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Systems Thinking and the Cynefin Framework

A Strategic Approach to Managing Complex Systems

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ABSTRACT

The evolution of management over the past century, from Taylor and Fayol through Drucker and Deming, has been a process of continuing search, trial and error, deduction and induction, figuring out what works, what works better, and what doesn't work very well at all. There is no shortage of management methods and tools. However, the preponderance of these are tactical and quantitative. Strategic, qualitative management aids are considerably fewer in number. Some methods and tools have realized significant successes in a variety of situations, while failing to meet expectations in others. Until now, there hasn't been an obvious underlying principle to explain why.

Systems and their external environments can be classified as simple, complicated, complex, and chaotic. This taxonomy is known as the Cynefin Framework. It provides an orderly way to evaluate the interaction of organizational systems, their external environments, and the myriad of management methods and tools available to decision makers. A significant number of organizations today qualify as complex. Their environment may change in short but irregular, unpredictable cycles, requiring the organization to adapt internally accordingly to avoid degradation. But the majority of available management methods and tools have been designed to succeed in simple and complicated domains, not complex. The failure to identify and understand the underlying assumptions about these methods made this limitation inevitable. That is about to change.

A BRIEF HISTORY OF MANAGEMENT

Many volumes have been written on the evolution of management over the last 125 years. It's not possible to recount all of that here, nor would doing so really advance the message of this paper. But some foundation—an anchor for the discussion that follows—is required as a departure point for considering a new way of viewing management of systems.

Since the days of Frederick Taylor and Henri Fayol in the early 20th century, the evolution of management has been a continual search for a theory or set of prescriptions that could effectively guide leaders' decision making in the widest possible variety of circumstances. The objective of this search has proved elusive. In most cases, it produced discrete tools or methodologies, usable in some circumstances though not in others, but not any kind of overarching framework that could be useful for the broadest population of organizational types: commercial, not-for-profit, and government agency.

Of Frederick Taylor, Peter Drucker, perhaps the most prominent management philosopher of the 20th century, said: [1]

> Frederick W. Taylor was the first man in recorded history who deemed work deserving of systematic observation and study. On Taylor's 'scientific management' rests, above all, the tremendous surge of affluence in the last seventy-five years which has lifted the working masses in the developed countries well above any level recorded before, even for the well-to-do. Taylor, though the Isaac Newton (or perhaps the Archimedes) of the science of work, laid only first foundations, however. *Not much has been added to them since even though he has been dead all of sixty years*. [Emphasis added]

Drucker wrote this in 1973. Since then the increase in management methodologies has been almost exponential.

Fayol's contributions were perhaps even more important to modern management. His functions and principles of management (**Figure 1**), first advanced in 1917, formed the basis for modern management thinking that persists to this day. [4] In the second half of the 20th century, Fayol's original functions were simplified to five: [5]

- Planning
- Organizing
- Staffing
- Directing (or leading)
- Controlling

Functions of management
1. Forecasting
2. Planning
3. Organizing
4. Commanding
5. Coordinating
6. Monitoring

Principles of Management
1. Division of work
2. Authority
3. Discipline
4. Unity of command
5. Unity of direction
6. Subordination of individual interests to the general interest.
7. Remuneration
8. Centralization
9. Scalar chain
10. Order
11. Equity
12. Stability of tenure of personnel
13. Initiative
14. Esprit de corps

Figure 1. Fayol's Functions and Principles

These are the basic things that all people with executive responsibility try to do well in order to succeed in their chosen environment. Both Taylor and Fayol sought to make the management of organizations more regimented, more standardized and repetitive, under the assumption that operations would be more consistent, effective, and controllable. Ultimately, such controllability was expected to produce better overall results.

From the perspective of the 21st century, the organizational systems Taylor and Fayol sought to regulate seem relatively simple, and largely linear. Even up to the mid-20th century, organizational systems remained fairly simple, or at most complicated, with a lot of components, but still relatively linear. Consequently, the standardization and regimentation that Taylor and Fayol sought to realize was relatively effective for the first half of the 20th century.

Vertical and Horizontal Integration

Throughout the first half of the 20th century, many of the largest companies in America were vertically integrated. [6] In other words, the same company controlled all elements of the supply chain, from raw material production through finished product distribution and sales. A good example of a vertically integrated company was Ford Motors. Ford owned the iron mines in the Mesabi Range of northern Minnesota and the rubber plantations of South America. Iron ore was shipped on Ford-owned and operated boats to Detroit, where it was delivered to Ford's River Rouge steel mill for smelting. The mill was adjacent to Ford's assembly plant. Rubber came by Ford-owned ships from South America to Ford's tire plants. All the components of Ford automobiles were produced by the company itself. Then the finished automobiles were shipped by Ford's transporters to Ford-controlled dealerships. Vertical integration provided corporate executives what they craved most: *control*. Vertically integrated companies may have been complicated and not terribly efficient, but from beginning to end they were firmly under the executive's control.

Horizontal integration, by comparison, is a strategy of market control in which a company acquires, or merges with, like businesses (perhaps even competitors) to expand its presence or control in other geographic or market segments. [7] For example, Delta Airlines' merger with Northwest Airlines in 2008 expanded Delta's reach into routes and markets it had previously not enjoyed. [8] But Delta is still not vertically integrated—it doesn't control its own fuel supplies, or the manufacture of its airplanes, or even all of the booking of its passengers.

Through World War II, most major companies were vertically integrated. But in the 1950s and 1960s, companies began to *dis*integrate vertically. [9] The advent of globalization following the war created an exciting new competitive environment, but it was also one that was more uncertain and risky, and less controllable. Vertical disintegration was a way of reducing risk and becoming more agile, more responsive to changes in market conditions. Moreover, by narrowing a company's span of attention to fewer corporate components, greater attention to efficiency was thought possible.

The Rise of Management Accounting

The increasing influence of "corporate bean counters" reinforced the drive for efficiency. Bob Lutz, the recently retired vice chairman of General Motors, observed: [10]

> ...the 1950s and '60s marked the decline of "the product guy" at GM and the ascendancy of professional management, often individuals with a strong financial background...and cars were merely a transitory form of money: put a certain quantity in at the front end, transform it into vehicles, and sell them for more money at the other end. The company cared about the other two ends—minimizing cost and maximizing revenue—but assumed that customer desire for the product was a given...without a passionate focus on great products from the top of the company on down, the "low-cost" part will be assured but the "high-revenue" part won't happen, just as it didn't at GM for so many years. (pp.41-42)

Not limited to commercial companies alone, the Defense Department of Robert McNamara in the 1960s, with its emphasis on *systems analysis*—the concerted application of mathematical optimization, modeling, game theory, dynamic programming, quadratic programming, and cost-benefit analyses—was accused of knowing "the cost of everything and the value of nothing." [11]

This exaggerated emphasis on the financial aspects of business management reached a peak in the 1980s with the advent of managerial (or management) accounting. [12] But the chief failing of managerial accounting is that it's almost exclusively inward-focused, and what externalities figure into it are almost inevitably based on assumptions, which, though accepted at face value, are often not verifiable, or even testable. Once again, Bob Lutz on external assumptions: [13]

> The error in the traditional Product Planning methodology is that it crowds out art, creativity, and spontaneous invention. It *assumes that automotive consumers are highly rational people* who will perform analyses and elaborate feature comparisons before making their purchase. As we well know, they don't. (pp. 133-114) [Emphasis added]

Analysis versus Synthesis [14]

Exacerbating the rise of "bean counting" is the historical tendency to analyze, rather than synthesize—to break things down, rather than to integrate them. Since the turn of the 20th century, 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 [15]—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 percent 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 percent decline in sales. Or, as the corporate treasurer enthusiastically observed, "Costs have come down quicker than our revenue has decreased." [16] (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 cautionary tale of self-delusion by analytical thinking and management accounting.

Globalization and Technology

Two other key factors in complicating management in the second half of the 20^{th} century are globalization and technology.

At the conclusion of World War II, the industrialized world was flat on its back economically, with one notable exception: the United States. America, one of the few combatants that did not suffer the direct devastation of war on its homeland, was also the only one with its industrial base not only intact, but actually at a peak of capability. This industrial base not only pulled America out of the great depression of the 1930s, but it became industrial supplier to the world as well—at least for the 15 years immediately concluding hostilities.

It can be fairly said that the end of World War II marked the advent of globalization. The U.S. began selling products overseas, and products from around the world began to appear in U.S. markets. This trend continued for the next six decades.

During the same period, the pace of technology advancement became almost exponential. The world "grew smaller" through advances in both communication and transportation. The time to cross the oceans dropped from days or weeks to mere hours. Air travel became affordable to the masses. Improvements in medicine, new discoveries in science (mostly physics and chemistry), and the higher standard of living these discoveries produced (so-called modern conveniences) all increased the complexity of life as well. Equipment became far more capable, but proportionally more complicated, too. For example, automobiles, once the domain of backyard mechanics, now require specialized training and expensive technical equipment to maintain.

Much of the increase in complexity came with increasing automation and the development of computers, integrated circuits, and their widespread incorporation ("embedding") into all manner of electro-mechanical devices. The most profound advance of all was the introduction and developmental explosion of personal computers—a seductive capability in search of application. And myriad such uses came out of the woodwork.

Take manufacturing, for example. What had previously been managed by people with handwritten or typed reports requiring days or weeks to prepare could now be done with the stroke of a key in a few seconds, or at most, minutes. Undreamed of economies of scale and efficiencies were possible. Take MRP, for example.

Material Requirements Planning (MRP-I) and its successor Manufacturing Resource Planning (MRP-II) represented the first substantive attempts to computerize, first, production scheduling and material ordering needs, and second, all aspects of a manufacturing firm. As with other complicated computer applications that exploded onto the scene between roughly 1985 and 2010, MRP-I/II in many cases became a kind of "crutch" on which managers came to depend, often abdicating their management responsibilities. ("The computer says 'replenish,' so that's what we're going to do.")

Increases in automation gradually phased out manual labor for many tasks. The combination of increasing efficiencies and the market competition of globalization resulted in cheaper products for consumers, raising people's standards of living even more. A collateral consequence of this industrial "evolution" was the shifting of a large proportion of what manual labor remained out of the country, to third-world countries with which the U.S. labor force could not effectively compete. [1]

Outsourcing

Another outcome of the never-ending quest for greater efficiencies and competitive edge was outsourcing. This is a euphemism for "vertically disintegrating," which was mentioned earlier. Ultimately, businesses became highly specialized. A classic example is Boeing Commercial Airplanes. It purports to be an aircraft manufacturing company, and there was a time when this characterization was accurate. But now, with the quantum increase in product complexity over the past 60 years, "aircraft assembler" would be a better description. Yes, Boeing still manufactures key structural components of its airliners, wings being the most significant. But from avionics to flight controls, engines, support systems, interiors, and even structural components, almost everything is outsourced to specialists all over the world.

Some of the motivation for outsourcing is certainly rooted in the complexity and technology inherent in the production of components. Rarely does a large-system manufacturer (perhaps better characterized as a systems integrator), in a rapidly evolving technical environment maintain the capability to also produce the complex technology inherent in those myriad components. But there are business motivations as well. In a truly open global market, competition will drive decision makers to outsource based on perceived cost savings alone.

Vertical disintegration, or outsourcing, is a two-edged sword. The price of cost savings is

[1] I still recall reading the label on a package of men's underwear I bought at a Sears store. It read "Assembled in Honduras." In other words, the fabric weaving, and perhaps even the cutting, took place in highly-automated American textile mills, but the pieces were shipped out of the country for sewing ("assembly"). The finished pieces were returned to the U.S. in bulk for packaging. And this was cheaper than paying American workers to do the same thing.

the creation of a new kind of complex system of interdependent organizations over which the primary company can exert only marginal, if any, control. At the same time, the uncertainty and variability incurred in the creation of such complex networks makes assured control even more problematic. The more connections or links there are in a system, the greater the chance of variability, or even system breakdown.

THE CHALLENGE

This, then, is the situation. Economies and societies are no longer isolated by nation or region. It's a global world, and old, simpler, more linear organizational structures aren't equal to the challenges such a world presents. The operating environment is more chaotic, uncertain, and more variable in shorter time horizons. The common traditional practice of analysis, rather than synthesis often produces sub-optimal solutions to complex problems. Managerial accounting, with its cost emphasis and inward focus doesn't always improve the situation. And the seductive tendency to depend heavily on technology, automation, and information systems frequently causes managers to abdicate their decision authority to "inanimate objects." **Figure 2** illustrates these contributory factors.

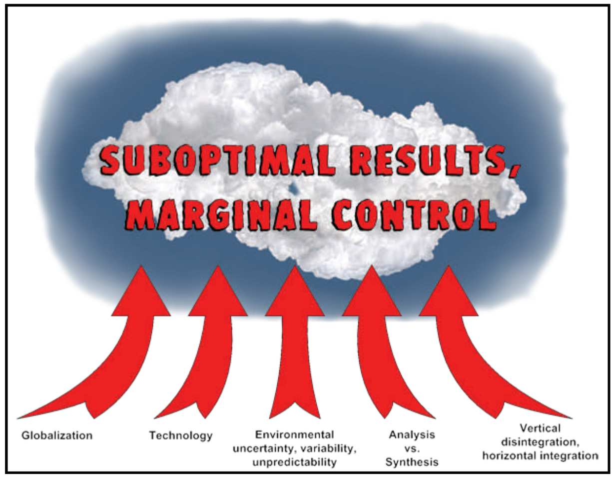

Figure 2. The Management Challenge

When people don't fully understand the essential nature of the systems they function in, letting the computer dictate the decision can actually seem reassuring. ("Well, I can't help it—the management information system said it was the right thing to do.")

Computer programs and decision information systems have a common shortcoming that might be expressed as "garbage in, garbage out." All that computers do is manipulate data according to pre-programmed algorithms. The outcome of the number-crunching depends entirely on the quality of data fed into the system and the accuracy (or realism) of the programming algorithm.

The Risk of Depending on Decision Support Systems

The vagaries of inaccurate data are well known. Less recognized is the divergence between the algorithm and reality. No computer can replicate reality exactly. All computer programs of the type that represent reality for decision-making purposes are *simulacra*—the "corners of reality are rounded off" to keep a lid on the computing power required. Consider the equations required to describe a simple system composed of two objects: [17]

> We must first describe how each object behaves by itself—the "isolated" behavior. We must also consider how the behavior of each body affects that of the other—the "interaction." Finally, we must consider how things will behave if neither of the objects is present—the "field" equation. Altogether, the most general two-body system required four equations: two "isolated" equations, one "interactive" equation, and one "field" equation.
>
> As the number of bodies increases, there remains but a single "field" equation, and only one "isolated" equation per body. [But the] number of "interaction" equations, grows magnificently...for n

bodies we would need 2^n relationships!

For only 10 interacting bodies, 2^{10}, or 1,024 interaction equations would be required. Computers, of course, can easily handle this level of complexity. But how many interactions are there among variables in corporate business systems, or climatological systems, or even processes as bounded as manufacturing?

Unless simplifications are made, we run squarely up against the Square Law of Computation: *The amount of computation involved increases at least as fast as the square of the number of equations*. [18] In the case of our 10-body system, those 1,035 equations (don't forget the ten isolation equations and the field equation) require a computer at least 1,071,225 times more powerful to successfully solve them in the same amount of time unless the corners of reality are rounded off (i.e., assumptions holding certain variables constant are made).

Since massively parallel supercomputers are not typically available for management use, and since decision makers are not accustomed to waiting days, weeks, or years for an answer, the obvious course of action (for computer software and hardware purveyors who actually want their products to be affordable) is to assume away *what appear to be* the least influential variables—a judgment call that is never free from risk.

The conclusion here is that, as constrained as the human brain may be computationally, human judgment and intuition are indispensable to effective decision making. This is not a bad thing, since, as Deming observed later in his life, *a priori* "The most important things are unknown and unknowable," and "The most important things cannot be measured." [19]

A horse! A horse! My kingdom for a horse! [2]

Still, humans are tool-making animals. It's one of the characteristics that distinguishes humanity from lower life forms. And in the realm of management, decision makers are constantly searching for newer and better tools. About the same time that the economies began to globalize and technology began to explode on the scene, new management methods and tools began to spring up. Some, such as management by objectives, came and went—"flavors of the month." Some, such as management accounting, came and stayed. Continuous improvement methods, sporting a veritable alphabet soup of acronyms such as TQM, QFD, BPR, SPC, MBWA, TOC, etc., and shorthand terms such as *kanban, kaizen,* just-in-time, lean, six sigma, etc., have occupied center stage for more than 20 years.

Unfortunately, the tools and methods in common use are usually discrete, process-oriented, and useful only within fairly restricted parameters. For example, just-in-time/*kanban*, designed for use in production processes, has little or no utility in marketing and sales, or product planning and development. Attempts to translate some methods into environments for which they weren't originally designed, like square pegs in round holes, often disappoint users with their results. Methods or techniques appropriate to commercial enterprises are often not relevant to not-for-profit organizations or government agencies.

But our organizations, whether commercial, not-for-profit, or government agency, live or die—succeed or fail—as whole systems, not as collections of independent processes. And these systems exist in, operate in, and interact with an external environment that includes other sys-

[2] Shakespeare, *The Tragedy of King Richard III*, Act V, Scene IV, line 9

tems and "state of nature" factors that can be irregular, highly variable, and unpredictable.

Complex problem solving and system improvement thus become somewhat of a crap-shoot. We hope we choose the right tool for the job at hand, based on our possibly incomplete understanding of the situation. It's no wonder that decision makers at every level are searching for a straightforward, reliable approach to whole-system improvement, not just "process polishing." Or, a Richard the Third said, "A horse...my kingdom for a horse!"

THE KEY TO SYSTEM SUCCESS: A SYSTEM NAVIGATION FRAMEWORK

> Big fleas have little fleas upon their backs to bite 'em. Little fleas have lesser fleas, and so on, *ad infinitum*.
>
> —The Siphonaptera

The key to engaging the apparently intractable problems that beset our organizations, societies, and countries is to recognize and understand the concept of systems—or, more accurately, a hierarchy of systems. Systems thinking is a relatively new domain. Essentially, it's an approach that views "problems" as parts of an overall system, rather than reacting to specific parts, outcomes or events and potentially contributing to development of unintended consequences. [20] Taking this thought a step further, each definable system is part of a larger system, and each system is composed of smaller systems.

Most people have heard the term "holistic." A holistic system is any set or group of interdependent or temporally interacting parts. These parts are generally systems themselves and are composed of other parts, just as systems are generally parts or *holons* [3] of other systems. Systems science argues that the only way to fully understand why a problem or element occurs and persists is to understand the parts in relation to the whole. [21] Standing in contrast to Descartes's scientific reductionism [22] and philosophical analysis, it proposes to view systems in a holistic manner. Consistent with systems philosophy, systems thinking encourages understanding a system by examining the linkages and interactions between the elements that compose the entirety of the system.

Synthesis versus Analysis

If the traditional analytical approach to management is counter-productive, what's the alternative? 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. Analysis tells us how the individual *parts function*; synthesis tells us how the various parts *work together*.

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—the internal *interactions* and the larger system's interaction with its external environment. Understanding the internal interactions requires *integrating* the components into something larger and more capable than the components represent

[3] *Holon* is a Greek word that translates as something that is simultaneously a whole and a part. (http://en.wikipedia.org/wiki/Holons)

alone. Understanding the external interactions depends on understanding the kind of system we're dealing with and the nature of the external environment.

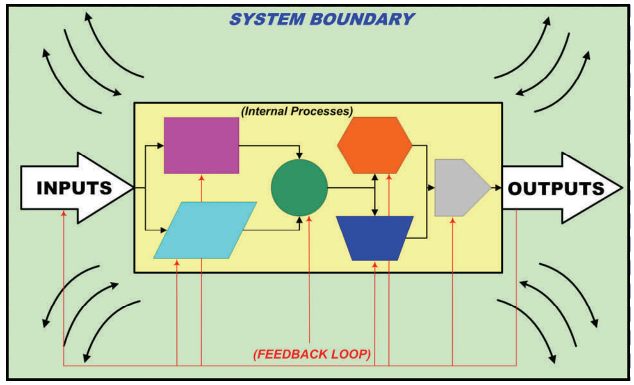

Figure 3. A Basic System

Systems and Environments

At it's simplest, a system is represented by some closed boundary between itself and the environment in which it exists. Within that boundary lie some determinate number of components that interact with each other in some way. The system takes inputs of some kind from the external environment, processes them in some way, and produces outputs back into the environment. While this processing is going on, the system as a whole interacts in various ways with its environment. **Figure 3** illustrates the system concept.

Notice the feedback loops in Figure 3. They represent conscious, active changes to system components or inputs, based on some assessment of the acceptability of outputs.

This system diagram could represent almost any kind of system, from biological to ecological, or from individual human to organizational or societal.

However, a system alone is only half the equation. The other influential factor is the context in which the system operates—some part of the external environment. This environment is populated by innumerable other systems of all kinds: weather, climatological, ecological, societal, regulatory, political, commercial, government, financial, economic, international, planetary, astronomical...the list is almost endless. In this "primordial stew" of interacting and overlapping systems, our system is just one of the pack.

But our system may not interact with all of the other systems in the environment. There is probably a finite number whose impact on our system can be assumed, even if only estimated. In much the same way that the cells of the human body are constituted in the form of organs, muscles, nerves, and bones—each with a limited set of different functional interactions—a system inevitably resides within a comparable grouping of environmental factors, or what might be called a *context*.

The Cynefin Framework

Between 1999 and 2003, synthesizing concepts developed by Boisot [23], Cilliers [24] and others, Snowden and Kurtz developed the Cynefin framework[4] [25] to help visualize and understand how systems operate within a variety of domains.

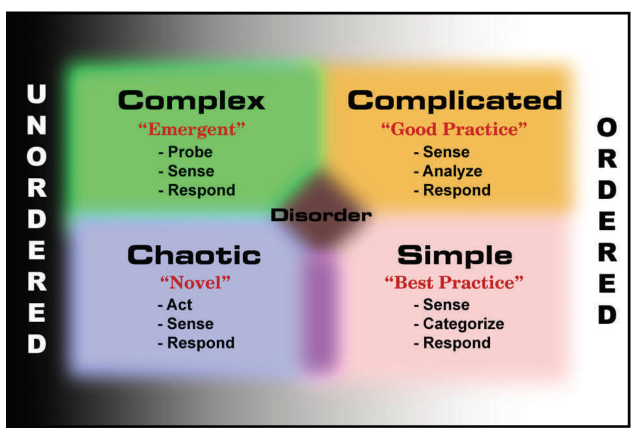

Figure 4. The Cynefin Framework

[4] "Cynefin," pronounced *ku-NEV-in*, is Welsh word that signifies "the multiple factors in our environment and our experience that influence us in ways we can never fully understand."

The Cynefin framework posits that the external environment describes a continuum from ordered to unordered. [26] That continuum is further divided into general contexts, or domains. As characterized above, these contexts represent the grouping of environmental factors and other systems in which a particular system functions. **Figure 4** depicts this concept.

Four of the domains—systems and their associated environmental factors/systems—are *simple, complicated, complex,* and *chaotic*. The fifth domain, pictured in the center, is *disorder*. The simple and complicated domains are closer to ordered than unordered. Complex and chaotic domains are more unordered.

It's worth noting at this point that the framework, which appears to be a matrix, is not intended to categorize. Rather, Kurtz and Snowden intended it to be a sense-making framework. [27] What's the difference? Most matrices imply some value judgment about which cell it's better to be in. The Cynefin framework makes no such assumption, other than that *disorder* be avoided. Instead, it merely describes domains. The chaotic or complex domains are no less (or more) desirable than the complicated or simple, and there is no particular virtue in attempting to migrate one's system from one domain to another—"it is what it is."

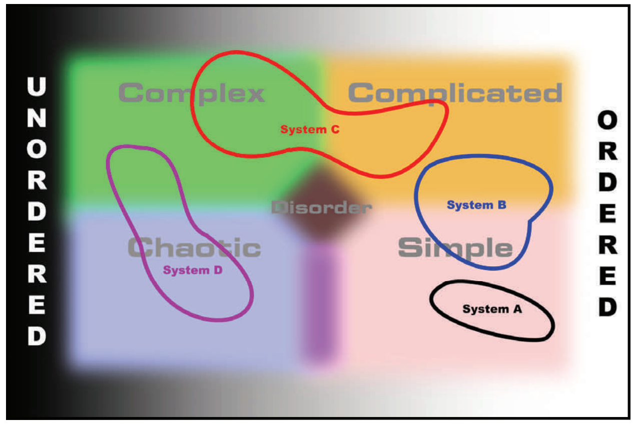

Figure 5. Where Does Our system Lie?

The boundaries between each domain are deliberately fuzzy, indicating that there are transitional zones between them. Typically, a particular system in question will reside primarily in one domain, though it may occupy a position that puts it at least partially in another zone, or in the transition area. (See **Figure 5**)

Cynefin's value as a sense-making framework lies in helping system decision makers understand approximately where their systems lie among these domains, and by extension, *what kinds of tools, approaches, processes, or methods are more likely to work successfully in a given system*. But what do these various domains really signify?

STATE OF AVAILABLE INFORMATION

STATE OF OUR KNOWLEDGE	KNOWN	UNKNOWN
KNOWN	**KNOWN KNOWN** "The information is available, and we have it." (Asked and answered)	**KNOWN UNKNOWN** "We know the information we need, but we don't have the answers." (Asked but not answered)
UNKNOWN	**UNKNOWN KNOWN** "The information we need is out there somewhere, but we don't know what we're looking for." (Not asked, but the answer is out there)	**UNKNOWN UNKNOWN** "We don't know what we don't know." (Not asked, not answered)

Figure 6. What Do We Know?

The Simple Domain

Systems that operate in a stable context characterized by clear cause-and-effect relationships easily discernible by everyone are themselves fairly well defined and simple or sequential in their activities. The variability of the environment is narrow. People know what to expect, and each event or action carries with it a limited number of potential outcomes that are predictable. Uncertainty and turbulence are minimal. Cause-and-effect relationships are clear and well understood by everyone. "Right" answers are often self-evident and undisputed. This context might be called the domain of "known knowns" (See **Figure 6**), and most decisions are unquestioned because everyone shares a common understanding. Decision makers can typically *sense*, *categorize* what information they gather, and *respond* directly. Simple contexts are heavily process-oriented situations typically managed through the application of standard practice. Both managers and employees have access to the information they need, and a command-and-control style is usually preferable. Adhering to best practice makes sense, and process re-engineering is a typical tool. [28] Some examples of systems that would fall into this domain would be automobile repair shops, retail merchandise stores, fast food restaurants, municipal government departments, church congregations, and help desks that follow prescribed patterns of questions and answers in responding to common problems.

The Complicated Domain

Snowden and Boone, who conceived the Cynefin framework, refer to the complicated part of the framework as the domain of experts. [29] There's a reason for this. Complicated domains don't have single right answers to problems. There may be several effective answers, but while not as straightforward as the simple domain, in the complicated domain the relationship between cause and effect still pertains, though such relationships may not be obvious. Whether or not they are obvious depends of the depth of people's knowledge about the environment and the system. Variability and uncertainty increase in a complicated environment, increasing the potential range of problems as well as the number of possible right answers.

In **Figure 6**, this is the realm of known unknowns: We know the questions to ask, but we don't know the answers. Thus, cause-and-effect analysis is only as good as the knowledge of system or environment that one has available. Fortunately, in the complicated domain that information is usually available somewhere. It's usually just a matter of research to find it.

Now, what about the system? While a system residing in the simple domain may itself be simple, it might also be complicated, meaning it has a myriad of interacting, interdependent parts. This may be less problematic in a simple domain, but in a complicated domain, the variability is compounded. Complicated systems may coalesce into "silos" that are highly specialized and require specialized functional knowledge to operate.

Consider, for example, a large-scale manufacturing company such as an automobile manufacturer. Specialization renders marketing and sales a function unto and of itself. Industrial engineers would be adrift there. The converse is also true: marketing and sales specialists would be incompetent to manage production operations. These functional silos, then, evolve into the domain of experts. Such experts may be internal to the company, or they may be external consultants. Either way, the preferred approach of most experts is *analysis*: the system is taken apart and its component parts examined in at effort to obtain a better understanding of how the parts function.

Each silo, function, or component of a complicated system searches for, or develops, its own specialized tools or methods to cope with its obligations and the performance demands made upon it. But because each of these systemic parts is a process within the overall system, these methods almost invariably favor process analysis and improvement. Nearly all the tools management has searched for (and used) over the past several decades can be characterized as process improvement aids. In fact, the philosophy of continuous process improvement (CPI) is rooted in the analytic axiom that the whole is the sum of its parts: "If we hone and polish all of our processes to their maximum performance potential, then 'glue' them together, we'll have the best overall system."

This kind of thinking was the basis of Deming's fourteenth point [30]: "Put everybody in the company to work to accomplish the transformation. The transformation is everybody's job." And it led decision makers to implicitly assume that all parts of a system are equally important to its performance outcomes. But there is ample evidence that Deming didn't really intend the fourteenth point to be interpreted that way, that his emphasis was on *transformation*, not on the function of discrete processes. Later, in explaining what he referred to as the four pillars of profound knowledge, Deming said: [31]

> Optimization is a process of orchestrating the efforts of all components toward achievement of the stated aim. Optimization is management's job. Everybody wins with optimization.
>
> Anything less than optimization of the whole system will bring eventual loss to every component of the system. Any group should have a its aim optimization over time of the larger system the group operates in.
>
> The obligation of any component is to contribute its best to the system, not to maximize its own production, profit, or sales, nor any other competitive measure. Some components may operate at a loss to themselves in order to optimize the whole system, including the components that take a loss.

So, while the importance of whole-system thinking and system optimization was clearly important to Deming, that message was largely missed by analytically oriented managers, and the consultants (both internal and external) who sought to serve them. The result has historically been a plethora of *process* improvement tools and methods, but precious few *system-level* improvement tools.

As a result, the typical decision-making pattern in the complicated domain, and in complicated systems, boils down to *sense-analyze-respond*. Take the cornerstone process of the ubiquitous Six Sigma methodology, DMAIC (define, measure, analyze, improve, control). [32] What is this but *sense, analyze,* and *respond?*

Some typical examples of systems in the complicated domain might be manufacturing (industrial production), insurance companies, hospitals or health care providers, and public school systems. Two common characteristics of all complicated systems and their environments is relative stability (most of the time) and fairly well defined variability. While things may change or the unexpected may happen, these phenomena are usually within the system's capability to respond without major system modification or redesign.

Entrained Thinking

Snowden and Boone emphasize the risk of what they refer to as *entrained thinking* [33], a conditioned response that traps decision makers in the practices, policies, techniques and rationales that have successfully put them where they are. Entrained thinking sounds like this: "I got to the top by doing things *this* way, why mess with success?" Another word for this is "complacency." Isaac Asimov once offered a rationale for entrained thinking: [34]

> To introduce something altogether new would mean to begin all over, to become ignorant again, and to run the old, old risk of failing to learn.

There are serious dangers in such complacency. Even simple domains evolve over time with changes in the external environment. A decision maker who fails to recognize such evolution risks falling behind events without realizing it. Notice in **Figure 4** the purple strip separating the simple domain from the chaotic—it marks a zone of increased risk. The reason the Cynefin framework places the simple domain beside the chaotic is that the complacency resulting from entrained thinking significantly increases the risk of system collapse into chaos.

Entrained thinking is also a risk for systems in the complicated domain, but in this case the ones at risk are not the leaders. Rather, it's the experts in functional areas who are most likely to fall into the trap of tradition, and they tend to dominate the complicated domain. The risk of entrained thinking in the complicated domain is that innovative ideas from non-experts may be disregarded by experts interested primarily in building and reinforcing their own knowledge. [35] As Deming observed, profound knowledge must come from outside the system—and it must be invited in. [36] Unfortunately, this doesn't happen as often as it should.

- The number of elements is sufficiently large that conventional descriptions (e.g. a system of differential equations) cease to assist in understanding the system; the elements must also interact and the interaction must be dynamic. Interactions can be physical or involve the exchange of information.
- Such interactions are rich, i.e., any element in the system is affected and affects several other systems.
- The interactions are non-linear which means that small causes can have large results.
- Interactions are primarily but not exclusively with immediate neighbors and the nature of the influence is modulated.
- Any interaction can feed back onto itself (recurrency) directly or after a number of intervening stages, such feedback can vary in quality.
- Such systems are open; it may be difficult or impossible to define system boundaries
- Complex systems operate under far from equilibrium conditions; there must be a constant flow of energy to maintain the organization of the system
- All complex systems have a history; they evolve and their past is co-responsible for their present behavior
- Elements in the system are ignorant of the behavior of the system as a whole responding only to what is available to it locally

Figure 7. Characteristics of Complex Systems
(Cillers, 1998)

The Complex Domain

Most people, if asked, would say that their systems qualify as complex. This may well be true in some cases, but those whose systems are really simple or complicated systems tend to think so, too. What defines a complex system?

The key difference between a complex system and one that is merely complicated is the inclusion of the concept of adaptation. **Figure 7** [37] provides more detailed characteristics of complex systems Without these characteristics (or most of them), a system is merely complicated. Cilliers' list of complex system characteristics only implies adaptation indirectly (see the next-to-last bullet). Snowden and Boone add an important characteristic to Cilliers' list: *emergence*. [38] Essentially, emergence means that problems and solutions arise from circumstances, often unpredictably. Complex systems have large numbers of components, often called agents, that interact and adapt or learn. [39] The key to complex systems is a high degree of adaptive capacity, making them resilient in the face of perturbation. Agents within the system have some latitude to react to those circumstances by changing the system, though both the system and its internal agents constrain one another.

What kinds of systems would qualify as truly complex, and adaptive? Here's a partial list:

- Stock markets

- Social insect and ant colonies
- The biosphere and the ecosystem
- Brains and immune systems
- Commercial business (national, international)
- Any human social group-based endeavors in cultural and social systems (e.g., political parties, communities).
- New product development organizations
- Inventors/innovators
- International relations organizations
- Unconventional warfare, insurgencies, transnational crime, etc.
- Conventional forces operating under maneuver warfare
- Revolutionary political movements

Complex systems are what Senge would refer to as learning organizations. [40] The agents or actors within complex systems are able to observe the impact of their initiatives and adjust accordingly to achieve desired results. Kurtz and Snowden describe the complex domain: [41]

> ...there are cause-and-effect relationships between the agents, but both the number of agents and the number of relationships defy categorization or analytic techniques. Emergent patterns can be perceived but not predicted; we call this phenomenon *retrospective coherence*.
>
> In this space, structured methods that seize upon such retrospectively coherent patterns and codify them into procedures will confront only new and different patterns for which they are ill prepared. Once a pattern has stabilized, its path appears logical, but it is only one of many that could have stabilized, each of which also would have appeared logical in retrospect.
>
> Patterns may indeed repeat for a time in this space, but we cannot be sure that they will continue to repeat, because the underlying sources of the patterns are not open to inspection (and observation of the system may itself disrupt the patterns). Thus, relying on expert opinions based on historically stable patterns of meaning will insufficiently prepare us to recognize and act upon unexpected patterns.

The old saying that the only thing constant is change applies in complex adaptive systems. A bad quarter, a change in management, or a merger or acquisition introduce unpredictability, uncertainty, and flux. In the complex domain, it's often only after the fact that we can understand why things happen. [42] Perhaps the best examples are major financial collapses, such as Enron in 2000 and the international financial collapse of 2008. The dangers may have been clear to a few in each case, but it wasn't until after events unfolded that the complex causality became clear. In fact, in complex domains most confusing or disconcerting issues that arise without apparent forewarning appear obvious in hindsight.

This brings us to a critical revelation about knowledge and tools: *in the complex domain, the knowledge of experts may be of limited value, and the effectiveness of cause-and-effect analysis is likely to be marginalized, or of short duration.*

This is not to say that expert knowledge is useless, only that it's value in predicting future events is likely to be limited. Snowden and Boone cite the Apollo 13 crisis as an example.

The event an—explosion in an oxygen regenerator—was never anticipated (predicted), so the astronauts and mission control team had never practiced for it. Yet the astronauts were ultimately returned safely to earth, because: [43]

> A group of experts is put in a room with a mishmash of materials—bits of plastic and odds and ends that mirror the resources available to the astronauts in flight. Leaders tell the team: This is what you have; find a solution or the astronauts will die. None of those experts knew a priori what would work. Instead, they had to let a solution emerge from the materials at hand. And they succeeded. (Conditions of scarcity often produce more creative results than conditions of abundance.)

Complicated Versus Complex: Some Final Thoughts

From the preceding discussion, it might seem as if almost all systems would be complex, and almost none complicated, especially in light of the contentions of Holland and Cilliers on agents and the latitude they have to change their systems. After all, don't most industrial operations (and even service organizations) have continuous improvement programs? Don't these represent agent-initiated changes?

Technically, the answer is "yes." But consider the nature of most of those changes: modifications to processes or procedures. How many instances can you cite in which dramatic, systemic changes resulted from continuous improvement programs? After all, by definition "improvement" implies refinement of existing processes, not wholesale replacement or redesign. Even the shift from manual labor to computerized automation is embraced as an improvement, not as a departure from the basic interactions of system elements. Moreover, even in continuous improvement situations, any changes must invariably be approved by management, so the agents' actual authority to effect change is arbitrarily limited.

Take the automobile industry, for example. With the advent of intensive Japanese competition in the 1980s, did American automakers institute major systemic changes to the way they did business? Cars still migrated down assembly lines. Employees still assembled them the same way, though total quality initiatives modified processes and procedures. The same number of interacting elements interacted in more or less the same way. Variability and predictability improved, within already defined parameters. Drastic perturbations—emergent situations—in the external environment (or even internal operations) requiring creative, revolutionary systemic response are absent.

Another example: The airline industry in the wake of 9/11. The external environment changed radically, requiring dramatic, creative responses—but the airlines themselves tried to continue business the way they had always done it, albeit with major process disruptions imposed by added security requirements. In essence, they were *complicated systems operating in an environment that has become much more complex*, which explains many of the difficulties they experienced adapting. In the aftermath, some airlines didn't survive, or went into bankruptcy and reorganization.

Ultimately, to the degree that we attempt to standardize operations and make processes replicable, most of our systems are really complicated, rather than complex. But the external environment in which a system operates experiences no such strictures. The most problematic situations occur when a complicated system finds itself trying to function in a complex environment. Neither its tools nor its management approach are likely to be suited for that kind of reality.

Cause-and-effect likewise has a different applicability in a complex environment. In simple and complicated domains, process-oriented problem solving tools such as Six Sigma's DMAIC or Five Whys are quite effective. They're less so in emergent situations, and the efficacy of the solutions they produce are likely to be short-lived. This is not to imply that cause-and-effect is absent (or doesn't apply) in the complex domain, merely that it's not discernible or predictable *a priori*. After the fact, cause-and-effect can easily explain what happened, but often that's too late to do system managers any good. The success of cause-and-effect in a complex domain will depend highly on the *depth of resident knowledge* about the system and its environment and *how much—and how quickly—system agents can learn* about them, the known unknowns, and the unknown knowns (Refer to **Figure 6**).

Leaders of organizations operating in the complex domain run a serious risk. Most of them have likely come up through simple and complicated systems (or simple/complicated parts of systems). Their experience is heavily grounded in the characteristics and tools of those domains: known knowns, predictability and process-oriented tools. They expect fail-safe business plans with well defined outcomes, and their leadership style may be more authoritarian. They may fail to realize that complex domains demand a more experimental management approach that admits some failure in the pursuit of understanding. If they find it difficult to tolerate failure—a key element in experimental learning—they may over-control their organizations and pre-empt opportunities for new informative patterns to emerge.

The Chaotic Domain

Cause-and-effect relationships are both operative and discernible in the simple and complicated domains. They are also potentially useful in the complex domain, if the necessary content knowledge is available and it's clearly recognized that its results can have a fairly short "shelf life" (i.e., a periodic re-do may be necessary).

But as the name implies, the chaotic domain is turbulent and highly uncertain. In the chaotic domain, cause-and-effect analysis is likely to be nearly useless. Causes and effects may not be perceivable, and if they were, the environment may be changing so fast that there isn't time to conduct an orderly cause-effect analysis. Waiting for patterns to emerge may be a waste of time, or a recipe for disaster. [44] This is the realm of unknown unknowns, and probably even unknowables. It's a highly tense situation, with many decisions needing to be made and no time for reflection or contemplation about them.

Examples of situations in the chaotic domain would include crises, such as the 9-11 terror attacks and the Fukushima nuclear reactor meltdown, natural disasters such as the Haitian and Chilean earthquakes, post-apocalyptic society (after the breakdown of law and order), civil revolutions such as Libya experienced in 2011, and organizations with much slower decision cycles than their competitors.

Disorder

In the Cynefin framework, the domain of disorder abuts all the others. (See **Figure 4**) This is intended to signify that an organization in a given domain (simple, complicated, complex, chaotic) can easily slip into disorder. As Snowden and Boone describe it: [45]

> The very nature of the fifth context—*disorder*—makes it particularly difficult to recognize when one is in it. Here, multiple perspectives jostle for prominence, factional leaders argue with one another, and cacophony rules. The way out of this realm is to break down the situation into constituent

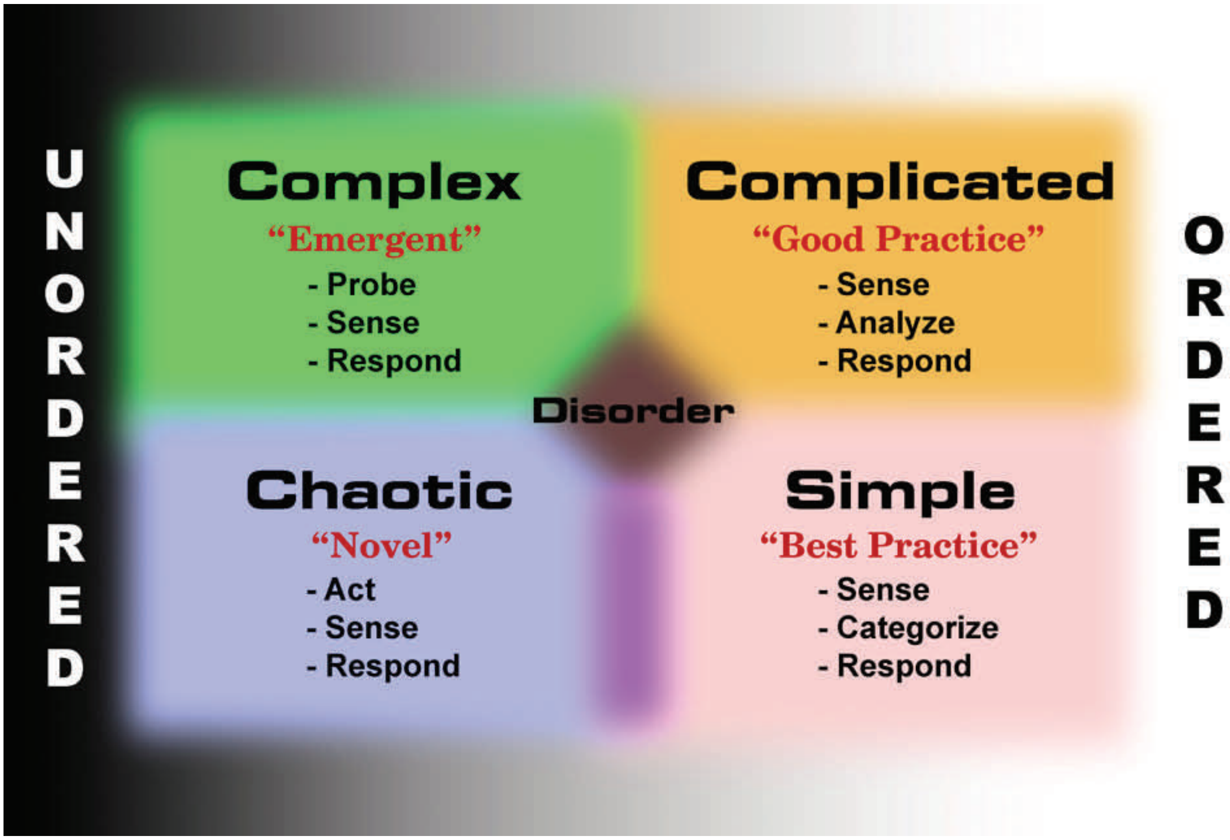

Figure 7. The Cynefin Framework Redux

parts and assign each to one of the other four realms. Leaders can then make decisions and intervene in contextually appropriate ways.

To summarize...

The Cynefin framework (**Figure 7**) is designed to help decision makers—organizational leaders and system managers—understand where their system stands in the external environment. It provides knowledge about the general characteristics of the five domains in which leaders could find their systems. It helps decision makers understand what kinds of methods and tools will be likely to work in their particular organizations, and which ones won't.

The Cynefin concept provides key insight that most leaders have likely been ignorant about:

- The boundaries between simple, complicated, complex and chaotic are indistinct. Consequently, changes in external conditions or internal system modifications may push a given system from one domain to another without leaders being aware of it, if they aren't paying attention.
- A particular system may inhabit more than one domain simultaneously. For example, a vertically integrated manufacturing company my find its production subsystem in the complicated domain, but its sales and marketing may be in the complex domain (or perhaps, in the economic conditions extant in 2011, teetering on the edge of the chaotic).
- The spatial relationship among the domains emphasizes how easily (or insidiously) an organization might slip from one domain into another, possibly without noticing it.

- The boundary between complicated and complex is less extreme than the boundary between the simple and the chaotic. Consequently, the failure of management to recognize a shift from complicated to complex, while problematic, is not likely to be as catastrophic as the failure to recognize a shift from simple to chaotic. But *all* domains are directly exposed to the zone of disorder, which should prompt leaders to heightened awareness of their system's relationship with its external environment.
- Simple and complicated domains assume an ordered universe, where cause-and-effect relationships are perceptible, and right answers can be determined based on facts. [46]
- Complex and chaotic domains are unordered, meaning that there is no apparent relationship between cause and effect. This doesn't mean that this *is no* cause-and-effect, just that it's not apparent or obvious. While the ordered part of the continuum (simple and complicated) can be managed based on facts, the unordered part requires intuition and recognition of patterns. Consequently, *the tools and methods that work well in the simple and complicated domains tend to be less effective (or completely ineffective) in the complex and chaotic domains.*

IMPLICATIONS OF THE CYNEFIN NETWORK

Consider the implications of these insights. Most managers and executives climbed the corporate ladder in parts of organizations that were either simple or complicated. As a result, they learned "best practices," or maybe just "good practices" that worked well in these environments. In most cases, the tools and methodologies were likewise very structured, prescriptive, cause-effect based, and proven to succeed in simple and complicated venues.

As managers move up the organizational ladder to positions of broader responsibility, the odds increase that the parts of the organization they are responsible for bridge the boundary between merely complicated and definitely complex, and perhaps even chaotic. They see and experience a larger number of possible outcomes and options, and greater variability in those outcomes. This happens without even considering the uncertainty associated with the evolution of the external environment. But psychologically they recognize that they reached their current position by doing the same, familiar things over and over, and doing them well. [5]

So, they try to apply the tools, methods, and knowledge that has worked for them in the past to new domains and situations—domains that may be relatively unresponsive to the tools that were effective in the ordered domains. Is it any wonder, then, that they sense, *try* to analyze, and respond in situations when they should be probing, sensing, and responding—or acting, sensing, and responding? Is it any wonder that such managers avoid experimentation, with its consequent risk of failure, in favor of options with quantifiable, predictable costs and benefits? [6]

Actions and Knowledge

[5] In other words, "I'm gonna dance with the one what brung me!"

[6] "There are people so conservative they believe nothing should be done for the first time." Source unknown.

As Fayol asserted some 90 years ago, management's functions include planning, organizing, staffing, leading, and controlling. At their most essential, the discharge of these responsibilities requires, first, decisions (what to do), and second, action.[7] But action without knowledge is like running in the dark—you might get where you want to be, but you are more likely to kill yourself along the way.

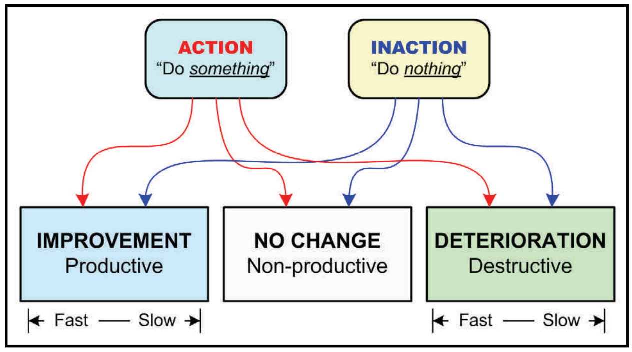

Figure 8. Outcomes of Action and Inaction

When one acts (or chooses not to act), three things can happen. (See **Figure 8**) The situation can improve, it can experience no change at all, or it can deteriorate. In other words, the action (or inaction) may be productive, non-productive, or destructive. And if the situation does change, the outcome of that decision may precipitate quickly or slowly, if it does anything at all.

Absent effective knowledge of the situation—in other words, when running in the dark—by acting your odds are only one in three of doing something productive. And if there is a range of possible actions, even if the action is productive, it might not produce favorable results as quickly as needed. The same argument could be made for inaction, whether this is a passive decision (dithering) or an active one. If the system is on an unfavorable trajectory, two of the three possible outcomes are bad, and declining the initiative (inaction) leaves the range of play-out options entirely to chance. So, as Elbert Hubbard once observed, positive anything is likely to be better than negative nothing. [47]

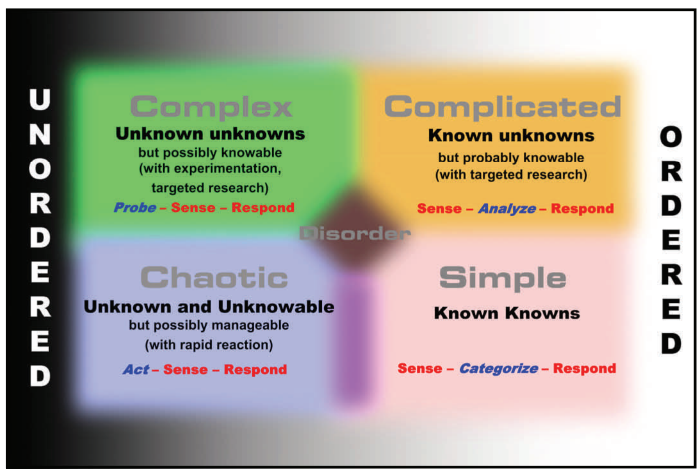

Figure 9. Cynefin Framework and the State of Knowledge

But the operative word in the preceding paragraphs is *knowledge*. If one has it, the odds of making the right decision—act or don't act—change. Instead of being a simple one-in-three probability, relevant knowledge shades the odds in favor of improving the situation. The Cynefin framework seems to imply the same thing. (See **Figure 9**) While it's primarily designed to guide executive action, with a little modification (and some inputs from Snowden and Boone [48]), the same framework can effectively point us in the right direction for skewing the decision odds in our favor.

Organizations in the simple domain have nearly all the knowledge they need to make decisions that produce highly predictable outcomes. They can observe what's going on, sort it into the appropriate pigeonhole, and respond with tried and true procedures.

[7] In the words of the Nike corporate slogan, "Just do it."

Organizations in the complicated domain know some of what they need to know to make informed, effective decisions. But they also know the questions they don't have the answers to, and they have a reasonably good idea of how to find those answers. They can't proceed on the basis of existing knowledge, so they must *sense* and *analyze*—which may point them in the direction of searching out the information they need but don't have.

Those in the complex domain have the knowledge available in the simple and complicated domains, but because there is far more variability and more possible scenarios, they run out of knowledge long before they run out of decisions to be made. They're much more uncertain about what to do and how to figure it out. They may be able to research what they don't know (if time pressures allow). Or, if the information is not readily available, they must *probe* by experimentation—thoughtful trial and error—*sense* whether their experiments seem to be succeeding or not, then *respond* based on those observations.

The worst case situation for an organization is to find themselves in the chaotic domain, particularly if its entire history has been in the simple or complicated domains. What they require to function effectively is unknown to them and, perhaps because of the turbulence and rapid change in the environment, it may be unknowable. In this case, the organization's leaders must *act* on their best intuition, observe the immediate effects, and rapidly decide to "pour on the coals," if the action appears effective, or rapidly *respond* with another option if it doesn't. This is a domain of *instinctive* (as opposed to thoughtful) trial and error, with the tacit understanding that because of the chaotic environment effective solutions are likely to be short-lived.

Discontinuous Innovation

It should be noted that, regardless of the domain (or combination of domains) that an organization finds itself in, *social entropy* is an ever-present threat. Social entropy refers to the tendency of human networks and society in general to break down over time, moving from cooperation and advancement towards conflict and chaos. [49] In other words, without a positive effort to hold an organization effectively on course, it will inexorably tend to run off the rails and into a ditch. In the context of our discussions on the Cynefin framework, this means that without constant attention to the changes occurring in the external environment, and the performance of the system within that environment, an organization can rapidly slip from a controllable domain (simple, complicated, even complex) into disorder.

In other words, don't become complacent. Keep your attention on the job at hand, but maintain a situational awareness of what's going on outside the system, so that you can determine whether it will ultimately invalidate your knowledge base. For example, for centuries Swiss watchmakers had been refining and perfecting their skills at creating precision mechanical watches. Yet in the space of ten years, a centuries old industry came crashing down because the insular watchmakers, who dated to the craft guilds of the 17^{th} and 18^{th} centuries, failed to recognize the wave of the future: inexpensive quartz crystal electronic watch works that could deliver accuracies an order of magnitude better than traditional mechanical works could achieve. Instead of acknowledging the existential threat and creating ways to deal with it, they deemed it a passing fad, then ignored the technology completely—until the Japanese captured a significant segment of the timepiece market and the Swiss watch industry had collapsed to a shadow of its former self. [50]

Knowing what we do now about the Cynefin framework, we can see that the Swiss watch industry was badly overwhelmed because it was a simple system (or, at most, complicated) whose environment radically changed under its feet to become chaotic. The Swiss watch industry fell victim to a phenomenon known as *disruptive innovation* [51] because it failed to perceive the quartz-digital technology as a threat to its market niche. So, it ignored the threat.

The nature of today's global economy and geopolitics, combined with the rapid expansion of technology over the past several decades, is such that discontinuous innovation is now a way of life for organizations and systems everywhere. Generational cycles are becoming shorter. The threat of entropy demands constant attention of decision makers, not only on their own internal operations but on developments in the external environment as well—developments that may invalidate their world view (and what their organizations are doing). The risk of an organization finding itself slipping into the chaotic domain is higher than ever.

CHARTING AN EXECUTIVE COURSE

With the evolution of management since Taylor and Fayol, with the complications imposed by globalization, technology advancement, and the increasing uncertainty of the external environment, what's an executive to do? Nobody wants to be a cork bobbing on the flood waters, but the alternative is a scattershot approach—rummaging in the management toolbox, looking for the "silver bullet" panacea, followed by trial-and-error to see what works or fails, ultimately gravitating toward a flavor of the month, repeated disillusionment, lost time (and, possibly, opportunity), and ultimately organizational confusion.

Figure 10. The Management Toolbox

Could there possibly be any doubts that the management toolbox (**Figure 10**) is flooded with tools of all manner, shape, and purpose? A quick look at the tools and methodologies list[8] in Appendix 1 should put any contrary notions to rest. [52] The real challenge, as the cat in the basement at midnight ruefully appreciates when the light comes on, is which mouse to pursue.

The holy grail of managers everywhere is what the physicists refer to as a unified field theory—an attempt to consolidate the laws of physics into a single grand framework—in other words, a theory of everything. [53] Physicists have, so far, failed to find such a theory. The Cynefin Framework is probably not the management equivalent, but it does offer a means to "put the pieces together" in such a way that they can be compared, make sense, and guide decision makers in choosing the methods and tools that will offer the greatest potential for helping them overcome the obstacles and constraints to achieving their organizations' goals.

COMPARING METHODS AND CYNEFIN DOMAINS

[8] This list is divided into categories, with numerous duplications among different categories. It is by no means a complete list, and your favorite tool or method may not be included. Consider this list to be a proxy for all types of management tools, methods and theories. In some way, they all find a niche in the Cynefin Framework.

John F. Kennedy once observed that success has a thousand fathers, but failure is an orphan. In business, successes are usually trumpeted, while failures are normally buried in obscurity. Consequently, it may be difficult to find practitioners willing to advertise that "we failed to achieve positive results with [name your chosen methodology of the month]," but successes typically find their way into the popular management journals of the day. Nevertheless, the memory of the failures takes on a life of its own, and with the passage of time all that is recalled is that the method failed. Rarely are methodological failures rationally analyzed to establish their cause. What lives on, however, is the conviction that "we won't try *that* methodology again!"

So, how does a decision maker use the Cynefin Framework to choose the methods and tools with the highest probability of success?

The first step would be to learn more about the domains of the Cynefin Framework, and with adequate understanding, decide *which domain(s) describe the external environment we believe our organization resides within.* Remember, the answer to this may not be clear cut. As often as not, a given organization may overlap more than one domain. Certain parts of the organization may clearly lie in the *complicated* environment, for example, while others may decidedly operate in conditions of *complexity*.

The second step would be to examine the nature of our systems themselves. Do they qualify as simple, complicated, complex, or chaotic—according to the characteristics identified by Snowden and Boone? [54] It's important not to lose sight of the fact that there are two factors involved here: the system *and* its external environment.

A system constituted to succeed in a simple or complicated environment will find itself desperately floundering in a complex or chaotic environment. That environment might start out well matched with a particular system but evolve to a different one. Without a commensurate adaptation, the organization can expect an increasingly entropic result—more disorder or randomness (and who wants *that*?!). Conversely, a system constituted to function effectively in a complex or chaotic environment that subsequently finds itself in a simple or merely complicated environment may experience a kind of anxiety that motivates people to tamper with already effective operations[9] or otherwise introduce disruptions and instability. ("It can't be *that* easy...let's tweak it!")

Once decision makers have a reasonably good grasp on their organizations' "place in the firmament," it's time to start a toolbox inventory. If we're comfortably ensconced in a system that's operating effectively within its environment, even if that position is somewhere between domains, we could continue to rest on our laurels and risk becoming complacent. But if we're smart, we'll be looking for ways to push the edge of the organizational performance envelope while maintaining effective control. If we're uncomfortable with our situation, concerned about the future, or perhaps sensing control of our circumstances slipping away, we will likewise be searching, but in this case for ways to restore our equilibrium and restore forward progress.

In either case, the choice of methods and tools is critical. It's not as simplistic as driving a nail into a wall with a screwdriver, or "when your only tool is a hammer, all problems start looking like nails." The consequences of using an inappropriate approach could be traumatic, perhaps even fatal. So, what's the prescription?

[9] "If it ain't broke, don't fix it!"

Finding "the Handle"

If we look inside the management tool box, we find that there's no shortage of methods to choose from. The question is, "What's the right tool for the job?" A cursory examination of all the possible tools a decision maker might use to guide his or her system effectively would likely show a distribution that resembles **Figure 11**. Each of the dots in the cells of the matrix represents a method or tool.[10]

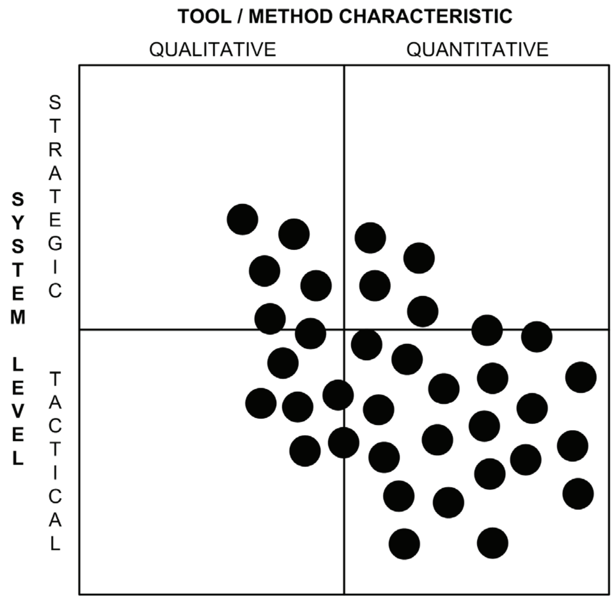

Figure 11. Types of Tools and Methods

There are two levels of the system under consideration—strategic and tactical—and two general classes of tools, qualitative and quantitative. Notice that the preponderance of tools available to managers lies in the quantitative cells, and most of those are at the tactical level. This reflects the reality that most tools, methods, software, support aids, measurement devices, etc., are intended and designed to assist with *process* control and management. The number of tools and methods designed for strategic needs is considerably fewer, and many of those are qualitative.

In a limited discussion such as this one, it's not possible to examine all the tools in detail. Moreover, sorting existing tools and methods by appropriate Cynefin domain has never been really done in more than a superficial way—and that only by Cynefin specialists. This offers fertile ground for more concerted research. But for the purposes of this paper, we'll confine our examination to a few key methodologies, some well known and others not so much.

"Begin With the End in Mind": Strategic-Qualitative Tools

In his landmark book, *The Seven Habits of Highly Effective People*, Covey recommended starting "with the end in mind." [55] Sage advice, because if you don't know where you're going, then any path will do.[11]

Determining direction and destination of an organization is a senior executive strategic responsibility, with input and advice from the system's owners, whether represented by a commercial board of directors, a non-for-profit board of trustees, or the owners directly. So, let's start with the strategic cells in **Figure 11**.

Clearly, some rational method of strategy development is desirable for all organizations, and in the simple, complicated, and complex domains it's not unreasonable to expect to find one. The chaotic domain, by definition, is not hospitable to rational approaches. In fact, Snowden and Boone make a point of emphasizing that the simple and complicated domains are

[10] There are many more tools and methods than we can indicate her. Figure 11 is for reference purposes only.

[11] Or, in the immortal words of Yogi Berra, "If you don't know where you're going, when you get there, you'll be lost."

the realm of logical cause and effect, but that it becomes less effective in the complex domain and virtually ineffective in the chaotic. [56]

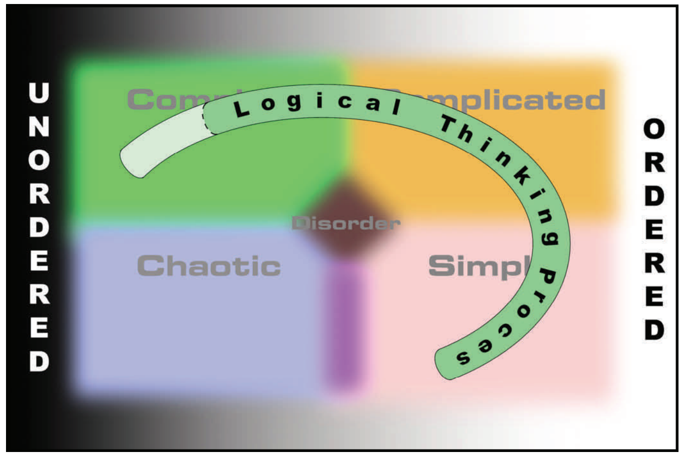

Figure 12. Logical Thinking Process and Cynefin Network

The Logical Thinking Process

Perhaps the preeminent methodology in the realm of cause and effect is the Logical Thinking Process (LTP) conceived by E.M. Goldratt. [57] (Refer to Appendix 2 for examples of the LTP.)

There are other cause-and-effect methods, but the LTP is the most rigorous and comprehensive, and it has proven applications in strategy development and deployment. [58] Yet this method has its limitations, too. (See **Figure 12**)

The LTP has proven its effectiveness in solving system problems in the simple and complicated domains for 20 years. It has also been applied with success in the complex domain as well, but because complex-adaptive systems continue to evolve, cause-effect relationships determined in the complex domain may have a limited "shelf life." Changing environmental conditions can make obsolete problem analyses and solutions developed with the thinking process, in either an evolutionary or revolutionary way.

This phenomenon of changing environments, perhaps the most prominent characteristic of the complex domain, means that although the Logical Thinking Process can be used to develop strategy or to solve system problems, it really constitutes "a snapshot in time," reflecting the conditions and prescriptions extant at the time of the LTP analysis. So, leaders in complex domains can't put the system "on autopilot" after an LTP analysis. They must continually monitor changing system performance and environmental conditions, watching for changes that could degrade the effectiveness of the solution or strategy. When such a deviation is identified, the LTP must be applied again to the newly evolved situation.

STATE OF OUR KNOWLEDGE	STATE OF AVAILABLE INFORMATION: KNOWN	STATE OF AVAILABLE INFORMATION: UNKNOWN
KNOWN	**KNOWN KNOWN** "The information is available, and we have it." (Asked and answered)	**KNOWN UNKNOWN** "We know the information we need, but we don't have the answers." (Asked but not answered)
UNKNOWN	**UNKNOWN KNOWN** "The information we need is out there somewhere, but we don't know what we're looking for." (Not asked, but the answer is out there)	**UNKNOWN UNKNOWN** "We don't know what we don't know." (Not asked, not answered)

Figure 13. LTP Effectiveness in Complex Domain

The key to useful, continuing application of the LTP in the complex domain is *system knowledge*. (See **Figure 13**) A continuing cycle of LTP corrections or new analyses depends on a continual infusion of new information. We already have the "known knowns." In the complex domain, as the external environment evolves, the importance of filling in the blanks in the known-unknown and unknown-known areas takes on added importance. Even more, a continuing flow of new information in a constantly changing environment is the lifeblood that keeps the LPT relevant in the complex domain, and even extends its utility (light shaded part of the arc in **Figure 12**). That's why the complex domain represents the ragged edge of utility for cause and effect.

So, to briefly summarize, the Logical Thinking Process can be an eminently useful method to solve problems and develop strategies for systems in the simple and complicated domains. It can also be effective in the complex domain, but that effectiveness is limited by the quality, reliability, and perishability of the knowledge that forms the substance of the logic trees. This means that the complex domain represents "the ragged edge" of LTP effectiveness. It remains so only to the extent that practitioners continually monitor the environment for significant changes and update their thinking process analyses to incorporate those changes. Fortunately, the LTP lends itself to rapid updating.

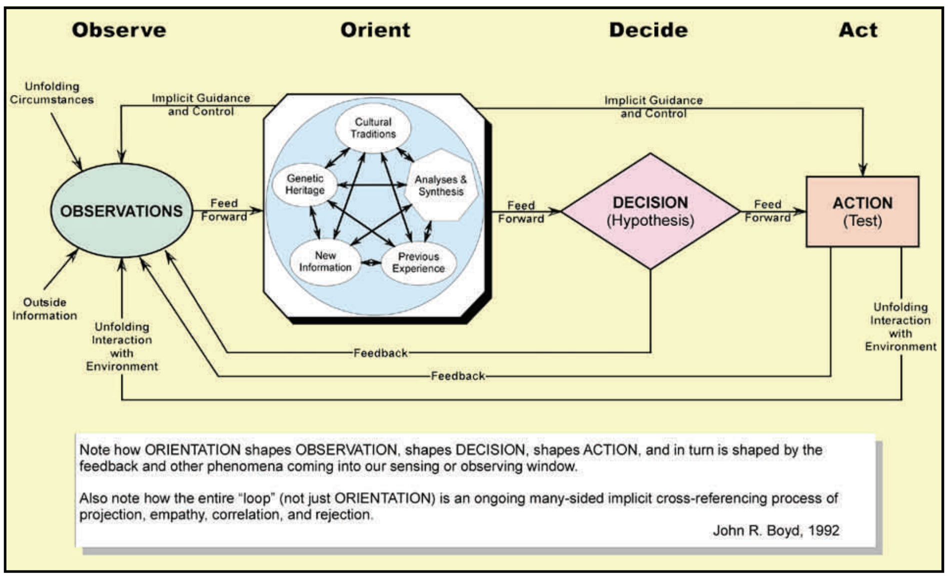

Figure 14. Boyd's OODA Loop

The OODA Loop

Conceived by John R. Boyd, the OODA loop is a structured pattern of observation, orientation, decision, and action. [59] (See **Figure 14**)

The OODA sequence begins with careful observation of the external environment. Those observations are then integrated with the observer's "world view"—the orientation step. That integration produces either congruency (i.e., observers see what they expect to see) or some kind of mismatch—in other words, the observed phenomena are unexpected. When that happens, the orientation step becomes a much more comprehensive activity, as reflected in **Figure 14**. Nevertheless, the outcome of orientation becomes the input of the decision step, i.e., what to *do* about the mismatch. That decision prompts action to close the gap between reality and expectations, the final step of the first OODA pass.

But it's called a loop for a reason. The action step is intended to change either the system or the external environment. Ideally, this change should narrow the gap determined in the orientation stage, but in complex or chaotic domains especially, one can never be sure. So, the next rational thing to do is observe the results of the action, along with any other unfolding circumstances in the environment that may not have been happening the first time around. And a whole new cycle of the OODA loop begins again.

OODA loop cycles can be either fast or slow, or somewhere in between. Whether the cycle is fast or slow depends on the nature of the system in question, the speed at which it senses and analyzes mismatches, the rate of environmental change, and how fast changes can be executed. Boyd's original application of the OODA loop was in the context of maneuver warfare, with minute-by-minute or hour-by-hour changes in the battlefield situation. But since the advent of the OODA loop, businesses have been applying it in their competitive environments, the rate of change of which is much slower than on a battlefield, perhaps as long as weeks or months.

Regardless of the nominal OODA cycle time, however, in a competitive environment the party with the faster OODA loop cycle—often referred to as the *decision cycle*—gains a decisive advantage over its competitor. It's important to keep in mind that while speed is important, and sometimes even an imperfect action taken immediately can be better than a perfect one later, *any* action taken should be better than the situation it replaces, or there's a serious risk of doing the wrong things faster.

People or organizations able to jump out to a lead of two or more decision cycles can quickly drive their competitors into confusion and ultimately into total collapse.[12]

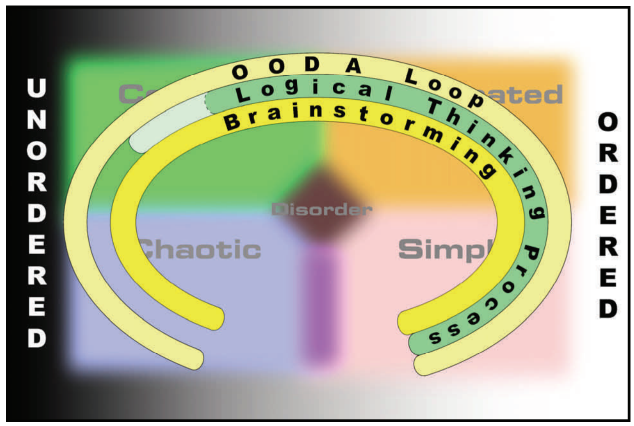

Figure 15. Qualitative-Intuitive Tools and the Cynefin Framework

Like the Logical Thinking Process, the OODA loop is a qualitative tool. Though it accepts quantitative data in the observation step, it ultimately depends on intuitive knowledge to capitalize on any such data. And like the thinking process, the OODA loop is effective in multiple domains. In fact, it is even more broadly applicable than the LTP. (See **Figure 15**)

The OODA loop can be effective in the simple and complicated Cynefin domains, but it really displays its value in the chaotic domain, and beyond the "ragged edge" of the LTP in the complex domain. In fact, the two tools integrate very well together in those areas where they overlap. The LTP is a potentially powerful means of "orienting" decision makers and developing options for the decision stage.

Brainstorming

Brainstorming is the original idea generation methodology. It was conceived in the early 1940s by Alex Osborn, then executive vice president of Batten, Barton, Durstine and Osborn (BBDO), one of the largest advertising agencies in the world. Brainstorming filled the need of an industry whose lifeblood was new ideas, yet one in which proffered ideas were suffocated by

[12] This is exactly what happened to the Iraqi Army during Operation *Desert Storm* in 1991.

an atmosphere of "No, no, a thousand times no." [60] Osborn's concept put BBDO on top of the advertising world, and its dissemination throughout the business world has made it perhaps the most widely accepted problem-solving technique ever developed.

Brainstorming is most certainly a qualitative tool—and a "right brain" tool, at that.[13] [61] It enjoys the virtue of applying to circumstances in any of the four Cynefin domains. Moreover, it can integrate effectively with other qualitative tools, such as the Logical Thinking Process and the OODA loop. But it is useful at the tactical level as well as the strategic.

Getting Down to Nuts and Bolts: Tactical-Quantitative Tools

The simple and complicated Cynefin domains are the realm of most of the tools and methods we typically associate with modern business management. Most of these methods are quantitative to some degree (maybe entirely), and they are primarily intended to address the tactical issues of day-to-day business performance. Most of these methods extend over into the complex domain to the degree that they are adaptable to changing circumstances. It's in the complex domain that we see applications of methods such as lean, six sigma, and business process reengineering that aren't exactly "orthodox." They may have been modified to accommodate situations that the "book solution" doesn't address. If such adaptation compromises the ultimate effectiveness of the method, it may be safe to assume that the methods or tools are pressing the outer edge of the envelope for which they are optimized.

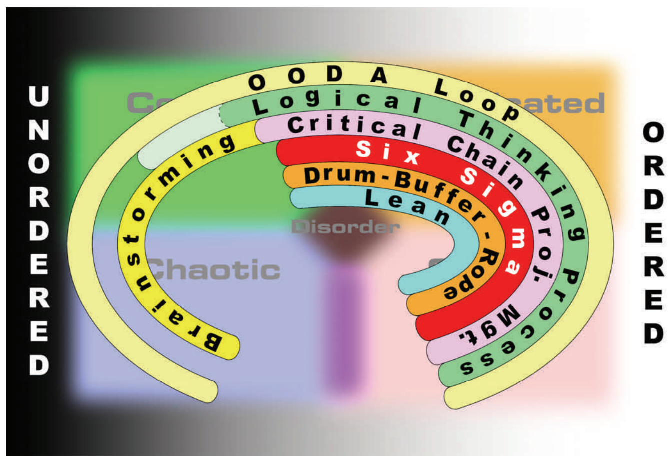

Figure 16. Various Methods and the Cynefin Framework

Figure 16 provides a conceptual overview of the relationship between methods and Cynefin domains. It's by no means complete—there just isn't room in this diagram to show all possible tools and methods. But combined with the message of **Figure 11**, it's sufficient to convey the idea: *some tools and methods work better in various circumstances than others*. And perhaps most important, with the aid of the Cynefin Framework, it's possible to predict with reasonable assurance which methods will produce the desired results in a given situation (a combination of system type and environment) and which ones aren't likely to do so.

SUMMARY AND CONCLUSION

Where does this discussion leave us? Here are some of the conclusions we can assert:

- The evolution of management over the past century, from Taylor and Fayol through Drucker and Deming, has been a process of continuing search, trial and error, deduction and

[13] The left brain is considered analytic in approach while the right is described as holistic or global. A successive processor (left brain) prefers to learn in a step-by-step sequential format, beginning with details leading to a conceptual understanding of a skill. A simultaneous processor (right brain) prefers to learn beginning with the general concept and then going on to specifics.

induction, figuring out what works, what works better, and what doesn't work very well at all.

- There is no shortage of management methods and tools. However, the preponderance of these are tactical and quantitative. Strategic, qualitative management aids are considerably fewer in number.
- Some methods and tools have realized significant successes in a variety of situations, while failing to meet expectations in others. Until now, there hasn't been an obvious underlying principle to explain this phenomenon.
- What has been missing in much of the study of management has been a top-down approach—from the general to the specific, the strategic to the tactical.
- The emphasis in most management methods has historically been on *analysis*—the division of complex systems into "manageable bites." The underlying assumption—that the parts can be individually improved and "glued back together" to produce the best-performing system—ignores the interactive effects of the system's parts. A *synthesis* approach, in concert with analysis, is required to achieve effective system success.
- Systems and their external environments can be classified as simple, complicated, complex, and chaotic. This taxonomy is known as the Cynefin Framework. The difference between a system and its environment, as they relate to these categories, is a matter of focus. Classifying an environment in one of the four domains is an exercise in *external* observation. Doing the same for a system is an exercise in *internal* examination.
- A particular system or organization may have components that operate (with varying degrees of success) in different domains simultaneously. For example, a production process may be considered almost exclusively complicated, but the marketing function that promotes the sales of what production delivers may be complex.
- Until the advent of the Cynefin Framework, there was no orderly way to evaluate the interaction of organizational systems, their external environments, and the myriad of management methods and tools available to decision makers.
- A significant number of organizations today qualify as complex, meaning that their environment may change in short but irregular, unpredictable cycles, requiring the organization to adapt internally accordingly to avoid degradation.
- The majority of available management methods and tools have been designed to succeed in simple and complicated domains. It wasn't intended this way, but the failure to identify and understand the underlying assumptions about these methods made it inevitable. Without extraordinary efforts, their effectiveness begins to deteriorate the deeper into the complex domain the organization is forced to operate. A typical example is the decreasing utility of cause-effect analysis the farther into the complex domain one goes. By the time one reaches the chaotic domain, cause-effect is nearly useless, because the situation changes faster than cause and effect can be determined.
- The closer to the chaotic domain a system or its environment come, the greater the dependence on intuitive decision making, command-control leadership skills, and faster OODA loop cycles becomes.

Without a sense-making framework such as Cynefin, decisions about which methods or tools to use in a particular situation become a trial-and-error, hit-and-miss proposition. How many times has a management team embraced a philosophy or methodology—Total Quality Management, for instance—promoted by a particular expert or consulting company, sometimes as a panacea, only to be disappointed with the results? There are obviously other factors instrumental to success, such as organizational psychology and change management. But with an effective foundational understanding of where a particular system resides "in the firmament," the choice of appropriate methods can dramatically enhance the probability of success of the system's improvement efforts, making the jobs of organizational psychologists and change agents much easier.

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Appendix 1. Management Methods, Models, and Theories

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Drucker, Peter. *Management: Tasks, Responsibilities, Practices.* New York: Harper & Row (1973)

Strategy − Value Creation Models & Methods (A-Z)

3C s model (Ohmae)
7P s (Booms, Bitner)
7-S Framework (McKinsey)
ADL Matrix (Arthur D. Little)
Ansoff product/market grid
Acquisition Integration
Approaches (Haspeslagh, Jemison)
BCG Matrix
Blue Ocean Strategy
Business Process Reengineering
Bricks and Clicks
Business Assessment Array
Capability Maturity Model (CMM)
Change Dimensions (Pettigrew, Whipp)
Clarkson Principles
Competitive Advantage of Nations (Porter)
Competitive advantage framework
Core Competence (Hamel, Pralahad)
Core Groups (Kleiner)
Cost-benefits analysis
Cultural Dimensions (Hofstede)
Delta Model (Hax)
Deming cycle (PDSA)
Dialectical Inquiry
Diamond Model (Porter)
Dimensions of Change (Pettigrew, Whipp)
Distinctive Capabilities (Kay)
ERG Theory (Alderfer)
Experience Curve
Extended Marketing Mix (7P s)
Five Forces (Porter)
Force Field Analysis (Lewin)
Growth Phases (Greiner)
Game Theory (Nash)
GE/McKinsey matrix
GE Business Screen
Growth Share Mix (BCG)
Hierarchy of needs (Maslow)
Impact/value (Hammer)
Industry Change (McGahan)
Industry Life Cycle
Instrumental Approach of Stakeholder Theory
Kaizen philosophy
Learning Organization
M&A approaches
Management by Objectives (Drucker)
Managing for Value (INSEAD)
Marketing Mix (4P s, 5P s)
Modeling (business simulation)
National Differences (Hofstede)
Normative Approach of Stakeholder Theory
OODA Loop (Boyd)
Organizational Configurations (Mintzberg)
Organizational Learning
Outsourcing
Parenting Advantage (Goold Campbell)
Performance categories (Baldrige)
Performance Prism
PEST Analysis
Plausibility Theory
Portfolio Anlaysis
Product/market grid (Ansoff)
Profit Ppols (Gadiesh, Gilbert)
Real Options (Luehman SDG)
Relative Value of Growth (Mass)
Requisite Organization (Jaques)
Resource-Based View (Barney)
Root Cause Analysis
Scenario Planning
Six Thinking Hats (de Bono)
Spiral Dynamics (Graves)
Strategic Alignment (Venkatraman)
Strategic Intent (Hamel, Pralahad)
Strategic stakeholder Management
Strategic Triangle (Ohmae)
Strategic Thrusts (Wiseman)
Strategy Map (Kaplan, Norton)
STRATPORT (Larreche)
SWOT analysis
Systems Thinking/Dynamics
TDC matric (Internet value)
Theory of Constraints (Goldratt)
Twelve Principles of the Network Economy (Kelly)
Value Chain (Porter)
Value Disciplines (Treacy, Wiersma)
Value Mapping (Jack)
Value Stream Mapping
VRIN (Barney)

Valuation − Decision Making Models & Ratios (A-Z)

Absorption Costing
Activity Based Costing (ABC/ABM)
ARIMA (Box and Jenkins)
Balanced Scorecard (Kaplan, Norton)
Baldrige categories of performance
Benchmarking
Brainstorming
Break-even Point
Capital Asset Pricing Model (CAPM)
Cash Flow from Operations
Cash Flow Return on Investment
Cash Ratio
Cash Value Added (CVA Anelda)
CFROI
Contingency Theory (Vroom)
Corporate Reputation (Harris-Fombrun)
Cost-benefits Analysis
Current Ratio (measuring liquidity)
Debt to Equity Ratio (measuring solvency)
Direct Costing
Discounted Cash Flow (DCF)
Dividend Payout Ratio
Dynamic Regression
Earnings Per Share (EPS)
EBIT
EBITDA
Economic Margin (EM)
Economic Value Added (EVA)
EFQM
EVM (CPM)
Excess Return (ER)
Exponential Smoothing
Fair Value accounting
Free Cash Flow
Full Costing
Game Theory (Nash)
Gross Profit Percentage
Groupthink (Janis)
Human Capital Index (HCI)

IAS accounting standards
Intellectual Capital Rating
Impact/value (Hammer)
ICT value
Indusive Value Measurement (IVM)
Intangible Assets Monitor (Sveiby)
Internal Rate of Return (IRR)
Leveraged Buy-Out
Liquidation value
M&A approaches
Management buy-out
MAGIC (QPR)
Marginal Costing
Market Added Value
Net Present Value (NPV)
NOPAT
OODA Loop (Boyd)
Operating Cash Flow
Operating Profit Percentage
Operations Research
P/E Ratio
Payback Period
Performance Categories (Baldrige)
Performance Prism
Plausibility Theory
Portfolio Analysis
PRVit
Quick Ratio
Risk-Adjusted Return on Capital (RAROC)
Real Options (Luehman SDG)
Real Ratio
Regression Analysis
Relative Value of Growth (Mass)
Reputation Quotient (Harris Fornbrun)
Return of Capital Employed (ROCE)
Return of Equity (ROE)
Return on Invested Capital (ROIC)
Return on Investment (ROI)
Return on Net Assets (RONA)
Risk Management
Simulation business modeling
Six Sigma (GE)
Six Thinking Hats (de Bono)
Skandia Navigator (Leif Edvinsson)
Strategic Thrusts (Wiseman)
TDC matrix (Internet value)
Time-Based Activity Based Costing (Kaplan)
Total Business Return (BCG)
Total Shareholder Return (TSR)
US GAAP accounting principles
Value Reporting Framework (PWC)
Value Creation Index (CGE&Y CBI)
Variable Costing
VRIN (Barney)
WACC
Z-Score (Altman)

Organization – Change – Culture Methods & Frameworks (A-Z)

7-S Framework (McKinsey)
Acquisition Integration Approaches (Haspeslagh, Jemison)
Attributes of Management Excellence (Peters)
Balanced Scorecard (Kaplan, Norton)
Baldrige categories of performance
Bases of Social Power (French, Raven)
Business Process Reengineering (Hammer)
Capability Maturity Model (CMM)
Change Approaches (Kotter)
Change Behavior (Ajzen)
Change Dimensions (Pettigrew, Whipp)
Change Management (Iceberg)
Change Model (Beckhard)
Change Phases (Kotter)
Changing Organization Cultures (Trice Beyer)
Cultural Intelligence (Early)
Clarkson Principles
Core Groups (Kleiner)
Competing Values Framework (Quinn)
Corporate Governance (OECD)
Crisis Management tips
Cynefin Framework (Snowden)
Cultural Dimensions (Hofstede)
Culture Change (Trice, Beyer)
Culture Levels (Schein)
Deming cycle (PDSA)
Dialectical Inquiry
Dimensions of Change (Pettigrew, Whipp)
Eight Attributes of Management Excellence (Peters)
Entrepreneurial Government (Osborne)
EVM (CPM)
EFQM)
Expectancy Theory (Vroom)
Industry Change (McGahan)
Five Disciplines (Senge)
Force Field Analysis (Lewin)
Fourteen Points of Management (Deming)
Gestalt theory
Growth Phases (Greiner)
Hierarchy of Needs (Maslow)
Implementation Management (Krüger)
Innovation Adoption Curve (Rogers)
Intrinsic Stakeholder Commitment
Intangible Assets Monitor (Sveiby)
Kaizen (change philosophy)
Learning Organization (Senge)
Levels of Culture (Schein)
Levers of Control (Simons)
Management by Objectives
Managing for Value (INSEAD)
OODA Loop (Boyd)
Organic Organization (Burns) Organizational Configurations (Mintzberg)
Outsourcing
Parenting Advantage (Goold, Campbell)
Parenting Styles (Goold, Campbell)
Path-Goal Theory (House)
People CMM (CM-SEI)
Performance categories (Baldrige)
Performance Prism
Planned Behavior Theory (Ajzen)
RACI (RASCI)
Requisite Organization (Jaques)
Results Oriented Management
Seven Habits (Covey)
Seven Surprises (Porter)
Six Change Approaches (Kotter)
Six Sigma (GE)
Skandia Navigator (Leif Edvinsson)
SMART (Drucker)
Stakeholder Management
Strategic Alignment (Venkatraman)
Strategic Stakeholder Management
Strategy Map (Kaplan, Norton)
System Dynamics/Thinking (Forrester)
Ten Principles of Reinvention (Osborne)
Theory of Planned Behavior (Ajzen)
Theory of Reasoned Action (Azjen, Fishbein)

Total Quality Management
Two-Factor Theory (Herzberg)
Value Reporting Framework (PWC)

Communication − Marketing Models & Methods (A-Z)

7P s (Booms, Bitner)
ADL Matrix (Arthur D. Little)
ARIMA (Time Series Analysis)
Balanced Scorecard (Kaplan, Norton)
Bass Diffusion Model (Bass)
BCG Matrix
Brand Asset Valuator
Brand Personality
Bricks and Clicks
Business Assessment Array
Business Process Reengineering (Hammer)
Change Behavior (Ajzen)
Change Management (Iceberg)
Change Phases (Kotter)
Core Groups (Kleiner)
Corporate Reputation (Harris, Fornbrun)
Crisis Management tips
Distinctive Capabilities (Kay)
Enterprise Architecture (Zachman)
Extended Marketing Mix (7P s)
Framing (Tversky)
Gestalt theory
Groupthink (Janis)
Implementation Management (Krüger)
Industry Life Cycle
Innovation Adoption Curve (Rogers)
Intrinsic Stakeholder Commitment
Kaizen (change philosophy)
Leadership Styles (Goleman)
Learning Organization (Senge)
Levers of Control (Simons)
Marketing Mix (4P s, 5P s)
PEST Analysis
Planned Behavior Theory (Azjen)
Positioning (Trout)
Product/market grid (Ansoff)
Product Life Cycle
Profit Pools (Gadiesh, Gilbert)
Reputation Quotient (Harris, Fornbrun)
Strategy Map (Kaplan, Norton)
STRATPORT (Larreche)
Theory of Reasoned Action (Azjen, Fishbein)
Twelve Principles of the Network Economy (Kelly)
Value Disciplines (Treacy, Wiersma)

Leadership − Manangement Methods & Theories (A-Z)

4 Dimensions of Relational Work (Butler)
Activity Based Costing (ABC/ ABM)
Bases of Social Power (French, Raven)
Benchmarking
Brainstorming
Business Process Reengineering (Hammer)
Change Management (Iceberg)
Competing Values Framework (Quinn)
Contingency Theory (Fiedler)
Cost-benefits analysis
Crisis Management tips
Cultural Intelligence (Early)
Cynefin Framework (Snowden)
Deming cycle (PDSA)
Emotional Intelligence (Goleman)
Enterprise Architecture (Zachman)
ERG Theory (Alderfer)
Expectancy Theory (Vroom)
Five Disciplines (Senge)
Framing (Tversky)
Groupthink (Janis)
Growth Phases (Greiner)
Hierarchic Organization (Burns)
Human Capital Index (HCI)
Just-in-Time (JIT)
Kepner-Tregoe Matrix
Leadership Continuum
Leadership Styles (Goleman)
Levels of Culture (Schein)
M&A approaches
Management by Objectives
Modeling business simulation
National Differences (Hofstede)
Organic Organization (Burns)
OODA Loop (Boyd)
PAEI (management roles)
Parenting Styles (Goold, Campbell)
Path-Goal Theory (House)
Poer Bases (French, Raven)
Requisite Organization (Jaques)
Results Based Leadership (Ulrich)
Results Oriented Management
Risk Management
Root Cause Analysis
Seven Habits (Covey)
Seven Surprises (Porter)
Simulation business modeling
Six Sigma (GE)
SMART (Drucker)
Social Intelligence
SWOT analysis
TDC matrix (Internet value)
Theory of Constraints (Goldratt)
Theory X, Theory Y (MacGregor)
Theory Z (Ouchi)
Total Quality Management
Two-Factor Theory (Hertzberg)
Value Chain (Michael Porter)

Appendix 2: The Logical Thinking Process (LTP)

With substantial roots in Aristotelean logic, the thinking process is a unique creation: a graphical way to express the interdependent cause-and-effect relationships within simple, complicated , and complex systems in a way that "even executives" can immediately grasp.

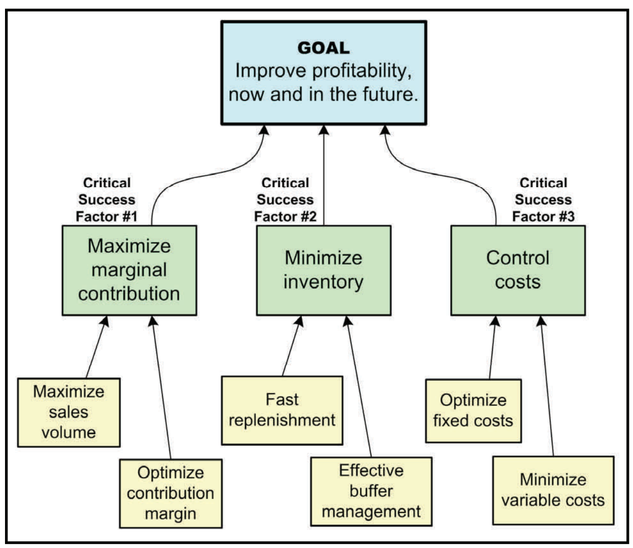
Originally conceived by E.M. Goldratt, the original objective of the LTP was to identify and break constraints limiting improved system performance that were not physical, or were not located in the production process (which was the focus of Goldratt's earliest efforts). Goldratt quickly came to realize that eliminating bottlenecks in production did not automatically translate to a better bottom line. His inquiry into why this phenomenon occurred led him to discover that what prevents most organizations from realizing significant improvements in performance is not problems with efficiency in discrete pieces of the system, but rather *organizational policies* that drive people to do the wrong things—in other words, non-productive behavior.

Unfortunately, though there is no shortage of quantitative tools for improving parts of a complex system, there are few qualitative tools that permit decision makers to manage holistically. Particularly, there historically has been no tool that would identify policies that, while seeming necessary for some specific purpose, actually drive suboptimal results.

Recognizing this deficiency in his management "tool box," Goldratt began to develop logical tools to analyze and improve policy. This development process took about seven years to complete, but by 1993 the logical thinking process (LTP), "release 1.0," was more or less ready for prime time. Succinctly stated, the LTP is intended to help organizational decision makers determine what to change, what to change it to, and how to make the change happen.

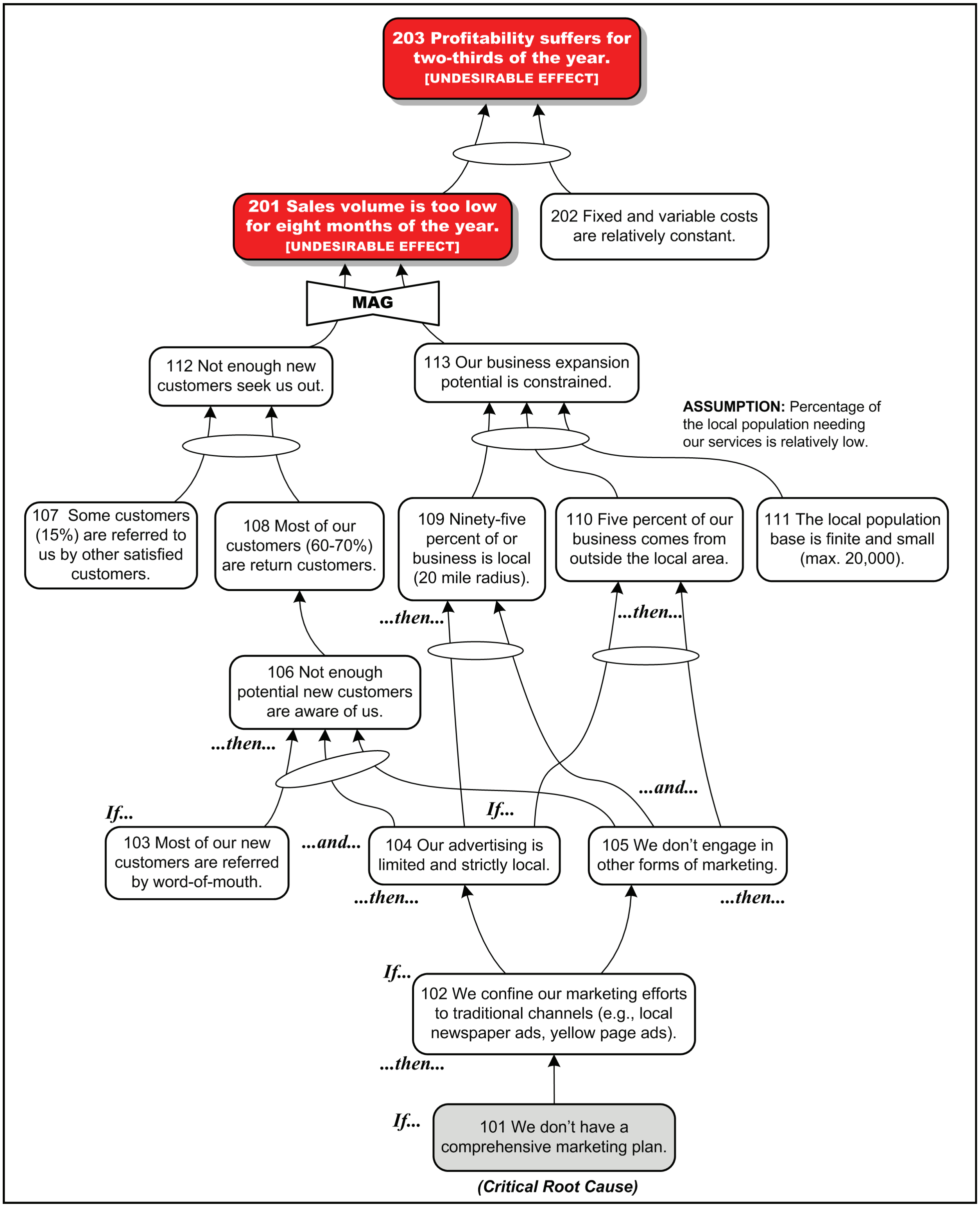
The thinking process is composed of five logic tools, or trees:

1. Intermediate Objectives (IO) Map. This simple diagram serves to engender consensus on the unitary goal of an organization and the critical success factors, or necessary conditions, that must be satisfied to achieve it.



Intermediate Objectives (IO) Map

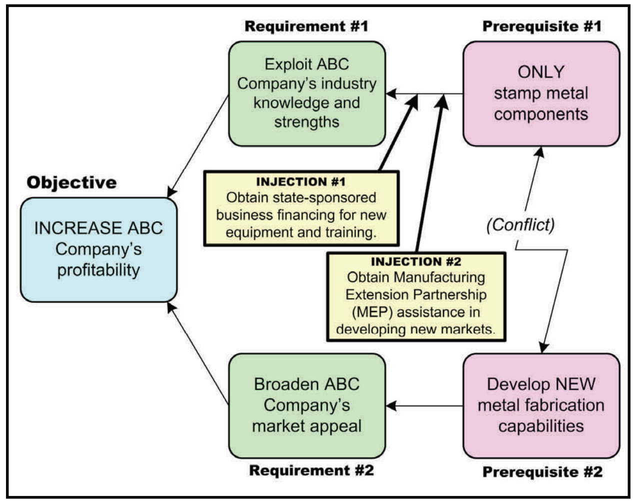
2. Current Reality Tree (CRT). A CRT is a logically rigorous cause-and-effect diagram that is used to reveal the root causes of undesirable gaps, or mismatches, between the system's critical success factors and what is actually currently happening in the system. Sometimes these root causes can be hidden under multiple layers of cause and effect, and invariably they prove to be policies that were at some time put



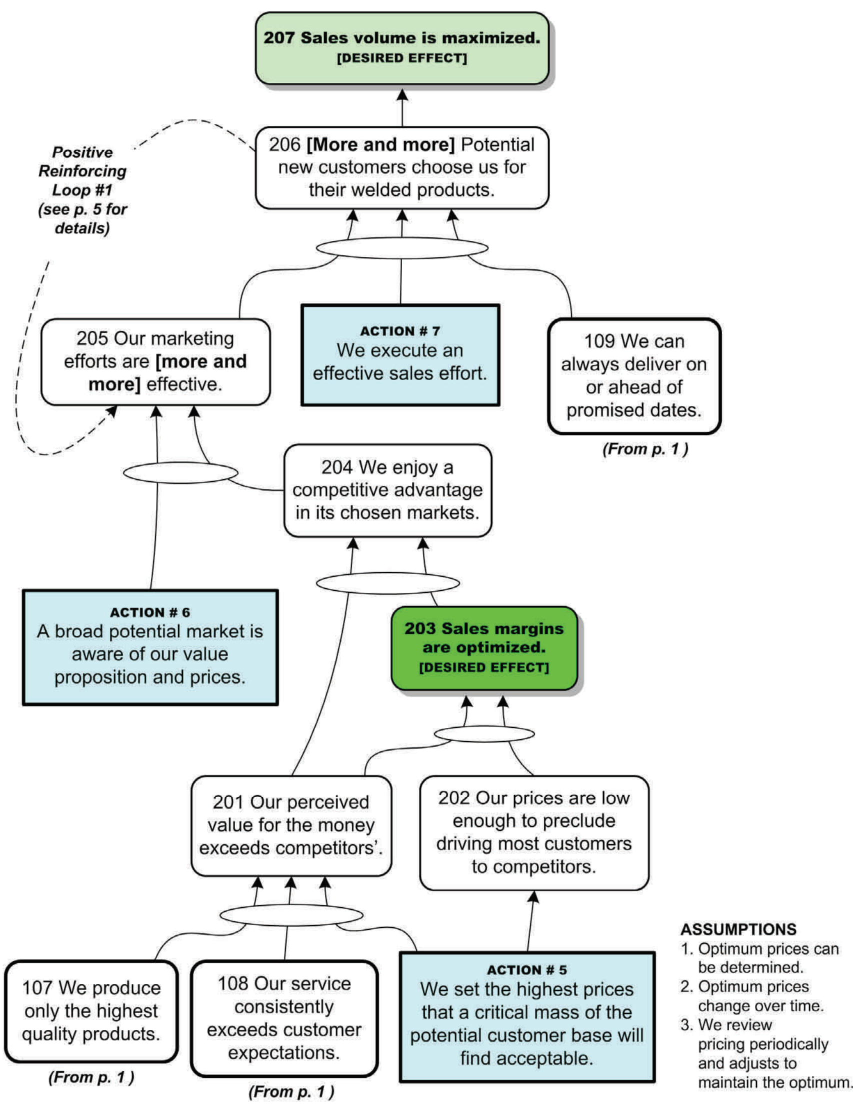
Current Reality Tree (CRT)

into place for very different reasons. In other words, in the immortal words of Pogo, "We have met the enemy, and he is us." We've done it to ourselves.

3. Evaporating Cloud (EC). Sometimes called a conflict resolution diagram because of its purpose (to resolve conflict), the EC is designed to help resolve often-hidden conflict that frustrates positive change and stagnates organizations in the same performance over time. The EC's purpose is to resolve resistance conflict in a win-win manner, by generating breakthrough (i.e., outside-the-box) solutions.

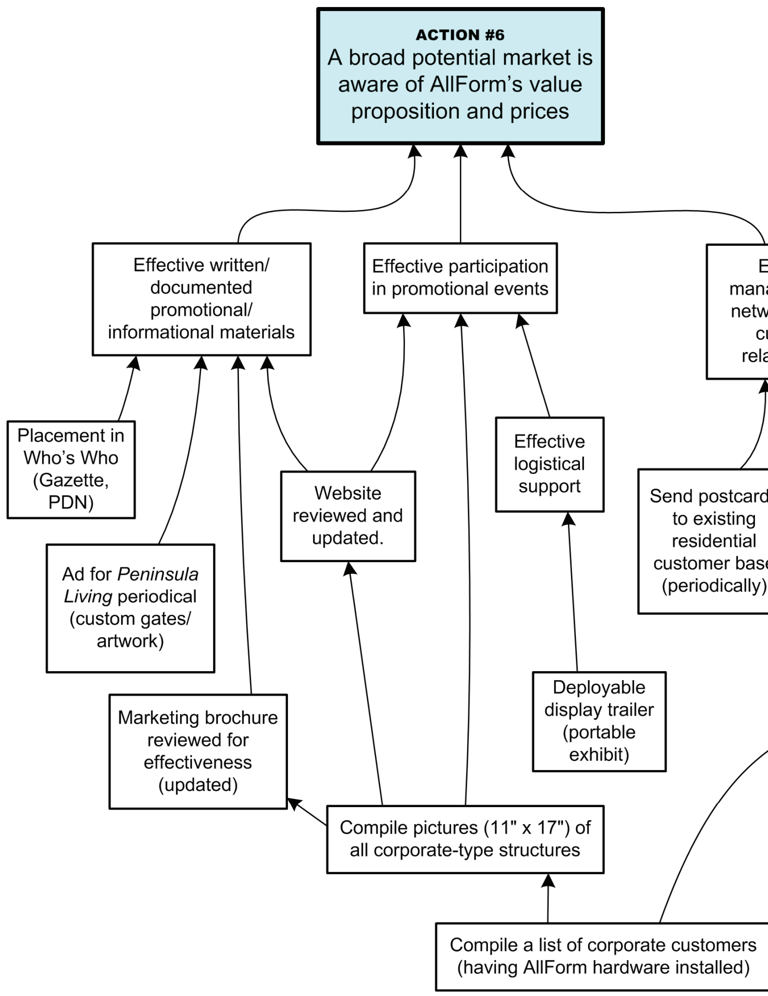


Evaporating Cloud (Conflict Resolution Diagram)



Future Reality Tree (FRT)

4. Future Reality Tree (FRT). An FRT is intended to "bench test" proposed solutions before time, money, manpower, or other resources are expended to try to implement them. The FRT visually depicts the logical outcomes of putting breakthrough ideas into effect. In other words, it demonstrates logically how the proposed idea will lead to the intended results. Perhaps even more important, it enables change agents to avoid the "law of unintended consequences." The FRT allows managers to avoid new, potentially devastating outcomes that might result from executing what initially appears to be a great idea. And all this happens before any actions are taken to implement change.



Prerequisite Tree (PRT

5. Prerequisite Tree (PRT). Once the organizational changes are decided upon and logically verified (through the FRT), a PRT is used to identify and help overcome obstacles to implementation, and to time-sequence all the required execution actions. The completed PRT becomes the basis for a project activity network, facilitating the management of large-scale, significant organizational change as a formal project.

The Categories of Legitimate Reservation

What differentiates the thinking process from other quasi-logical tools is its logical rigor. This rigor is provided by eight rules Goldratt called the Categories of Legitimate Reservation (CLR). These rules form the underlying basis for the effectiveness of the entire LTP. The CLR are completely neutral to politics, agendas, or other biases that might influence the outcome of a thinking process analysis. Rigorous application of the CLR ensures the maximum degree of objectivity in a thinking process analysis.

Applications of the Thinking Process

While detailed descriptions of applications of the thinking process are beyond the scope of this paper, three noteworthy examples warrant citation:

In the mid-1990s, Lucent Technologies applied the thinking process to effect a 50 percent reduction in the time required to develop new releases for the most complex software project in the world (1,600 full-time programmers working on the software required to manage telephone system software for the Baby Bells).

The U.S. Air Force used the thinking process to improve aircraft depot maintenance operations and software support throughout the Air Force.

Boeing Corporation has used the thinking process in several different divisions to guide internal process improvement efforts. (The thinking process helps managers decide what to apply other quantitative tools to.)

Seagate Technology applied the thinking process to increase the effectiveness of its Six Sigma efforts by an order of magnitude, and to develop and test a new supply chain management strategy.

There are hundreds of other, less visible applications of the thinking process in smaller and medium-sized companies, government agencies, and non-for-profit, non-governmental organizations.

The thinking process is described in detail in two books:

1. Dettmer, H. William. *The Logical Thinking Process: A Systems Approach to Complex Problem Solving*. Milwaukee: ASQ Quality Press (2007).

2. ___________. *Strategic Navigation: A Systems Approach to Business Strategy*. Milwaukee: ASQ Quality Press (2003).