I. Introduction

My wonderful colleague, Janet Bercovitz, and I have shared the exploration of "strategy" a lot of years. We can, and she no doubt has, shared with you many definitions of the word. But perhaps a little story will tell it best.

[story]

You who are in this room today have a vital interest in understanding strategy as something that can bring you not only economic reward, but more important for the enormous satisfaction that comes from winning. I wish I could give you a magic formula for assuring that satisfaction for yourself. I can't. But in the next few minutes I want to give you a way of thinking about strategy, that with diligence will be helpful to that end. Strategy is not a prescription or a set of rules. It is a way of thinking and above all it is a way of contrarian thinking. Like all the great generals of history it involves the ability to visit the unexpected on your competitors. But it is nevertheless rooted in fundamentals. Those fundamentals are, not surprisingly, straightforward, practical and common sense.

They are also as long lasting as the great pyramids of Egypt. Here is the strategy pyramid.

[powerpoint slide]
The foundation, the base of the success pyramid, is technology. Since technology is the foundation it is essential that we know what it means. What is technology? What is the definition of technology? (pause) Technology is know-how. It is manifested in artifacts - bits and bytes, designs, processes, chemicals, formula - but technology rests in the minds of people. So technology is inseparable from people and the minds of people.

From know-how we fashion innovations, the next block of the success pyramid. Innovation can best be defined as "problem solving." Innovation is solving the problem of meeting some need in a novel, and competitively superior way. So the first step toward success is to engender an organization that has innovation as its fundamental value and belief. How to do that? I'll come to that shortly.

Given an innovation organization, the question then becomes, how to use that capability. That is strategy. Strategy is, then, also problem solving. Strategy is mustering the innovative and financial resources necessary to achieve a goal, and in the case of those of us in business it is the goal of meeting an economic need better than others who are attempting to do the same - or said more succinctly, in a competitively superior way.

That, then, leads us to the pinnacle of the pyramid - success.
II. The Basics of Building an Innovative Organization

But the idea that growth through innovation depends on home runs such as Seymour Cray's supercomputer in 1966, or more recently e-bay and Google, permeates strategic thinking. I call this the "savior syndrome." In sports we are very familiar with the idea. The NFL and NBA drafts are yearly reminders that there is a constant search for players who can "make the franchise."

So is the answer likewise for those of us in business to comb the world for Seymour Crays or Pierre Omidyars who can solve our innovation dilemma and deliver growth through breakthrough ideas? Unfortunately the savior solution to growth through innovation will prove inadequate to 21st Century competitiveness. There must be a better answer than some kind of annual "Innovator Draft."

[PAUSE]

Some others think along yet different lines: perhaps there is formula, a set of rules which we can learn and apply to our top line challenge. After all that has worked for cost and quality. The torrent of advice on innovation is evidence in and of itself that there is a vigorous search for (and thus an enormous market for) simplistic solutions to corporate innovation. Google the word "innovation" and you will be told there are 349,000,000 sites. In this galactic array surely there is an algorithmic answer. Sadly it seems improbable. As for the current cost-cutting competitiveness formula - outsourcing - the very idea of outsourcing top line growth seems oxymoronic. Yet strangely there is a deeply ingrained strategic belief in top line growth through "outsourcing," and even more
strange, in spite of all the statistics to the contrary, a belief that it actually works. But of course we don’t call it outsourcing. We call it “acquisition.” There are many statistics on the failures of mergers and acquisitions, but one will suffice for my discussion here.

Seventy per cent of acquisitions fail to achieve revenue expectations and that doesn’t even consider whether they are accretive or dilutive to earnings per share.

How can it be that rational executives pursue a strategic path that seven out of ten times has been shown to fail. Actually you can easily see what brings this about. Consider an enterprise with $10B in revenue that desires to grow by a modest 10%. That’s $100M per year. Assume that the company’s organic growth due to demographic and/or economic constraints is limited to 5% per year. Where to find the other $50M?

The temptingly easy answer is simply to acquire it. This is especially so in a corporate culture where innovation, and thus internal growth, is not a dominant characteristic.

[PAUSE]

So what to do about this terrible dilemma: cost-cutting anorexia leads ultimately to starvation, the search for savior innovators and blockbuster products or services makes the search for needles in haystacks seem easy by comparison. And finally, relying on acquisitions, something which is going to fail us 70% of the time, is to say the least unappealing.

Finding an Answer - Embedding Innovation
The answer to this dilemma is at our fingertips, or perhaps better said right before our eyes.

In order to see that, it is first important to have a crystal clear and practical definition of "Innovation" and "Technology,” two words which have become almost meaningless in their overuse and misuse.

First, what is "technology?" Technology is know how. Whether technology is bits or bytes or formulas or designs, it is inseparable from people and the minds of people. The first step of the solution, then is to cast off the mystical aura of the word “technology” and revert to its true meaning — know how.

And what about Innovation? What visions spring to mind? The novel, the esoteric, even the exotic.

Wrong! Innovation is gut wrenching and down to earth. Because innovation is problem-solving.

It is the ability to see a need and to think creatively how that need might be met in a better way. That is, we apply know-how, maybe old know-how, perhaps new know-how, in novel ways to solve the problem of a finding a better means to meet a need. All of a sudden innovation is a fact of life for everyone. The long term answer to robust top line growth is to foster innovation within the enterprise. Not just in some laboratory or skunk works, but throughout, top to bottom, in every nook and cranny.
This is the first principle of the strategic management of innovation: Innovators are Made Not Born.

Certainly some of us are more creative, some have unusual skill at problem solving. But the key is to nurture and hone that skill in everyone. Innovation depends on the motivation and the working environment of the individual beings who call themselves engineers, or administrators, technologists, or managers, individuals who are more than mere mechanical participants in the organized human behavior we call a business. How do we bring that about?

First of all, embedding innovation in an organization is not a matter of having a set of rules nor is it achieved by slogans on the wall. Leaders must focus on the end result — the nature of an innovative organization they want to have. When we look at some company that we think of as innovative, what do we see? What are its characteristics? You can't just imitate that company’s polices and practices, but you can learn from them and devise your own approach to developing the same characteristics.

[PAUSE]

Highly innovative organizations have four dominant characteristics: awareness, skills, motivation, and supportive infrastructure. Time doesn’t permit me to cover each of these in detail, but I will talk about the first and probably most important one: awareness.
Awareness is the essential underpinning of innovative creation. Awareness is something much more profound than simply being well versed in currently available technologies. Awareness involves a correlative ability to understand how know-how - old and new - can be best brought to bear on the problem at hand. We think of people with this correlative ability as being “intuitive.”

[optional, if time: Bob Perkins story].

It is an ability to connect seemingly disparate bits of knowledge to the problem at hand. In people such as Bob and Seymour, there is an innate curiosity about problem solving that heightened their awareness of the possibilities for problem resolution. It is a considerable leap, however, from a few innovative individuals to an organization that is similarly attuned. In nearly every organization one may find a Bob Lillestrand or Seymour Cray. That does not make the company highly innovative. It is a corporate culture of awareness.

This characteristic of awareness can also be thought of as “caring curiosity.” It can, like other traits or skills, be learned, and, with practice, it can be honed to rewarding sharpness. Most of us will never design a supercomputer or figure out how to navigate space vehicles. But each of us can know the satisfaction of innovation, of devising a novel solution to the dilemma, “There’s gotta be a better way.” Mostly we learn this skill through experience and practice. That’s not surprising. What is surprising is how few organizations know how to challenge employees and give them the opportunity to learn and practice that skill. Of all managerial inanities none is more regrettable than to deprive
people of the opportunity to learn and exercise caring curiosity - the single most important skill to corporate health and renewal.

[PAUSE]

Control Data was an exception. The seed of the company’s “awareness” culture was planted long before the company was formed on a farm in Nebraska. In the 1930s, farmers throughout the Midwest were hit with two extraordinary problems – the Depression and the Dust Bowl, an extended period of drought. On the Norris family farm, both money and cattle feed were in short supply. Young Bill Norris, then an engineering student at the University of Nebraska, remembered that in his teens he had observed the cows picking out green thistles from the fresh hay they had been fed. There was Russian thistle (tumbleweed) aplenty on the farm. It was generally considered a nuisance, but Bill harvested as much of it as he could find. The neighboring farmers thought he was crazy, but it worked; the thistle nourished the cattle and kept the Norris farm going. Awareness of a pressing need was joined with a contrarian’s view of an available resource to meet an urgent need.

III. Strategy

Good strategy starts with having a clearly defined goal. In warfare goals are usually well defined: conquest, take the next hill, cross the next river, defeat the enemy army. In our world today it is more likely to be the defeat of terrorists who seek to undermine and destroy the basic structure of society. In business it is market share or superior profitability or some other measure of economic superiority.
So as I have said, strategy, like innovation, is problem solving, but it differs from innovation in that the problem solving process has the added dimension of creating demand for an innovative way to meeting some need.

Creating Demand. The dictionary definition of an entrepreneur is: "One who organizes, managers and assumes the risk of a business enterprise." The heart of the matter is in that phrase "assumes the risk," the essence of that risk is the ability or inability to create demand for your innovative product or service. I have two favorite stories that remind me of what creating demand is all about. The first is that of Edward Marshall Boehm. Early in their marriage, Helen Boehm urged her husband, Edward, who was working as an assistant veterinarian, to get serious about his sculpture avocation. He researched ancient ways of handling clay and finally developed his own formula for hard paste porcelain that had the properties and translucence that were to be key to the beauty of Boehm objects. Hard paste porcelain technology was not unknown, but its formulation was a closely guarded secret of the fine porcelain houses of Europe and Asia. There was no equivalent technology in the United States until Boehm developed his formula.

However, art and technology, no matter how unique, do not suffice to make a successful enterprise. Their modest basement start-up in 1954 needed to attract the attention of the marketplace. To do this, Helen hit upon the idea of the presentation of a Boehm sculpture to President Dwight Eisenhower. She was successful, and thus established a tradition that Eisenhower and succeeding presidents commissioned Boehm to design and provide porcelain figure gifts for foreign dignitaries. The high point came when President Nixon
made his historic trip to China in 1972 and commissioned Boehm, Inc., to create a new symbol of world peace as a gift to the people of China. Boehm’s massive porcelain of two swans became world renowned. Awareness of, and a desire to own, Boehm porcelain grew steadily from the publicity following the Eisenhower gift. Helen Boehm had created a most effective “reference sale.”

The second story is that of Intel. The integrated circuit is certainly one of the most revolutionary innovations in history. Fairchild and Texas Instruments filed patents for the integrated circuit in 1958-59. By 1961, three years later, there was still no U.S. commercial market for integrated circuits. Then in 1961 President John F. Kennedy announced his famous “man-on-the-moon” goal to be achieved by the end of that decade. That single stroke generated a market pull for the integrated circuit. Still, for the next seven years the U.S. government was the major user. By 1968, much had been learned about application of the integrated circuit and the manufacturing process for them. In 1968 Bob Noyce, Gordon Moore and their small band left Fairchild and founded Intel. Their first product was a 1K memory chip, creating demand, educating computer designers in how to use it rather than ferrite “cores” in their computers.

[design tools, a simple computer give away]

There was resistance. It took time and it took money - patience and persistence - to actually convince designers to use this thing which is today so ubiquitous in our lives.
So creating market demand, market pull, is a vital part of strategy. But it is still just one part. The first step, as was the case with both Boehm and Intel, was to devise an innovative product. Then comes devising the processes by which that product can be produced. By 1980 the fabrication process almost proved to be Intel's undoing for by that time as a result of a multi-company collaborative project, the VLSI project, Japanese manufacturers were able to provide integrated circuit memories of much greater capacity, and even more important at much less cost. Intel was on the ropes. By 1981 Intel had moved from rapidly growing profits to a 170 million dollar loss. By that time Intel's first microprocessor, the 8088, was adopted by IBM for its PC. Part of that agreement was for IBM to share important computer aided design technology with Intel. They were able to capitalize on that technology, and with an aggressive marketing strategy created tremendous market demand for its microprocessors. The rest, as they say, is history.

Strategic Space

My forty-plus years as a business executive and as an educator of other executives have taught me that a helpful view of strategy is as an ongoing journey through what I call "Strategic Space," as illustrated in Figure 5. This simple metaphor of space defines a firm's strategic position at any point in time as comprising three elements:

markets
products
processes
We can then view strategy as a change in position with respect to one or more of these elements. In essence, we move strategically in a space of three "dimensions." As in our real world, there is most definitely a time dimension as well. Each move will reposition the firm, and over time we thus shape a strategic journey.

Viewing strategy within such a space–time world helps us understand what each strategic move entails with regard to product, process, and market—and to anticipate the consequences accordingly. The incorporation of "process" in the model may not be immediately obvious, but new processes can be just as integral to effective strategy as a new product or movement to a new market. Note that "process" as used here is not narrowly defined as manufacturing or production processes. Competitive advantage can, in fact, come from any process, including administrative, marketing, information, and financial processes, (for example, the "routines" of Nelson and Winter).

Like the space of our familiar physical world, Strategic Space is in no way inert. There are powerful forces at work. Just as in the physical world we experience solar and radiation energy, winds ranging from gentle to tornadic, and sometimes violent movements of earth and water, so too is Strategic Space buffeted by changing social values, government policy and regulation, demographic and economic change, and technology. At any given point in this Strategic Space time, the relative intensity and nature of these forces will determine industry structure and the probability of a given strategy's success. It does little good to
carefully analyze a situation presumed to be static that will in reality change tomorrow. Strategy, by its very nature, must deal with the future, not the present simply transported to a future time.

So management needs to look at the fundamental dynamics of change. Clearly it is important to understand, or even anticipate, economic change, demographic change, and changing societal values. Even participation in government regulation and policy formulation is somewhat limited by the very nature of that process. Once again, of the several evolutionary forces at work in the space–time world through which a business journeys, technology is management’s only friend, or more precisely, technology is the only hope management has for any friend at all. Any successful friendship, of course, is built on understanding and appreciation of the nature of your friend.

However, managers, as well as academics, generally fail to deal with technology, their most powerful strategic tool, as an integral factor in strategy formulation.

In everyday management this failure takes three forms:

an inadequate understanding of necessary and sufficient technologies; a focus on product technologies rather than process technologies; an inability to properly assess the time and cost of converting technology push into market pull.

I’ve already spoken of the cost of these failures—underestimating the time and cost of creating demand. Edward Bok was fortunate to have a wife who not only was innovative at creating market demand, she was also good at raising the money they needed. Intel had the great good fortune to have one of the best venture capitalists, pioneer Arthur Rock, as one of its early backers.
Most of the rest of my remarks will focus on the first of these most common strategies.

The base of our pyramid of success is technology, that is, know-how. Successful strategists therefore need to understand the dynamics, the nature of change of technology. The first step of that understanding comes by understanding the difference in “necessary” technologies and “sufficient” technologies.

Bill Norris once said to me that he wished to be cremated when he died. I asked why. “Because,” he said, “all the cemeteries will ultimately have to be covered over for IBM factories, and I don’t want to be buried under those assholes.” This sardonic, if somewhat raw, bit of Bill’s humor revealed a deep and profound understanding of the commoditization inevitable in the evolution of computers, and how one remains competitive in the face of that commoditization. More precisely, it underscores that competitiveness hinges on the distinctions logicians would make between “necessary” and “sufficient” know-how (technology). Devising successful strategies involves being able to discern those technologies that are required to compete but that are not of themselves sufficient to yield competitive advantage. These are the “necessary” technologies. They are the tickets to the game.

Beyond that, successful strategy involves being able to identify those technologies, either existing or potential, that secure competitive advantage by differentiating a firm from its competitors. These are the “sufficient technologies.” Say, for example, a firm that makes bicycles wishes to distinguish itself by making the lightest weight bike. It should focus its attention on the technology of lightweight materials and architectures. All the other
technologies that go into a bicycle are necessary but should not be the focus of the firm's attention. Such thinking was a way of life for us at Control Data from the very beginning. We began with a single intense focus: design for high performance . . . all else being necessary but secondary.

Although this idea seems straightforward, in practice the ability of business leaders to distinguish between necessary and sufficient technologies is surprisingly rare. Even this singular ability is not enough, however. Whether a technology is sufficient or merely necessary is a function of time; those that are at one time sufficient will most assuredly become merely necessary at a later time. Prolonged fine-tuning of today's "sufficient technology," denying its natural transition from sufficient to necessary, is a recipe for strategic disaster. The importance of understanding these dynamics of change is made clear by looking at the microelectronics and computer industries and the experience of Control Data.

In the early stages of the computer industry, competitive advantage came from differentiation in any or all of the several components of a computer--logic circuits, storage devices, and systems software such as operating systems and data management systems. As the industry matured, the nature of competitive advantage changed. This began early on with data storage--the computer's "memory" devices. In the 1960s, a lively OEM business in magnetic core storage existed. Many computer manufacturers bought rather than built these memory devices for their computers. By the time semiconductor memories became
standard in the 1970s, almost all manufacturers (IBM was a notable exception) met their needs by buying these standard components from merchant semiconductor companies such as Intel.

By the 1980s, the logic circuit, the component most valued in the earlier decades as competitive differentiator, was no longer the industry's focal point. Almost all the larger original computer companies resisted and failed to change. As technology advanced, they continued to spend vastly increasing sums of money on research and for production facilities for proprietary logic chips that, with the exception of certain niche markets, had become outdated technology differentiators. They failed to switch the focus of their technology to software and systems integration know-how, which by then were the sufficient technologies of competitive differentiation. New entrants, such as Apple, bought microprocessors from merchant semiconductor companies (Motorola and others) and concentrated their efforts on other technologies, such as human interface technology, that would give them differentiation. It was the continued focus on technologies no longer sufficient for competitive advantage, rather than technological change per se, that inexorably took its toll on those older, now mostly forgotten, companies that failed to adapt.

Today, while it is still necessary for systems companies such as Dell or Hewlett-Packard to have state-of-the-art system components, competitive advantage must come from a higher-order skill. Moreover, the mere task of maintaining "state of the art" in any given
component has become increasingly R&D intensive, and the need for economies of scale begins to dominate—thus the dominance of Intel in microprocessor technology. The need for the systems integration task, which was supplied by the vertically integrated computer companies in the 1960s, still exists. The difference is that it is no longer possible for any one company to supply all the necessary technologies that are to be integrated. Rather, those technologies are, to one degree or another, supplied by the specialist firms, and technology sufficient for competitive advantage to the “systems” company must come from integration skills—though not from those skills alone. Continued maturation has meant that marketing skills have become dominant in the matter of competitive differentiation. Witness the success of Dell and the failure of Compaq with regard to direct marketing. Thus “skills” do not necessarily mean those involved in product design: Dell still has the highest margins in its class even though it uses a microprocessor equivalent to or even identical with others.

IV. Conclusion

The strategic manager must have a firm grasp of the nature and evolution of technology. The first and essential challenge he or she faces is to fashion and nurture an organization that is innovative, an organization that can effectively use technology to fashion novel ways of meeting a need. It may be a new product or a new way of providing a service. The strategic path is determined at each step along the way by making decisions with respect to the three dimensions of Strategic Space: Markets, Processes and Produces. The goal is
competitive and financial success. With patience, persistence and creativity that goal can be reached by each of us and the organization's that we manage.