Chapter 7 The Next Step Forward for Humanity

The commonality of all new post-industrial organizational structures is their focus on purpose, principles, and people. The post-industrial organization, like any organization, must have a purpose. However, the purpose is much more prominent and important to post-industrial organizations. For the industrial organization, purpose was of primary importance in designing the organizational structure. However, once the structure was in place – each position identified, given a specific function, and placed within the management hierarchy – the purpose became secondary. If the responsibilities of each position were performed effectively, the organization would fulfill its purpose. With post-industrial organizations, however, the purpose of the organization must remain continually in the consciousness of everyone in the organization. The focus is on the people who fill the positions rather than on their position descriptions – the people are the keepers of the purpose.

The structure of post-industrial organizations is dynamic rather than fixed. Positions, departments, divisions, organizational units, take on new meaning. They are continually changing and evolving, forming, and dissolving as the organization transforms and renews itself to meet the ever-changing demands of a dynamic marketplace in an ever-changing economic, social, and natural environment. This is the chaotic part of Dee Hock's "chaordic" organizational model. The" order" part of the chaord is embodied in its organizational principles. The purpose and principles of the organization remain unchanging -- leaving the structure free to evolve as needed to maintain the effectiveness and efficiency of the organization.

The purpose and principles must be firmly established in the minds of the people who own, manage, and work for the post-industrial organization. The principles of an effective organization must embody the standards of conduct of the people of an organization – standards both necessary and sufficient for the organization to fulfill its purpose. If a principle is not necessary for the functioning of the organization, it will unduly constrain the ability of the people of the organization to adapt to changing needs. If the set of principles is not adequate or appropriate to ensure success, the organization may not function effectively, even when it functions according to its principles.

Principles are fundamentally different from the specific functions that make up a position description. A person in a post-industrial organization may still have specific responsibilities, but will be free to meet those responsibilities by any means consistent with the principles of the organization. The person in a position, not the position description, will determine the most appropriate means of pursuing the purpose of the organization. And the person may change their means of fulfilling their responsibilities at any time to adapt to different situations or changing organizational environments.

Moving from the industrial to post-industrial organizational paradigm will not be quick or simple – neither for corporate businesses nor for government. Both are locked into a hopelessly out-of-date system that is essentially beyond their control. However, human society is a living system. Change is inevitable, and society will continue to transform itself, taking the next step forward into a new post-industrial era of human progress. The primary question is not whether change will come but whether this will be an orderly evolutionary process or instead will be a revolution sparked by some economic or social catastrophe.

By John Ikerd, from "Alternative Organizational Structures: Implications for Competitiveness of Markets" Published in "A Food and Agriculture Policy for the 21st Century," edited by Michael C. Stumo, Organization for Competitive Markets, May 2000.

Divorce can be devastating. Mine was. I had taken the biblical description of a marriage literally – "and the two shall become as one" (Ephesians 5:31). Everything my wife did affected me and I felt that everything I did affected her – we were no longer separate people. For example, I never really knew how I was feeling on a given day, good or bad, until I came home to see what kind of mood my wife was in. If she was happy then I was happy; if she was unhappy, then I was depressed. I had become only a part of a person.

Toward the end, I began to realize that my concept of a good marriage was a classic description of mutual co-dependence. In mutual co-dependence, each person becomes addicted to the other and each supports the other's addiction. Each depends on the other for his or her sense of well-being rather than developing an independent sense of self-worth. The result is a parasitical relationship – each person draws their energy from the other and neither is capable of relying on their own resources. Since neither person has a source of strength other than what they get from the other; they slowly suck the life out of the other. People can't live that way – at least not for too long. But, when they finally separate, divorce leaves them as two very incomplete people.

Thankfully, triumph can arise out of tragedy. When you find you are left with only part of yourself, you have the opportunity to recreate the missing parts. And, it's far easier and quicker to recreate parts of your life after you have lived life for while – when you are older. You have the opportunity to look back and ask; what kind of person would I have liked to be at this point in my life, if I had not ended up who I am? You can then start recreating the missing parts; to the best of your ability, you can become who you would have wanted to be in the first place. You can't go back and correct your mistakes, but you have a chance to fill in the spaces left blank with answers learned from experiences of living.

A person doesn't have to wait for a tragedy to fix the broken part of their life. In my case, I waited until I had no choice. Some parts were not just broken – they were totally missing. The tragedy is that I waited until I was old, lonely, and sick to realize that I could have stopped, rethought, and renewed my life at any point in time. We don't have to wait for a disaster to make us stop, rethink, and rebuild. But, we do need a vision of what we want to be instead of what we are. Once we have that vision, we can start tearing down the old and start building anew – just about any time we choose.

As I eventually came to realize, contemporary American society is built on a foundation of mutual co-dependency. Industrialism has created the illusion of independence, as specialization has separated people from each other – functionally, spatially, and personally. Each person does their own thing in their own place and relates to others through impersonal market transactions. We are able to sell what we produce and to buy what we need, so we don't need to develop and maintain personal relationships. In fact, specialization leaves us completely dependent on others – not only for luxuries of life, but also, for our very existence. In an industrialized society, people can't feed and clothe themselves; they can't keep a roof over their head, nor can they do any of the dozens of things they feel must be done each day. Our very existence depends on hundreds of other people that we don't even know. We have become a nation of co-dependents. We are slowly sucking the life from each other as we vainly strive to satisfy our addictions.

So what's wrong with depending on each other – after all, that's what community and society is supposed to be about, right? Wrong! Community and society is about *interdependence* rather than co-dependence. Steven Covey in his book, Seven Habits of Highly Effective People, deals with the concepts of dependence, independence, and interdependence.[1]

Dependence refers to situations where one person relies on another out of necessity – one must have the other to succeed, or possibly even to survive. Dependent people are always subject to exploitation – they are needy, and thus, vulnerable. Independence refers to situations where people are able to rely solely on themselves – they don't need anyone else to survive or succeed. Independent people are strong – they are secure within themselves. Most dependent people would prefer to be independent. Interdependence refers to situations where people rely on each other, but by choice rather than out of necessity. Interdependent people don't necessarily need each other to succeed or survive; they simply rely on each other to make their lives richer, fuller, and more complete. Independent people may or may not choose to become interdependent. Regardless, people must first be independent before they can *choose* to engage in an interdependent relationship.

The nature of dependency is not just psychological or social; dependency affects all aspects of our lives. Economists, for example, sing the praises of free trade as a route to greater economic efficiency. Gains from free trade are based on the principle that different people value the same things differently. These differences may arise for a whole host of sources – including producers with different abilities or resources and consumers with different needs or preferences. So, if I have something that you value more than I do, and you have something I value more than you do, we can trade, and we will both be better off than before. The same principle holds true for individuals, corporations, or nations. It also holds true when we trade hours of work for money, and then trade the money we earn for something that is worth more dollars to us than it's worth to the seller. Buyers and seller both are better off after the trade. Money is just a means of making the trading process easier. This is the underlying premise supporting economists' claims of gains from free trade, whether among individuals or among nations.

However, we can only be confident that free trade makes both parties better if each party to the trade also is free to *not trade*. The economic premise of free trade is that each party to the trade is independent – they are free to either trade or not trade, and neither is in a position to defraud, mislead, or coerce the other. Thus, true free trade is an interdependent relationship – each otherwise independent party chooses to engage in the relationship with the other, not out of necessity but as a matter of choice.

Obviously, not all trades labeled as free trade today are actually free. Many advertising, promotion, and sales gimmicks today are designed to mislead, if not outright defraud the uninformed buyer. This is not free trade; this is exploitation. In the international arena, the so-called

developed nations are in a position to pressure, if not coerce, the less-developed nations to engage in trade. This is not free trade; this is exploitation.

So why do those who are misled or coerced agree to trade? Uninformed buyers and less-developed country are trapped in a dependent trade relationship – they are not free to not trade because they don't know they have options. Large corporations or powerful nations that dominate trade relationships are not dependent on any particular customers or supplier – although they may well be dependent upon their customers or suppliers in total. Thus, they are free to not trade with any one of them – they have plenty of others. Weak trading partners, on the other hand, have few if any good alternatives. They must trade with this particular partner or suffer some undesirable consequence, such as the risks of unemployment, for workers, or the cost of driving several miles to buy a comparable product elsewhere, for consumers. Weaker trading nations may risk loss of access to markets, loss of credit, or loss of military protection, if they choose not to trade with a more powerful nation. They are made dependent by their lack of good alternatives, and consequently are subject to exploitation by their stronger, independent, trading partner. Exploitation is not free trade.

Americans claim to be a fiercely independent people, but we are not. John Ralston Saul in his book, The Unconscious Civilization, points out that we are fiercely independent about personal things.[2] Freedom of speech, freedom of religion, freedom from unreasonable search and seizure, and freedom to possess and use personal property as we see fit are all fiercely defended in American society. We don't want the government or anyone else imposing restrictions on what we do in our personal lives. However, in matters that relate to our role in the economy, politics, and society in general, we seem more than willing to depend on others rather than to make our own independent choices.

In political matters, we have become dependent on political parties, political action committees, and other special interest groups to define the issues and to articulate our positions. We have no political independence. In economic matters, we have become specialized workers who are completely dependent on other specialized workers. In addition, most of us work for or invest in some corporate entity that makes all of the major economic decisions for us. We have no economic independence. We don't do what we want to do but instead do what we feel we have to do to keep our jobs and to survive. Our lives, in general, have become dependent – not interdependent.

Our preoccupation with competition and self-interests has caused us to become exploitative rather than supportive – we want to win, to beat someone else, to profit from someone else, or to use someone else for our own benefit. Even though we may be the victors, we are still dependent on our victims. Without something or someone to exploit, many of us would not know how to survive.

Americans today are only parts of people – we have let a big part of ourselves become little parts of thousands of other people and of the non-human organizations over which we have no control. All of these other people and things, likewise, have become dependent upon us. And, these dependent relationships have become mutually destructive. Not only are we exploiting each other, we are also exploiting the natural environment – the ecosystems of which we are also a part and upon which we all ultimately depend. We are sucking the life from each other and from the whole of creation. We have become part of a process that quite simply is not sustainable.

The good news is that we can break free from these destructive relationships – whenever we choose to do so. When we do, we will have to replace the broken and missing parts, but it won't be nearly as difficult as building a new society from scratch. We don't have to become completely independent in order to choose interdependence, but we do need to stop exploiting each other. We can't become completely independent of our natural environment, but we need to stop exploiting it. We simply need to become sufficiently independent to break free from any dependent relationship that we cannot change. We must be sufficiently secure within ourselves to refuse to participate in relationships that would force us either to exploit or to be exploited.

We can develop interdependent relationships with people and with the environment without declaring our independence. We can declare our interdependence instead. We can commit ourselves to building up other people, to sharing our strength with them, as we rely on them to help make our lives better. We can commit ourselves to protecting and restoring the natural environment, to using our God-given abilities to be good stewards of the land, as we rely on the bounty of nature to make our lives better.

This would be a significant beginning to achieving a more positive vision for the future of humanity – a vision of what we would have liked our society to be rather than what it has turned out to be today. We can't go back and correct all of the mistakes made by past generations, but we can fill in the missing pieces with the things that will make us, as nearly as possible, the kind of society that we would have liked to be. We can

begin to break free of the old dependencies – just about anytime we choose. We don't have to wait until *America* is old, sick, and alone in the world, we can start rebuilding it now.

It's time to take the next step in human progress. If fifty years from now, the world is to be far better than it is today, what will it take to make it so? Our common sense tells us that *better* will not mean that we have a lot more *cheap stuff*. Perhaps having more stuff – particularly food, clothing, and shelter – did make life better in the past; but, how much more food, clothing, and shelter do we need? More food won't feed the hungry any better in the future than does the surplus of food that exists today. Hunger is a problem of distribution – of equity and justice – not a problem that will be solved by producing more food. How many more clothes do we need? People are cold in winter because they are poor, or are mentally ill and homeless, not because there aren't enough clothes to go around. How many more houses do we need? People are not homeless because they aren't enough houses or living space, but for the same reasons they are hungry and cold.

What about the non-necessities of life, the *things* that make life *better* for those who can afford them? How many more cars do we need, when we can only drive one at a time? Do we need bigger houses, when many rooms now set empty and people don't have time to live in the houses they own? Do we need more clothes, when closets are already filled with clothes rarely worn? Do we need more food, when the nation is struggling with an epidemic of obesity? What about more computers, cell phones, and web sites – new information technologies – for what? Do we need these technologies to build and sell sophisticated *things*? How many more, more-sophisticated, things do we *need*?

What about personal services – recreation, virtual vacations, things that make our chores less tiresome, make leisure time more relaxing; such things take the hassle out of living? We are told these things will allow more of us to live the good life. But, where would the pursuit of this vision of the good life actually lead us? Perhaps one day in the future, a person could be born, could be hooked up to a virtual reality machine, could take pills for hydration and nourishment to eliminate the unpleasantness of human waste, and could be entertained *virtually*, all day, every day, until they eventually grow old and die. Or perhaps, we could devise the means by which no one would even have to grow old and die. Maybe we could do all this, but why do it? What would be the purpose of it? What difference would any of it make to anyone or anything? An extreme scenario, perhaps, but it simply points out the intrinsic nature of the escapist lifestyle many Americans seem to be pursuing today. Hopefully, we will wake up before we reach such a state of absurdity; but why not wake up now?

Our common sense tells us what we really need is an ability to get along better with each other – within families, among friends, within communities, within nations, and among people of all nations of the world. We need to learn to build more-positive human relationships. We need to learn to build each other up rather than tear each other down – and learn to receive something in return that builds us up as well. A world with far fewer wars – that would be a step toward human progress. A world with less crime, fewer prisons, fewer policemen, and fewer judges – that would be a step forward for humanity. A world with less personal conflict, fewer fights, fewer lawyers, fewer broken families – that would be a better world. A world without terrorism, without genocide, without war, would be a better world. All of these things are possible, but only if we break free of our destructive patterns of dependence, competition, and exploitation and start building new patterns of truly interdependent relationships.

We must begin the process of breaking free of our destructive co-dependent relationships by challenging the ways of thinking and knowing that emerged from the Age of Reason. In the late 1600's, a specific method of inquiry was devised for discerning knowledge and it was called the *scientific method*. The scientific method involves both inductive and deductive reasoning. Inductive reasoning begins with observations or experiments, from which are derived hypotheses and theories concerning the nature of relationships. Deductive reasoning begins with theories or hypotheses concerning the nature of relationships, which are then verified or refuted through observation or experiments. Scientists generally begin by making general observations of relationships among things and then formulate their hypothesis regarding the specific nature of the observed relationships. Next, they design experiments or make specific observations to either verify or refute their hypotheses. Finally, they draw some logical conclusion regarding the validity of hypothesized relationships basis on their experiments or observations. This is the scientific method – the accepted definition today of *good science*.

For example, current-day meteorologists have observed some general relationships between the temperature of water in Pacific Ocean currents and weather patterns in the United States – commonly called the El Nino effect. Since scientists can't experiment with the weather, they must rely on observations of natural occurrences. Scientists have formulated hypotheses concerning the relationship between El Nino and specific weather patterns – during El Nino, it will be hotter in some regions and

cooler in others, it will be wetter in some regions, and dryer in others, and more storms will occur in some regions and fewer in others. Now scientists are observing weather patterns to test their hypotheses.

Meteorologists, thus far, have been unable to either verify or refute their El Nino hypotheses because they have too few observations or have observed too much variability from year to year. Over time, if observations provide more evidence to verify some of the hypotheses, scientists will be able to formulate theories. Theories have more credibility than hypotheses, because they have been supported, although not proven, through observation. Scientific theories become scientific laws only if relationships can be specified, quantified, and validated through repeated observations. If we had an El Nino *law* rather than an El Nino *hypothesis*, meteorologists would be able to predict precisely how much more or less rain a given location would receive as a consequence of a given change in ocean temperature. It seems highly unlikely that meteorologists will ever be able to derive such laws, but this is how they would search for the truth of such laws by using the scientific method.

The scientific method, as it is commonly practiced today, is based on a specific kind of worldview – a mechanistic worldview. It is based on the preconceived notion that the world works like a big sophisticated machine made up of many complex and interrelated, but separable, parts. In science, the relationships among these parts are understood in terms of causes and effects. Some parts cause effects on other parts. A part is said to be *independent*, if it affects other parts, or *dependent*, if it is affected by other parts. The mutual dependence among all parts in the effective functioning of the mechanism is implicitly recognized, in terms of individual independent-dependent relationships, not in terms of true *interdependence*. Relying solely on the scientific method, the whole is understood only as a collection of individual, interrelated parts – not as an inseparable, unified whole. Herein, lays the root cause of today's co-dependent, dysfunctional society.

In the early seventeenth century, a Frenchman, Rene Descartes, laid the philosophical foundation for the scientific worldview of today. Descartes believed that God had created a world of reality that is made up of two classes of substances. One class was "thinking" substances, like the mind, the other he called "extended" substances, like the body. He considered living things, specifically humans and other animals, to be made up of both thinking and extended substances. Descartes believed that all non-living things, and even the non-thinking parts of living things, operated as if they were sophisticated machines. He frequently used the clock, with its many precisely interrelated parts, as an analogy for how the non-thinking world worked. Each part has a specific function and a specific relationship to all other parts – they fit together physically, they worked together sequentially. A weight, spring, water, or some other energy source causes one part to move, which causes other parts to move, in sequence, eventually causing the hands of the clock to move. Each effect, i.e., movement, has definite cause.

Isaac Newton, an Englishman, built upon the work of Descartes and others to develop the mathematical foundation for contemporary scientific thinking. Although best known for deriving the law of gravity, Newton created the concepts of calculus and discovered many of the fundamental laws of mechanical physics. Newton, like Descartes before him and most scientists since, viewed the world as fundamentally mechanistic in nature.

According to contemporary science, all we have to do to understand anything it is to take it apart, piece by piece, and observe how the parts work together to form the whole. The parts are separable – so we can understand the whole of a thing by understanding the functioning of its individual parts. That's what the word *analysis* means – taking things apart to examine the pieces. In a mechanistic world, relationships are defined in terms of causes and effects. And in science, all phenomena of interest are either the cause of or the effect of something else.

In the world of science, *reality* exists – independent of our ability to observe or understand it. Reality can be understood and defined only in terms of objectively observable, verifiable, replicable, sensory experiences. If it can't be observed, replicated, and verified – by seeing, hearing, touching, smelling, etc. – you simply cannot conclude that you have discovered anything real. Our senses are often aided by sophisticated sensing devices – microscopes, telescopes, listening devices, feeling devices, etc.; however, in science, no scientific conclusion is considered credible until it is verified by some sensory method. For example, scientists have developed various hypotheses about *black holes* in space, but such hypotheses achieve scientific credibility only when scientists see something in space to validate their claim. The purpose of science is to discover and define reality, and reality can be verified through sensory experience.

This all seemed quite logical and reasonable, at least until a few decades ago. In the early twentieth century, the world of physics was shaken at its very foundation. Einstein put forth his *theory of relativity*, Heisenberg, his *uncertainty principle*, and a handful of other scientists developed new *quantum theories* of physics. Quantum theory, in particular, turned the world of classical, mechanical physics upside down

and shattered the philosophical foundation that had supported the Age of Reason.

Defenders of the scientific status quo staunchly argue that quantum theory only applies to things at the subatomic level – to things so small that most of us don't even realize they exist. However if some of the most important quantum theories are valid, then all phenomena at all levels of organization are interconnected. Thus, things true at the subatomic level quite likely are true of all higher and lower levels of organization as well.

Quantum theory suggests that objects do not have properties independent of their environment – that reality is determined as much by the interconnections among things as by the things connected. Quantum reality exists as *potentials*, which become *real* only when something is observed within a specific context – in relation to other things. Things *become real*, when we observe them, and thus, we can't observe anything without changing it from potential to reality. Since a thing might be observed in more than one context, it has more than one potential reality. So, facts are a function of human observation – of human consciousness.

A classic quandary in quantum reality is a question regarding the "cat in the box." The story goes: "There is a cat in a box. There's no means of determining whether the cat is alive or dead without opening the box. Question: 'Without opening the box, tell me, is the cat alive or is it dead?' The answer, 'It's neither alive nor dead – not until you open the box and discover it to be one or the other.'" Such is the nature of quantum reality – it exists as potentiality. And such a concept of reality seems completely illogical and irrational in a mechanistic, materialistic world.

A now-classic experiment in quantum physics pertains to the nature of light. When scientists devised a method for observing light as energy, as light waves, they were able to observe it as energy. But, when they devised an alternative method to observe light as matter, as particles or photons, they were also able to observe it as matter. In mechanical physics, everything is either energy or matter, but not both. In quantum physics, light is both, you find whichever you look for. Our assumptions concerning the nature of phenomena determine our methods of observation, and thus, shape the nature of the phenomena we observe.

Science, in general, is based on the proposition that reality exists as fact, and is objectively observable, replicable, and verifiable. However, quantum reality exists as potential, and is not objectively observable, replicable, or verifiable. Quantum reality depends on the conditions under which the observation is made, including the means of observation and the person observing.

So how are scientists today able to observe the same phenomena, replicate experiments, and verify each other's results in coming to the same scientific conclusions? Everything in a quantum world is interconnected with everything else, but some connections are just weaker than others. For dead things, many of the connections are weak, and thus, cause and effect relationships can be effectively isolated and observed. In living systems, however, the interconnections often are strong and important, making isolation of cause and effect virtually impossible. Virtually every part of a living plant or animal is important to the life of the organism. Relationships among people within families, communities, and nations and among communities and nations are important to the people involved.

The hard sciences deal effectively with dead things – with chemicals, minerals, and gasses – and for dead things, the connections are weak. Even the researcher is less likely to be biased by experience when dealing with chemicals and minerals than with past relationships with people or other living things. When dealing strictly with dead things, a mechanical approach to science does no great harm. However, an inadequate understanding the relationships between chemical, minerals, gasses, etc. to living things most certainly is cause for concern.

The sciences of living systems, such as economics, sociology, and ecology, where relationships are strong, the mechanical approach to science is clearly inappropriate and has been largely ineffective. There are no true mechanical laws of economics, sociology, or ecology. In living systems, whatever is observed is always significantly dependent upon the conditions under which the observation is made, and is always dependent upon the observer.

Apparently, Descartes was at least partially right; "God did create a world of reality made up of two classes of substances" – the living and the dead. A mechanistic approach to science may be acceptable, if not completely accurate, for dealing with dead things; however, treating living things as if they are dead has inevitable negative consequences. Mutually exploitative co-dependence today is a direct consequence of treating an organismic, living world as if it were mechanistic or dead.

Relationships of dominance and submission seem natural and normal in a mechanistic world. One person causes and the other person is affected; one is independent, the other is dependent. With these central ideas of how the world works, it's easy to understand why we tend mentally to put people into hierarchical categories. Some people provide jobs and others work for them, some people run for public office, and others support them, some people teach or preach, and others listen and

learn from them. Someone must be in charge, we are told; otherwise, there will be chaos. Concepts such as shared-leadership, shared-responsibility, shared-learning and shared- rewards seem unreasonable and illogical in a mechanistic world of cause and effect. Mutual benefits, to the extent they exist, are seen as consequences of people accepting their appropriate place in the natural hierarchy of things. Interdependent relationships of choice, among otherwise independent people, simply don't fit the mechanistic model. Most people probably are unaware that their basic beliefs about normal human relationships are rooted in the science and logic of a now ancient Age of Reason.

In the real world, chaos exists, regardless of whether we like it. However, the existence of chaos does not imply the absence of order. Neither does chaos preclude the ability to function effectively and efficiently. Chaos theory is another twentieth-century scientific development that has shaken the foundations of predictive science. A Frenchman, Poincaré, supposedly anticipated chaos theory in the late 1800s when he questioned the predictability of motion in the solar system. But Edward Lorenz, an American meteorologist is credited with developing the modern theory of chaotic motion. Lorenz showed that weather models, although based on fairly simply mathematical equations, were extremely sensitive to initial assumptions; small changes in assumptions could lead to wildly different forecasts. He concluded that it was scientifically impossible to make accurate long-range weather forecasts, although clearly definable short run weather patterns made short run forecasting quite feasible. The behavior of weather patterns over time is chaotic, he claimed. If true, forecasters will never be able to validate an El Nino law or to prove that ocean temperatures precisely determine weather.

In general, many natural systems are simply too complex – they have too many significant interrelationships – to be accurately modeled for purposes of long run forecasting. The errors in long run forecasts are not *random* errors, as is assumed in all statistical forecast models, but instead are the consequence of complexities that are well defined, but simply too complex to be discerned. There is definite order within chaos. In the short run, fewer interactions have time to take place, which results in predictable short run patterns, even while the long run remains unpredictable.

High-speed computers have allowed scientists to show that general patterns will emerge even out of long-term chaos, given a sufficient number, like billions, of observations. But it is still impossible to predict where any future observation will occur within that pattern. So there are general patterns or trends within even the most complex reality, although specific occurrences remain fundamentally uncertain. Typical examples of chaotic phenomena include smoke, steam, clouds, streams, ocean currents, disease outbreaks, insect infestations, and plant and animal populations. I believe all living organizations, including families, communities, economies, societies, and ecosystems, are inherently chaotic in nature.

I first became interested in chaos theory when I was trying to forecast livestock prices in Oklahoma. I have since come to believe that most markets, including the stock markets, are chaotic phenomena and are fundamentally unpredictable over any significant period of time. Market analysts who successfully discern short-term patterns and trends in prices can create an allusion of predictability. But markets can shift chaotically and dramatically, to higher or lower level, catching the best of market experts totally by surprise. I've seen it happen, over and over again. It has happened to me. Economists cannot forecast the future; the economy is chaotic.

During my last few years in Oklahoma, I discovered that month-to-month changes in cattle prices were being influenced far more by cyclical changes in the spread between prices of beef in retail stores and live cattle prices, than by changes in fundamental supply and demand conditions. The cycle I discovered was about 11 months. At the narrow point of the cycle, live cattle prices would be as much as $10 per hundredweight higher relative to retail-beef prices than at the wide point of the cycle. I had discovered a short run pattern in a market that I knew, from previous research, to be fundamentally unpredictable over the long run. Sure, there were broad patterns or cycles in cattle supplies and prices; but the long run cycles were too variable in length and amplitude to be of any real use in long run price forecasting.

As long as the pattern held, I was forecasting cattle prices more accurately than anyone in the country. But, I had studied historic spreads between retail-beef and live cattle prices, and I knew that spreads were not predictable over time. Spreads were determined in a dynamic system with a host of intangible variables, including many and varied expectations and lagged reactions – the process was simply too complex to predict. I knew that once something happened to break this particular pattern, I wouldn't have a clue as to what type of pattern might emerge next. And, until I was able to discern a new pattern, I wouldn't be able to predict prices. I now see this same type of phenomena in all types of living organization, including economies, societies, and ecosystems. They seem to behave in an orderly, predictable fashion for a time, but

then, something seems to trigger a dramatic, unanticipated change – a recession, a revolution, or an ecological collapse. Then, a time of apparent chaos eventually is followed by a time of comparative order and predictability.

I realized that I didn't need a Ph.D. in economics to forecast livestock prices – to the extent that they were predictable. So, I moved on to other things. But, I moved on with a clear understanding that livestock markets are not mechanistic systems with separable and measurable causes and effects. I understood also that living systems were not predictable over any extended period. I knew living systems function according to basic underlying principles, and thus, order exists within the chaos. But, if science was to support further progress in managing economics, societies, natural ecosystems or in any other living system, I believed science itself would first have to change.

Quantum physics and chaos theory seem to point the way to such change. Chaos theory has no obvious relationship to quantum physics, except that both challenge the worldview that has dominated thinking throughout the Age of Reason. The chaotic behavior of observable phenomena, such as weather and markets, has definite similarities to quantum behavior of subatomic phenomena, although I am not aware of anyone attempting to link one to the other scientifically. Both most certainly raise questions about the adequacy of a mechanistic, deterministic science as the foundation for contemporary thinking, and thus, seem to hold promise for better understanding of an organismic, living world.

Human organizations – cultures, societies, economies – are living systems. Certainly, such systems have mechanistic, non-living elements. But, the non-living elements are passive – they cannot change their reactions to actions. Living things, on the other hand, may respond differently in the future than they responded in the past, even to the same stimulus. Living things are constantly growing, evolving, and changing. Thus, cultures, societies, and economies must be managed, or rather nurtured, as living organisms, rather than as dead machines. The differences between living and dead systems are subtle, at least in the abstract. Nonetheless, they are based on fundamentally different worldviews.

In his book, The Web of Life, physicists Fritjof Capra contends that all systems, living and dead, possess three basic characteristics: pattern, structure, and process.[3] Pattern is the conceptual framework for the system. For a dead system, the pattern is the blueprint or design. For a living system, the pattern is embedded in the DNA – in the genetic code. For both living and dead systems, the pattern is constant, unchanging, fixed over time. A bicycle always is a bicycle, for example, and a person always is a person.

The structure of a system is the physical manifestation of the pattern. For dead systems, the structure is the thing you see or touch – the bicycle, automobile, building, etc. For a living system, the structure also is the thing you see or touch – the plant, animal, human, etc. The primary difference between dead and living systems is found in the different nature of their structures. For dead systems, the structure is fixed – it can never change on its own. It may wear out or it may be rebuilt or redesigned, but it has no ability to change itself. A machine keeps its same physical structure for all of its useful life – a bicycle always has the same size, shape, and form. However, the structure of a living system is in a continual state of change. Living things are born, they grow, they mature, they reproduce, and they die – the baby, the adult, and the old man are all the same person. This continual change in structure is a fundamental characteristic of all living things.

Process also is different for dead and living systems. Dead systems perform their purpose or tasks by linear sequential processes of input, transformation, and output. The fundamental purpose of dead systems is to transform some input into a more useful or desirable output. A person rides a bicycle to transform kinetic energy stored in leg muscles into mechanical energy that turns the wheels and propels the bike down the road. An engine transforms the kinetic energy in fossil fuels into mechanical energy to perform some useful task. Input results in output.

Living systems perform useful purposes or tasks as well, but living processes are self-renewing and self-regenerating as well as functional. Living systems replace the cells of their bodies and transform their physical structure in the process of performing their functions. The human body transforms kinetic energy into physical work, but it also builds muscles, changes, grows, and eventually dies in the process. Living processes are circular and simultaneous rather than linear and sequential. As plants grow, they convert solar energy into protein, carbohydrates, and fats – energy forms that can provide energy for animals or for the next generation of plants. Function and regeneration occur simultaneously for living system – they renew themselves in the process of fulfilling their purpose.

In summary, dead systems are designed to accomplish some purpose according to a blueprint or pattern, their structure is fixed or constant, they function for the duration of their usefulness, and then they are either redesigned or discarded. For living systems, on the other hand, the

pattern and purpose is embedded in their genetic makeup, in their DNA. The processes of a living system include both functional usefulness and self-renewal. Living systems continually change and renew their structure in accordance with the unchanging genetic code embedded in their DNA. The DNA of living organisms obviously changes from generation to generation, as organisms evolve and adapt to their ever-changing environment – another difference between living and non-living systems. But, DNA remains unchanged during each lifetime.

We all function as parts of living organizations. Families, communities, economies, societies, and natural ecosystems are all living organizations. During my last five years at the University of Missouri, I provided leadership for a three-state sustainable rural community development project, which focused on nurturing living communities. This the Kellogg project linking sustainable agriculture with sustainable community development. For five years, the project team attempted to carry the project according to the principles of a "living organization" – patterned after Dee Hock's "Chaordic" organizational paradigm, described briefly in the preface to this chapter.[4] We built the project organization around a fundamental purpose and set of principles – the conceptual DNA. The individuals involved in the project were then free to pursue a wide range of means of contributing to the overall purpose of the project, as long as they remained true to the set of fundamental guiding principles – the structure was to be dynamic and self-renewing.

The purpose and principles of the project were articulated with input from, even if not fully embraced by, all who were actively involved in the project. Our stated purpose was, "To create a place where our children and our children's children will choose to live and grow." Our purpose was to be achieved by following our principles: "by linking people, purpose and place," through "shared-leadership, shared-responsible, and shared-rewards," utilizing, "local initiative, local leadership, and local investment," to "create wealth while caring for the land and building community."

In general, the experiment was successful. However, I encountered a number of difficulties in providing leadership for this type of project. It was difficult to explain to those involved how a "living organization" is meant to function because we are all so accustomed to the mechanistic, industrial model of organization. I had even more difficulty convincing people that we could carry out a successful project without the usual rigid organizational structure spelled out in a hierarchical organizational chart, accompanied by a set of written operating procedures. People kept asking what I wanted them to do – I was seen as being the one *in charge*.

The best example of an effective living organization I was able to provide was that of an effective democracy. The conceptual DNA of a democracy is encoded in the Constitution. The preamble to the U.S. Constitution begins by spelling out the purpose of the Union. "We the People of the United States, in order to form a more perfect Union, establish justice, insure domestic tranquility, provide for the common defense, promote the general welfare, and secure the blessings of liberty to ourselves and our posterity, do ordain and establish this Constitution for the United States of America." The Bill of Rights outlines the fundamental principles by which our democracy is to be carried out. The first four Articles of the Constitution define the structure of the government – with its legislative, executive, and judicial branches – and define the nature of relationships between national and state governments. But, Article V makes it clear that the Constitution is to be a living document, in making clear provisions for the people to amend and even rewrite the Constitution whenever necessary to meet the changing needs of the people. The DNA of a democracy must evolve from generation to generation to accommodate its ever-changing environment.

Our experiment with a living organizational paradigm in Missouri was less than completely successful – primarily because we were unable to convey an understanding of and to maintain a commitment to the purpose and principles of the project. However, I remain convinced that a living organization is not only a far more hospitable climate in which to work, but is potentially far more productive than the more common industrial organization.

The people who work in organizations are living beings and most of the work being done today relates to living systems. It is just common sense that our organizations should be modeled after living systems. By organizing around principles, the structure of the post-industrial organization can continually change and evolve as needed to continue fulfilling its purpose. The health and regenerative capacity of living systems depend upon mutually beneficial, interdependent relationships among the cells, organs, organisms, or people that comprise the organism or organization. The post-industrial organization – including families, communities, societies, and ecosystems – can empower people to use their uniquely human capacity to think and to act on their own for the mutual benefit of all. People, in general, must accept their God-given responsibility to make conscious purposeful decisions to care for each other and to care for the earth, if we are to sustain a desirable quality of human life on earth.

I am not wise enough to anticipate with any degree of accuracy the next steps forward for humanity – even if it were humanely possible to do so. But, common sense tells us that the world will continue to change and human society must change also. There are growing indications that an old era is coming to an end and a new era is being born. Our common sense also tells us some of the things that the new era must be, if it is to represent true progress for humanity. A better world cannot be built by continuing to produce ever-increasing quantities of things, but instead must come from positive, interdependent, mutually beneficial relationships – among people and between people and their natural environment. If we are to live in a better world, we must break free of the bonds of dependent relationships of necessity and develop interdependent relationships of choice.

In the new era, we must reach beyond the logic and reasoning of the scientific method to understand the true nature of our relationships with each other and with the earth – not rejecting science but neither denying our common sense that a better science is both possible and necessary. The conceptual foundations of contemporary, mechanistic, scientific thinking have been eroded by new kinds of thinking, such as quantum physics, chaos theory, and principles of living systems. We are discovering that the world does not resemble a big complex machine nearly so much as is resembles a complex living organism. We need a new science that is capable of dealing with the living as well as non-living elements of the organisms, organizations, and ecosystems of the earth. And, to give purpose and meaning to our efforts to understand both living and non-living systems, we need to return to common sense.

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