer than we think and as a consequence the money required is greater. Money, then, is the third and most crucial risk facing the entrepreneur.

Money Risk

The money required in the typical entrepreneurial endeavor is, at best, underestimated by a factor of two. That risk is there because of the uncertainty of the education process that I've mentioned. We try “educating” the prospective buyer by explanation, references, demonstrations and/or free trials. But behind all that is the fact that the entrepreneur is an unknown stranger who in some way speaks to us in unknown terms, a strange language if you will. There are generally a few pioneers who will try anything new and different. But bridging the gap between those pioneers and general market acceptance is an uncertain process.

So entrepreneurship requires not just courage, but dogged determination and persistence as well.
Leadership and Innovation

If Technology, Innovation and Entrepreneurship are the basic building blocks of a solid, consistently improving business, the question becomes how do we foster and nurture those things. What is the role of the leader? The average life of companies on the Fortune 500 list is less than 50 years. Is this inevitable? It is not, and the degree to which it is not is dependent on its leaders understanding that innovators are made, not born. Your first reaction to that statement may well be that simply isn’t true. You think of “celebrity innovators” from Thomas Edison to Steve Jobs - historical anecdotal evidence certainly leans toward “born innovators.”

Obviously there are those people who have a great natural talent for creative problem solving, for innovation. There are also those who have a great natural talent for golf or tennis or crossword puzzles. But if the world of golf was limited to those few individuals that would be a sorry state of affairs indeed. And so it is with innovation. The leader’s task is to see that everyone has the opportunity to exercise innovation to the degree that they can. It may be an improved minor administrative task, it may be a new method of performing some operation, or it may be a new and revolutionary product or service. But if the organization environment is conducive to innovation, then the best innovators will be attracted to it.

Innovation results from caring curiosity and that attribute flourishes in a setting which recognizes and fosters it. People become more skilled at recognizing needs and once given a chance to meet a need in an innovative way they become more skilled, both in recognizing opportunities and in fashioning innovations.

Leadership and Entrepreneurship

Entrepreneurs, unlike innovators, are more born than made. Their characteristics of not only accepting but embracing risk is a difficult trait to develop in an adult whose basic personality traits are long since embedded. On the other hand, what can be done is to provide an environment that encourages latent entrepreneurs and provide them skills that will help assure their success.

Most business organizations fail to do that. Businesses can be characterized as a set of “routines,” ways of doing things, and implicitly as well as explicitly there is an enormous force of conformance on the people who carry out those routines. And in today’s world, management guidelines, not to mention headlines, are increasingly about assessing and managing financial risk and the dire consequences of poor performance of
that task. Certainly poor judgment, and even more the lack of strong ethical values, lead ultimately to bad outcomes. But the true task of business leadership nonetheless is to encourage and assist those who have the ability to turn innovation into marketplace reality.

I had the great good fortune to work for one of the 20th century’s best business leaders, William C. Norris, and to assist him in shaping and leading an entrepreneurial information technology company, Control Data Corporation. Control Data itself grew from a start up company with $600,000 in initial capitalization to a multi-billion dollar leader in information services and computers. Over the course of some twenty years more than 100 companies were spun out of Control Data and the entrepreneurs who led those companies came from within it. To some degree that was a result of Control Data’s rapid growth that pushed managers and executives to the limit of their abilities and provided them great opportunity to learn a broad spectrum of business skills.

More important were explicit company strategies that provided horizon expanding experiences. The first of these was technological collaboration with other companies including competitors. “Collaborate to Compete” was a company by-word. We worked with others to develop new technologies which then would be used by each collaborator on their own distinct product or services. This gave our people a window on technological possibilities that simply isn’t possible within the walls of a single company.

The concept of collaboration grew and was extended to public-private partnerships. Examples were collaborative agreements with the governments of countries as diverse as Russia, Canada, Hungary and Iran, to develop and build products and services in those countries. This provided another whole set of management learning experiences. Beyond that, however, were collaborative projects in the U.S. at local, state and national levels to improve education, create jobs and newly skilled workers and to address the economic problems of minorities.

There were other policies aimed at helping the would-be employee entrepreneurs. We put in place the Employee Entrepreneurial Advisory Office (EEAO). Any employee could go to this office - which consisted of one senior executive by the way - any employee could go on a totally confidential basis and assistance from outside and inside the company would be provided to help the employee put together a business plan. These would-be entrepreneurs when faced with the reality of a start up, especially the reality of getting financing, most often decided it wasn’t their thing. In the first three years of its existence some 600
employees went to EEAO. Sixty-one new businesses were started. (This business count is in addition to the spin-offs that I mentioned earlier.)

So entrepreneurship can be nurtured by providing the opportunity to learn business skills, perspective on needs and one-on-one coaching and assistance. Leaders make that happen.

**Close**

In summary, then, improvement in quality of life and in economic betterment for people rests on this tightly connected and interwoven hierarchy. Upon a foundation in the growth of knowledge and scientific understanding there is built an ever-increasing fund of applied science or technology. Using technology new and old, the innovator devises new and more effective ways to meet the vast array of human needs from energy and food to creative arts and entertainment. It is the entrepreneur who has the ability, persistence and courage to face risk, overcome failure and make innovation a part of our everyday lives. The pivotal roles in this process are the innovators whose guiding mantra is: “There’s gotta’ be a better way” - and the entrepreneur who makes reality out of wishful thinking. Innovation and entrepreneurship are so tightly interwoven, that frequently innovation and entrepreneurship are embodied in the same person. But that does not have to be: The Eye for Innovation has two meanings. One is the eye for, the ability to conceive of a new way to utilize technologies to meet needs. The other is the ability to see innovations that have real world economic potential. Leadership is about forging an environment in which those wonderful things can happen.