AN INTRODUCTION TO THE SYSTEMS APPROACH

By H. William Dettmer

There is no question that in our age there is a good deal of turmoil about the manner in which society is run. Probably at no point in the history of man has there been so much discussion about the rights and wrongs of the policy makers…[Citizens have] begun to suspect that the people who make the major decisions that affect our lives don't know what they are doing… They don't know what they are doing simply because they have no adequate basis to judge the effects of their decisions. To many it must seem that we live in an age of moronic decision making.

—C. West Churchman

The Systems Approach [Introduction] [1:vi]

It sounds like Churchman is talking about us today, doesn't it? The preceding quotation comes from the introduction to his seminal book on systems thinking, *The Systems Approach,* written in 1968. That's sad testimony to the fact that few decision makers in the world have learned much about complex systems in the last 37 years. In the immortal words of Winston Churchill, "Man will occasionally stumble over the truth, but usually he just picks himself up and continues on."

We've been "continuing on" for four decades. It's time to go back and revisit that truth we stumbled over in 1968. We can snicker at the fact that life seemed so much simpler then. The world has "gotten smaller" as travel, communication, the information age, and the Internet have combined to connect people and societies as never before. As economies have evolved from regional to national to transnational to global, our organizations have grown in size and complexity. It is nearly impossible for the people running them to fully understand what goes on "where the rubber meets the road" in nations, governments, and companies.

Analysis versus Synthesis

Since the turn of the century (the 20th century, that is), the accepted approach to dealing with increasing complexity is to try to *reduce* it into manageable "bites" and address them in isolation. This approach is referred to as analysis. We analyze a complex situation or issue by trying to break it down into component pieces and consider each in isolation from the others. This kind of thinking has its roots in analytic geometry, where one basic axiom is that *the whole is equal to the sum of its parts*. Think about that for a moment. The underlying assumption behind this conclusion is that all of the parts are essentially independent of one another.

But although this mathematical thinking might apply to bricks and other inanimate objects, it fails when applied to dynamic, homeostatic, or cybernetic systems [2:28-31]—which generally include any organic systems, or those where human beings have a role. And unfortunately such systems are the ones that exert the most influence on our lives. We see the failure of the analytical approach all the time: The Rohr Corporation's Riverside, California, plant recorded a 55% increase in profits in 1996. Great news, if all you focus on is short-term profits. When you look at the larger system, you see the reason for that increase is better "efficiency" (meaning cost cutting) temporarily had a greater impact than the 3% decline in sales. Or, as the corporate treasurer enthusiastically observed, "Costs have come down quicker than our revenue has decreased." [3:G-1].

(I'm sure the 3,500 people laid off at Riverside by Rohr in the preceding few years are immensely gratified to know that!) The Rohr story is a classic example of self-delusion by analytical thinking.

If an analytical approach to management is counter-productive, what should we be doing instead? A holistic, or whole system approach is considerably better suited to the kinds of complex organizations we usually encounter today. What's the difference between an analytical and a systems approach? The systems approach represents synthesis—thinking with an integrated perspective about the whole enterprise. Before one can synthesize, one must first analyze. In other words, we first take the system apart (usually conceptually—it's not often practical to physically deconstruct the systems we normally work with) to understand the functions of each link or component. Once the components are fully understood in isolation, we study the interactions among components to understand how the system as a whole functions. Understanding these interactions requires *integrating* the components into something larger and more capable than the components represent alone. In the fourth installment of this series, we'll examine analysis and synthesis in more detail. And in the ninth installment, we'll consider some tools to help us visualize and manage a system as an integrated whole.

A Paradigm Shift

In 1962, Thomas Kuhn introduced the word *paradigm* [4:x] to describe a pattern of knowledge, rules, assumptions, or thinking. The difference between an analytical approach to management and a synthesis approach might easily be characterized as a paradigm *shift,* or a significant change in the "rules of the game." Paradigm shifts can be either evolutionary (i.e., a slow pace of change) or revolutionary—dramatic, short-term, and immediate high impact. The rise to primacy of air travel over ships was an evolutionary change. The advent of the atomic bomb was a revolutionary shift—almost overnight—in the way we looked at national defense.

The shift from analysis to synthesis in the way we consider systems is assuredly an evolutionary paradigm shift. It's been under way for nearly 40 years. It started in engineering, where synthesis has been the source of creativity and innovation. Even now, an Internet search on "analysis versus synthesis" will turn up a preponderance of engineering references. But since Churchman's work, the concept of synthesis has begun a transition from the purely technical arenas to the sociological, ecological, environmental, and philosophical. So far, this transition seems to have been neither consistent nor continuous. In fact in some respects, as our world has become more complex, many leaders and managers seem to have retreated even more deeply into analytical thinking: "If our world is getting more difficult to manage, we need to *analyze* the situation more. We need more *detailed information!*" (Who was is that said "the definition of insanity is doing the same thing over and over, and expecting a different result"?)

The Importance of Theory

Theory can be a slippery word. Many (most?) people outside the science community don't really understand the meaning of the word. I frequently hear executives say, "I don't have time to worry about theory—I'm too busy dealing with the real world." A similar comment one frequently hears is, "Well, that's only a theory." Both statements indicate an erroneous perception that theory is no more than

speculation, or a best guess. Nothing could be farther from the truth.

W. Edwards Deming, one of the people who taught the Japanese the concepts of quality that they subsequently used to hammer the west economically for the last quarter of the 20th century, said this about theory:

Experience alone, without theory, teaches management nothing about what to do to improve quality and competitive position, nor how to do it…Experience will answer a question, and a question comes from theory. [5:19]

And later:

Without theory, there is no learning…Theory is a window into the world. Theory leads to prediction. Without prediction, examples and experience teach nothing. To copy an example of success, without understanding it with the aid of theory, may lead to disaster. [6:106]

Deming was not the first or only system thinker, but because of his impact on Japanese business, he happens to be one that many people pay attention to. Not long before he died, Deming proposed what he called his system of profound knowledge. [6: 94-118] Successful transformation of any organization, Deming suggested, depending on a thorough understanding of four components of profound knowledge. These components include appreciation for a system, knowledge about variation, the theory of knowledge, and an understanding of psychology.

Grossly oversimplified, Deming was saying that if you don't see your environment as a system of interdependent parts, you don't understand the nature of variation within and among those parts, you have no clue about why or how you know what you know about your system, and you don't comprehend the psychology that drives the humans that make up your system, you haven't got a chance success—except by dumb luck. (And who would be comfortable depending on that?) In the sixth installment of this series, we'll see how Deming's idea of profound knowledge will help us understand and manage our systems *as* systems.

The Scientific Method

All of these concepts we've examined so far—analysis and synthesis, the importance of theory, and Deming's system of profound knowledge—represent the underlying foundation for an effective systems approach to management. But they are no more than a foundation without a methodology to follow. The scientific method is an excellent transition from foundation to practice.

The scientific method begins with informal observation of discrete phenomena or events. The person practicing the method, sensing a connection of some kind among the events and using inductive logic, generalizes a hypothesis to explain the cause-and-effect relationship between them. This hypothesis is then tested either by experimentation or more intensive observation to confirm or refute the hypothesis. If the hypothesis is invalidated, it's usually "thrown away." On the other hand, if there seems to be some confirmation in the experiments or observations, then the hypothesis takes on the characteristics of a theory: a proposition with some evidence to support it. As time goes on and more data on the subject is accumulated, some aspects of the theory may be reinforced, and some data points that don't fit the theory may be

discovered. If these data can't be adequately explained in light of the theory or accepted knowledge, then the theory may be abandoned. However, it is more likely that the theory will be modified to fit the existence of the outlying data points. In this way, the theory is improved, and our knowledge of reality is enriched. In other words, we have *learned* something! This learning is at the heart of Peter Senge's classic management book, *The Fifth Discipline*. [7]

The importance of learning in any endeavor cannot be overemphasized. George Santayana once said, "Those who cannot learn from history are doomed to repeat it." This is another way of saying "Learn from your mistakes, or you'll have to do them over again until you get it right." (Remember the definition of insanity, mentioned earlier?)

Summary

There is a paradigm shift underway, from analytical thinking to systems thinking. In time, it will transform the way business is done, in commercial enterprise, government, and the not-for-profit sector. You can ride the leading edge of this wave, or you can swim like the devil to try to catch up with it after it's passed. Over the next twelve months, we'll see how you can do the former, if you're so inclined.

We'll see how theory and sound methods will contribute to the challenge of learning more about our systems, how they function, and how to get improvement efforts right the first time.

Winners make things happen. Losers let things happen, or watch things happen and wonder what happened.

—Unknown

ENDNOTES

1. Churchman, C. West. The Systems Approach. New York: Dell Publishing Co., 1968.
2. Athey, Thomas H. The Systematic Systems Approach. New Jersey: Prentice-Hall, 1982.
3. "Rohr reports big increase in earnings," The Riverside (California) Press-Enterprise, May 22, 1996, p.G-1
4. Kuhn, Thomas S., The Structure of Scientific Revolutions. Chicago, IL: University of Chicago Press, 1962
5. Deming, W. Edwards. Out of the Crisis. Cambridge, MA: MIT Center for Advanced Engineering Study, 1986.
6. W. Edwards Deming. The New Economics for Industry, Government, Education. Cambridge, MA: MIT Center for Advanced Engineering Study, 1993.
7. Senge, Peter. The Fifth Discipline: The Art and Practice of the Learning Organization. New York: Doubleday, 1990.

ABOUT BILL DETTMER

Bill Dettmer is a world recognised authority on Theory of Constraints & Total Quality . His publications include:

- Goldratt's Theory of Constraints (ASQ Quality Press, 1997)
- Breaking the Constraints to World-Class Performance (ASQ Quality Press, 1998),
- Strategic Navigation (ASQ Quality Press, 2003),
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