INTRODUCTION

For the past four hundred years, virtually all practitioners of the dismal science we call economics have agreed on one basic premise: namely that a society's wealth is determined by its supply of physical resources -- its land, labor, minerals; water, and soon. And underlying this premise has been another, even more profound, assumption -- one supposedly so obvious that it is rarely mentioned: namely that the entire world contains a limited amount of these physical resources.

This means, from an economic point of view, that life is what the mathematicians call a zero-sum game. After all, if there are only limited resources, one person's gain must be another person's loss; the richer one person is, the poorer his neighbors must be.

Whether or not we ever did, today we do not live in a resource-scarce environment. That may seem hard to believe, but the businessperson and the politician -- as well as the butcher, the baker, and the candlestick maker who continue to behave as if they were operating in the old zero-sum world, will soon find themselves eclipsed by those who recognize the new realities and react accordingly.

What are these new realities? To put it simply, we live today in a world of effectively unlimited resources -- a world of unlimited wealth. In short, we live in what one might call a new Alchemic world.

The ancient alchemists sought to discover the secret of turning base metals into gold; they tried to create great value where little existed before. But an analysis of their writings shows that they were on a spiritual as well as a monetary quest. They believed that by discovering how to make gold they could offer unlimited prosperity to all of God's children. And, although in our era the term alchemy is often equated with "false' science" and fraud, the ancient alchemists were successful in their quest in a manner that they could not have anticipated.

Consider this: if the ancient alchemists had succeeded in fabricating gold, gold would have become worthless and their efforts would have been for naught. Yet, through their attempts to make gold, they laid the foundation for modern science, which today has accomplished exactly what the alchemists hoped to achieve: the ability to create great value where little existed before. We have achieved this ability through the most common, the most powerful, and the most consistently underestimated force in our lives today-technology.

Our ability to transform raw materials of nature into the most elegant and sophisticate devices imaginable -- to "make computers from dirt," as the mathematician Mitchell Feigenbaum recently put it -- has so dramatically altered the rules that we are paying an entirely new game.

The most successful entrepreneurs of our time -- H. Ross Perot, Sam Walton, Steven Jobs -- have been playing this new game without necessarily understanding its principles.
This book explains the new "game" -- its origins, its nature, and its rules. It spells out just what these new realities mean to business people and government policy makers -- what kind of business strategies and public policies make sense in the alchemic world and what kind are obsolete. It discusses what we, as consumers and citizens affected by it all, can and should do to become active participants in the game so as to enhance not only our own lives and the lives of our children but our society as well.

Underlying the Theory of Alchemy is the notion that technology has liberated us from the zero-sum game of traditional economics. Instead of finding better ways to slice up the same old pie, in the alchemic world you concentrate on baking a new pie big enough for all to share. In short, an *Alchemist creates Wealth; an economist merely moves it around.*

The alchemic world is neither a promising model, a hypothetical theory, nor an abstract dream. The alchemic world has arrived; we are living in it right now. Indeed, almost all of our successful people are applying its principles, though they may not know its underlying formulas. Alchemy explains why their behavior is so effective. But, more important, it explains to would-be achievers how the alchemic view can lead them to success. And, like any good theory, it not only explains the recent past and the present but also provides a guidepost for the future.

**THE THEORY OF ALCHEMY**

Since World War II, the wealth of the Western world has been expanding at an unprecedented pace, confounding the expectations of conventional economic theories. Unable to explain this activity, economists have taken to qualifying their predictions and prescriptions with phrases such as "on the other hand,..." a state of affairs that once led Harry Truman to remark that what the United States needed was a good one-handed economist.

In the alchemic world, a society's wealth is still a function of its physical resources, as traditional economics has always maintained. But unlike the obsolete economist, the new Alchemist recognizes that today both the definition and the supply of those physical resources are controlled -- almost exclusively -- by technology. In fact, for the past few decades, it is the backlog of unimplemented technological advances, rather than the supply of unused physical resources, that has been the determinant of real growth.

In 1981, urged on by newly elected President Ronald Reagan, the U.S. Congress passed the Economic Recovery Tax Act (ERTA), which dramatically lowered individual income tax rates and provided incentives to businesses that purchased new equipment. As put forth by the supply-siders who then dominated the Reagan administration's economic policymaking councils, the idea behind the legislation was that the increased work incentive resulting from lower tax rates would lead to increased economic activity, which in turn would more than offset the reductions in federal revenue that tax cuts might normally be expected to produce. This was something of a radical notion. Indeed, many traditional economists warned that Reagan's policy would lead to an economic collapse; they expected federal deficits to balloon without the expected corresponding increase in gross national product (GNP).

But that's not what happened. Late in 1982, the GNP began a meteoric rise that initially outstripped even the most optimistic projections of the supply-siders.

The tax incentives that ERTA gave businesses in 1981 -- in effect, a government subsidy amounting to 58 percent of the cost of new equipment -- virtually forced corporate America to
retool. Among other things, this greatly accelerated the integration of the computer throughout the economy. The short-term effect of wholesale computerization was an increase in productivity -- or, to put it in alchemic terms, growth in the relative levels of implemented technology -- on a scale not seen since the dawn of the industrial revolution.

An alchemic analysis of the 1981-89 period shows that these increases are only the beginning of a multi-decade period of economic expansion for the entire industrialized world. The reason for this impressive growth has to do with the technology gap. When traditional economists talk about a technology gap, they are generally referring to the disparity in technological sophistication between the United States and Japan, or between the industrialized nations and the Third World. In the Theory of Alchemy, by contrast, the technology gap is not between countries but between the best technology currently available and any less-advanced technology actually in use. In the alchemic equation, the size of the technology gap—that is, the amount of available but unimplemented technology -- is the greatest determinant of economic growth. And our technology gap today is wider than it has ever been in the history of civilization, owing to the types of technological advances we have been experiencing.

Historically, we measured levels of technology in terms of ages: the Iron Age, the Bronze Age, and so on. More recently, our yardstick was revolutions, such as the agricultural or industrial revolutions, which generally played themselves out over several decades. In the early 1960s, we began spewing of product generations, which usually spanned a few years.

Today, technology is changing by the moment. As a result, the snapshot provided by traditional economic theories can no longer give us an accurate picture of economic activity, let alone predict future activity.

Traditional economists have generally ignored the impact of technology on economic growth because traditional economics has always treated technology as a constant. None of these men formulated the three major tenets of the Theory of Alchemy:

• Technology is the major determinant of wealth because it determines the nature and supply of physical resources.
• The advance of technology is determined mainly by our ability to process information.
• The backlog of unimplemented technological advances (that is, the technology gap) is the true predictor of economic growth for both the individual and society.

Technology doesn't just affect the supply side of the economic equation. It has an even more impressive impact on the demand side. As evidenced by the spending habits of the contemporary yuppie, upscale consumer demand is insatiable. The more we earn, the more we spend; the more we spend, the more we get; the more we get, the more we want; and the more we want, the harder we seem to be willing to work to earn more money to get it. If any segment of our society has lost the incentive to work, it is the poor, not the upwardly mobile and increasingly wealthy middle class.

Virtually our entire modern economy is based on this eroding distinction between luxuries and necessities. In today's alchemic world, individual wealth is created not merely by figuring out how to supply an existing product at a lower price, but more often by creating an entirely new product, filling a need that consumers didn't even know they had. In this light, it is hardly surprising to discover that many of the greatest personal fortunes acquired in modern times -- for example, those of H. Ross Perot (data-processing), Sam Walton (automated distribution), and Steven Jobs (personal computers) -- were created by individuals who supplied society with products and services that did not even exist when they were born.
In the early 1970s, pessimism was the order of the day. The world, it was said, was running out of everything. Unless radical action was taken immediately action that included massive conservation efforts and a wholesale lowering of Western standards of living -- humanity was doomed.

At bottom, this apocalyptically gloomy view of things was probably nothing more than an understandable reaction to the optimism of the previous decade. Nonetheless, it did have a specific genesis: the publication early in 1972 of The Limits to Growth, an enormously influential -- and utterly downbeat -- study issued by the Club of Rome, a collection of distinguished industrialists, scientists, economists, sociologists, and government officials from 25 countries.

The future looked grim indeed. Americans, we were told, would have to tighten their belts, garage their cars, turn off their appliances, and generally adjust to lower standards of living. The government even printed up billions of gasoline ration cards.

But then a strange thing happened. The world didn't come to an end.

As we approach the final years of the twentieth century, we are coming to grips with an astonishing - and heartening -- realization. The Club of Rome scientists and the other environmental pessimists of the 1970s were wrong. The world's supply of physical resources increasing. decreasing. On the contrary, our effective supply of resources is increasing.

Consider the example of one of our world's most essential and problematic resources -- crude oil. On the eve of the 1973 oil crisis, global oil reserves were figured to be something on the order of 700 billion barrels -- enough to last about 40 years at then current rates of consumption.

Well, the pessimists were wrong. In 1987, worldwide oil reserves were estimated at close to 900 billion barrels -- nearly 30 percent more than they'd been 15 years earlier. And that 900 billion barrel figure included only proven reserves; it didn't count the nearly 2,000 billion additional barrels of oil still waiting to be discovered or produced by enhanced recovery methods. The same is true of most other commodities.

As supplies have increased, prices have tumbled. Between 1980 and 1985 alone, prices in the International Monetary Fund's thirty-product commodity index dropped fully 74 percent. Indeed, the downward trend has been so dramatic that the U.S. Office of Technology Assessment was led to conclude in a 1988 study that America's "future has probably never been less constrained by the cost of natural resources."

To put it simply, we are richer than we have ever been before. This may seem hard to believe in an era in which we seem to be overrun with poverty and crime, in which we often feel that we have to work harder than ever simply to make ends meet. But it's true. In 1970, for example, Americans had to work more than three times as many hours to earn enough to buy a TV set as they did in the late 1980s. Similarly, they had to work twice as long in 1970 to afford new clothing and 25 percent longer to earn a new car.

So what is going on? How is it that we seem to have more resources at lower prices than ever before? The answer, in a word, is Alchemy.

As we noted earlier, traditional economic theory views the world as containing a fixed-and hence essentially scarce -supply of physical resources. There is only so much coal, oil, iron, gold, water,
arable land, and so forth to go around. According to this way of looking at things, the only way to increase your real wealth -- whether "you" are an individual or a society -- is at someone else's expense.

The Theory of Alchemy, in contrast, recognizes that physical resources are neither scarce nor even finite -- not in an era in which we possess the know-how to "make computers from dirt." What counts today is not the particular minerals we find buried in our backyard, but our growing ability to make more and better use of whatever does happen to be there. This is the heart of the Theory of Alchemy: wealth is the product not just of physical resources but of physical resources and technology. And of the two, technology is by far the more important.

Mathematically, this profound truth can be expressed as a simple formula:

\[ W = PT^n \]

In this expression, \( W \) stands for wealth, \( P \) for physical resources (that is, the traditional measures of wealth such as land, labor, minerals, water, and so on), \( T \) for technology, and \( n \) for the exponential effect of technological advances on themselves. (As we shall see, technology has a multiplier effect on itself as each new technological advance becomes the foundation for another advance.)

This simple formula has enormous implications -- not just in terms of improving our understanding of the economic basis of our society, but as the key to developing more effective strategies for our individual lives as consumers, businesspeople, and citizens.

For most of the past five or six thousand years, ever since the earliest days of organized society, people have thought of wealth as being an abundant supply of the physical necessities of life -- namely, food, shelter, and clothing. In the earliest societies, the sources of these necessities were obvious: land, livestock, and building materials. The more of these resources you possessed, the wealthier you were considered to be.

Even in the most primitive societies, however, mere possession of physical resources was not in and of itself enough to guarantee anyone survival, much less comfort or luxury. In order for your physical resources to do you any good, you needed to know how to make use of them; you needed some smattering of what today we might call basic technology. It was this technology -- this knowledge of how to make productive use of the raw materials of nature -- that made resources worth having in the first place.

Thus we arrive at the First Law of Alchemy:

*By enabling us to make productive use of particular raw materials, technology determines what constitutes a physical resource.*

Although this fact may seem obvious today, it was not evident throughout most of history. The reason is that until recently technology advanced quite slowly. Untold generations were born and died in the centuries it took for the Stone Age to give way to the Iron Age, for the Iron Age to give way to the Bronze Age. As a result, technology's impact on society was taken for granted to such an extent that it was as if it didn't exist. (Or for those who did notice it, technology was treated, for decision-making purposes, as a constant over their lifetimes.)

The crucial importance of technology becomes evident to us only when we see it shift massively in a relatively short time. In our lifetimes, technology has exploded as never before. As Ralph Gomery,
the longtime chief scientist of IBM recently noted: "When my father was young, he used to take a horse-drawn carriage to the railroad station. There were no automobiles, no telephones, no atomic bomb, and no man on the moon. But by the time he died, he had flown in a jet and had seen all those other things happen. No generation had ever been through a transformation like that."

We have seen, in other words, technology transform chaff into wheat and wheat into chaff before our very, eyes. In recent years, we have watched technology make important resources of commodities as mundane and ubiquitous as sand (the raw material from which we make silicon chips) and seawater (from which a variety of minerals ranging from gold to magnesium can be extracted). At the same time, we have seen it diminish -- if not actually erase -- the importance of such once key resources as natural rubber, tin (increasingly superseded by aluminum and plastics), aluminum (itself being supplanted by newly developed ceramics and carbon fiber composites), copper (demand for which is slowing as a result of recent advances in fiber-optics and superconductivity), and sheet steel (which is beginning to see competition from light, corrosion-resistant super-polymers).

The technology considered by the First Law of Alchemy -- the technology that enables us to make use of particular raw materials and, in so doing, defines what constitutes a valuable physical resource -- can be called **definitional technology**. Clearly, definitional technology lays an enormously important role -- probably the most important role -- in determining a society's wealth. But it is hardly the only kind of technology to affect us in this way. There is a second category of technology that we must consider -- the technology that controls how much we have of an already defined physical resource.

Although we live in a constantly changing world -- indeed, in a world in which the rate of change is constantly accelerating -- not everything in our world changes every day. There is at any given moment an existing level of definitional technology -- which is to say, an existing base of currently defined physical resources -- that for all practical purposes we can and do consider to the measure of what is available to us.

Reading history, one might quite understandably come to the conclusion that the best way -- indeed, the only way -- to increase one's supply of physical resources is to take them from someone else. This notion, just like the Aristotelian notion that the sun revolves around the earth, seemed to accord with the evidence of our senses. What could be more obvious? If someone else had something, you could get it by taking it away from him.

However, the resource base has never been fixed. The fact is, even in the context of a given set of previously defined physical resources, the supply of resources is always expanding. It's not that vast new amounts of oil or gas or copper are somehow spontaneously being created deep in the bowels of the earth. The amount of these commodities is pretty much the same as it's always been less, of course, what we've consumed over the millennia. But the amount of a resource is not the same as the supply of a resource. The amount of a resource is how much is known to exist and is physically available for our use -- a figure that is determined as much by how we use it as by the quantity we happen to have available.

This leads us to the Second Law of Alchemy:

*Technology determines our supply of existing physical resources by determining both the efficiency with which we use resources and our ability to find, obtain, distribute, and store them.*
What makes a physical resource a resource -- as opposed, say, to just a pretty rock or an annoying black goo --- is its usefulness. Take oil, for example. One of the things that makes oil such a valuable physical resource is that we can refine it into gasoline and use it to power our cars. In this context, the most sensible way of measuring how much oil we have is not in terms of how many barrels it can fill up, but in how many miles of driving we can get out of it. The actual amount of oil buried in the earth is irrelevant. What counts is how much good the oil we know we have will do us -- in other words, the supply.

Clearly, a veritable ocean of oil won't do us any good if we don't know it's there. Nor will it do us any good if we can find it but can't get to it. Nor if we can't move it to where we want it. Nor, finally, if we can distribute it to where we want it but can't find a way to store it there until we need it.

Beyond these constraints, there's the question of how we actually use it. If I've got a car that gets 10 miles to the gallon and you've got a car that gets 20 miles to the gallon, the same amount of gasoline will get you twice as far as it will get me. In other words, your effective supply is twice as big as mine.

From this it should be clear that there are basically two ways to increase the supply of a previously defined physical resource: (1) we can improve our ability to find, obtain, distribute, and store it; and (2) we can improve the efficiency with which we use it.

The first set of abilities constitutes what we might call supply technology. The second set can be labeled use technology. Together, they constitute the general category of technology considered by the Second Law of Alchemy -- quantity technology, or technology that determines the available quantity of existing physical resources.

In general, the four aspects of the technology of supply -- the ability to find, obtain, distribute, and store a resource -- constitute a kind of conceptual pipeline through which all physical resources must flow for them to be of any value to us. Our ability to clear up bottlenecks at any of those four points thus effectively increases our supply of a given resource.

But then, we might ask, what controls the advance of technology? This question brings us to the most important realization of all -- that of the Third Law of Alchemy. This law explains what determines the advance of technology -- and hence the nature of the key to increasing our wealth.

In short, the speed at which technology advances depends on how easily members of a society can access and share their acquired knowledge--that is, it depends on the level of information-processing technology.

Thus we arrive at the Third Law of Alchemy:

*The rate at which a society's technology advances is determined by the relative level of its ability to process information.*

Viewed in alchemic terms, the critical importance of information-processing technology is obvious. If information is the most important resource we have (because it is the raw material on which technological advance depends), then the quantity technology of information -- namely, information-processing technology -- must be the most important technology we have (because it determines the usable supply of information).
This, then, is the way to increase the size of the pie. The more we can improve our ability to process information, the faster technology in general will advance. The faster technology in general advances, the greater its ability both to increase the effective supply of existing physical resources and to define entirely new ones -- and the richer we will be.

What, in practical terms, does it mean to say that as a result of modern technology we effectively have access to an unlimited supply of resources? To begin with, it means that the accumulation of resources is no longer the key to achieving wealth.

There is a basic lesson to be learned from this: namely, in the alchemic world, the market has no corners. While the old-fashioned economist attempts to succeed by cornering the market in some valuable commodity, the Alchemist recognizes that commercial enterprises based on the exploitation of scarcity are doomed.

When it comes to resources, the Alchemist never forgets that this is a buyer's market; that as a result of technology, there is virtually no raw material for which one cannot find a substitute. No particular raw material is all that important in the overall scheme of things, and the real price of any raw material is determined as much by the price and supply of potential substitutes as by its own availability.

If accumulating resources is no longer the key to achieving wealth in the modern world, what is? In the 1960s, the movie The Graduate offered a one-word answer to that question: "plastics." In the 1990s, we offer a different (though no less pithy) answer: "distribution."

These days, as a result of the impact of advancing technology on the costs of labor and raw materials, the actual consumer cost of virtually every manufactured item has fallen. Most of this reduction in price has come because the actual production cost of an item has fallen to where it typically represents less than 20 percent of the retail price. Most of the remaining 80 percent represents the cost of distribution. The reason distribution has come to represent such an outsized proportion of the consumer's price is that distribution cost has not declined as fast as production cost. This cost-reduction disparity reflects the fact that, with very few exceptions, we have yet to apply to our distribution networks the technological advances that have so profoundly transformed the rest of the supply pipeline.

The point is that on the supply side of the alchemic equation, improvements in distribution have the potential to yield far greater savings than improvements in any other area.

Until well into the twentieth century, most of the greatest personal fortunes in American history—like those of the Astors (fur trading), the Rockefellers (oil), the Carnegies (steel), and the Fords (automobiles)—were built on the bedrock of natural resources and manufacturing.

In our modern alchemic world, however, the route to wealth has shifted. In the last decade or two, the biggest personal fortunes have all been earned by individuals like Fred Smith (who founded Federal Express) and H. Ross Perot (Electronic Data Systems) — proto-Alchemists who made their mark by coming up with new and better ways to move goods and information.

Perhaps the best example is that of Sam Walton (Wal-Mart Stores). In the early days of discounting, there simply weren't any distributors willing to service many of the small towns in which Wal-Mart wanted to do business. So what Walton did was start his own distribution system. He realized that the key to success lay not just in his ability, to get goods to his stores, but in being able to keep track of what was selling and what wasn't -- that is, in moving the
goods and sharing the information. Walton took advantage of the latest advances in data processing and communications technology to construct the most sophisticated automated distribution system the world had ever seen.

As a result of this emphasis on distribution, Wal-Mart has grown into a $30 billion-a-year behemoth that sometime early in the 1990s will probably pass Sears and K-Mart on its way to becoming the largest retail chain in the world. And though he still drove a battered old Ford pickup truck with cages in the back for his two favorite bird dogs, by 1989, Sam Walton was worth more than Donald Trump, Rupert Murdoch, and the late Malcolm Forbes put together -- his alchemic understanding of technology and distribution having earned him and his family a personal fortune of something on the order of $9 billion.

**DEMAND-SIDE ALCHEMY**

As economist John Maynard Keynes noted, "Consumption . . . is the sole end of all economic activity." Among Keynes' major contributions was the notion that demand had as much to do with subjective consumer psychology as with objective economic reality, that factors such as envy and self-esteem were every bit as significant in determining consumer spending habits as income and inflation. Before Keynes, few economists bothered to wonder about the human sources of demand. All that mattered was that people needed things. How or why, they might have come to conceive a particular need was considered irrelevant.

Certainly, Keynes was right in assuming that consumer demand depended on the extent to which people had unsatisfied needs. But he was wrong in thinking that people's needs were basically fixed and absolute -- that they were capable of eventually being met, at which point demand would be satiated.

This is the essence of the alchemic view of demand. In contrast to the conventional economist, with his tacit assumption that at their most basic level human needs mirror the essentially unvarying requirements of human physiology, the Alchemist recognized that people's needs are neither fixed nor absolute. Rather, they are being redefined constantly. And what determines both the nature and pace of that redefinition is technology.

The way in which technology defines human need -- and hence determines the nature of consumer demand -- is quite straightforward. By providing us with new products or processes, advancing technology invariably induces changes in our basic behavior -- changes that are sometimes so fundamental that forever long we cannot imagine living any other way. The new product or process on which our new way of living depends thus becomes essential to maintaining our way of life. In other words, it assumes the status of a necessity-something that we need in order to live the way we want.

The classic example of this sort of self-justifying innovation is the automobile. When it was first introduced, the automobile was considered to be a luxury-an expensive toy that men of means bought mainly to take their families for Sunday drives in the country. Over time, however, and not very much time at that, as mass production made car ownership practical for an increasingly wide public, people's notions of distance and mobility changed profoundly. Before long, a sizable chunk of the population had actually moved to the country -- or at east to that convenient strip of it that we now call suburbia -- and suddenly the car was a necessity. Indeed, for most suburban families, **two** cars were essential.
In short, by providing consumers with a series of alternatives that hadn't before occurred to them, technology created a need that previously hadn't existed. There was no demand to speak of for a waterproof portable telephone that one could take swimming -- until, that is, telephone manufacturers developed such a device. Then, suddenly, every homeowner with a backyard pool had to have one.

So it is that by creating new products that soon become the basis of an entirely new way of life, technology creates needs that did not exist before (or at least were not perceived before). Those new needs then proceed to generate consumer demand in a self-fulfilling cycle that is bound to continue as long as technology continues to advance.

We can state this formally as the Fourth Law of Alchemy:

*By providing us with new products and processes that change the way in which we Live, technology determines what constitutes a need, and hence the nature of consumer demand.*

Technology's role on the demand side of the alchemic equation is entirely analogous to its role on the supply side. In both cases, it is the definitive factor. Just as a society's level of technology at any given moment determines what particular raw materials will have value as resources to that society's producers, so too does its level of technology determine what sort of goods and services are likely to be in demand by its consumers.

There are two fundamental types of alchemic demand: *quantity demand and quality demand.*

Quantity demand, the more rudimentary of the two, is the consumer's basic desire for more of what he or she already has: more food, a bigger house, an extra suit of clothing. This kind of demand may seem adolescent and consequently limited but in fact it can reach huge proportions. For example, from 1960 to 1988 the number of homes containing a television set rose from 90 to 98 percent. But the number of homes containing two or more television sets rose from 11 to 60 percent.

If quantity demand can be thought of as the consumer's demand for a larger supply of an existing alchemic product, quality demand reflects the appetite for a different kind of product. In the case of television sets, quantity demand manifests itself in terms of a consumer's relatively simple desire to own more than one TV. Quality demand, by contrast, reflects his or her more sophisticated yearning for a better TV as well as for related but otherwise entirely new products (such as a VCR, a laser-disc player, and so on).

When quantity demand is satiated--as it is these days among the vast majority of Americans -- quality demand kicks in. When you have a the food, clothing and TVs you need -- as most Americans do today -- you start wanting better food, better clothing, and better TVs. To put it another way, the typical middle-class American couple would probably have little if any interest in buying a third Toyota to add to the two they already own. Far more likely, they would get rid of one of the Toyotas and upgrade to a BMW.

As long as technology continues to advance, there never will be a best car--at least not for very long. Each year a better car will be developed, and the process will start all over again.

Less evident but even more pervasive is the way in which quantity and quality demand feed on each other directly. A man gets a better lob and buys a better quality suit. Immediately, he
needs better tie, a better shirt, and a better pair of shoes. Then he needs another better quality suit, the acquisition of which causes him to need another new set of accessories—and so on and so on. The reason he needs all these accessories is that, without them, the quality of his new suit will be diminished. In other words, quality is inextricably linked to quantity. This is a fundamental characteristic of alchemic demand; as in the case of one's wardrobe, quantity, and quality demand cannot be satisfied separately—either both are met or neither is.

The Fifth Law of Alchemy:

*Technology determines the level of consumer demand by determining the price at which goods can be sold.*

The conventional understanding of the way the marketplace works is that the price a producer can get for an item depends on the level of consumer demand for it. For the conventional businessperson, therefore, the crucial question is: will the price the market is willing to pay for my product exceed the cost of manufacturing it? If it does, the manufacturer will prosper. If it doesn't, he or she will fall. Either way, it's something of a crapshoot.

In our alchemic age of unlimited technology, the reverse is true: the level of consumer demand for a new product depends on the price. For the alchemic businessperson, therefore, the question is whether the technology is good enough to permit setting the price of the product sufficiently low to generate the demand that is needed. Given the accelerating pace of technological advances on the supply side of the alchemic equation, the answer will be yes.

What the alchemic businessperson must recognize is that, whether selling cars or clothing or computers or cat food, he or she is fundamentally in the business of change. In a world in which the nature of demand is infinitely plastic (that is, constrained only by the virtually unlimited ability of technology to mine up with new products) and the level of demand is potentially unlimited (that is, constrained only by technology's ability to make things cheaply enough), the businessperson must always be on the lookout for what is coming next—and what is coming after that.

If Alchemy teaches us anything, it is that there is no end to what people can, will, and must have.

Can we use our alchemic understanding to determine what the future holds in store for us? The answer is yes. As we shall soon see, by understanding the technology gap we can use our understanding of what has happened to predict and explain what is about to happen.

**THE TECHNOLOGY GAP**

What really matters is not the technology gap that exists between societies but the one that exists within each society: not the gap between us and them, but the gap between what is and what could be. This is the technology gap on which Alchemists focus—the gap, as a 1976 Brookings Institution report defined it, "between the best production practice possible with current knowledge and the practice in actual use."

In short, no society has ever—in economic terms, at least—lived completely up to its potential. The degree to which a given society falls short of that potential at any given time—that is, the degree to which the advance of technology outstrips a particular society's ability or willingness to make use of the latest developments and breakthroughs—is the measure of its technology gap.
We have seen in the First and Second Laws of Alchemy how technology determines the definition and supply of physical resources, in the Fourth and Fifth Laws how technology determines the nature and level of consumer demand, and in the Third Law how information technology controls the advance of the overall level of technology. Thus having explained how technology is the major determinant of economic activity, we have arrived at our final and Sixth Law of Alchemy:

*The immediate economic potential for an individual, all industry, or a society can be explained by examining the technology gap, the best practices possible with current knowledge, and the practices in actual use.*

We can call the better way for which the Alchemist is always searching a Ready-to-be-Implemented Technological advance, or an R-I-T. An R-I-T isn't a pipe dream or an item on a wish list. It is a new product or process that is available to us today. It's just that, out of ignorance or indolence, we haven't yet got around to making use of it. A list of current R-I-Ts would include the computerized fuel injectors that haven't yet replaced mechanical carburetors, the radial tires that haven't yet replace the standard bias-ply models, and the push-button phones that haven't yet replaced rotary models.

Above all, what makes an R-I-T literally "ready to be implemented" is that it is user transparent - that is, from the standpoint of the skills required for its use, it is virtually the same as the product it is meant to replace. As far as the user is concerned, the only thing that has changed is that a job that used to be more difficult now seems easier. Of course, not all technological advances are user transparent when they are first introduced. In fact, most aren't. Some new products never become user transparent; that is, however much their design is refined, they continue to require new and different operating skills than the devices they are meant to replace. They can still achieve the status of an R-I-T, however, if their cost-effectiveness is great enough to justify the time and trouble it takes to learn new operating skills.

Though they probably wouldn't put it in these terms, today's smart entrepreneurs almost universally look for the existence of R-I-Ts when deciding what new business to enter. That is, they recognize instinctively that in the modern Alchemic world there is no point in trying to get into some particular business unless they have some 'better way' of doing it--in other words, unless there is an R-I-T that they can implement or develop.

How does the Alchemist tell whether or not there are R-I-Ts out there waiting to be exploited? He or she studies each and every component of the business; from the efficiency of its equipment to the way it trains its people to its system of handling correspondence, to see whether or not each particular operation utilizes the most advanced technology available. In other words, he or she looks for the existence of individual technology gaps. The sum of these individual gaps is the business's overall technology gap.

As we have seen, one can develop a reliable model of tomorrow's opportunities by studying today's R-I-Ts. But modeling tomorrow isn't enough. What about the day after tomorrow? How can the Alchemist get a fix on that?

The answer lies in what we might call our Basic Research Technological advances, or B-R-Ts. Just as studying and understanding the nature of our R-I-T's can provide us with a reliable picture of what's around the corner, analyzing our B-R-Ts gives us a preview of what we can expect over the next hill.
Real advances to technology are not so much ends in themselves as they are links in a continuing chain of innovation. To put it another way, it's not simply that today's breakthrough will be superseded by tomorrow's; it's that today's breakthrough will become the building block for tomorrow's. This is the multiplier effect of technology: every new development that we can identify as an R-I-T quickly (if not immediately) becomes the basis for a whole array of brand new technologies. It becomes, in other words, a B-R-T. Over time that B-R-T yields a new R-I-T, which in turn generates a new B-R-T, which eventually produces another R-I-T and on and on, the process accelerating and widening with each cycle until it seems to be continuous.

Where it will all end—if, indeed, it ever will end—is impossible to say. But by keeping an eye on the current round of B-R-T's, the Alchemist can stay at least two steps ahead of the current game. And in our fast-changing alchemic world staying two steps ahead may well be the bare minimum necessary for survival.

**CONCLUSION: THE AGE OF ALCHEMY**

In the alchemic world, where we have the power to create unlimited wealth, what we can accomplish is limited only by our dreams. In fact, it was the American dream itself, more than anything else that made us the richest and most powerful nation on earth. We have the ability today to control our destiny; the question facing us now is, what will we do with this power?

In 1982, the United States embarked upon what has already become the longest peacetime economic expansion in history. More significantly, when we examine the underlying cause of this unprecedented expansion -- that is, the implementation of technological advances -- we can see that the United States, and the entire Western World, is entering a multi-decade period of economic expansion of unfathomable proportions.

As for those who are being left behind, we have the ability to bring them into our alchemic world so that they, too, can share in the prosperity. Not only is it morally and ethically right that we should do this, but it is also in our economic best interests. Indeed, when we accomplish this noble objective, we may well become known not only as the richest and most powerful nation on earth but as, to paraphrase the words of our President, the kindest and gentlest as well.

The situation for the world's less developed nations is not as auspicious. But some of the most significant technological advances in the history of humankind -- cold fusion, superconductivity, genetic engineering -- may be just over the horizon. We can therefore hope that these imminent developments will allow the rest of the world to share in the wealth of the alchemic age.

As we enter the last decade of the twentieth century, more than just our promising economic future is in sight. We have finally reached the age that every would-be Alchemist has dreamed of from the beginning of time: the age when one person's gain is not another person's loss, when what we should do because it is morally right is exactly what we must do to increase our individual and societal wealth, when the only limit to what we can accomplish is what we can dream of accomplishing -- the Age of Alchemy.
We are educated to think that wealth is limited and sb's gain is somebody else's loss. It challenges us to reconsider this cliché and think of the wealth as unlimited. Read more. One person found this helpful. Helpful. Comment Report abuse. B. DeWitt. 3.0 out of 5 stars good but with some reservations.