Changing the Dialogue

A Series on the New Business Dynamics

June 2012

Structural Dynamics:
The Foundation of Next Generation Management Science

White Paper

βeta Version of the Construct

Version 1.0

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"What is the most rigorous law of our being? Growth. No smallest atom of our moral, mental, or physical structure can stand still a year. It grows / it must grow; nothing can prevent it."

– Mark Twain
1835–1910

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Acknowledgements

This document is not an academic peer review piece. Rather it posits a new approach towards achieving and sustaining organizational value. Following the tradition of research, it seeks to build on accepted hypotheses to offer an enhanced model to achieve maximum performance and sustainability.

As such, this work is not so much the enlightened position of the author as it is the continuing amalgamation of the sum total of knowledge in this field. The author owes more gratitude that can be repaid to those who came before and hopefully, this argument will further the discussion and others will build upon this model.

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Changing the Dialogue Series

Over the past several decades, it has become apparent that we continue to face evolving and even disruptive or transformational changes in the way global business is practiced. This is one volume in a series of monographs that address these challenges businesses face. The intent of this series is to explore new business models or more appropriate a new business philosophy.

Our *New Business Dynamics* demand new ways of assuring not just the preservation of shareholder value but its tangible growth. This includes new ways of addressing governance concerns and new ways of responding to market changes using this century's technological driven business management tools.

While each monograph is designed to be a standalone manuscript, the synergy of series will hopefully provide management with a new set of tools to meet his or her daily operational challenges as well as the strategic positioning of the firm for long term value added.

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Forward

This work is effectively a continuation of my doctoral dissertation published in 1996. The original concept dates to that period and the first draft of this work was completed circa 1999. For a variety of reasons, this thinking was relatively dormant for the next decade, albeit the construct of *Structural Dynamics* was frequently cited in a variety of works by this author.

In January 2009, the first of this *Changing the Dialogue* series, *Rapid Response Management: Thriving in the New World Order* was released amid the chaos of the recent recession. Much of that thinking was built on the *Structural Dynamics* foundation.

Later this year, the white paper will be released as a book and subsequently the follow on volume, *Asset/Equipment Integrity Governance: Operations—Enterprise Alignment (A Case for Board Oversight)* will be published as well. Therefore, it seemed appropriate to finalize this original thinking and make it available as well.

Throughout most of the 1980s, the author sold technology to a variety of public and private organizations across most of Asia. Other experiences included selling in the Middle East, South America as well as Europe in addition to North America.

My search for a common platform for negotiation across these different cultures led me to explore a process-oriented structure of negotiation incorporating multidimensional criteria. The resulting system level analysis used structural equation modeling and game theory to construct a cross cultural negotiation framework model.

During the process, it dawned on me that there are forces working in our everyday business processes that are not seen—so called latent variables. Usually, we only see their results, for example, Facebook supplants MySpace, Google takes a dominate position from Yahoo and Apple leads the mobility revolution.

However, these processes did not unfold in a vacuum nor did a management guru descended from the mountain giving a chosen few insights others could not avail themselves of. Management science has been around for almost 4,000 years.[1]

During this time, we have learned a lot about the management of personnel, physical assets, capital, and knowledge. For all this experience, we still make fundamental errors in judgment. Moreover, it seems that each generation is doomed to repeat the mistakes of the past.

While there is no “silver bullet” and new theories will come and go, we continue to miss the mark when it comes to long-term success. For every company more than 25 years old, there are literally thousands that did not make the cut. Miss-reading market forces remains an accomplished art.

In recent memory, we have managed by objectives, re-engineered processes, taken a life-cycle approach to quality, developed Customer Relationship Management (CRM) models, and a host of other approaches to increase the bottom line. While all of these efforts have merit in their own right–something is still missing.

In the early 1990s, I was involved in a number of re-engineering projects with a major energy services company. At the time, the oil & gas industry was in a precarious state, and the service companies were more dramatically affected than the oil companies. Throughout a number of reorganization scenarios, the firm’s position did not seem to improve.

A student of industry and organizational structure and processes associated with them, I found myself wondering, “Are we trying to fix the right things?” Inevitably, I arrived at the conclusion that we were not.

Regardless whether firm’s are trying to adjust to new market conditions by restructuring, launching a “dot com” (or Mobility) business, or acquiring / divesting business units or entire corporations, they are faced with one fundamental question. Will this action result in increased shareholder wealth? In other words, is it accretive?

This paper addresses the fundamental problem facing business today. Are our processes addressing the right issues? This is not an easy answer, but it is even more difficult to ask the right questions.

For unless we understand the *Structural Dynamics* underlying our processes, it is easy to re-engineer this year, then 'tweak' or refine processes next year, and then re-engineering the business again the next year. It is no wonder that employees often feel “that we can wait out this reorganization for the next.”

This discussion will center on a new way of thinking. An approach that focuses on the underlying dynamic behaviors of all systems, physical or natural as well as (human behavior) business. For only when we have the basic knowledge of the underlying forces at work within any given business process can we truly have insight.

This understanding of the market can be invaluable–it may prevent us from investing scarce resources inappropriately. Such insight can become competitive advantage when we have this asymmetric information our competitors do not.

In the physical world, weather forecasters have a very good understanding of the natural phenomena and their interactions. Compared to only a few years ago, our short-term predictions are more often than not quite good. This knowledge has saved billions of dollars and countless lives.

This modeling technology is now available for general business concerns. By applying proven concepts in this new setting, we can gain an insight into the *Structural Dynamics* of our environment. Those who capitalize on this knowledge of the underlying structure and its evolution will undoubtedly be better prepared than those who only hope that the bad weather will pass them by.

Finally, readers may note that some of the discussion herein uses verbiage that was perhaps more in vogue a decade ago. Since much of this paper has its roots in that era, the terminology has been kept to reflect the lineage and put this construct in its proper historical context.

-- Scott M. Shemwell
June 2012

Introduction to *Structural Dynamics*

For years, business has been downsizing, re-organizing, or re-engineering. Sometimes at a torrid pace! More often than not, one re-engineering program begets another, and yet another. This is often couched in the guise of Deming's approach to *continual improvement*[2].

Does this suggest that these process oriented management methodologies are incorrect or poorly implemented? Sometimes it is a bit of both, but perhaps more importantly is the possibly that these processes are built on the wrong premises.

False Thinking

In ancient times, mankind believed that the earth was the center of the universe, and that the sun, moon, stars, and other heavenly bodies revolved around the earth. Most theories, measurement processes, concepts, and understandings developed around this core belief proved to be unreliable and unsupportable.

We now know that only the moon and collection of manmade objects revolve around the earth. In other words until we understood the fundamental structure of our universe we had almost no chance of developing adequate processes for understanding this physical system. Think of the economic and social loses incurred over the centuries of misunderstanding.

Moreover, think of the missed economic opportunities. Until the nature of the universe was at least partially understood it was impossible to harness this system to our economic good. For example, until we understood that the world was round, not flat our attempts at seamanship and its associated economic trade were limited.

Such was the risk that in 1492 many of Columbus' crew feared they might sail off the end of the world. Without accurate charts and *reasonably* good celestial navigation, seamanship was in the hands of a few daring explorers. Perhaps these adventures were simply foolhardy attempts at fame and fortune.

Enlightenment

Once these simple tools were widely available trade between nations became commonplace. The economic vistas were greatly expanded for those nations such as England, France, Portugal, and Spain that capitalized on seamanship to conquer new worlds. Clearly these nations had direct access to the sea as did the Phoenicians prior, but other nations such as Germany, and Italy were not landlocked. However, these and other nations did not capitalize on knowledgeable seamanship to the extent others did.

Structural Dynamics **is defined as 'the morphology or patterns of motion toward process equilibrium of interpersonal systems'.**

Unless we can develop an understanding of the underlying structure of a process, whether a physical system such as the universe or a behavioral system such as those found in business processes, our ability to architect the correct processes is limited. Therefore, if we are to avoid re-iterative re-engineering, it is important that we develop a basic understanding of underlying structure.

Structural Nature

We must also keep in mind that structure is not static. Again using the physical metaphor, earth science plate tectonics, our 'terra firma' rests *solidly* on semi-liquid mantle that is in constant movement. Normally, our senses cannot detect this movement, and geologists tell us that significant movement takes place only over great periods of time, even millions of years.

Yet, this movement is the fundamental cause of earthquakes. Every once in a while a significant tremor takes place in one of several earthquake prone areas. These areas, or faults, are at the juncture of two or more moving plates. Typically, this movement takes place miles below the surface of the earth; however, the results can be devastating.

It is no wonder scientists are spending a great deal of time and money trying to understand the nature of earthquakes better so as to predict the likelihood of their occurrence, where, and when. We need to also understand, that while large newsworthy earthquakes are uncommon events, throughout the world smaller earthquakes are daily events.

So we see that 'terra firma' dynamics impact on our social processes continually. Societies in earthquake prone areas have strengthened building codes, trained their citizenry, and taken other measures to minimize the impact and disruption caused by these tremors. Some societies have succeeded better than others in their quest. Certainly, having the money and technology to invest in this effort is important, but no amount of money and perhaps the wrong technology will have a positive effect until such time that the society understands the nature of these movements deep inside the earth.

This is a relatively simple example of the dynamic nature of systems and their underlying structures. And while the example is easy to understand, we have yet to be able to predict an earthquake with any certainty. As with most complex systems, there are a number of variables involved.

Sometimes we can see and measure a variable, thus added to our understanding of its nature and behavioral characteristics. Often the variable is unseen or *latent*, and is only detected because of the impact it has on the system. Nuclear physicists are constantly theorizing that unknown 'particles' are present based on their impact on the nuclear system under investigation.

The structure upon which physical and human processes are built is itself in a state of dynamic fluctuation. We can provide additional evidence, but the reader gets the point. Webster's dictionary provides several definitions for structure, (a) something arranged in a definite pattern of organization, (b) the arrangement of particles or parts in a substance or body, (c) organization of parts as dominated by the general character of the whole, and (d) the aggregate of elements of an entity in their relationships to each other.

The first two definitions lead one to see the rigidity of a structure, and while the second two focuses on a more flexible interaction among structural components, but interpretation still does not suggest that the structural system is dynamic by nature.

> **The fundamental premise upon which the theory of *Structural Dynamics*[3] is developed is the belief that structures are not static and that more often than not, these dynamics are not directly observable. Over time, the very nature of the structure and the very nature of the component parts of the structure may be radically different from today's composition.**

Those individuals, firms, industries, and even societies that are able to recognize and react to structural changes will be the best suited to obtain competitive advantage over their competitors. Those who do not conversely will be disadvantaged.

Disadvantaged long enough and you may even be forced to withdraw from specific competitive spheres. The question remains, how does one understand the *Structural Dynamics* at work on his or her processes, and how does one pro-actively use this information to secure competitive advantage.

> Structural dynamics is defined as: The morphology or patterns of motion towards process equilibrium of interpersonal systems[4].

The word *system* is key. According to Peter Senge, *The Fifth Discipline*, markets and competitive forces must be regarded as systems. As such, markets will strive for (although never truly reach)

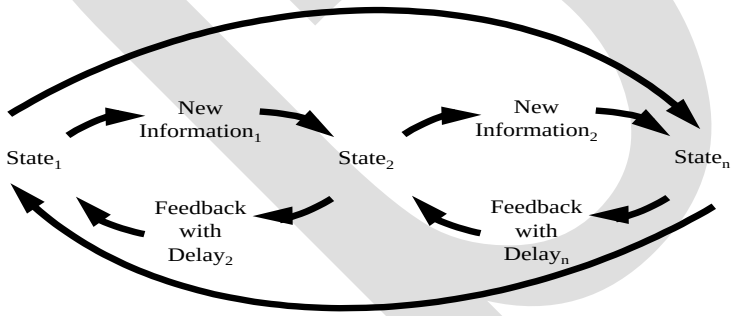
stability or equilibrium. As a behavioral process, *Structural Dynamics* has been difficult to measure and analyze until recently.

Emerging new thinking is integrating market behavioral models with econometric models in an effort to shed new light on latent or hidden market dynamics. Recently, the Nobel Prize was given to several individuals for their contribution to *game theory* (which has been around approximately 50 years).

The renaissance of game theory is recognition that the description of complex system dynamics has value in business systems, not just physical science and engineering systems. However, game theory in and of itself is insufficient alone and must be used in the context of other theories, i.e., marketing and systems theories.

Integrating Structure and Process

Structural Dynamics is one statistical and modeling technique (developed by the author in his doctoral dissertation) which integrates structural and process thinking, providing new insight into the underlying forces at work in markets. Although built on a strong foundation of statistical and mathematical theorems, these techniques are straightforward and easily mastered by individuals with minimal exposure to statistics. There are even models that require no mathematical analysis.



Interrelated Systems

Systems are actually a combination of multiple sub-systems with varying degrees of integration. All of us have witnessed this phenomena simply watching television. In order to see our favorite sitcom, several systems must interact in a timely and efficient manner. Scripts must be written, the cast must be auditioned and casted, recording, and subsequent transmission to receivers of the “ordinary type”/cable/satellite. Don’t forget about the process of generating and transmitting electricity necessary to power our televisions.

For the battery operated TVs, there is the whole process of building and marketing batteries. What about programs on other channels, isn’t there a competitive component to these systems. We all take this process for granted, and as consumers we should.

The television industry has done an excellent job integrating multiple technologies, processes, and businesses to the benefit of their customers. Systems change and sometimes dramatically. 'Lucy' reruns are as popular today as they were in the 1950's; however, many of us have small theaters with stereo sound in our homes; a technology unheard of, even in the most modern air-conditioned movie palaces of Lucy's day. Mobility devices take this model to the next level of complexity.

System State

The current state of a system ($State_n$) is a function of all new information (NI_n) which is the sum of current information (CI_n), plus feedback (F_n).

$$State_n = \sum (NI_{1\ldots n})$$

where

$$NI_{1\ldots n} = (CI_{1\ldots n} + F_{1\ldots n})$$

Moreover, system delay can either be by design or through system imperfections. Delays can be caused by the system or individual's initial lack of understanding of the impact of the new information, flaws in the feedback mechanisms, inaccurate or incomplete analysis of the new data, or confusion caused by the interaction with other systems.

Structural Equilibrium

The following text reflects status as of the original writing and may not reflect the current situation. In essence, a mini case study.

Simply, the general direction a system is headed in as it seeks a stable or equilibrium state. In actual practice systems do not reach equilibria states, but only seek to through feedback loops.

It is important to understand that structure and process are interrelated. One cannot exist without the other. This point is often misunderstood by managers, consultants, and business book authors alike.

IBM was previously maligned as the company that was once the best run corporation in America but became an also ran[5]. However, as of this writing, IBM stock is once again high. And although many of the IBM 'want-a-bes', i.e., HP, Microsoft are doing quite well, they are all a shadow of IBM from a revenue perspective. Most of these companies are spending large sums trying to establish a presence in the IBM fortress, the Fortune 500 corporations.

In spite of IBM's well-publicized troubles, the company still controls the purse strings for these prime accounts. The others have yet to penetrate this bastion at even the elementary levels. Technology, youth, vigor, and processes would suggest that IBM would have been dethroned.

This has yet to happen. IBM seemingly understands the corporate landscape upon which it plays. The others appear not to, in spite of hiring IBM employees and senior management at a rapid rate.

One could argue that the IBM 'want-a-bes' have not been able to embody the knowledge resident in IBM despite hiring keep personnel during a time of perceived IBM weakness. So why hasn't IBM gone the way of Control Data Corporation (CDC), an earlier significant player in the computer business, and now a provider of minimal information technology services such as payroll checks. And since they have not, why not? The answer, of course, lies in the structure upon which this corporation is built.

IBM has based their very existence on their customer's corporate management. Buying IBM has often been called the 'safe decision', i.e., one would not be fired for buying IBM. Recently, the computer industry has believed that this 'half-nelson' has been broken. In reality it has not.

IBM still holds a premier position with Fortune 500 management. It is still one of the largest software vendors. It is still the one of the largest computer hardware vendors. It is still one of the

largest information technology service vendors. One could argue that IBM does not deserve holding this position; however, no one including Microsoft has been able to really dislodge them.

IBM appears to understand the structural nature of computer systems within large organizations. Many of its competitors are struggling to understand these issues. Even their strong growth is largely attributed to the growth of the computer industry and not necessarily to the reduction of IBM's customer base. This is a markedly different scenario than the RCA experience.

In the late 1950s and early 1960s, RCA 'owned' the television market in the United States. Today, almost no one owns an RCA television. From a position of technological and marketing leadership, this company has become an unknown in this market.

RCA discounted the initial forays of its Japanese competitors 30+ years ago. The company was apparently obsessed with its own success. They failed to understand what their customers wanted, low price and reliability and they misunderstood their competitors resolve and technological expertise. Any focus RCA had on internal processes had no effect.

This company did not understand the *Structural Dynamics* of its industry. In hindsight, the result was predictable, although at the time few if any saw the real issues. This is nature of *Structural Dynamics* and its unobserved variables.

Practical Applications of Structural Dynamics

This is not a document of theories. Rather, it a meant to provide practicing business managers with a new set of tools to more thoroughly understanding of the environment in which they play.

Competitive advantage[6] will go to those players with the best understanding of the environment of the game if they develop and implement the best strategies. Managers will only develop 'best' strategies if they understand the processes which govern their business and the underlying industry, organization, and business structures upon which processes are built.

Several years ago a large computer systems integrator was having difficulty meeting its sales forecasts. The sales manager put a new forecasting process in place, the purpose of which was to insure that the sales force met its projections. He decreed that the sales personnel should only book those sales that were on the forecast.

Following this process, he believed that the sales forces would meet it sales objectives and would no longer be scrutinized for missing its objectives. Naturally, actual sales became more closely aligned with the forecast.

So what happened to opportunities that we not on the forecast or that developed after the forecast was submitted? As one might expect, these sales never occurred.

The sales force was measured on its ability to forecast, and not on its ability to sell. Actual sales declined and the sales force became demoralized. The top people moved on to other career opportunities, and the remaining individuals spent their time managing the system and not selling the product.

Total actual sales declined. The failure of this process begot a new process. One designed to increase sales.

What went wrong? The sales manager intended to put a process in place that would make the sales force more accountable, professional, and successful. The result was just the opposite. The sales manager did not understand the *Structural Dynamics* of his sales force.

Typically, sales personnel in that industry are compensated by an average base salary coupled with a substantial commission plan. A top sales representative typically makes six figures and in some cases seven. These individuals are corporate 'gun slingers' by nature, and they are few in number. They care very little for paperwork and organizational processes and often tend to be loners.

They recognize that one cannot always forecast with impunity and they will take the sale when and where they can get it. Theirs is a uniquely competitive world in today's economy; heads 'I' win and everyone else loses. Their livelihood and that of their family depends on the individual's consistent pattern of winning 'the sale'.

The sales manager in this case did not recognize or understand the dynamics of the social order he was trying to regulate. To those in the 'game', the structure of high-tech sales industry is well understood. Processes that run counter to the dynamics of this business segments are pre-destined to fail.

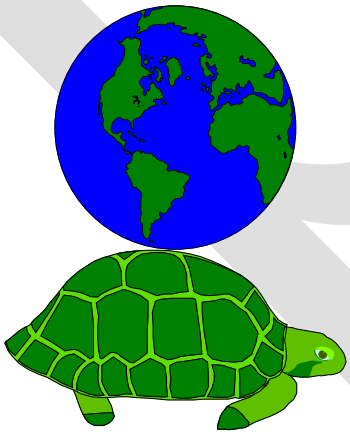
It is important to understand that this social dynamic is not restricted to one company. Often these sales professionals will move from company to company in search of better products and higher commissions. The sales manager also made the mistake of forcing a 'fix' for a general sales population onto a group of high performers. This is often the case when managers from one industry try to impose learned processes upon another industry.

This is a simple case; however, it is very representative of management techniques often used. Frequently, we put new processes in place without a complete understanding of the environment of structure upon which we placing these processes. It should come to as no surprise that failure, or less than optimum performance is the result of these management mistakes.

The Need for Structural Understanding

In ancient mythology, one perspective on the world depicted it as being carried on the back of a giant turtle. This metaphor was used to explain a dynamic that the ancients did not understand; the apparent movement of the earth in relationship to the sun and other celestial bodies.

It is no surprise that this structure fell short in the light of scientific investigation. We must be cognizant that our business and individual processes may be riding on the back of a mythical giant turtle. Turtles move very slowly and even imperceptibly at times. It is no wonder that we have difficulty in discerning even their very existence.



One Mythological Foundation of the World

The modern reader may be more comfortable with the geophysical plate tectonics metaphor previously described. Regardless of whether one believes in the giant turtle, plate tectonics, or other unseen forces, processes are not built in a vacuum.

These processes are built upon industry, organization, and human structure and these structures are not static. Sometimes structures change quickly, and sometimes they change slowly. None-the-less *Structural Dynamics* is a force we must understand if we are to re-engineer the right processes, and re-engineer processes correctly.

Medical Analogies

When you go to a doctor and have a physical, he or she will conduct a series of tests, both inter-personal (the exam) and non-personal (analysis of blood, etc.). The end result is a 'snap shot' of your body's structure and processes. Should the doctor diagnosis a disease, further tests will determine a prognosis for its cure. Most cures involve fixing both processes; organ function and structure and condition of the organ.

We could go on with additional medical analogies, but the reader gets the point. Physical and behavioral systems are a combination of structure and processes. They are irrevocably intertwined. One cannot exist without the other.

Only an understanding of the dynamics of both can fully illuminate the overall picture in much the same way that a cat scan provides a better 'snap shot' than a simple X-ray. Multiple tests of both structure and process provide the physician with a more complete understanding of the condition of the body. Particularly when the patient has a medical problem the more complete picture dramatically increases his or her chances for a cure. Sadly, we have all heard cases where insufficient data and/or miss-understanding (miss-diagnosis) have led to tragic results.

Computing History

The following text reflects status as of the original writing and may not reflect the current situation. In essence, a mini case study.

For years, IBM defined American business success. Apple invented the personal computer, and then almost lost it. Microsoft was the upstart software company that seized an opportunity to provide computer operating systems for the emerging personal computer marketplace. For all its success, Microsoft 'almost' missed the Internet.

And let's not forget the Xerox Palo Alto Research Center (PARC) of the 1970s. This group basically conceived and designed the personal computer, operating system, networking, object oriented programming, graphical user interface (Macintosh / Windows), and software that is in use today; by the way this organization also invented the computer 'mouse'. Once again, this company did not understand what they had, were not able to commercialize it for they were only trying to save their 'core' business in the face of the mythical 'paperless' office.

While PARC was creating the new vision, the organizational man was fixated on the present, or was it the past. XEROX executives actually explained to Steve Jobs how to develop the Macintosh. Would an understanding of *Structural Dynamics* have changed the nature of the computer industry?

Did XEROX snatch defeat from the jaws of victory due to their lack of insight and understanding. Perhaps, but the more salient point, is that we most often cannot see the forest for the trees. Only when you 'helicopter' up to the 50,000-foot level can you see the forest.

The forest represents the extent width and depth of the environment. Vision is often the reserve of those who can see the forest. We must not confuse those would be sages who claim they have vision, with those who truly do.

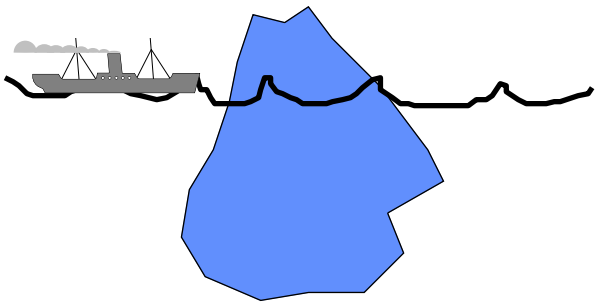
How do we know the difference? Pseudo-visionaries restate the obvious, usually using the same 'buzz' words that are in vogue at the time. It is amazing how many experienced, senior managers fall into the web of the pseudo-visionary.

Those that can truly see below the surface, those that assemble the pieces of the latent puzzle are the true visionaries. Even these visionaries must understand that vision is fleeting. Only constant attention to *Structural Dynamics* will assure 20-20 vision.

Could it be that these very icons of the computer industry did not understand the dynamics of their environment as well? Subsequent events suggest some did and some did not.

The Iceberg Principle

As the Captain of the Titanic discovered all too well, 90 percent of the iceberg structure is below the surface. The foundation of most structures is hidden or unobserved. Sometimes, as in the case of the Titanic, it is the hidden component, which can have the greatest impact on us.



The Iceberg Principle

It is the mass below the surface that gives the iceberg it momentum. When pushed along by currents and waves it becomes an almost unstoppable force. Moreover, the progress and direction of icebergs can be predicted. Computer simulations based on visual tracking, meteorological, and sea state advise shipping and other interest on iceberg population (number), and direction of movement.

Iceberg movement can also be controlled to some extent. At least this is the theory behind the oil industry's oilfield development activities in 'iceberg alley' offshore Newfoundland.

Two approaches include building offshore structures which are designed to deflect icebergs and building iceberg prediction systems which include the use of tugboats and other devices to change the course of 'bergs'. Both approaches represent an understanding of the nature of icebergs, and both represent two viable methods for addressing the problem.

> *The Iceberg Principle*—90% of any system's structure is below the surface or hidden from direct observation. This latent component controls *all* the processes associated with the system.

While watching the movie *Patton* with George C. Scott, I was drawn to one conclusion. Patton understood his business. He understood the fundamentals, the structural nature, and the processes associated with military action.

He was also a student of history and strove *'not'* to repeat the lessons of history. Patton's belief was that *'we are in the business of doing the impossible'*. Sort of like changing the direction of an iceberg!

If you know the nature of the problem, mortal men and women can do the impossible.

The 'iceberg principle' says that if we understand the 'below the surface' structure, the impossible can be accomplished. Understanding the 'directly' visible processes and structure limits our ability to see the full scope of the business environment we are in. The iceberg principle is a clear departure from traditional thinking.

IBM is often seen as 'the' traditional computer company. For years, they have owned the industry. While IBM is still the largest computer company in the world (based on revenue), they are no longer the most valuable computer company (based on stock valuation). Recently, this company does not appear to understand the underlying change in their industry.

Even though IBM dominated the personal computer industry for a time, the iceberg principle ultimately ended their reign. The underlying currents dictated by the need for information unseated the 'glass house' approach to controlling business information. Ultimately the MIS (Management Information Systems) groups lost out to the momentum of the 90 percent of the

organization that was not being served--those with limited access to organizationally controlled information. The momentum of the iceberg was not recognized and as such it was certainly not manageable.

Historical Development of Process Models

The business process body of knowledge is substantial with deep roots. Process is a key component of *Structural Dynamics* and it is worth a brief overview of some of the critical thinking in this field that is relevant to this discussion. This section only touches the visible surface of the iceberg.

Four Thousand Years of Business Processes

Management thought is the sum total of the existing body of knowledge about the activity, functions, purpose, and scope of the art/science of management. While the formal study of management is relatively new, the practice of management is as old as mankind.

For example, the concept of the 'corporation' was developed in ancient Mesopotamia (circa. 3,000 BC). The religious temples of the time operated under a dual system that embodies the religious and administration aspects of temple operation. Records were kept, plans were developed, labor divided, and work was supervised by a hierarchy of managers[7].

It may also surprise some readers that the concept of empowered teams is not new. Military organizations have been practicing teamwork as far back as recorded history. Most military operations have involved a combination of foot soldiers, cavalry (horse, armored motorized, or airborne), artillery (or archers), naval resources, and in modern times air power.

Typically, winning forces have been well trained, managed, and led by skilled generals. Often these forces have been multi-national in composition. Whether it was the Allies invading Normandy during World War II or the Gulf War against Iraq, high performance multi-disciplined and multi-dimensional empowered teams have often won the day.

Re-engineering

The popular business literature is consumed with re-engineering in all its approaches and implementations, e.g., re-engineering the corporation, or management. It is useful at this point to formally define re-engineering using the definition put forth by Hammer and Champy[8]:

> *"The fundamental rethinking and radical design of business processes to achieve dramatic improvements in critical, contemporary measures of performance, such as cost, quality, service, and speed."*

There are four key words in this definition, *fundamental, radical, dramatic*, and *processes*. The first three words focus on the significant nature of re-engineering while the fourth concept has become the focal point of business managers and consultants since the 1990s.

The pundits lead us to believe that fundamental, radical, and dramatic re-invention of processes will provide us with the competitive advantage we need to be successful in the global business arena. Many consultants and authors have focused almost exclusively on the radical changes in corporate processes often implying that it is necessary to throw out four thousand years of managerial learning[9] in pursuit of re-engineering.

Fundamentally, industry and organizational processes are built on the industry and organizational structures that have been built over time. Time is relative, although even our newest industries, such as the Mobility Internet can trace their lineage back to the Babbage Difference Engine (circa. 1822)[10] and the work during the 1960s at Xerox's Plato Alto facility, among others.

One often hears arguments that individual inventors are ahead of their time, or that the technology had to catch-up before specific products could be successfully developed and marketed. Others might argue that specific activities are 'not our core business'. No doubt all these arguments are valid.

Sometimes; however, ideas that do not work in one environment take-off in another. The passage of time allows technology and popular acceptance to make the 'timing right'. If only a manager could know when the timing was right.

Understanding *Structural Dynamics* will not make the timing right. It will; however, offer insight into the basic system that fundamentally drives timing and other aspects of processes.

Hyper Environments

In his book, Hypercompetition D'Aveni posits an environment where competitive advantage is rapidly created and rapidly eroded. He charts the evolution of an industry as a series of competitive moves and countermoves he labels the four arenas of dynamic strategic interaction:

1. Cost and quality competition
2. Timing and know-how competition
3. Competition for the creation and destruction of strongholds
4. Competition for the accumulation and neutralization of deep pockets.[11]

The traditional view of competitive advantage as developed by Porter argues that a company can develop a strategy to obtain competitive advantage. The strong implication with this scenario is that an organization can create and indefinitely maintain competitive advantage in its industry. This is effectively a static view of the competitive marketplace. One, which we all know from personal experiences, is limited in nature.[12]

We all realize that that there are patterns of movement and responses in all four arenas described by D'Aveni. Our competitive arenas are anything but static. Many of us can recall the time when RCA was the color television of choice by U.S. consumers. Today, few American television brands are available. Many have Korean brand names although their actual origin of manufacture may be Malaysia or Mexico with the apparent ultimate destiny of China.

D'Aveni states that the goal in today's marketplace is actually *disruption* of industry status quo rather than the creation competitive advantage for the firm. Thus the firm seizes advantage through a series of temporary advantages.

The obtainment of economic equilibrium is an effort in futility. Creating a series of disruptions one can 'attempt' to stay one step ahead of the competition. Likely as not, your competitor is doing the same to you.

So how can you stay one step ahead of your competitors? Everyone reads the same management books, attends the same management seminars, and studies the same management curriculum at business school. The solution is not a simple one. If it were easy, it would have already been done!

What makes one firm develop one strategy while another in the same industry pursues a dramatically different approach? Often these seemingly opposite approaches often achieve similar financial and market results.

There are many ways to skin the cat, and often one process is as good as another. History is also replete with processes that did not work as well as the competition, or that successful processes did not change with the times resulting in the loss of competitive position and even the destruction of the division or firm.

Industry consultants, practicing managers, and academics alike have largely ignored the underlying currents in any given industry. This is principally because they are difficult to divine and even more difficult to measure. The closest we get is our attempt to define industry or business 'drivers'.

For example, the oilfield services industry is greatly concerned about the price of oil, since high oil prices have historically meant an increase in oil well drilling. Oil prices are driven by demand for

gasoline, heating oil, and the energy needs of the nation and the global economy in general. This approach is entirely logical and has generally worked.

In some years for example, in 1960s, 1982, 1987, 1992, early 2000s and 2008 the price of oil and gas dropped precipitously. In all cases, the industry was caught with over capacity, and generated substantial losses with resulting massive loss of employment and industry restructuring. The same was true with the oil and gas companies themselves. Armies of high priced consulting firms were not able to stem this tide.

Transition Archetype

Years ago, the former Digital Equipment Corporation (DEC) (acquired by Compaq in 1998) conducted a study of the transition of its VAX model computer sales from its earlier PDP model sales[13]. The purpose of this study was to attempt to understand the process of transition from one computer technology to the next or new technology. An understanding of this process was of some interest to DEC as they were in the process of transition from the VAX model to the new RISC (Reduced Instruction Set Computing) product.

> *"As product life cycles decreased, we found ourselves having to deal with families of products and computer generations rather than individual systems."*[14]

To understand the *substitution* process, DEC used a model based on natural competition put forth by Fisher and Pry.[15] The Fisher Pry model assumes that,

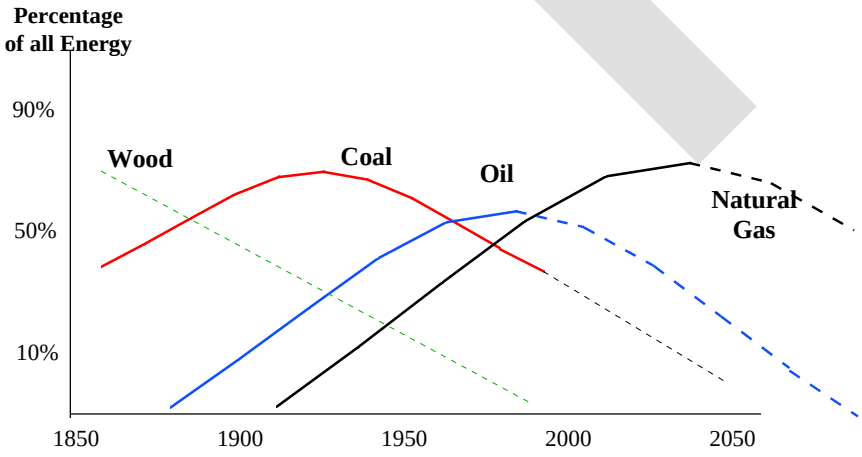
> *"The percentage rate of substitution of new for old is proportional to the amount of oil still left to be substituted."*[16]

This model had been previously validated in a *multi-competitor* market. This market was none other than the evolution of energy, from wood to coal to oil, gas, and nuclear.

Throughout human existence, including today, multiple energy sources have been in use; the current predominate form is obviously hydrocarbon (oil and gas). The issue we are concerned about here is not the fact that one competitive form of energy currently dominates the others.

Rather, it is the process of substitution of one form to the other that is relevant. The time horizons for energy substitution is quite long (see figure below) and many may not see the relevance of this system to their environment.

For example, in the lifetime of many readers, the station wagon automobile has given way to the sport utility vehicle (SUV) despite the fact that most automobile manufacturers had written off the station wagon as a product of the past. It was not until Chrysler introduced the minivan that automobile manufacturers addressed the need for extra space and hauling capacity. Clearly the role filled by the station wagon was filled by the substituted minivan or SUV.



Competition between Primary Energy Sources

It is interesting to note that, as described above with the DEC computer products, energy is likewise a *family* of energy sources across several *generations*. Understanding that, in the multi-competitor marketplace, there are several competing products that are generational by nature.

Generational is defined, in the demographic sense, as groups of products at different points in their *life cycle* coexisting together. In much the same way that coal, oil, and natural gas are used by different (or the same) consumer groups concurrently even though each energy source is either old or new.

The *Life cycle* of a specific technology has three distinct phases[17]:

1. Growth
2. Saturation
3. Decline

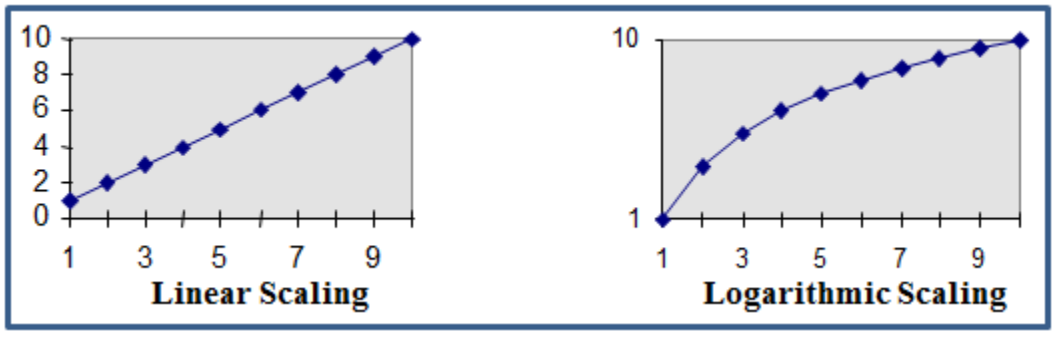
It is interesting to note that the life cycle (in this case the energy life cycle) is represented by the natural or *evolutionary* curve. This curve is the same life-cycle curve that biological organism, including human being follow.

On the surface, this is a rather profound statement, which at least at one level supports Darwinian thinking (survival of the fittest). Upon reflection, it should not be all that surprising that carbon based life forms might have similar life cycles, and that these same carbon based life forms would project their own imprint upon products and services they acquire.

This point requires further explanation. Human beings are carbon-based life forms that are born, mature, live, and ultimately die. In much the same way that young birds will 'imprint' the first being, bird or otherwise, as its parent, we imprint our own evolutionary processes and life cycle expectations on human structures and processes, in our case business structures and processes. Generally, business books, academic research, and general practice do not recognize much less elaborate on this point.

The astute reader will question this hypothesis by suggesting that the human being is part of the same ecosystem and that we do not imprint our measurement system on life cycles, but that we measure them in this way because this is their very nature. This argument is also suspect.

Mathematicians can straighten a curve into a straight line by changing the scale of an axis. For example, the following charts are drawn from exactly the same data; the numbers 1—10. The Y-scale on the left chart is linear, while the Y-scale on the right is logarithmic.



Mathematical Scaling

This is a simple example, which illustrates the point. Advanced statistical processes can measure data in a variety of ways. Usually correctly, but when improperly used statistics can incorrectly analyze data, leading to incorrect conclusions.

It is beyond the scope of this document to elaborate fully on the strengths, weaknesses, limitations, and misuses of statistical techniques. Interested readers should refer to any number of good statistical references on this subject.

The simple point of this metaphor is that everything is not what it seems to the casual observer. Moreover, different approaches often lead to the same conclusion.

So it is irrelevant whether we observe life-cycle processes whether we are objective arm's length observers or whether we see life-cycle phenomena from the standpoint of someone who is part of the process itself. Either way, according the physicist Hyzenberg, the simple act of measurement disturbs the system enough that there is some *uncertainty* concerning the actual state of the system under study[18]. For our purposes, we can assume that life cycle phenomena as discussed in this book are reasonable approaches toward viewing business behavioral processes.

Assessing *Structural Dynamics*

How can an individual or an organization recognize their industry *Structural Dynamics*? Are their symptoms for the unobserved and the unclear signals that managers can recognize? If they can see industry *Structural Dynamics* through a 'lens', what can they do with this information, and so what?

Structural Dynamic Components

Recognizing *Structural Dynamics* might be defined as an art form, but it is an art form that can be learned. While there is a statistical basis and approach to understanding the nature of industry *Structural Dynamics*, there is a sound non-statistical basis as well.

To begin with, an industry observer must look for the non-obvious. He or she can use much the same approach put for by John Naisbitt with his *Megatrends* series of books.[19] Naisbitt assembled data from a number of resources in a cohesive manner. In other words, he observed that which was happening all around him.

Typically, one must step outside the boundaries of his industry. Conventional wisdom would have us 'step outside the box' or 'change our paradigm'. While these approaches have value, they are not the same as stepping outside the boundaries of an industry. When we step outside the box or change our paradigm, we are typically doing so within the boundaries of our industry mindset.

Even when we benchmark 'best practices' of other industries, we are still looking through the lens of our own experience. We are seeking to learn from the experience of others and adapt their experiences and understanding to our own problem.

Sometimes the best practices of one industry or even one company in our own industry do not translate well into our own context. We all know cases where what seemingly worked very well in one industry, company, or context was a terrible failure in another.

But the point here is not to focus on shortcomings of other thinking, for they certainly have their place and have contributed significant value. Our interest is to explain the difference between the *Structural Dynamics* thinking and other approaches.

Structural Dynamics analysts can use the following checklist as guidelines. This list is not meant to be all inclusive, nor is it meant to be a list that one simply puts a check mark next to and tallies up the number of checks versus not check.

It is more accurately a framework for developing a structural dynamic model for any given industry environment. The following criteria provide a preliminary check list of set of questions that should be addressed when one seeks to better understand the latent variables associated with an industry segment or emerging environment, such as new technologies.

1. Not obvious or normally thought of as industry driver
2. Usually not directly related to standard industry practices
3. Becomes more visible over time or repeated measurement
4. Often not specific to a single industry or economy
5. Cannot be determined by analysis of best practices
6. Typically not associated with a single or few number of processes
7. Not associated with processes in a single firm
8. Can be cyclical or seasonal in nature
9. Not necessarily random or chaotic events in nature
10. Not necessarily economic variables in nature
11. Tend to be long term variables with limited reaction to specific current events

12. Can remain dormant for long periods of time, but when they become visible the impact can be significant and swift
13. Demographics may provide insight into emerging or future *Structural Dynamics*, they should not be used exclusively
14. Often small niche (or new) players may benefit from *Structural Dynamics* opportunities. These niches are often outside of the industry of interest, but are subsequently imported into the industry of interest
15. Technological developments may forecast future competitive events, i.e., the impact of cellular phones on the pay phone industry
16. Not all technology is useful in the near term. The technology developed by Xerox, Palo Alto in the 1960s was not commercialized for almost 20 years. Computer icon and windows technology was not commercially viable until Steve Jobs (founder of Apple Computer), and Bill Gates (Microsoft) expanded hobbyist's niches into the personal computer revolution of the 1980s.

Knowledge of *Structural Dynamics* variables can defeat the brute force of large deep-pockets organization, although this is not guaranteed. In later versions of this construct a more robust set of tools will be provided so managers and other practitioners will be better able to visualize their *Structural Dynamics* environment. In the meantime, it is useful to define latent variables.

Latent Variables

It is not the intent of the document to robustly develop statistical concepts; however, it is useful for readers to have a high level understanding of latent variables and the tools available to investigate them. Wikipedia defines latent variables, *"as variables that are not directly observed but are rather inferred (through a mathematical model) from other variables that are observed (directly measured)."*[20]

> *…the researcher must operationally define the latent variable of interest in terms of behavior believed to represent it. As such, the unobserved variable is linked to one that is observable, thereby making its measurement possible.*[21]

As such, a number of statistical tools are necessary to when addressing problems with a number of latent variables. It is the basic hypothesis of the *Structural Dynamics* construct that there are a number of latent variables in any given decision process and these must be addressed.

The statistical models do require data in specific formats and data reliability and validity are essential for good models. Good data integrity and collection techniques are a necessary aspect of *Structural Dynamics*.

A brief overview of the author's doctoral dissertation is provided in Appendix IV—Negotiation Process Modeling. This work provides a specific structural equation model of this complex process. This early model is the basis of *Structural Dynamics* and provides a method for assessing the impact of latent variables on an observable and hence measureable human behavioral process. A more detailed discussion, including in depth mathematical treatment is available in the author's dissertation.[22]

Revealing the *underlying truth* is the goal of *Structural Dynamics* thus providing the decision maker with a better and more complete picture. As previously stated, weather forecasting has greatly benefited and now business executives have access to the same capabilities when making critical and high dollar decisions.

Industry Structure Analysis

One of the most difficult things to determine in what industry you are in and how is that industry structured. In other words, what is the playing field?

Forget SIC (Standard Industrial Codes), forget categorizations such as the Fortune 500, forget most stock market analyst's ratio analysis or other reports. For example, a simple question, who does General Electric compete against? There are several answers to this question, depending upon your perspective as a manager within said company, a competitor of one of their business units, a Wall Street analyst, or an investor.

Determining one's industry segment, and hence competitors is no easy task. Many long held positions may need to be rethought and perhaps abandoned. Moreover, today's merger and acquisition fury is dramatically changing the competitive landscape.

Industry Structure Analysis Matrix

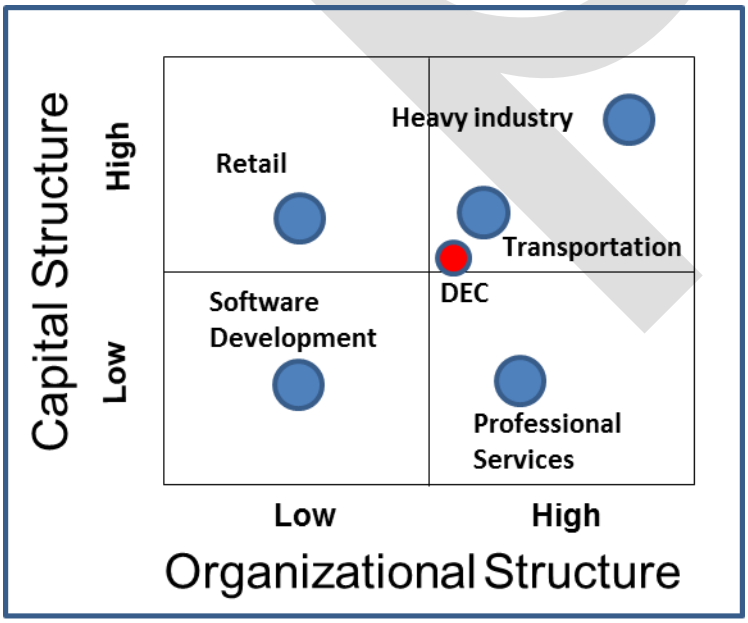
Management will increasingly look for tools, methodologies and procedures that will facilitate this competitive assessment. One approach may be found in the following Industry Structure Analysis Matrix.

We defined Capital Structure as a function of the capital necessary for that industry segment. For example, the software development segment does not require the "brick and mortar" and inventory that retail establishments do. To be sure the cost of talent may be higher for software companies and most major retailers have an online component, so we are measuring levels of gray not absolute figures.

The amount of Organization Structure required is a function of the complexity and interdependencies a firm has. For example, heavy industry has a significant supply chain process with major regulatory requirements. Conversely, a law firm works in a highly structured environment but with a lower capital cost.

As with most models of this type, it is the relative relationship that is more important than the absolute positioning. It is important to position the firm in the quadrant against its competitors for a couple of major reasons:

1. Perhaps most importantly, *Structural Dynamics* appears to be most appropriate for companies in the upper right hand quadrant. Principally, these firms have significantly different Management of Change processes than those in the lower left hand quadrant.
2. The Transition process described above, as function of the Fisher and Pry model is perhaps more appropriate for firms with high capital structures that require a high level of organizational structure.



Industry Structure Analysis Matrix

All industry sectors can benefit from the use of *Structural Dynamics* thinking. However, one could argue that the tectonic shifts the software industry faces are of a higher frequency. It is perhaps those with the long wave undulations are impacted by latent variables that are more difficult to detect.

This suggests a higher value for those firms where missteps or mistakes may take longer to recover from.

Yet as we have seen industry entrenchment is also a major important concern. Companies such as DEC (Red Dot) have missed their inflection points as well. As an equipment manufacturer, this firm had a capital structure higher than a software firm and organizational structure consistent with the management of global factories.

Competitive Intelligence

Market/competitive information are difficult to obtain and even when we have it, one must ask *'how can we use it to maximize our knowledge'*? Typically, organizations are interested in market share, strategic direction, and product features and benefits of their competitors although there is also a great deal of additional data available. How do we capture this data, and what do we do with it to create value for our organization?

Competitive information is often obtained on an ad-hoc basis. This information is sometimes factually based, i.e., annual reports, 10Ks, and sometimes subjective such as analysis of sales force call reports, etc. Usually extensive documentation does not illuminate one's competitive environment to the extent that is expected.

Frequently, companies launch major campaigns based on fallacious assumptions as a result of improper or inadequate analysis of the data. It should come as no surprise that many marketing campaigns fail, and often dramatically, e.g., *New Coke*.[23]

Structural Dynamics can provide industry structural and process modeling techniques that Competitive Information (CI) professionals can use to provide additional and often dramatic insight into business. These techniques can provide insight into the nature of competitive systems that is beyond the capability of traditional statistical models. Furthermore, having an understanding of these techniques will often result in changes in the way data is gathered, i.e. survey construction, as well the way that we interpret the results of the analyses.

Competitive advantage will go those firms that have better *knowledge* of the competitive forces in their environment. Our ability to measure and understand the *Structural Dynamics* of our industry will be a critical success factor for firms operating in the hypercompetitive markets.

Concluding Comments

This document has been many years in the making, yet much of what has been put forth in this preliminary discussion on *Structural Dynamics* is more relevant today than it was during the original thought processes of the 1980s and 1900s. This is perhaps due to two major developments since the inception of this thinking:

1. The development of sophisticated software tools that managers and others can use to statistically model the latent or structural equation modeling necessary to assess the *Structural Dynamics* they are faced with
2. More than ever before, insight into latent variables driving our business model is paramount to success and is perhaps better understood, often from a Business Intelligence and Predictive Modeling perspective.

Structural Dynamics is not a predictive model in the colloquial sense. It is a methodology that enables management to better understand the dynamics of their environment, indeed the basic structural shifts under their very feet. From that point, adjusting to new situations can go forth.

In this sense is greater than the sum of these parts. The synergy and depth of understanding is not available from any other process or managerial construct.

DEC no longer exists. What can be said for your organization next year, next decade, next …?

Structural Dynamics is not simply the answer because executives must act upon its perspectives. However, the other option is to be captive to events with no understanding of why.

Without a good understanding why, organizational response will be less than optimal. Owners deserve no less from their management stewards. Structural dynamics is The Foundation of New Management Science that not only enables shareholder value growth but assures it.

About the Author

Dr. Shemwell is an acknowledged authority and thought leader in field operations and risk management with over 30 years in the energy sector leading turnaround and transformation processes for global S&P 500 organizations as well as start-up and professional service firms. He had been directly involved in over $5 billion acquisition and divestitures as well as the management of significant projects and business units.

Formerly Chief Operating Officer for an Energy Services Company after merging Strategic Decision Sciences, Inc. whereas CEO he helped global clients tackle difficult strategic problems and attain operational excellence. He directed Oracle's Energy Practice as vice president responsible for driving the strategic direction and business development efforts for Oracle's global energy and chemical business sectors.

He was brought into MCI Systemhouse (now HP) to expand its energy practice where his most notable achievement was the development and implementation of the firm's Y2K practice with a focus on the real-time systems responsible for both upstream and downstream petroleum production operation—forerunner of today's Digital Oilfield.

While serving on the Halliburton Energy Services Leadership Team, he led its Information Technology line of business and was directly engaged in the transformation of the company into its Integrated Solutions business model as well acting as the CIO of the $2 billion Terra Nova (offshore Canada) project.

Dr. Shemwell is recognized as an authority in risk management, technology, knowledge management, industry change, process change management/modeling and simulation, and logistics and operational supply chain management, having authored over 300 articles and presentations on these subject matters. He is the author of Essays on Business and Information, volumes I & II a collection of short essays focusing on the relationship between business processes and information technology, written from his perspective as an energy industry executive and adviser.

Dr. Shemwell's unique background and expertise in oil-field management make him highly qualified to guide oil and gas companies in creating economical and efficient oil fields of the future.

Formerly a Commissioned Officer in the United States Army Air Defense Artillery, he holds a Bachelor of Science in physics from North Georgia College, a Master of Business Administration from Houston Baptist University and a Doctor of Business Administration from Nova Southeastern University.

Appendix I—Overview of Systemic Processes

To those readers trained in engineering, the concept of the system and its feedback loops is a tried and true axiom. To those readers without such training, Peter Senge's book the *Fifth Discipline* represents clear insight into systems processes in the business world.

Engineers have known about physical systems for hundreds of years. Likewise, the business practitioners have known of this phenomenon for a similar period of time. Only recently, however, has the popular business press fallen 'in love' with *systems theory*.

Systems theory is a powerful managerial tool, for it describes both process and structure in a single concept. While recent business thinking has concentrated on the process component of systems theory, this book seeks to provide the business executive with a more robust approach to system theory.

Only when we combined process and structural components can we fully appreciate the nature of our environment. However, we do not pretend to suppose that this is the final answer, only a more enlightened approach than less complete models undertake.

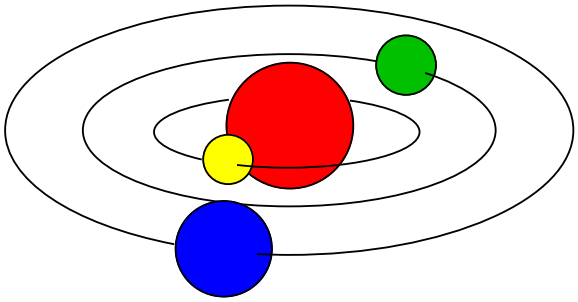
Physical Systems

We are all governed by a set of physical laws. Scientists have spent thousands of years trying to understand and in some cases change our set of physical laws. In medieval times alchemist tried to turn common items into gold, and who can forget the story of King Midas and his golden touch. As with King Midas who ultimately turned his daughter into gold, the moral of stories on those who tamper with physical laws is that they are doomed to failure, often with terrible consequences.

If we understand the physical laws that govern our existence, then we can develop a better of understanding of the physical systems that surround us. And once we understand the nature of physical systems we can send men to the moon, for instance. Other examples of physical systems include DNA and the subsequent ability to understand the genetic audit trail used in everything to disease prevention to criminal investigations.

DNA Double Helix Structure

Physical systems such as the DNA example are a combination of structure and process, and sometimes multiple processes within a single system. For example, the earth revolves around the sun, the moon revolves around the earth, while our entire solar system revolves around the Milky Way galaxy.



The Solar System

The galaxy likewise is part of the Universe that we have not yet discovered whether the universe is infinite or bounded by other systems. We have a significant understanding of much of the world around us but we also know that there is much to learn.

These examples are just several of thousand possible cases which describe the physical environment in which we life. It does not matter whether we are talking about biological, chemical, or engineering systems.

All have two things in common; structure and process(es). Systems cannot exist without both. It has been fashionable to focus on the process component *only*. With a better understanding of both structure and process and the interaction between the two we can better understand the cause and effect relationship.

Structure in a physical system is *not* just those tangible attributes such as molecules or planets and while it includes these components, structure also includes the physical laws associated with the system. Process on the other hand is relatively simple in that process is a function of the behavior of physical components obeying the laws of the system.

System structure includes *knowledge*. Components in a physical system are behaving according to a set of physical laws; usually laws which we do not truly understand.

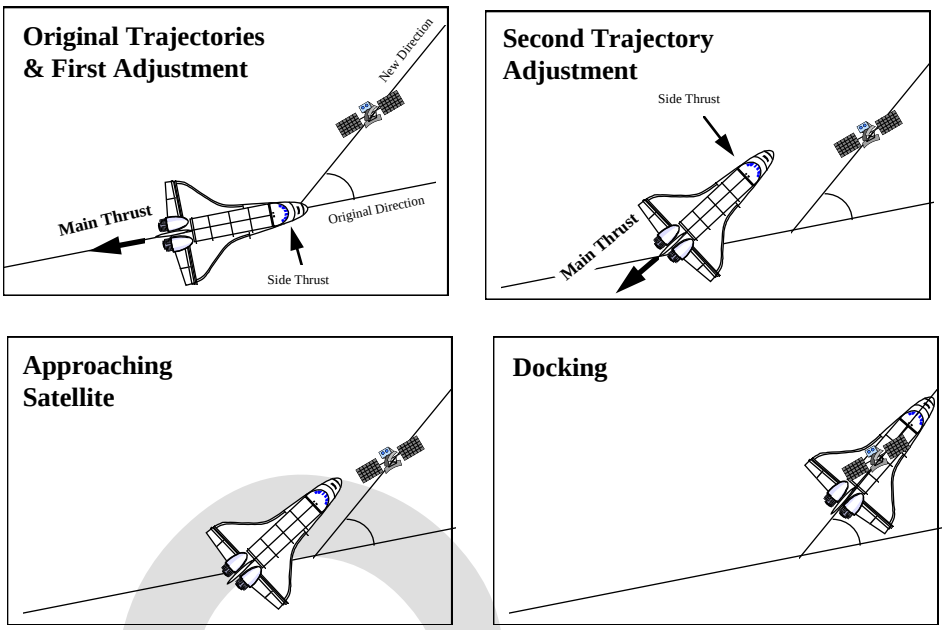
The components of systems have knowledge of these laws even if we, the observers, do not truly understand them or even know of their existence. We often see the knowledge component of systems as part of the system process, but reality it is the structural knowledge that dictates process behavior.

Physical laws are dictated by a higher level or providence. We know we cannot change them, only better understand them. Industry and organizational knowledge, on the other hand, are often within our control, but unless we can learn and obtain this knowledge we can never exploit systemic opportunities.

In biological organisms (systems), the genetic knowledge or code in contained within the DNA structure. This genetic code contains all the knowledge required for the organism to grow, mature, and often the source of potential demise of the organism (cancer, etc.).

Physical systems, like all systems have a feedback loop. When the space shuttle is approaching a satellite in space, it fires a maneuvering jet. The jet pushes the shuttle in the opposite direction thus changing the direction of the space.

Based on changes in the speed and direction of the shuttle, the commander (or computers) fire opposite jets to control the rate of movement. Prior reaching the satellite, the shuttle will decelerate by using a series of retro-jets and thereby joins the satellite at the same rate of speed through space. In other words, *feedback* from the shuttle's guidance system provides input to the system which causes changes to made to the direction and speed (whether manual or automatic) of the spacecraft.



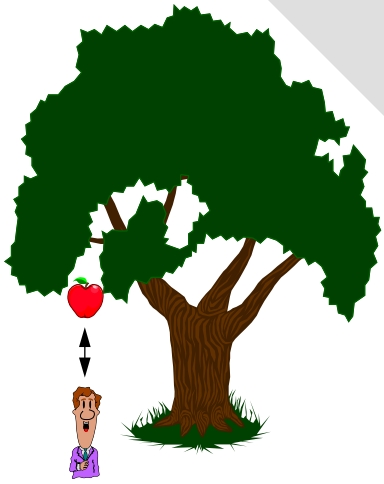
Space Shuttle Approaching Satellite

Clash of Worlds

> *WHERE CHAOS BEGINS, classical science stops. For as long as the world has had physicists inquiring into the laws of nature, it has suffered a special ignorance about disorder in the atmosphere, in the turbulent sea, in the fluctuations of wildlife populations, in the oscillations of the heart and the brain. The irregular side of nature, the discontinuous and erratic side—these have been puzzles to science, or worse, monstrosities.*[24]

Newtonian physics is very deterministic or straightforward. The law of gravity states that *bodies exert force on each other*.[25] When the apple falls from the tree, it exerts a force on the head of the intended victim.

We think of this phenomenon as a falling object striking the man, and do not really see, feel, or even believe the premise that the apple and the man are actually attracting each other. In our everyday experience, this explanation of events is quite satisfactory and correctly explains the observed events.



The Law of Gravity

If however, we really seek to understand the underlying dynamics of the apple falling on the man, we must view this phenomenon from the basis of the underlying physical theory. Taken to the perceived extreme, we must believe that the man is also drawn to the apple. Sounds ridiculous doesn't it? Don't be too quick to judge.

According to physics, this is exactly what happens. Newton's law states that bodies exert force on each other. We must therefore, acknowledge that at some level, the man is actually drawn to the apple (note the bi-directional arrow in the drawing).

NASA has proven that this mutual gravitational attraction is correct again and again during the last 35 years of space travel. Once again, our point here is that what is obvious is not always the case.

Note that other theories of gravity posit that objects are actually pushed together.[26]

Our Quantum World

Einstein believed that 'God does not play dice with the universe'. Modern scientific theory would suggest that Albert might have misstated. Even Einstein must have believed in the statistical nature of the universe when he posited the famous $\mathbf{E = mc^2}$ equation.

It was this equation that is the foundation of nuclear energy, whether the 'bomb' or nuclear medicine. By definition, atomic and nuclear physics is statistical in nature. Einstein discovered the 'dual' nature of fundamental matter. At the atomic level elementary particles such as electrons and neutrons have a dual nature.

These particles exhibit both particle (physical) and wave (energy) attributes. For example, our high school physics teacher explained that 'visible light' has both particle and wave attributes.

We *see* visible light with our eyes, and we measure non-visible electromagnetic radiation (visible light is a specific narrow bandwidth of electromagnetic radiation) with various instruments such as is the case with medical X-rays scanners. This argument further support our supposition that everything that we can *touch and feel* is not necessarily the total sum total our experience, and everything that we *see* is not necessarily the complete picture as well.

Our Self Organizing World

Newtonian mechanics are deterministic and quantum physics addresses the dual nature of latent variables. Chaos theory on the other hand is the study of nonlinear dynamics.[27] Seemingly random processes can actually be predicted as the self-organizing nature of systems drive towards this convergence.

It is not our intent here to more fully develop this theory. The important considerations are (1) that very complex systems have an underlying order and (2) this order can be expressed and hence understood by using mathematical models similar to those of *Structural Dynamics*.

Appendix II—Structure and Process

Typically, we think of business from the standpoint of marketing models (product life cycles, market share, market penetration, etc.), the value chain (input, process, output, margin), operations research, or any number of other frameworks. These models are useful tools to help explain the dynamics of our commercial environment.

We also know from academic research, that currently there is no single model that will describe the complete framework within which industries and firms exist[28]. It is also doubtful that we will find a universal model to describe the structure and processes of firms. Physicists continue to look for the Unified Field theory of the universe as well.[29]

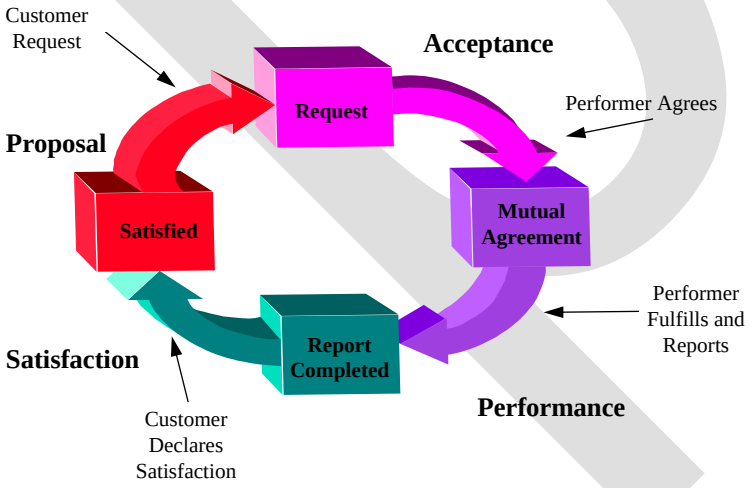
Business Design Technology

One model that is of interest, is the Business Design Technology (BDT) framework put forth by Fernando Flores and his colleagues.[30] The BDT develops a set of four core building blocks, each of which represents business processes.

These four components represent *action workflow*. The following figure represents the BDT framework for a customer satisfaction problem, and as we see, the BDT framework allows us to break down complex processes into, each comprising the action work flow loop.

This is a useful framework because it allows us to see the total process as the synergism of multiple sub-processes. In our parlance, business structure is the series of sub-processes, and *Structural Dynamics* is the interaction of these structural components.

Business structure is the linkage of processes governed by a set of business/industry laws. Since this business structure is not static but dynamic (subject to continuous change) we can see that this model is consistent with the theory and methodology herein.



Business Design Technology—Basic Action Work Flows

This is the essence of the new concept of *Structural Dynamics*. Structure and process are interwoven with each other. As we have previously discussed, no single model or process has been proven adequate to completely define the enterprise or the industry in which the firm functions.

Economists will tell us that this is microeconomics. Macroeconomics is the study of the relationship between economic aggregates, particularly at the national level. [31]

Role of Information

One has only to pick up a magazine, newspaper, or computer industry rag to notice that software, information technology, data management, data warehousing, etc. are the hot item. These items are focused on IT (information technology) infrastructure.

That is the framework that is necessary for people to accomplish work with computers. Google is a good example of a firm that has grown rapidly to a large size providing portions of the infrastructure necessary for firms to make decisions and add value to their customers.

Recently, the Internet and the Mobility version of the Internet are providing worldwide interconnected infrastructure which allows data to be accessed by individuals at any place and at any time. Corporations are also spending hundreds of millions if not billions of dollars managing their internal data and combining this data with external data to provide better customer service, better product development, and other forms of competitive advantage. This process is typically referred to as *data management* and has fueled the development of entire industries and launch major corporations and created billionaires, e.g. Larry Ellison of Oracle.

Valid and Reliable

We have all hear the old computer adage *garbage in–garbage out*. This is another way of saying that the computer cannot process or translate poor or incorrect data in valid and reliable information.

Valid and reliable information cannot only be obtained when validated data is process in a way that is routinely repeatable. For example, we expect that the mathematical equations in a spreadsheet software program to give the same and the 'correct' answer time after time. If the program does not perform this task properly, not only will we not purchase the program, but the software development company will go out of business, and may even be sued.

Today's commercial programs are routinely valid and reliable—this was not always the case. We therefore assume that by processing data (raw numbers) with these programs we will obtain the correct answers.

The same is true with word processing programs as well. We expect the program to write what we type, and spell check to be usually correct (barring words not in the electronic dictionary).

These programs enable us to translate the raw data into information or *content*. Often, the content of one set of processes is insufficient in itself. A business plan, for example, includes a financial analysis (spreadsheet), description of the plan itself (text), and often charts and graphs (graphical software).

The plan becomes the vehicle for communicating the intent of the writer(s). The integration of these components becomes information or content.

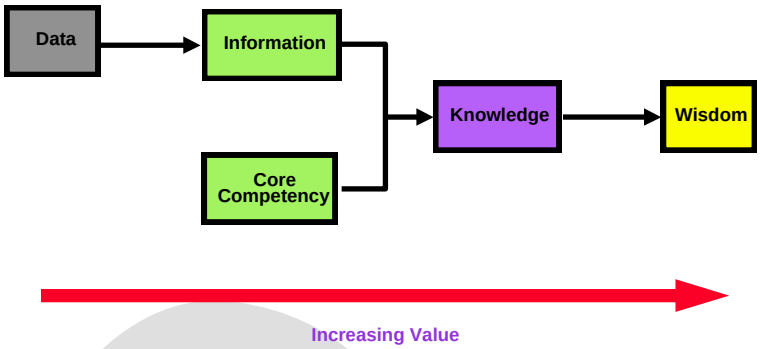
The integration of the business plan with that of other groups with the organization (manufacturing, marketing, operations, sales, etc.) is the synergy, or *content integration*, of the firm. Content is the basis of competitive advantage in the firm today. Many observers see the next step in the information value chain as *knowledge*.

Linear Information Value Chain

Knowledge can be defined as information and content plus the core competency of the organization. Business executives, sales representative, marketers, engineers, etc. transform information into knowledge, thereby adding value to the firm.

Information provides the airplane manufacturer with the basics of flight, and the manufacturing competence necessary to build the airplane. Organizational knowledge enables the airplane to be built, fly, and mass produced. Over time, organizations accumulate knowledge thereby gaining industry and business *wisdom*.

Wisdom enables organizations to perseverance in spite of changing fortunes and generations of management and employees. Often called *corporate culture*, wisdom is embodied in the organization. Wisdom becomes the essence of the organization, and the rock upon which new generations of managers build the next generation. This process is described by the *Information Value Chain* figure below.



The Information Value Chain

The information value chain is a relatively simplistic *linear* model. Starting with data we successively add value until we arrive at wisdom. While this is a logical model, and no doubt a good representation of the problem faced by the organization today, it is not complete.

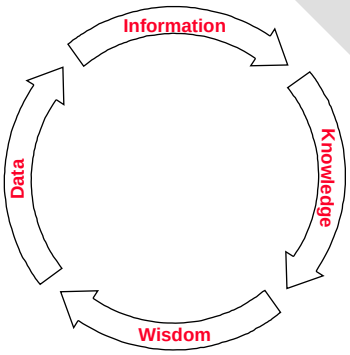
There is a gaping hole in this concept. The astute reader will realize that the hole in this process theory is its linearity. In fact, the process is not linear. By defining wisdom as accumulated knowledge, the implication is that there is a continuing stream of data, information, core competency, and knowledge into wisdom.

Systemic Information Value Chain

Accumulated knowledge is accomplished because; the process is not linear in the sense that the information value chain is a system. As a system, the value chain includes a feedback loop.

Accumulated or better knowledge, demands that better data enter the system on each succeeding cycle. This is a logical process, since the more informed or wise organizational process will be able to develop processes that generate better data—basis for organizational learning.

Likewise, wisdom will generate better processes for turning data into information thus increasing the core competency of the organization, resulting in better and greater knowledge and finally higher wisdom. And so the cycle repeats itself getting better all time; also defined as greater wisdom.



Organizational Learning System

The systemic approach to the value chain is a different concept, with further implications to our discussions on the structure and the dynamics of the structure of industry. The hypothesis of this

discussion is that with organizational wisdom and as direct consequence, organizational learning throughout an industry segment changes the nature of the industry itself. As a series of interlocking processes, industry and/or organizational structure changes, as a result of the enhanced wisdom result in the fundamentals of *Structural Dynamics* under discussion here.

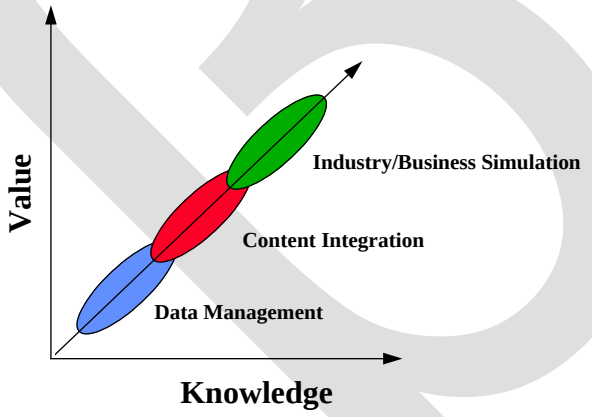
One question begs itself, and that is how do we realize better knowledge and wisdom? Typically, we assimilate knowledge in a deterministic manner. That is we accept the results of analysis as *fate accompli*, or on face value. There is however, the probabilistic approach.

Scenario Based Learning

W. Edwards Deming described this approach as *statistical process control*, which is viewing events from a probabilistic viewpoint. Probabilistic is defined a statistical bounded approach to a problem, wherein event can happen in a random manner within a set boundary. This approach becomes the basis of the next step towards understanding our environment, scenario simulation.

When we develop an industry or business simulation model, we analyze valid and reliable data against a set or rules, which enable us to simulate various business processes. Simulation is significantly more value to the firm than data and information management.

Simulation is the end result of a process that begins with data management. Content integration cannot take place unless data is validated and put into a format that allows management to conduct the proper analysis. Simulation is the emerging methodology that will provide management with a more robust model of the industry or organizational process and structural environment. In this sense, simulation is the current 'end game' of the management process.



End Game Management

Simulation is defined as a technique or set of techniques for 'representing' *real world* facilities or processes.[32] Typically, we refer to this representation as a *system*.

As with any system, there are sets of rules and/or assumptions about how the system works. When a system is presented in a logical or mathematical form it becomes a *model*.

Because of the mathematical nature of models, we can quantify different scenarios. We can input different data based scenarios in a deterministic manner, resulting in several different options or scenarios, or we can build probabilistic models that are based on statistical analysis.

These models can represent a number of different scenarios (all in the same model) all of which have an *expected* value. Expected value is a statistical significant event in the sense that mathematical logic predicts or determines that, within some range of value (-1 to +1 for example) an event is likely to occur. One might predict in this example that the mean of this range or expected value is zero.

We must realize that real world systems are very complex and difficult to understand. We must also ask the question that Albert Einstein sidestepped; "does God play dice with the universe?"

In a mathematical sense, the answer is yes. Statistical analysis, often referred to as probability is usually described in the context of a roll of the dice.

Las Vegas was built and is currently operating on the basis of gaming or probability. Quantum mechanics, a branch of physics and the basis of the nuclear age and the semi-conductor (computer hardware technology), can only be defined in a probabilistic sense.

Science is full of support for the hypothesis that the world is statistical by nature. It stands to reason, and there is plenty of proof to support the hypothesis, that the behavioral world of human interaction/business is statistically based as well.[33]

Once we accept this proposition, our opportunity to better understand the dynamics of the environment is well founded. Chaos theory, which dates itself back to Newton's equations of motion, is a method of understanding the dynamics of systems.[34]

Set of Equations

A *dynamical system* may be viewed through as a set of mathematical equations which provides knowledge of the evolution of the state of the system based on its previous history.[35] At the risk of becoming too technical, Chaos systems can be evaluated mathematically using differential or continuous change equations or difference or time discrete based changes.

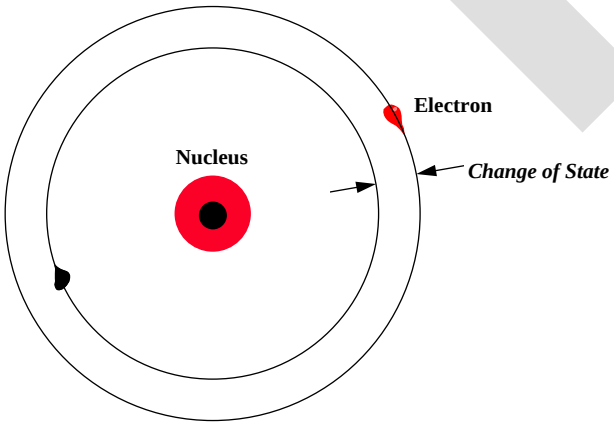
In other words, change can be the result of continuous improvement or 'step level' change from one state or plateau to another. Continuous improvement is well understood as incremental changes to a system along a path towards a better or more productive environment. While there is nothing wrong with incremental or continuous improvement, the value received from this approach can be limited.

These changes are small and in some cases not measurable. The end result is that the system is better off in the future than it is today. While this is a noble concept, *breakthrough performance* is not realized in this manner.

Partly because any of our competitors can continuously improve their processes, and partly because our customers see limited value add in continuous improvement. In order to obtain competitive advantage and add significant value to our customers (and our firm), we need to make major *difference* changes or transformation in the way we do business.

Step level change can be described simply when one looks at an atom. Electrons are typically at a stable state or orbit. When an electron is excited by an increase in energy, the electron will jump to a higher orbit where it will stay until such time as the increase in energy is withdrawn and then the electron returns to it normal or stable state.

This is a well-known physical phenomenon which is the basis of semiconductor (computer chips) as well as nuclear weapons, and nuclear medicine (radiation for cancer treatment). As with all technologies there are good and not so good uses!



Step Level State Change

Part of the problem with Management of Change processes is the fact that once the energy of change is withdrawn, the organization will “seek” its natural state resulting in no effective change. This result is not a systemic change in the organization, but only a temporary level of excitement.

A Case Study—Pearl Harbor

Prior to the attack on Pearl Harbor on December 7, 1941, the United States Navy had an opportunity to dispatch the ill-fated battleships to sea in response to concerns about Japanese Naval movements. The decision was made not to put the battleships to sea because battleships are slow moving ships and the Pacific command was concerned that the presence of battleships in a task force would slow up reconnaissance missions. The rest as they say is history.

Pearl Harbor was attacked, and numerous battleships were sunk, having never seen action in World War II. As President Roosevelt said, *"A day which will live in infamy."* Indeed this was a tragic day for the United States of America and to the soldiers and sailors, and their families lost on that tragic day.

But did the Japanese really achieve victory and accomplish their objective? As has often been said, their (and our) generals were fighting the last war.

The decision of the Japanese to attack and sink the American battleship fleet, and the American decision not to put the battleships to sea was seen, at the time, as either brilliance or incompetence depending on your point of view. In reality, battleships played no important role in World War II, either in the Pacific or the Atlantic. Indeed the Allies sunk the German battleship *Bismarck* on her maiden voyage.

The war in the Pacific was won by the aircraft carrier. This was demonstrated less than a year after Pearl Harbor at the Battle of Midway when airplanes from American carriers won the most decisive naval engagement against airplanes from the Japanese Imperial fleet. Battleships, in this engagement, saw no action at all.

Senior military officers and politicians on both sides of this struggle did not recognize that the *structure* of warfare had changed. Junior officers, those closer to the action or closer to reality, understood these *Structural Dynamics* better than their superiors, although not completely.

Could it be that employees and junior executives have a better understanding of the dynamics their environment or industry than their more senior politically correct managers? History suggests that this statement is most probably true.

As we empower those most closely involved and affected by corporate processes, we admit that these individuals and teams are the 'owners' of better information and knowledge that those higher up. Therefore, those at the top of the corporate pyramid are well advised to acknowledge and act upon the information and knowledge of those who are actually engaged in *Structural Dynamics*.

As we have stated before structure is not what if first or often appears to be. In fact, the *Structural Dynamics* were not necessarily clear to either adversary.

Most often, changes from the old industry structure to the new industry structure are as much a mystery to your competitor as it is to us. Significant competitive advantage goes to the party that first understands and *acts* upon changes to industry structure.

> But what if the first mover is wrong? What would have been the outcome, if battleships had been the key in World War II after the Japanese destroyed the American battleship fleet at Pearl Harbor?

The airplane had already made the battleship obsolete; therefore, the battleship *could never have been* the decisive factor in this conflict. Structural changes do not allow us the luxury of massaging existing capability *in lieu* of the dynamic changes in effect. In as much a glaciers and icebergs have a momentum that will carry them along a path; influenced by environmental factors, wind, waves, etc., industry structures change with a veracity that is undeniable.

We often look back on these traumatic events, and blame some participants with compliance and others as brilliant. It depends on your point of view at the time.

However, as we know *Structural Dynamics* transcend time. Events are in effect that no one can control. Most often this effect is seen in warfare, but in reality this happens to each and every one of us and our organizations every day.

Who among us has not regretted the spat we had with our spouse the day before. We can never take it back, and over time these behaviors change the structure of our relationship with our significant other. Sometimes for the good, many times these behaviors detract from the structure of our relationship. And so it goes. All of us can relate to these issues.

Another issue brought to light in the attack on Pearl Harbor was the indecision and 'play it by the book' (often described as bureaucracy) on the part of the American leadership; at all levels. Failure to respond in spite of overwhelming evidence is often described as a failure of leadership. More realistically, it is a failure to understand the changes in the structure, not the processes (which are easy to see), surrounding the leader that often leads to disaster.

Did the Japanese think they could win against America in World War II? The obvious answer is yes, or why would they have attacked Pearl Harbor. However, Admiral Yamamoto was concerned that the industrial might of the United States would overwhelm the Japanese unless the Japanese Navy could deliver a decisive military blow against the United States at Pearl Harbor.

Does the law of *Structural Dynamics* imply that the 'big guy' always wins? Not necessarily so, or how would have Microsoft overcome the obvious power of IBM when it came to personal computer operating systems.

Winning goes to he or her that understands the *Structural Dynamics* of the environment. When neither party understands the nature of structural movement in their environment, such as the case of the Americans and Japanese at Pearl Harbor, then the big guy will often turn a momentary defeat into a strategic victory.

The other dimension of *Structural Dynamics* is the micro-component. Significant movement in industry structure is usually not the result of a major measurable event.

Like the geophysical plate tectonic movement described early, structural change is essentially the integral calculus (the integration of the sum total) of a large number, perhaps infinite cumulating of events. This process is what makes changes in structure so difficult to discern, much less understand until after the fact.

Appendix III—System Dynamics

The concept of *systems dynamics* evolved from the idea that complex systems are usually composed of a series of cause and effect chain of events known as feedback loops. The outcome of an individual decision or cause produces an end result or effect.

This process results in the need for another decision, which results in another effect, and so the process(s) repeats itself.[36] In large systems over an extended period of time these systems dynamics become quite involved and complicated. Often cause and effect feedback loops are intertwined, and it is not always easy to determine which cause or series of decisions results in a particular result.

It is frequently difficult to determine individual cause and effect loops inside a complex system, and even when we believe we have individual loops isolated, can we really be sure. A case in point, human behavior, a complex system refuses to be categorized into a series of definable cause and effect feedback loops.

If this statement were not true, then the entire medical branch of psychiatry would be out of business. The truth is that cause and effect loops are not always rational and therefore are not easily identified and quantified.

Despite these limitations, system dynamics models are useful. Empirical models, or models based on actual data have been used in market share studies, oil and gas exploration and production[37], and organizational transformation.[38]

Evolution—Transformation

Systems have also been defined as evolutionary and transformational business processes.[39] Evolutionary processes are the result of the competitive selection processes first developed by Darwin, wherein whole populations or organizations adapt to environmental change.

Transformational processes are *internally focused* and are the processes by which organizations adapt to the changing environment around them. Evolutionary are *externally focused* in that they center on the organizational changes to the events surrounding while transformational processes that cause organizations to re-constitute themselves *because* of changes in the surrounding environment.

In actuality, organizations must go through both processes. Only through the synergistic effect of the combination of both evolutionary and transformation forces or process can the firm maximize its *competitive advantage*.

Organizations achieve competitive advantage when the *temporarily* obtain a position that competitors cannot easily overtake. The word *temporarily* is appropriate, because in the hypercompetitive marketplace of today, a firm *must* assume that its competitors will overtake the current position.

Often competitors *leapfrog* their adversaries with the announcement ("it's coming soon at a theater near you") and/or the delivery of new technology, products, or services. Typically, we see this as a significant event. Sometimes, however, it is not.

Apple Core

Does anyone remember Apple Computer's *Lisa* product? Many readers will not since it is over twenty years old. The Lisa product line was announced and delivered in the mid-1980s. It was intended to be the IBM PC 'killer', and technologically it may have been the IBM PC replacement product. Unfortunately for Apple, Lisa failed.

It did not replace or even dent the IBM presence in this market. One of the reasons for the Lisa failure was its price; it was very expensive. In the end, the market, or the environment rejected

this product; perhaps the value of Lisa was not understood. Maybe, it was a concept ahead of its time. However, all was not lost, as a result of the failure of the Lisa, Apple transformed itself.

The next product introduced by Apple was the Macintosh. The Macintosh became the bestselling and most famous computer Apple produced during that era. It became the only alternative to the IBM (or clone) personal computer. The Macintosh was Apple's most successful product then and ultimately saved the first personal computer company from oblivion.

Is it possible that without Lisa we would not have the iPhone and iPad?

Structural Dynamics vs. System Dynamics

This is an interesting question, for at first pass, there does not appear to be much difference between *Structural Dynamics* and *systems dynamics*. In this section, we will hopefully not only show the reader the difference, but also convince the reader that the difference between the two is profound and useful.

We are not interested in academic rigor or splitting hairs concerning what are ultimately immaterial definitions. Rather we hope to provide a new and useful tool for understanding our business environment better which as a result leads to subsequent better performance both for the individual manager, but his or her organization as well.

Systems Dynamics is a concept that suggests that complex systems are usually composed of chains of cause and effect known as feedback loops. A loop is envisioned as a chain of events in which a decision (cause) produces a result (effect), which in turn produces the need for another decision.[40]

Structural Dynamics has been shown to be the morphology or patterns of motion toward process equilibrium of interpersonal systems as adapted from Flexner & Hauck, 1987.[41] As such, it combines much of systems dynamics as the capability of assessing latent variables with economic utility theory.

Systems Dynamics is the most comprehensive tool available to assess Tsunami like impacts on businesses and even whole industries. It integrates behavioral science with a broad array of mathematical tools now available to all managers. Yet it is simply to employ and does not necessarily require rigorous mathematics to achieve real value to the organization.

It is very different from systems dynamics and a much more exacting method to assure the growth of shareholder value.

Appendix IV—Negotiation Process Modeling

Some of this section is taken from the author's 1996 doctoral dissertation.

This book really originated in the mid-1980s. For over ten years, the author was a principal, representing United States based high technology companies, during many business negotiations with customers throughout the Asia Pacific area. During this period, negotiations we concluded with business firms and governments in over 15 countries.

Typically, these negotiations followed a pattern that was somewhat dissimilar from negotiations with American (Western) businessmen. The biggest difference, on the surface, appeared to be the time required to culminate these negotiations. It did not seem to matter whether the negotiations concerned several hundred thousand dollars or tens of millions of dollars.

The other usual issue in these negotiations was 'the price'. Most sales people strive to obtain the highest price and most buyers seek the lowest price in any given transaction. This has been true for over 4,000 years, and it will be true for the next 4,000 years.

But price is not always the issue (most sales trainers preach this as gospel). Perceived value on the part of the customer is *the* issue. The customer value chain is his/her driver. Only when a vendor can contribute to value does he obtain the order.

In the early 1990s, the author was involved in his first significant negotiation with a national oil company in the Middle East. This process took several months, and at times was not going all that well.

As I tried to understand the dynamics of these discussions and drive towards a favorable conclusion, I tried various techniques based upon my experience in the Far East. As luck would have it, I tried a pattern I had used with a particular Asian culture, and much to my surprise this process was favorably received by the Middle East customer.

I began to wonder. Was it possible to develop a framework that would identify the different 'negotiation' styles based on various cultures?

If these negotiation styles could be understood and quantified, could these patterns be determined in other cross-cultural settings. Could the results of a cross-cultural negotiation ultimately be predicted?

Human behavior is difficult to evaluate much less predict. Most academic processes such as *game theory* only claim to describe processes, not predict the end result of these processes. We have learned the prediction can be a dangerous thing. Who among us has not been bitten by a forecast presented to management, sales, utilization rates, economic indicators, and the list goes on.

Predicting the results of individual negotiation scenarios proved to be an improbable if not impossible task. However, understanding the dynamics of the underlying structural nature of negotiation processes proved to be within our understanding.

We were able to support the hypothesis that it was possible to actually model the very nature of the negotiation process. This is a profound statement, and is new ground. Never before, has academic research been able to support the hypotheses that it was possible to 'dive below the surface' and explain the fundamental drivers at work in this process.

This research tested the Relationships, Behavior, Conditions (RBC) framework put forth by Weiss several years ago.[42] This framework suggests that there are dependencies among these variables.

It is important for us to understand what these variables are, and how they are interrelated. These variables are primal, and if we can understand what these variables are (their definition) and how they interact, we can obtain a better understanding of the dynamics, not only of the processes, but the underlying structure as well.

While conducting this research, we learned that it is not just the typical (usual suspects) or easily observed variables that matter. The more fundamental drivers are the unobserved or latent variables that are really critical. For example, how many of us believe that the Relationships variable is easily measured?

It seems logical that we can easily determine the *relationship* among individuals or groups based on simply observation. In fact, we are actually measuring the *behavior* between and among individuals or groups.

There is substantial support for the hypothesis that we can measure behavior directly. That is we can monitor, evaluate, and make some judgment concerning the behavior of one biological entity with another. It does not even have to be human to human contact.

Don't we have behavioral patterns with our pets, and don't they have a behavioral pattern with us? For example, my dog was always happy to see me when I come home at the end of the day. Typically, she would jump up on me to the great annoyance of others who felt Coco (dog's name) should be better behaved.

What is the relationship between my dog and me? Is it sum total of the behavior of both my dog and myself? Perhaps, but relationship between these two biological entities may actually be a deeper level.

That is, relationship cannot actually be directly observed much less measured. We have all seen situations where for example, a husband and wife do not appear to have a good relationship based on observed behavior.

We often see two people, who appear not to like each other, but yet they remain married year after year, and if we make the mistake of entering into their debate, much less choosing sides, we are often swiftly and completely rebuffed by both individuals. Often to our complete surprise! Similarly, we all know that families (parents, children, siblings) all pull together when threatened by outside forces even when it appears that the family unit is in total disarray.

Since this familiar coming together often surprises us, even though we may be in a similar situation ourselves, suggests that there are deeper and often hidden family dynamics at work.

One might consider this the *Structural Dynamics* of the family unit, and more often than not these dynamics are not directly observable. This is similar to the 'family of man' interactions observed in the cross-cultural negotiation setting we have been discussing.

Dynamic Relationship Models

For generations, social scientists and business academics have conducting research on the behavior between two or more individuals or groups. More recently, academia has added the dimension of environment to their behavior models.

Most researchers agree that the *situation* and individual or group finds itself in will dictate boundaries within their behavioral pattern. For example, when faced with danger, the human species generally behaviors with a *fight or flight* reaction.

We either react aggressively towards our antagonist, or we attempt to flee to a safer place. Likewise, calling for 'help' is an attempt to change our situation or environment.

In the group or corporate environment, two distinct behaviors occur. The behavior of individuals within the group or *intra*-group behavior is the sum total of the actions individuals take amongst themselves. *Inter*-group behavior on the other hand is the sum total of the actions that the group takes with other individuals, such as the boss, or other groups.

Based on our understanding of the behavior between two or more individuals or groups, a relationship(s) is assumed to exist between individuals and/or groups. This of course seems obvious to our everyday experience.

But how do we define, much less measure a relationship. Are a man and a woman sitting on the park bench, lovers, husband and wife, brother and sister, friends, or simply two strangers sitting on the same bench at the same time? Even perceived romantic behavior between the two does not in and of itself categorize these people. If a relationship exists, then there is the whole question of whether the relationship is good or poor.

The reader will catch this drift, and I'm sure can relate to many similar quandaries in their own life. The point is, relationship(s) is not measurable by direct observation.[43] Relationship(s) can only be inferred indirectly. Researchers will often refer to a variable which is indirectly measured as *latent*.

The Relationships, Behavior, Conditions (R B C) Model is a robust attempt by researchers to understand the dynamics of complex negotiation processes.[44] Developed by Stephen Weiss, he labels his X axis (temporal) is the (P) Pre-negotiation period, (N) Negotiation period, and the (T) Post-negotiation period. He labels his Y-axis (R) Relationships, (B) Behavior, and (C) Conditions.

From this model he develops a complete set of 159 possible 3-cell relationships. As with the 2 x 2 model previously discussed, research may prove that some of these configurations are either implausible or uninteresting.

As previously discussed, the R B C Perspective suggests a form between the three facets in accordance with the framework's core logic. The major (although not all are conceivable) structural relationships are shown graphically in following figure; temporal dimension runs left to right. The corresponding equations are:

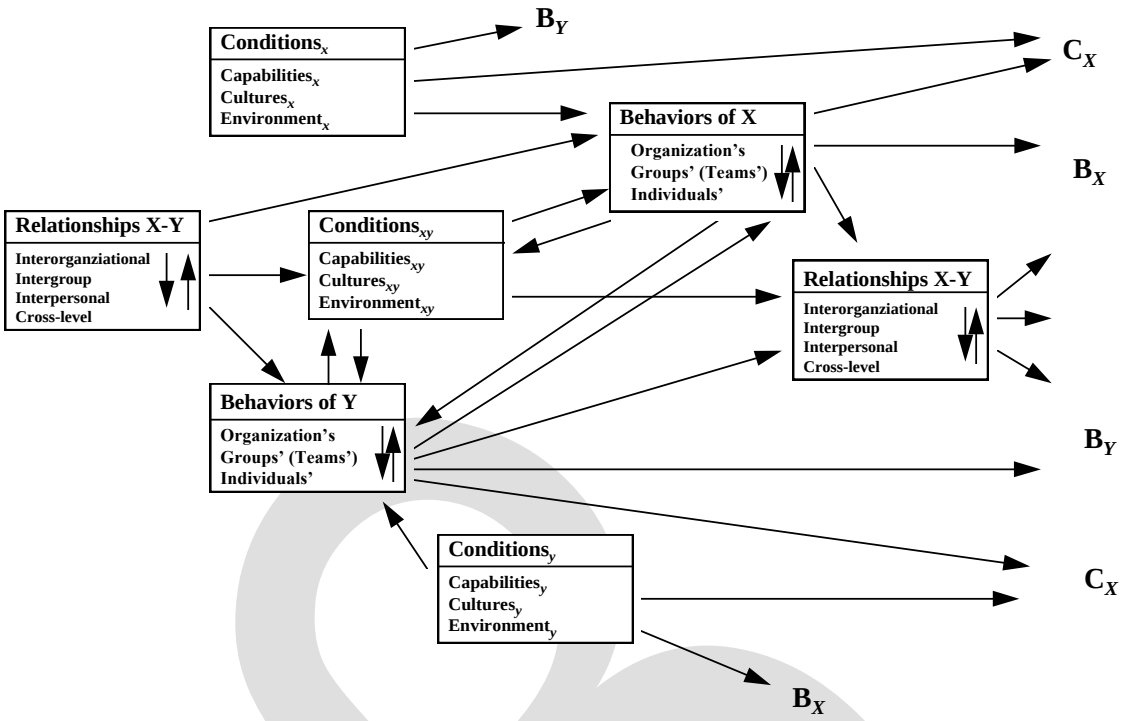
(E1) $R_t = f\,(B_{xt}, B_{yt}, C_{xyt})$;

(E2) $B_{xt} = f\,(C_{xt\text{-}1}, C_{xyt\text{-}1}, B_{yt\text{-}1}, R_{t\text{-}1})$;

(E3) $B_{yt} = f\,(C_{yt\text{-}1}, C_{xyt\text{-}1}, B_{xt\text{-}1}, R_{t\text{-}1})$.

(E4) $C_{xt} = f\,(C_{xt\text{-}1}, B_{xt\text{-}1})$

A basic graphic representation of this set of equations follows:



The Basic R B C Model of Complex Negotiations: The Bilateral (X-Y) Case

Clearly, several of these variables can occur at different or multiple times, within or across the three periods of negotiation; values of *t* can range from minutes to months depending on the context within which negotiations are being conducted.

Further, the figure postulates the effect of R_{t-1} on R_t as mediated by B_x, B_y and C_{xy} but a direct R_{t-1} effect could easily be incorporated in (E1) and examined empirically as (E1*). Notice also some secondary facet relationships in Figure 2 that were mentioned in the section on Conditions: (E4) $C_{xt} = f\ (C_{xt-1}, B_{xt-1})$, and the direct effects of C_x on B_y, and of B_x, B_y and R_{xy} on C_{xy} (specifically, Circumstances) (p. 293).

Thus an empirically testable equation for R_{t-1} is derived,

(E1*) $R_{t-1} = f\ (B_{xt-1}, B_{yt-1}, C_{xyt-1})$.

Ultimately, the real power of the RBC framework is in its ability to provide the practitioners with the tools he/she needs to conduct complex international negotiations. When the focal point is on the relationship, and not the bargaining tactics, the *low context* individual is better able to understand the behavior of the *high context* individual.

Unless the situation is a one-time purchase, unlikely in organizational negotiations, the relationship between the parties takes on an increasing importance. Once practitioners understand this point, then a negotiator can focus her efforts on tasks that will influence the other parties' behavior, thus positively impacting on the negotiations.

Additionally, the role of interaction in the structuring of social exchange is well researched. Evidence has supported 'a reciprocity norm' in interactive behaviors, or integrative communication strategies.[45]

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