1989

Implementing systemic change through issues management

Karen D. Spencer
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Implementing systemic change through issues management

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San Jose State University, 1989

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**IMPLEMENTING SYSTEMIC CHANGE THROUGH
ISSUES MANAGEMENT**

A Thesis

Presented to

**The Faculty of the Department of
Anthropology and Cybernetic Systems
San Jose State University**

**In Partial Fulfillment
of the Requirement for the Degree
Master of Science**

By

Karen D. Spencer

December, 1989

APPROVED FOR THE DEPARTMENT OF
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The kabala

Man must see that nothing is, but that everthing is always becoming and changing. Nothing stands still. Everything is being born, growing, and dying. The very instant a thing reaches its height, it begins to decline. The law of rhythm is in constant operation. There is no reality. There is no enduring quality, fixity or sybstantiality in anything. Nothing is permanent but change. Man must see all things evolving from other things and resolving him to other things, a constant action or reaction, inflow or outflow, building up or tearing down, creation or destruction, birth and growth and death. Nothing is real, and nothing endures but change.

DEDICATION

I have worked on this thesis for a long time, and I owe its completion largely to the support of some very special people. Warm thanks are due to my fellow students and the faculty of the Cybernetics Department who contributed in the inspiration, learning, and evolution of ideas. To Margaret Ledesma for sharing and conspiring. To Bob Clements, Larry Koepke, and Marty Michaels who made the fulfillment of prerequisites a rewarding experience. A special thank you is due to Bill Reckmeyer for his knowledge and guidance throughout the entire process.

In addition, I want to express a loving thankyou to Larry Letterman who began to teach me systems thinking at a very early age; Gloria Letterman who has been my cheering section; and my husband Bill, who has been an endless source of support, patience, and love, no matter what my state of mind. Finally, Megan and Ryan, for the time being, you now have your mother back.

PREFACE

Issues management is being developed to deal with the impact on organizations of a rapidly-changing environment. Issues are those unique aspects in the relationship between an organization and its external and internal environments that pose a significant threat or opportunity to the organization's goals. Issues often require organizations to undergo structural and/or cultural changes; however, most organizations are usually ill-equipped to manage such transformations.

The issues management literature is sufficient in describing the reasons and means for anticipating issues, but is lacking in its theoretical and philosophical insights for overcoming resistance to change and acting to create more favorable environmental conditions. This thesis presents an approach to issues management that could help managers to actively intervene, influence, and adapt to the consequences of emerging issues.

Chapter I sets the context by discussing the historical development of issues management, including the current state of the art and various perspectives on approaching the subject. The major drawback of current methods is their focus on control, maintenance, and influence. The systemic approach to issues management

developed in this thesis focuses on the proactive, reflective, and synergistic abilities of organizations.

Systems science and cybernetics allow the user to understand the holistic qualities of complex systems. Chapter II overviews general systems theory and explains some of the meta-patterns that cause issues to emerge. This topic is further developed to show how systems can use their abilities of self-organization to leverage their learning capabilities in the face of complex situations.

Chapter III discusses management and organization in terms of cybernetics and systems. The integration of these concepts can help in understanding the management of organizations as healthy viable systems, the structures and processes of which act to reduce the occurrence of issues.

Chapter IV describes a systematic and systemic approach to issues management that can be used as a guide for practitioners of issues management through the various stages of problem-formulation, decision-making, and implementation. The conclusion discusses the practicalities and preferabilities of implementing a successful issues management program.

My thinking on this topic was affected by an earlier reading of the articles edited by Erich Jantsch and Conrad Waddington in their 1976 book, *Evolution and Consciousness*:

Human Systems in Transition. They point out that evolution is the result of progressive correlations between genotypes and the physical, social, and cultural environment. To be healthy and viable in times of high fluctuation, systems need to be highly resilient, diverse, and exhibit an "openness as 'self-transcendence' to imperfection, courage, and uncertainty." Combined with my earlier studies in environmental concerns, I understood that the biological analogies of evolution and symbiosis apply to an organization's capability for survival in a changing environment. Issues could be seen as a symptom of the organization's often active ignorance of the evolutionary process and the interactive influences of its external and internal environments.

Gilbert Probst's article, "Cybernetics Against Mismanagement" (1982), and his later book with H. Ulrich, *Self-Organization and the Management of Social Systems* (1984), helped to shape these ideas as to their relevance to the more practical aspects of self-organization in complex management situations.

Although most of what has been written about issues management focuses on its systematic methods, there is much to be said about the art of dealing with complexity and uncertainty. Donald Schon's *Reflective Practitioner* (1983)

provided insights into professional competence in problem settings as having as much to do with the epistemology of the practioner as with her bag of tools.

Finally, this thesis is a hypothesis based on reading, interviews, and coalescence of a variety of thoughts and experiences. There is a great need for a clearer understanding of the management of emerging realities. It is my hope that the concepts provided here may act as an impetus for either practitioner or academic to apply them to a situation that allows for a more careful monitoring for their empirical results.

TABLE OF CONTENTS

PREFACE.....	iv
CHAPTER	
I. GENERAL FEATURES OF ISSUES MANAGEMENT.....	1
Introduction.....	1
State of the Art Issues Management.....	6
The Need for the Systems Approach.....	11
Conclusion.....	16
II. CYBERNETICS, LEARNING, AND ADAPTATION.....	17
Introduction.....	17
The Systems Paradigm.....	18
Self-Organization and Purposeful	
Adaptation.....	27
Learning to Learn.....	34
Conclusion.....	38
III. MANAGEMENT CYBERNETICS.....	42
Introduction.....	42
Systems View of Organizations.....	44
Organizations as Multi-Dimensional	
Autonomous Systems.....	53
Systemic Management.....	61
Conclusion.....	66
IV. SYSTEMIC ISSUES MANAGMENT.....	68
Systems Methodology.....	68
Process.....	74
Systemic Issues Management.....	76
Conclusion.....	88
V. CONCLUSION.....	89
Diagnosis and Implementation.....	89
Significance of Study.....	95
SELECTED BIBLIOGRAPHY.....	101

CHAPTER I

GENERAL FEATURES OF ISSUES MANAGEMENT

Introduction

Metaphorically, I think of the Systems Age (Ackoff, 1981) as a web stretched across the globe. A slight fluttering at one spot can send reverberations across the whole. The Systems Age is characterized by systems of variables that act synergistically to create a tide of social forces that are often turbulent, unpredictable, and discontinuous from the past. In particular, the rapidity of communications exaggerates the speed of impact that these variables may have on any given system. There is great need for a management device to handle the impacts of this increasing complexity on the internal and external environments of organizations.

A fairly new tool, termed issues management (IM), is introduced in this chapter and discussed regarding its potential and pitfalls for managing emerging trends and realities. The systems approach is also introduced as a way to enhance issues management's abilities to deal with change.

Organizations exist within the context of their greater environmental systems. When these environments are

changing and the organization is sufficiently complex, incongruences in the form of issues may develop. Issues may be external, such as the current demands for accountability of toxic wastes; or internal, such as the demands for child care in the work place. In any case, issues usually arise from a complex mixture of political, cultural, and technological features. Moreover, they are characterized by their novelty, unpredictability, and speed of development (Powers, 1987).

Organizations are becoming more subject to these forces and must be prepared to adapt. Whereas management has traditionally focused on hard (as in quantifiable) problems such as finance and marketability, they are now having to learn how to deal with soft (qualitative) inputs where changes are occurring most and are occurring rapidly. Qualitative trends, such as social, political and regulatory concerns, were once considered externalities to corporate planners. In recent years, however, many excellent corporations (Peters, 1987) have come to recognize that their survival is as dependent upon their ability to anticipate, understand, and adapt to new socio-political environments as it is on their proficiency in business.

Public participation through issues, perhaps more than traditional forms of democracy, is forcing

organizations to become more responsive to their social environment (Renfro, 1982). Outside participation is accomplished through the media, public opinion, and government response. Stakeholders (consumers, employees, and the community) are demanding action on such issues as environmental protection, community renewal, corporate influence overseas, energy conservation, and the employment of women and minorities. Various interest groups place moral demands on issues - from conducting business in South Africa to closing plants in one-company towns.

Participative demands are reflected within the corporation as well, as the increasingly pluralistic nature of the work place calls for a humanization of design and management. These demands emerge in the form of pressures that are as diverse as the people employed - demands for a variety of health care programs to fit individual needs, for more control over decisions that will affect the quality of the work environment, to the emergence of different values regarding the meaning of career success.

Another area of concern for organizations is the increasing impact of government regulations. Special interest groups have turned their attention to government legislation to achieve their goals. In the context of issues management, this means that organizations will have

greater need to anticipate and define emerging issues early and work with government to develop effective policies. In working to define the issues and forming governmental relationships, there is a better chance of developing win-win situations with all parties involved. For example, the matter of disposable aluminum cans has become a major environmental issue. The aluminum industry - led by ALCOA - dealt with this issue early by sponsoring recycling programs. ALCOA redefined the issue from environmental pollution to conservation of resources, thus avoiding potentially damaging government regulations. They turned the problem into an asset and emerged as a responsive, responsible corporate citizen rather than an insensitive polluter (Renfro, 1982, p. 62).

Beyond the marketing and competitive aspects of rapidly-changing technologies, the impact and rippling effect of those technologies require decision-makers to have a tool that can incorporate anticipation, foresight, and public affairs into business decisions regarding their technological development. A recent example are those issues that have surrounded the release of genetic mutations for agricultural experiments. Both the potential benefits and threats are enormous; the stakeholders can be said to be global. Such actions require the interaction of community,

organization, and government in order to manage these heterogeneous concerns.

Socio-political issues cannot be considered just the concern of public affairs or marketing. They are corporate concerns, since they cut across traditional departmental divisions and may have a significant effect on the current functioning and future of the entire corporation. They will influence - and be influenced by - the strategic direction and operation of the company (Johnson, 1983). Corporate profits, operations, and general viability are closely intertwined with these issues; therefore, their management should become a major consideration in the overall strategic planning and management process. Most organizations, however, are ill-equipped to handle the interdependent nature of these types of problems. When issues do arise they are usually handled on an ad hoc basis, but there is rarely an institutionalized program for planning to handle them with foresight.

Issues management is an emerging field that is being developed to deal with these socio-political issues. It is a planning and management tool that is used to identify and evaluate emerging trends, concerns, and issues, and also for the orchestration of appropriate plans for dealing with these concerns. IM identifies potential threats and

opportunities in the operating environment and points out weaknesses and strengths within the organization to deal with these variables. Often, when issues are recognized, they have already become crises. The practice of issues management gives a company a tool to better anticipate socio-political issues that might affect them in the future, rather than being just a reactive victim. In turn, the conscious act of planning for and managing issues broadens the awareness of the corporation's context within its environment.

State of the Art Issues Management

The term "issues management" was originated by W. Howard Chase in 1976 (Duke, 1983; Ehling & Hesse, 1983) and is defined differently by different people. The literature on and experience in the subject are sparse and sometimes ambiguous. For example, Andrew Gollner, in his *Social Change and Corporate Strategy* (1983), uses the terms "issues management" and "public affairs" interchangeably (p. 134). Also, the methodology is inexact. Some authors, Halstead (1985) for example, believe issues management should be performed in an algorithmic fashion with specific steps and procedures; while other practitioners approach it as an

as an "art" that is performed in a manner suitable to both the organization and the issue involved.

Issues management is an amalgam of the techniques and philosophies of forecasting, futures research, environmental scanning, planning, public affairs, government relations, and public relations. There seems to be, however, four fundamental perspectives as to the emphasis of IM. Although these perspectives reflect the background of the observers and are different in nature, they are very much interconnected and mutually inclusive. First, there is the futurist perspective, which views foresight as the most important product of issues management. Second, the public affairs perspective views IM's role as an important contributor in the attempt to establish and expand the corporate "arena for action" of corporate advocacy and influence. Third, public policy analysts discern issues management as a tool for public policy development. Fourth, strategic planners understand issues management abilities to systematically deal with "real time" issues not accounted for in the annual planning cycle.

The futurist uses issues management as a window into the future of the organization. Coates (1986) best represents the futurist perspective. In his view, issues management is applied futurism (p. 1). IM is used to tune

into emerging trends, learn about the environment, and respond with appropriate planning (p. 28). The emphasis, though, is on environmental analysis and extrapolative methodologies.

The public affairs perspective views issue management's role as a contributor to managing the relationship between an organization and its social environment. Its emphasis is on detecting those behaviors, opinions, and values of a key portion of the public that may have a negative impact on operations and on detecting them early enough to develop a public position (Heath & Nelson, 1986; Gollner, 1983; Arrington & Sawaya, 1984). Although similar, the public affairs council (Heath & Nelson, 1986, p. 20) asserts that issues management is not public affairs and that it is unique in four key ways: (1) it is a systematic monitoring system that allows companies to intersect public opinion at an early formative stage, atypical of most public communication efforts; (2) it is pro-active rather than reactive; (3) it requires that corporations apply substantial empirical and qualitative analysis to solving corporate planning problems; and, (4) success in public affairs mandates that research and campaign targeting be supplemented by two-way communication to reach a wider range of constituencies. The addition of

the tools and techniques of issues management provide for this expanded perspective.

The concern for the environment has been a major public policy issue and an early cause to be dealt with by the techniques of issues management. Those involved with public policy use IM to participate in the shaping and resolution of those public issues that will affect the future of the enterprise or cause. Public policy professionals work closely with regulatory agencies, industry, and the community to define and resolve the important aspects of an issue.

Strategic planners (Cassidy & Halstead, 1986; Ansoff, 1984) view issues management as a systematic process that optimizes the management of trends and concerns not accounted for in the annual planning cycle. Additionally, strategic plans often stifle creative innovation when change requires overcoming limitations of established policy. Issues management can act as the entry point by identifying emerging concerns and enabling the organization to quickly take action when a strategic plan is inadequate.

Important Steps in Issues Management

Regardless of the perspective taken, there is some consensus as to the important steps of any issues management program:

Issues Identification. This starts with the scanning of the environment for a wide range of potential information regarding trends that may be developing into issues. Scanning involves tuning into what is being said, written, and done by the general public, media, special interest groups, government, and other opinion leaders.

Monitoring and Tracking. The scanning described above is likely to reveal a large number of prospective concerns or issues. The next step is to identify and prioritize those which may have a significant impact on the economic viability and legitimacy of the corporation. These potential issues are then monitored and tracked for their extent of change.

Issues Analysis. The issues with the greatest potential for impact and nearest on the horizon are subjected to research and analysis for their major features and potential outputs.

Options Development. Basic decisions are made regarding the corporation's response to the challenges and opportunities posed. The strategic option is carefully

selected for its potential on achieving long-term corporate goals.

Implementation. To successfully achieve stated goals, implementation requires the involvement of senior management in adopting policies to support the change strategies. The policies need to be implemented at the various organizational levels and need to be included into the short-, mid-, and long-term business plans and decisions. Tactical resources are organized to put the plan into effect.

Evaluation of Results. The effectiveness and the efficiency of the strategy is evaluated. Based on the results of this evaluation, the issue is restated and the process of managing and problem solving is recycled.

The Need for a Systems Approach

Organizations are open systems made up of interacting subsystems and are, themselves, subsystems of larger economic and industrial systems. As open systems, they are influenced by changing technological, political, resource, and cultural variables in their environment. As the turbulence among these variables becomes increasingly complex, management tends to react through operational and tactical maneuvers that are meant to stabilize structures

and control change. The focus on stabilization often acts, however, to neglect other possibilities for future ideals and goals. In the long term, controlling change hampers the organization's ability to evolve and grow with its changing environment. There is a need for organizational designs and management processes that recognize the need for flexibility and synergism.

Although all issues management systems purport to be a proactive tool for organizing long- and short-term strategies, their current designs significantly lack in incorporating the interactive tools and philosophies that are known to encourage co-evolution between systems. Their methodologies have been based on traditional management and systems analysis methodologies that were designed to control change and seek stability in an organization's structures and behaviors.

Management science has reached a high standard of precision for analyzing and simulating socio-technical problem situations -- largely due to the inputs of the cybernetic notions of feedback, adaptation, and self-stabilization. These are the concepts of first-order cybernetics, which focuses on the structure-maintaining behavior of highly stable, equilibrium-seeking systems, such as any automated mechanism or routine. These concepts are

appropriate for tactical maneuvers to stabilize events; but problems emerge when so much focus on short-term stabilization leads to a general ignorance of long-term concerns and impacts. To survive, the organizational system must balance the concerns of deviating from the status quo with the need to reflect and learn from incoming information and purposefully undergoing appropriate degrees of adaptation and growth.

Contemporary studies in cybernetics and systems science have produced many theories and insights into the understanding of the structure of irregularities and discontinuities (Probst, 1982; Ulrich & Probst, 1984). The rules of second- and third-order cybernetic systems have been derived from isomorphic patterns of governance in physical, biological, and social systems. Although the fields are still fairly young, they have produced a set of tools for thinking about and handling change through the notions of evolution, co-evolution, reflective learning, symbiosis, and self-organization. Contemporary cybernetics studies systems that are able to observe their environment and are capable of (re)organizing their goals, structures, and functions to meet perceived challenges. This requires an active process of detecting the environment, reflecting on current operating norms, selecting an appropriate option

to meet the change, and effecting the chosen plan of action. The second- and third-order cybernetic system can use control in the broadest sense: it can self-organize its processes and structures to co-evolve with change and use change to its advantage.

Using the contemporary concepts of second- and third-order cybernetics, the function of issues management expands from detecting possible scenarios and developing options to a tool for managing the evolutionary process of the organization. In a more specific sense, this means that the issues management process should not only provide information on emerging trends and issues, but that it should also examine current institutional missions and operating norms for their appropriateness in the emerging reality, as they may have actually caused the issue to arise. Only through this level of examination can the proper response be developed and implemented.

Thesis Proposal

In this thesis the theories of cybernetics and general systems are used to address transformational and developmental processes that are the foundation for systems that have the variability to cope with a large range of disturbances. Applying these concepts to the organization

and issues management, I look at their potential for enabling the organization to become a learning and self-organizing system. The integration of the theoretical insights of cybernetics with traditional management practices and functions and with current IM procedures produces an enhanced approach to issues management and brings about a more relevant process for handling a turbulent environment.

Within this thesis, I explore the philosophical, theoretical, and methodological aspects of systems science and cybernetics in terms of their implications for issues management using Reckmeyer's "renaissance systems approach" (1982, 1989) as a foundation for this exploration. Second, as the operating environment changes, the conceptual framework of the practitioner needs to progress. I discuss how being a reflective learning system is an applicable paradigm for practicing issues management. Third, I use cybernetic theories to look at organizational design and the management of healthy, viable organizations. This is then integrated into an enhanced approach to issues management that incorporates the philosophical and theoretical concepts of systems science and cybernetics into a systematic and systemic methodology.

Conclusion

There is usually a gap between knowledge of a methodology and practice in the real world. This is also apparent in issues management, because, although a methodology has been developed and even applied, few companies seem to get through the bottleneck that lies between knowing that certain issues exist and actually being able to implement a change strategy. Change goes beyond influencing public opinion; it should actually involve evolving the organization's perspectives and operations to a new dynamic equilibrium within its environment. The integration of the theoretical insights of first-, second-, and third-order cybernetics with traditional management functions should be useful for interpreting the underlying structures and processes of change and adaption.

Issues management can be a major entry point for developing the intersystemic tie between the organization and the environment. By becoming an active participant with its environment, an organization can actually reduce the number of issues that may otherwise arise -- thus enhancing its autonomy and continued success.

CHAPTER II

CYBERNETICS, LEARNING, AND ADAPTATION

Introduction

Systems science and cybernetics are relatively new fields that are being developed to tackle problems of irreducible complexity inherent in the real-world. Many contemporary social problems are too complex to be reasonably studied within the well-defined boundaries of the traditional disciplines. When simple solutions are given to complex problems, they lose their breadth and depth and therefore their realism. The complexity of variables that make up socio-political issues creates situations that evade singular solutions; rather, the tangled web of issues necessitates that they be understood and managed as wholes.

The systems paradigm seeks a holistic understanding of these complex problems by describing the quality of the whole through an understanding of its characteristic relationships and processes (Ashby 1956; Checkland, 1981; Laszlo, 1972; Miller, 1978). This chapter reviews aspects of the systems field regarding their relevance in times of uncertainty and uniqueness and explains some of the meta-patterns that cause issues to emerge. Further, general

regarding self-organization and purposeful adaptation are discussed in the context of their ability to amplify an organization's control over change and complexity.

The Systems Paradigm

The term "system" is broad, but refers to an integral identity whose parts act in some important sense as a unity. It is the interaction between the parts of the system that create the emergent properties of the whole. Consequently, when a system is taken apart for a closer examination it loses those relationships that form the essential properties of the whole. This is critical to the management of issues, for it becomes clear that an understanding of complex problems cannot be derived solely through the analysis of any singular part.

Systems are generally thought of as complex wholes made up of smaller subsystems. For example, higher animals are complex systems made up of interacting subsystems; such as the skeletal system, the circulatory system, and the nervous system. The hierarchy of subsystems is apparent in man-made systems as well; an organization may have an inventory control system, a planning system, and a manufacturing system. While, in turn, an organization is itself part of a larger industry system that is, in turn, a

itself part of a larger industry system that is, in turn, a subsystem of an even larger economic system. The nesting of subsystems form hierarchies of interconnected and interrelated functions and attributes that provide the context in which the system must exist (Checkland, 1981).

As in ecosystems, systemic survival depends on the establishment of mutually compatible relationships. The design and operation of healthy organizations depend upon the viability of the relationships with their environment as well as the internal integration of their structures, processes, and functions. Systems thinking attempts to understand the factors that control these complex relations between systems and between their components - at variance with most analytic paradigms, which simply look at the structure.

The systems field contains three fundamental features - the epistemological, the ontological, and the methodological (Reckmeyer, 1982, 1989). These features are essential dimensions in all science and together form the paradigmatic assumptions of a given field. Epistemology concerns how observers generate and attribute meaning to knowledge. The ontological aspects of science are the theories that are established to explain the nature of reality. The methodological features connect the

procedures that are useful for control in a given situation.

Epistemologically, the systems paradigm is constructivistic and expansionistic. Epistemology is the study of how observers attribute meaning to raw data based upon a larger image of how the world works. The images of the observer are not absolute, but rather are story lines that have been constructed over the life of the observer (Bateson, 1972; Boulding, 1956; Clemson, 1984; von Foerster, 1982). It is these embedded perceptions that are the basis of a practitioner's problem-solving methodology. Two major lessons can be drawn from this realization. First, the way the practitioner draws his boundaries around a problem area and which set of variables are included within these boundaries are influenced by what the practitioner deems important. The domain of these boundaries affects the way the system behaves under analysis. Second, the premises or normative theories of the practitioner are crucial on how the system is subsequently treated and the strategy that will be taken to deal with it (Clemson, 1984, p. 16).

Each person involved in the search and evaluation will have his own views and biases as to the correct definition of an issue. Often, organizations will attempt to resolve issues as if there were only one perspective; or, perhaps, the plan for dealing with an issue will be

developed from the aggregation of solutions from various departments - ignoring the mutual causality of complex socio-economic-technical problems. It is essential to obtain the multiple perspectives of the diversity of stakeholders to treat problems holistically. Interactive planning and action recognizes the importance of exploring these different viewpoints and is appropriate when issues are critical and complex. The awareness of this epistemological aspect underpins the need to incorporate interactive principles into management and problem solving methods.

Ontologically the field of systems science recognizes the interdependence of observed phenomena. This interdependence is the foundation of its basic premise that systems are emergent wholes which exist in context of larger environments (Beer, 1977, 1980; Checkland, 1981; Kuhn, 1974; Laszlo, 1972; Miller, 1978; Reckmeyer, 1982). Systems science examines the isomorphy of concepts, laws, and models of causality, organization, and regulation of science in general. Its theories examine the variety of linear, mutual, and circular causal relationships that are the source of regulation in certain systems in their pursuit of purposeful activities. In short, general systems theory

looks at common organizing processes that manifest similar traits and behaviors in the broad range of systems types.

The field of cybernetics examines ways that entities organize and govern themselves to reach their goals. The term cybernetics was originated in the 1940s by mathematician Norbert Wiener as a metaphorical application of the Greek word *kubernetes*, meaning "steermanship." The key concept of cybernetics is feedback. Cybernetic systems have purposes and/or goals of their own and will resist disturbances that tend to displace them from those goals. The control in cybernetic systems is obtained through the use of four basic operations. First, they have the capacity to detect external and internal conditions; second, they are capable of comparing this information with a goal and will select an option that will help maintain their desired state; third, they then will effect this option; and, finally, they will do this in a connective manner so that the impact of their actions are joined with a new detection phase (Kuhn, 1974; Reckmeyer, 1982).

Cybernetic systems use feedback to monitor the impacts of their outputs. There are two forms of feedback. Negative feedback is the self-regulating mechanism that engages in the process of error detection and correction automatically, so that movements beyond specified limits in

one direction initiate movements in the opposite direction in order to maintain a desired course of action. Positive feedback emphasizes, or amplifies, the tendency for change and alterations. In a system dominated by deviation-amplifying feedback, a change in A causes B to change in the same direction and a change in B causes a similar change in A. Therefore, any disturbance is amplified by the interactions of A and B. These interactions often produce changes that are quite out of proportion with the initial "kick" or incident that activates them. Systems dominated by positive feedback that do not have stabilizing loops can result in exponential change that cannot be sustained in the long run (Malthusian population dynamics is based on positive feedback concepts). Yet the differentiation in a system over time can only happen with sources of positive feedback.

Cybernetic systems are considered open systems; that is, they are embedded in environments that affect and are affected by them. An organization is an open, socio-technical system which exists within the context of its environment. A continuous process of information exchange is created between the system and its environment, allowing the system to monitor changes and initiate appropriate responses. In order to survive, the system uses feedback in

its interaction and adjustments to its environment (Figure One).

The design of the system's structures and processes must be related to and interact with many environmental variables. A complex, self-organizing system is capable of setting some of its own goals and processes, but the environmental suprasystem sets the limits of variance of behavior of the dependent system. The general forces of its environment pull and push the system in various directions, which may result in greater or lesser system performance. The system monitors these forces and, by making adjustments in its processes and structures, can maintain an effective relationship.

The ability of a system to regulate and modify its goal in conjunction with the demands of its environment is called requisite variety. This principle, originated by Ashby (1956), suggests that the diversity of any self-regulating system must match the variety and complexity of its environment if it is to deal with the challenges posed by that environment. The ability of a complex system to control deviations is dependent on its ability to cope with the systems variety. That is, it can choose the appropriate measure among all those possible or available that will counter the movement of the system that it is

Figure One

trying to control. In other words, any control system must be as varied and complex as the environment that it is trying to control.

In the case of the management of socio-technical issues that involve a diversity of factors, the concept of requisite variety implies that no single person has the variety to understand and cope with all the inputs. The manager must either dampen the complexity of the situation at hand or amplify his own (Reckmeyer, 1986, 1989). Managers usually try to dampen turbulence by regulating the internal consensus of thought and procedure. Although this is usually effective in achieving immediate needs, the long-term adjustment that is required by issues requires a diversity of ideas, skills, and techniques to amplify the variety of options.

The methodological feature of the systems field should be integrated with the epistemological and ontological aspects. Traditional areas of expertise expound their own correct approach to problem-solving based upon their disciplinary views. Unlike any other discipline, though, general systems theory does not have a singular approach to problem-solving. Systems scientists try to match the tools and techniques of the enquiry to the degree of complexity - or precision - of the problem. The multi-

dimensional aspect of issues requires an integration of a variety of tools and techniques that can handle the range of hard (precise and quantifiable) and soft (messy and qualitative) concerns (Ackoff, 1962, 1978; Argyris, 1985; Athey, 1982; Clemson, 1984; Reckmeyer, 1982; Schon, 1983). For example, operational problems are usually quantifiable and can often be solved with a high degree of precision. Soft systems, such as issues or social concerns, are value-based, however, and call for an increased use of informal reasoning processes. Systems methodology looks to coherently integrate the structured and unstructured aspects of a problem with the perspectives and concerns of the operational, tactical, and strategic subsystems to get a broad picture that includes important details.

Self-Organization and Purposeful Adaptation

General Forces of Change

The dynamic interplay of variables results in living systems constantly changing their behavior or structure or both. Reckmeyer has argued that there are specific meta-patterns of change relevant to all systems (1982). Organizational features refers to the forms the systems take and clarifies the primary operating patterns within the system and between the system and its environment.

Morphostatic features refer to the relatively invariant processes that preserve existing systemic structures. Ritual and values in socio-cultural systems are morphostatic processes that tend to continue certain patterns and act to resist sudden deviations.

Morphogenic features refer to structural transformations that are not inferable from the existing state of its properties or variables (Maruyama, 1963). The chrysalis of the butterfly is an example of morphogenesis. A morphogenic system is capable of maintaining its continuity and integrity by modifying essential aspects of its existing structures or organization. These modifications, however, are the system's way of insuring its continuance. Morphogenic systems are driven by deviation-amplifying processes (positive feedback) which tend to elaborate the structure. Learning, evolution, and technical developments are all characterized by morphogenesis. The fourth meta-pattern is morphopoiesis, which acts to create or destroy systems.

These patterns that create and resist change underlie the emergence of new trends and the resistance of companies to adapt to them. Many issues, for example, may be considered as morphogenic. The interactions of certain social or technological activities may cause a sudden

transformational leap becoming something so new that a company has had no experience in managing it. Because of the morphostatic tendencies of most social organizations, the first reaction is usually to try to control the situation with established norms and values. These norms, however, may have now become obsolete. Take again the ALCOA company example described earlier (page 3). ALCOA could have lobbied Congress for protection against environmental regulations - a morphostatic reaction. Instead, it examined its current modes of operation and chose to restructure its approach. ALCOA accentuated its evolutionary capabilities and was able to maintain its congruency within a changing environment. The ability of an enterprise to restructure its operating norms to adapt to changing environmental circumstances depends upon its self-organizing abilities.

Self-Organization

Systems of sufficient complexity and dynamics can organize themselves. The structural and behavioral characteristics of organizations are such because of the mutual adjustments the parts have made in the process of interacting with each other. The organizational abilities of systems can be termed either adaptive self-stabilizing (Cybernetics I), adaptive self-organizing (Cybernetics II),

or reflective self-organizing (Cybernetics III) depending on the degree to which they can modify their existing structures and processes. The ability of an organization to self-organize in the face of extreme complexity and rapid change depends on the cultural norms, policies, and values of the people involved. Given the diversity of variables and interactions required for the resolution of issues, a brief examination of these processes may give some insights on how to make organization more humanely effective.

Cybernetics I. Adaptive self-stabilizing systems seek stability through error-reducing negative feedback. The early development of systems theory and cybernetics was influenced by the perspectives of equilibrium and homeostasis. These systems have been termed Cybernetics I (Laszlo, 1973) to differentiate them from systems of more complex organization.

Adaptive self-stabilizing systems are adaptive - to a degree - but, because they are regulated by morphostatic and negative feedback processes, they adapt in a stepwise progression and are always seeking an ultimate equilibrium (Jantsch, 1976, p. 38). Stability is achieved by many finely adjusted, interlocking processes that monitor transmissions of matter-energy and/or information and control for deviations in these transmissions. The

operation of a thermostat is an example of a stability seeking system; so is the homeostatic function of the mammalian body.

Cybernetics I has had a considerable impact on management science. The institutionalized goal of management systems, including issues management, has been to control deviations in an operating environment in order to keep an organization on course. Yet, management systems dominated by negative feedback are limited in their learning capacities. When the standards in place are no longer appropriate for dealing with the changes encountered, the "intelligence" of the organizational system breaks down -- the process of negative feedback ends up trying to maintain an inappropriate pattern of behavior (Morgan, 1986).

Cybernetics II. Recently, attention has been devoted to the analysis of instability (Maruyama, 1963; Prigogine, 1978; Lazslo, 1972; Jantsh & Waddington, 1980). Complex, living systems have the capacity to select a new steady-state brought on by pressures in their environments. This is termed adaptive self-organization and not only involves the re-establishment of parameters defining a previous steady-state of the system after perturbation, but also allows for a progressive development of new steady states that are more resistant to future perturbations. Deviation-

amplifying mechanisms give these systems the capacity for functional learning, wherein information can be interpreted and compared within the memory, and a suitable option chosen that allows adaptation to environmental change. The positive feedback features of these systems allow them to undergo the structural evolution that moves them to new levels of organization and ultrastability.

Unlike the mechanistic behavior of self-stabilizing systems, the objectives of adaptive cybernetic systems are not rigidly fixed. They can compare their current standards with changing environmental realities and adapt to them in such a way as to maintain the system. The biological analogy, though, is insufficient in describing the ability of some systems to purposefully change their own operating standards as well as being able to impact the standards of their environment.

Cybernetics III. An even higher level of self-organization is a system which exhibits the ability to make a conscious choice of goals and standards. A reflective self-organizing system is able to project learned experiences into plausible future states and decide on its own course of action. Unlike Cybernetic I and Cybernetic II systems, they can change their goals, terminate certain activities, engage in research, and continually search their

memories for information that is appropriate to the present situation (Schoderbek, Schoderbek & Kefalas, 1985). As the system learns, it increases its requisite skills for operating within its diverse environment and thereby increases its immunity to further turbulence and disruptions. The important difference between reflective self-organizing systems and adaptive self-organizing systems is their ability to purposefully interact with their environment and actively examine their own operating tendencies. They are not only able to detect and correct deviations in their environment, but can also perceive errors in operating norms and are thus able to influence the standards that guide their detailed operations. It is this level of self-questioning ability that allows systems to go beyond reactive learning and underpins their ability to learn to learn and to reflectively self-organize.

Current approaches to issues management have lacked these systems philosophies and ontologies that accommodate an openness to learning and growth. To manage systemically, managers need more specific tools to apply reflective self-organization to the management of emerging issues.

Learning to Learn

The desire to maintain a pre-determined end and the view that objectives must be clearly stated leaves most organizations closed to a realm of possibilities. The cybernetics of reflective self-organization show that a coherent direction can emerge from a domain defined by values stated in terms of limits (negative feedback noxiants) one wishes to avoid. Pre-determined goals, as Cybernetics I and II point out, act as constraining factors that limit an organization's ability to evolve. Rather than trying to control in order to remain within these constraints, a better strategy is to define and challenge them (Morgan, 1986). For example, traditional management may set goals such as specifying market shares; a more intelligent strategy should include a plan stating limits one wishes to avoid - such as excessive reliance on a particular product or market segment, environmental regulation, or community or employee unrest. The exploration and understanding of chosen values and the avoidance of noxiants involves the choice of limits and constraints rather than ends. These limits act as a guide for future action and create greater degrees of freedom that allow meaningful direction to emerge.

Argyris (1983) maintains that if organizations are to control their future they must learn to re-examine their underlying values and assumptions and increase their ability to change the programs which govern them. Argyris developed the concept of double-loop learning as a process which allows a system to guide itself with reference to a set of coherent values or norms, while questioning whether these norms have proven an appropriate basis for guiding behavior. This concept is opposed to what he terms single-loop learning, which, he explains, is the attempt of some practitioners to manage problems with rhetoric, bias, rationalization, and through the use of only those techniques and information that are already known. Single-loop learning is used by practitioners who are more comfortable with security, power, and stability than with risk, challenge, and change.

Most organizations are adept at single-loop learning. Based on the notion of keeping the organization on course, the primary focus of single-loop learning used by management is on monitoring expenditures, sales, profits, and other indications of performance to ensure that activities remain within the requirements established through the budgeting process. Too great an emphasis on these aspects can limit

the learning potential of the organization and fits with the cybernetic notion of adaptive self-stabilizing systems.

By making explicit normative theories of design, the double-loop learning process allows practitioners to understand the limits that are placed on potential action by what may be obsolete theories and thus frees them to new areas of action and problem-solving. The double-loop learner moves through the various phases of design and problem-solving by a process of discovery, challenge, invention, production, and re-discovery. The process explores the environment, while iteratively evaluating the effectiveness of current procedures, and then incorporates these re-evaluations into the creation and implementation of a more viable system (Argyris, 1983, p. 160).

Schon (1983) develops the double-loop learning approach further. He shows that reflective design is a circular, mutual causal process that iteratively loops back upon itself. Through "a web of moves, discovered consequences, implications, appreciations, and further moves," the "reflective practitioner" is able to impose his own limits to the complexity of the situation (p. 94). A reflective practitioner improvises and self-organizes by using a combination of divergent, intuitive skills, and convergent, scientific techniques to get through the various

phases of problem solving. Schon states that learning requires an openness to new information; necessitates giving and receiving valid information with the other participants; the surfacing of private dilemmas; the creation, for oneself and for others, of an awareness of the values at stake in decisions; and reconciliation with the limits of ones own capacities (p. 231).

The learning system is based upon the four key principles of cybernetics. First, cybernetic systems must have the capacity to sense, scan, and monitor their environment. Second, they must be able to relate this information against specified goals that guide systems behavior. Third, they need to initiate an appropriate course of action. Fourth, they need to make adjustments when discrepancies are detected.

Simple cybernetic systems, like a house thermostat, are able to learn in the sense of being able to detect and correct deviations. The house thermostat cannot question the appropriateness of its behavior if circumstances change. More complex systems, such as the human brain or certain computer systems, have this capacity. It is this kind of self-questioning ability that underpins the activities of systems that are able to learn to learn and self-organize (Morgan, 1986, p. 87). This extra step is the basis for the

difference between single- and double-loop learning systems (Figure Two).

The double-loop learning process helps to balance the self-stabilizing factors that are necessary in day-to-day operations with the more long term realities of emergent change. The process acts to bridge the gulf between theory and reality by using common theories-in-use as a reference point for the concerns of here and now, while moving toward new areas of discovery and action by questioning whether these norms provide an appropriate basis for guiding behavior. New concepts are allowed to emerge and the practitioner can incorporate these into more congruent and, thus more viable, systems designs.

Conclusion

When combined with the more systematic features of issues management, the epistemological and ontological aspects of reflective self-organizing systems create a modified theory of control during times of change. The organization can undergo transformations that are purposeful, controlled, and yet open to new notions, structures, and processes of emergent realities. Cybernetics suggests that this basic principle could be usefully applied to help organizations learn and evolve, and

SINGLE AND DOUBLE LOOP LEARNING

Single loop learning rests in an ability to detect and correct error in relation to a given set of operating norms:

Double loop learning depends on being able to take a "double look" at the situation by questioning the relevance of operating norms:

step 1= sensing, scanning, and monitoring the environment
step 2= comparing this information against operating norms
step 2a= questioning validity of operating norms
step 3= the process of initiating appropriate action

Figure Two

(Morgan, 1986, p. 88)

to better deal with environmental turbulence and issues that may arise.

In the face of urgent issues, time and bureaucratic constraints may make it seem impossible to use these concepts. A systemic approach to problem-solving takes more time for evaluation and comparison of constraints. Additionally, the exploration of values is not considered scientific enough in a culture where managers have been taught to "set targets and go for it." Yet reflective action is rigorous in its own right. There is an art of practice in times of uncertainty and uniqueness that complements the science of management. Important issues need to be approached through a process that is both rigorous and relevant. The reflective approach can help a management team link the specific aspects of technical problem-solving with the broader, more qualitative variables of issues. The result can be a plan for action that is more meaningful and effective.

Reflective practice requires an organization in which members must value the activities in which they engage, a commitment to the products they produce, and a culture which appreciates the need to remain open to the kinds of learning that allows them to question, challenge, and change the activities and products. Implementation of a Cybernetic III

system would require interventions and processes that help harmonize and connect the people-organization-environment into a system whose structure is capable of self-organization in the face of challenges posed by new demands.

CHAPTER III

MANAGEMENT CYBERNETICS

Introduction

A systems approach to management involves applying relevant concepts from the systems field to facilitate the understanding of organization theory and management practice. These concepts can be applied to all levels and functions of management and organization, including issues management. Most fundamental to systemic management is the systems philosophy or the "way of thinking" about phenomena in terms of wholes - including parts, components, or subsystems - with a significant emphasis on their interrelationships. There is acknowledgement of the mutual dependence of these parts and variables as they relate to the organization and of the broader society in which it operates.

Systems analysis is also a major component of systemic management. It refers to the systematic techniques used in problem-solving or decision-making. Systems analysis involves the cybernetic cycle of the detection of a problem; identification of relevant variables, analysis and synthesis of the various factors; determination of an optimal solution; and effecting that program of action. To

be thorough, the decision-making process needs to include all phases of the cybernetic cycle. Systems analysis is usually associated with quantitative applications; but it is also useful in qualitative thinking, such as the double-loop learning technique. Approaching "messy" problems systematically and systemically requires the use of a variety of thinking tools, the inclusion of several decision making levels, and the recognition of multiple needs and requirements.

Systemic management can then be said to involve applying systems theory and the cybernetic cycle of decision-making to the management of organizational systems. It requires the recognition of the general Cybernetic I model of input-transformation-output, including the flows of information, matter, and energy; some skill in systems analysis techniques; and the recognition of the interrelationships among subsystems and the suprasystems to which the organizational function belongs. Systemic management acts as a systematic guide for effective organization and decision-making within the multi-dimensional autonomous system.

Historically, there has been a progression in the complexity of models and perspectives of organizations and their role in society. Part one of this chapter looks at

general, conceptual models of the organization that have been developed over time by academics and managers. Part two looks further into the principles of self-organization, discussed in Chapter Two, as they apply specifically to managing complex organizations. Part three examines systemic management in light of the above. Systems analysis is tackled in Chapter Four in laying out a methodology for issues management.

Systems View of Organizations

Essentially, the focus of systems science and organization theory has been on structure, homeostasis and balance, continuities, and coordination of subsystems. At times organizations have been depicted as mechanistic systems that could be controlled fairly precisely through means of rational decision making:

A social organization is a continuing system of differentiated and coordinated human activities utilizing, transforming, and welding together by a specific set of human, material, capital, ideational and natural resources into a unique, problem-solving whole whose function is to satisfy particular human needs in the interaction with other systems of human activities and resources in its particular environment (Bakke, 1959, p. 19).

The similarity between this definition of an organization and the definition of Cybernetics I may be evident. In the above example, organizational behavior is

viewed as highly structured, predictable, and stable; the various resources available - people, material, and machines - were manipulated in just that way. Management with this perspective is based on an economic-technical rationality, with a rigidly scientific approach toward internal design and task efficiency. This rather mechanistic view has, in fact, been useful for dealing with those situations where a firm hierarchy, a precise program of planning and control, and the routinization of activities have been called for - such as a post office, a manufacturing situation, or a fast food establishment. The mechanistic approach has trouble, however, when there is a need to accommodate the more intangible aspects of managing outside social forces.

Most contemporary business models concede the interdependence of the organization and its environment. Economic, technological, social, political, and ethical variables push and pull on the organization, while it, in turn, influences these same aspects. There is a great need to manage this interdependent relationship. The "open systems approach" to organization, which takes its main inspiration from theoretical biologist Ludwig von Bertalanffy, views an organization as similar to an organism. Both an organization and an organism are involved in a constant interplay with their environments, with which

they must achieve an appropriate relationship. Attention is paid to the internal design, but this is defined by an organization's interactions with the many outside elements that will affect operations. This biological concept, often called the "adaptive-organic model," has had important implications for organizational practice through its focus on the importance of an organization's ability to sense, evaluate, and adapt to environmental changes. Much of the development in strategic and issues management has grown from this acknowledgement of the outside world.

The adaptive-organic model defines an organization in terms of interrelated parts or subsystems working together. Systems theorists are fond of thinking about intra- and inter-organizational relations in these terms, using configurations of subsystems to depict key patterns and interconnections. Miller, in his *Living Systems* (1978), describes a framework of 19 critical subsystems that are apparent in all living systems. These subsystems are divided into those that process matter and energy and those that process information. Within his categories are subsystems that perform maintenance activities, adaptive activities, managerial activities, communication activities, reproductive activities, among many others. Miller states that in all levels of systems - from the cell to the

supranational - these subsystems are apparent, being "shredded out" recursively at each higher level.

Miller's subsystems are bound together to form an organization that is composed of multi-level (echelon), multi-goal systems that are themselves components of their society (p. 595). The task of management is to guide and coordinate the activities of these subsystems. Because of the complexity of levels, goals, and processes of the systems and subsystems, there must be significant consideration of the relationships and interactions, rather than just their connection in space. A major job of management, therefore, is to design a structure that can take into account the variability and autonomy of these internal and external environments and to establish a congruency between them.

The question of systemic design asks what sort of pieces are needed and how they should be connected to form a holistic, circular, interactive system. Beer (1979) states that the aim of systems design is to create the capacity to dissolve rather than solve problems and thus improve the overall viability of the system. The tenet of a viable system is one that should not only be compatible with the current reality, but also have the ability to respond to a stimulus that was not included in the list of anticipated

stimuli (Beer, 1966). Keeping in mind Ashby's Law of Requisite Variety, which shows that it is impossible to control the full range of concerns of complex issues and organizations, corporate performance depends on how well it manages the interaction and performance between its complex and highly autonomous subsystems. Designed into the viable system is the capability to learn, grow, and maintain its identity through morphostatic and morphogenic balances. With appropriate structures, processes, and underlying philosophies, the viable system will be robust against internal error and breakdown due to unanticipated situations (Checkland, 1981).

Beer's viable systems model provides an operational framework for self-organizing systems that brings into play various systems ideas such as requisite variety, homeostasis and evolution, differentiation and integration, and process and structure. His model specifies five broad functions (or systems) that must be carried out in any organization for internal stability and external adaptation. They are:

System One is the management meta-system. Its responsibility is to monitor all the operational elements to make sure they function effectively as a whole.

System Two is the real-time coordinating function for the operational units. It is the channel of communication

that is used to intercept and nullify oscillations between different areas. An example is a secretary making arrangements for a meeting between different departments.

System Three functions as the mechanism that ensures internal homeostasis and watches that various operational units are producing what they are supposed to be producing. It is responsible for such things as securing the resources (people, machines, raw materials, money) that the operational elements need to function.

System Four is charged with having an explicit model of the organization that describes what the organization does and how it does it. The model also describes the environment so the context is understood in which the organization must survive.

System Five acts as the closure around the other systems. It provides the self-identity and maintains the proper balance between systems three (the internal and now) and four (the external and the future). For example, system five is often performed by the board of directors or a singular entrepreneurial personality.

The viable systems model specifies the information flows and interactions between the subsystems in the multi-dimensional autonomous system. It shows that there are several levels of recursion within these systems, so the

model can be used to describe a task, a department, on up to the organization itself. Beer's model provides managers with a descriptive theory of the organization's structure and areas of functional authority and hierarchy, while calling for an explicit coherency and alignment of the corporation's past, present, and future.

The adaptive-organic model of organizations has been much more suitable for describing and designing the mutual dependency of organizations. A dilemma arises, though, when it tries to take into account the self-defined goals of its parts. Unlike most biological systems, whose fairly concrete subsystems act in selfless functional unity, organizations have subsystems that are highly autonomous and deliberate. The product of organizations is produced by creative collaborations or competitive acts serving very human interests.

Ackoff, in *Creating the Corporate Future* (1981), has contributed greatly in addressing this deficiency of biological descriptions of organizations. Ackoff states that organizations are purposeful systems which are part of one or more purposeful systems (environments) and have parts (people) which have purposes of their own (p. 29). In terms of previous discussions, this means that the whole and its parts are a reflective self-organizing system - they

their course of direction and therefore intentionally direct their own futures. Unlike most organisms, which only have the capacity to be adaptive, organizations can be active agents in shaping their operating contexts.

In addition to having the capacity for being proactive, human interests produce many dynamic, interactive - but not always mutually inclusive - goals and perspectives. Dealing with the complexity of these plural interests, functions, and processes requires an expansion of the usual "taken for granted" theories of management. Morgan, in *Images of Organization* (1986), uses eight metaphors to explore the multi-dimensional realities of the socio-technical system. According to Morgan, many images and events may be acting simultaneously to shape the organizational environment. As shown with double-loop learning, the use of alternative images as a general method for problem-solving can contribute greatly to the understanding and practice of organizational analysis. These metaphors were chosen for their relevance for explaining a wide range of situations (Table One).

Many of the conventional ideas about organization and management are built on a small number of taken-for-granted images, especially mechanical and biological ones. By exploring these and a number of alternative images, managers

Table One

Mechanical systems - which are merely instruments that can be manipulated (quite precisely) for profit.

Adaptive organisms - which are made up of sets of interacting parts reacting to environmental variables.

Brains - which are capable of using cybernetic processes to think, learn, and evolve.

Cultural systems - which serve the values brought in from the environment. The shared reality of the group (or often a single dominate personality) shape the structures, tasks, and goals of the organization.

Political systems - which are shaped by the pluralist needs of its people, task and department structures, and the various power echelons.

Psychic prisons - which create and sustain the institution by conscious and unconscious processes. The notion is that preconceived images, ideals, and thoughts form the daily approach to problem-solving.

Systems in perpetual flux and transformation - which are continually in the process of change. As complex socio-technical systems they are affected by the principles of mutual-causality, autopoiesis, and co-evolution.

Instruments of domination - which use and exploit their employees, as well as social and ecological environments.

(Morgan, 1986)

can begin to piece together new ways of thinking about organization and diagnosing problems.

Organizations as Multi-Dimensional Autonomous Systems

The management literature tends to feature management concepts as parts or segments of the organization and is concerned with the separation of these activities into tasks or operational units. Koontz and O'Donnell (1974), for example, break management down into processes and functions that are involved in planning, organizing, staffing, leading, and controlling. To manage a self-organizing system, however, it is necessary to integrate these concepts into a systemic and dynamic conceptual model. Again, the management of issues has its own group of dilemmas and concerns - as it involves managing change and maneuvering around threats and opportunities affecting the organization's survival. The following section examines certain systems principles, the application of which can help organizations control the number and severity of disruptions to manage the change necessary for creating symbiotic relationships.

Often the core dilemma of control and guidance in an uncertain environment requires selecting an appropriate point along the mechanistic-organic continuum. Viability is

a function of the balance maintained along two dimensions: (1) autonomy of sub-systems versus integration of the system as a whole; and, (2) stability versus adaptation (Beer, 1972; 1979). Too much autonomy of organizational units results in a lack of overall cohesion across organizational boundaries; while too much integration will have detrimental affects on the flexibility, innovation, and identity of those sub-units. On the other hand, too much stability will lead to obsolescence; while too rapid a pace of adaptation leads to confusion and chaos. An organization is always fluctuating along this control-change spectrum as it seeks to adapt to environmental circumstances while ensuring that internal relations are balanced and ordered.

As stated earlier, general systems theorists tend to look for patterns between laws among different fields. The principles of autopoiesis, coevolution, evolution, and dissipative structures that have been borrowed from the biological, anthropological, and physical sciences are processes that help explain the system's search for a dynamic balance in a turbulent environment.

Autopoiesis was developed by biologists Maturana and Varela to show how living systems maintain their identity while undergoing change. Although Maturana and Varela do not purport that their theory of autopoiesis applies to the

not purport that their theory of autopoiesis applies to the level of social behavior, certain patterns seem to be applicable to managing change in general. Autopoietic systems are living entities that maintain their organization, and so their identity, in times of structural change through certain interactions of their components (Maturana and Varela, 1980; Morgan, 1986; Varela, 1979; Zeleny and Pierre, 1976). The components of the system work as an interrelated network that produce processes which act to recursively generate the same network of processes that produced them. The product of an autopoietic system, then, is necessarily always the system itself (Zeleny and Pierre, 1976).

Autopoietic systems cannot be understood by only studying the properties of the components. Their properties as wholes are characterized by interactions between the components. An understanding of the autopoietic nature of living systems requires an understanding of how each element simultaneously combines the maintenance of itself with the maintenance of the others (p. 151). The circular chain of interactions of autopoietic systems go beyond the so-called boundaries of the system to its relationship with its environment. The system is described in terms of its context to the environment, and vice versa. At the

different levels, subsystems, systems, and suprasystems co-produce themselves and become mirrors of each other.

Yet, in important ways, an autopoietic system is a closed system. Through the circularity of its interactions and the autonomy of its subsystems, the maintenance of the structure and viability of the subsystems becomes its main purpose. An autopoietic system can become rigidly self-referential - the system resists entering into interactions that are not specified in the pattern of relations that already defines its organization.

Applied to an organization, the principle of autopoiesis helps explain the patterns of entrenchment that a company establishes around its rules, norms, and culture. It makes sense for production to be autopoietic, but not management. Management needs to be the dynamic agent of adaptation. When change is difficult to implement, management will find it helpful to reflect upon its autopoietic tendencies.

The autopoietic principle can be applied in a further sense: it is a way of looking at those patterns of interactions that have shaped the identity of a company and made it successful and stable. Any necessary restructuring should be instituted with the idea of creating a minimal

disruption to the basic organization that has proven successful in the past (Probst and Gomez, p. 443).

The concepts developed by Maturana and Varela have much in common with Bateson's (1972; 1979) view of co-evolution and the idea that nature thinks and the mind evolves. The essence of co-evolution is that every system is coupled with its environment by cyclical processes (Miller, 1978). These couplings range from simple communicational relationships to symbiosis and from extremely loosely coupled autonomous systems to fusions.

Bateson (1972) points to the pathology of conscious purpose that lacks recursive awareness of system and environment relations. Many organizations encounter great problems in dealing with the wider world because they do not recognize the extent of the connection. The problem of the impact of change hinges on an organization's perspective of it. In an attempt to maintain a fixed identity, threatening fluctuations are either repressed or ignored:

In the promotion of their self-interest organizations create an over-assertive relation that results in trying to sustain unrealistic identities, or to produce identities that ultimately destroy the contexts of which they are a part (Morgan, p. 243).

It is the ignorance of the co-evolutionary features and intimate connections that cause the failure of management to

understand that these identities may no longer be relevant or realistic.

An example, presented in Morgan (p. 244), is the case of agriculture's use of fertilizers, pesticides, fungicides, herbicides, and mechanized methods of farming that bring short-term profits while destroying the soil and other aspects of the ecosystem on which farming ultimately depends. Even more relevant to this thesis are the public relations tactics that are suggested in some of the issues management literature. These tactics focus on short-term control, rather than on integrative, long-term solutions. Work in autopoiesis and co-evolution shows that systems can maintain stable identities by sustaining processes of negative feedback that allow them to detect and correct deviations from operating norms, but they can also evolve by developing their capacities for reflective double-loop learning that allow them to modify these norms to take into account new circumstances.

In the context of this thesis, evolution describes the process of the development of systems, led by positive feedback and through a sequence of autopoietic structures, to new, more complex, self-maintaining structures (Probst & Gomez, 1982). This variation of structure occurs when developments in the environment of a system forces it to

react. The variation might be from permanent pressure, turbulence, or sudden oscillations. The importance here is to again realize the importance of mutual-causality. Boulding refers to evolution as "survival of the fitting," which emphasizes cooperative relationships; rather than "survival of the fittest," which assumes a competitive or adversarial stance (1981). Patterns of relationships evolve, not separate units of the organization or environment. The strategic manager can be aware and engaged in the cocreation of these patterns.

From highly stable autopoietic systems we move to dissipative structures (Prigogine, 1976; Jantsch & Waddington, 1976; Jantsch, 1979). Dissipative structures are non-equilibrium systems that are characterized by their high degree of energy exchange with their environments. The inflow of matter, energy, and/or information tends to develop instabilities that drive the system to a new dynamic regime, which often corresponds to a higher level of complexity.

It is this higher degree of complexity that allows a system to be more resilient and adaptive. A central theme to ecology theory is that a diverse trophic (nutritional) web is the basis of a community's stability; that is, the greater the number of links and alternative pathways in the

web, the greater the chance of absorbing environmental shocks. Taylor (1976, p. 175) explains the impact of these principles fairly clearly:

The rapid and turbulent dissemination of information in contemporary society leads to a web of connections between subsystems. As in ecological systems this flexible coupling leads to conditions for metastability which become more pronounced with higher complexity. Because of the marked coupling of its subsystems, a modern societal system can usually sustain relatively large fluctuations (deviations from the norm) and still maintain structural integrity. As these fluctuations attain critical size, however, the system verges on quantum transition, which occurs if the fluctuations rupture the parameters of the system itself, or again, those which couple the system with its environment. At one stage of systemic organization, the societal system utilizes negative feedback for self-stabilization (Cybernetics I); in a second time frame, technological innovation, the introductions of a new type of government, or the formulation of new socio-political goals may act as a catalyst to cross the "threshold level" which nullifies the overall effects of the system's existing negative feedback processes. As a result, the system is reorganized internally, and shifts to a new level of integration with environment, which in turn is thereby altered (Cybernetics II).

Human ideas and practices seem to develop in a similar manner, exerting a major transformational effect when they acquire a critical level of support. From an autopoietic standpoint, random variations provide the seed of possibility that allow the emergence and evolution of new system identities and can lead to the emergence of new modes of organization.

The corporate strategist is usually seen as someone in command, directing the path of corporate development, but the ideas presented here suggest successful strategic planning and the issues management system's design can never be unilateral. An organization is a unique network of values, norms, and precepts that must be self-created, self-maintained, and self-grown. The role of a manager should be a catalyst that stimulates the growth of a network of decision processes, systems, programs, and values that allow an organization to be effective in attaining institutional objectives during change.

As managers we have to...learn to be what we really are: not doers and commanders; but catalysts and cultivators of a self-organizing system in an evolving context (Ulrich & Probst, 1984, p. 55).

Interpreting change and management on the basis of the insights of cybernetics is fruitful in acquiring an awareness of an epistemology and ontology of management in a dynamic era. The following section provides more specific ideas for applying these concepts to the art of management.

Systemic Management

Systemic management processes are associated with a particular way of approaching problems that is integrative, continual, and participative (Ackoff, 1981). Applied to issues management, it requires the willingness to move

beyond established corporate wisdom, to combine ideas from unconnected sources, and to embrace emerging change as an opportunity. A systemic issues manager recognizes the intrinsic aspects of relational phenomena of problems and is thus able to challenge established practices of problem-solving - rather than walling off separate pieces and preventing them from being touched by new experiences and ideas. The systems paradigm also extends the context of management to include the proactive concerns of design and operation that are capable of maintaining identity during times of fluctuation. The ultimate goal is to develop healthy organizational structures and processes that have the generic abilities to change, to learn, and to handle specific issues as needed (Reckmeyer, 1986, 1989).

Success in managing emerging issues cannot be measured by standards of the past, but by visions of the future. With this in mind, the pragmatic approach to issues management - as layed out by Ansoff (1984), Buchholz, Evans, and Wagley (1985), Chase (1987), and others - could blend well with the idealistic, epistemological, and future-oriented approach to management of Ackoff (1981, 1984). Ansoff points out that there is little chance of an issues management program being successful unless it is integrated into an organization's strategic management process. Within

the realm of strategic management, issues management is not just fine tuning or purely maintenance oriented; it can play an important part in taking advantage of emerging opportunities, managing real time threats, and the resolution of complex problems as managers steer the company to new areas of thought and action during times of change.

The outcome of the strategic planning process relies significantly on different management responses to change. Chase (1987) lists three styles of management response: reactive, adaptive, and proactive. Buchholz, Evans and Wagley (1985) list four response patterns: reactive, accommodative, proactive, and interactive. Ackoff calls these patterns reactive, inactive, preactive, and interactive.

In the reactive response pattern, organizations ignore problems until they have an impact on operations. resulting in the need to clean up after the crises have already hit. The inactive response adapts to issues as best it can; management tends to satisfice by resolving the issue with as little effort and internal change as possible. The preactive mode is the response of many high technology companies that seek to accelerate change by optimizing each and every opportunity. The interactive response develops mechanisms to anticipate issues, affecting and influencing

their outcome by changing the environment in which they arise and are decided.

According to Ackoff, the interactivist believes that the future is largely subject to creation. Interactive planning is "the design of a desirable future and the invention of ways to bring it about." The interactive planner is ideal-seeking and engages in normative planning upon no fixed time horizon, explicitly selecting the means, goals, objectives, and ideals of the organization. Not all issues can be planned for, but the process of being interactive with the operating environment helps to reduce the number of issues that may arise.

The process of interactive management requires the recognition of the relationships between the organization and the environment. How well a corporation performs depends on how it is affected by both the people who are part of it and the systems of which it is part. According to Ackoff (1981) management is seen as having responsibility for the purposes of the system they manage (control), the purposes of the people who are part of the managed system (humanization), and the purposes of the containing system and other systems that it contains (environmentalism). An interactive approach to issues management is more likely to occur in companies whose cultures and structures are

integrative, which encourage the treatment of problems as wholes, and which consider the wider implications of actions.

In these organizations, there is a realization that problems are often parts of larger problems. Such organizations act to reduce rancorous conflict and isolation of the subsystems by creating mechanisms for exchange of information and new ideas across organizational boundaries. They ensure that multiple perspectives will be taken into account in decisions and problems dealt with simultaneously on many levels. By creating a shared frame of reference, there is a greater possibility of progress in immediate problems at hand while establishing an atmosphere for organizational learning within the greater environment.

This participative aspect of management is an integral part of what Ackoff calls "mess management." Messes are systems of problems, that, like other systems, lose their essential characteristics when taken apart. Messes usually cannot be solved, but rather need to be nurtured toward a resolution that is acceptable for all stakeholders. By developing the abilities for collective problem solving, organizations increase their variety to match more appropriately the variety of the complex issues that are constantly emerging from the turbulent environment.

Conclusion

The advancement of historical models of organization can be described by a progression of Cybernetic models. The description of organizations as machines fits the Cybernetic I model and adapts to change by monitoring and adjusting for deviations. The adaptive-organic description of organizations aligns with the Cybernetic II model, which adapt in a reactive fashion to external phenomena. Reflective organizations, as with Cybernetic III systems, are capable of actively influencing and shaping their future environment. In applying the notions of cybernetics and learning to issues management, it can be seen that an important role of management is the monitoring of its environment. However, rather than reacting to emerging issues by setting up more internal and external constraints, the meta-patterns of growth and transformation show that a better option for management is to develop external and internal relationships in a co-evolutionary manner.

The systemic approach to management requires a continual balancing of the pressure of the "here-and-now" with the "there and then" (Reckmeyer, 1989). Certain meta-patterns of self-organization have given insights into the need to maintain identity and integrity while undergoing change. Management needs to rely on its morphostatic skills

and instincts for maintaining those aspects that have proven successful in the past, while developing a talent for steering morphogenic change in a deliberate and controlled manner.

This combination requires an issues management design that is systematic in its research and decision-making techniques, but flexible enough to deal with the variety of emerging issues. Chapter Four attempts to develop an approach to issues management that is both flexible and deliberate and incorporates the above features of systemic management.

CHAPTER IV

SYSTEMIC ISSUES MANAGEMENT

Systems Methodology

Most issues management systems, like many modern business systems, use systems analysis as a general methodology underlying their formulation. Systems analysis is a set of systematic steps organized to make problem-solving as effective and painless as possible. The methodology combines subjective and objective problem-solving processes in order to take into account the rich milieu that is characteristic of socio-economic problems. The role of systems analysis in problem solving is to structure the debate between these diverse variables by acting as a guide for organizing the variety of techniques and processes needed for multi-dimensional problems.

Systems analysis was developed from the recognized need to look at problems as wholes. Problems are considered in light of their environmental context and alternatives are chosen after considering their multiple impacts and possible outcomes. It is the consideration of systemic roles plus the use of feedback to measure systems performance that makes systems analysis a subset of the systems field.

The fundamental steps in systems analysis are generally formulated as follows (Churchman, 1968; Quade, 1966):

- * Define objectives
- * Design solutions to meet objectives
- * Evaluate cost and effectiveness of solutions
- * Question objectives and assumptions
- * Consider new solutions
- * Recycle until satisfactory results are achieved

Defining objectives involves determining what is desired for the system under analysis. Designing solutions involves developing alternatives that can meet those stated objectives. The various solutions are then evaluated in terms of how effective and costly they are. Recycling of the steps is then done (questioning of objectives, generating new solutions, etc.) until satisfaction is reached (Athey, 1982, p. 4).

The systems analysis methodologies used today were refined through the 1960s and 70s. However, Athey, in his *Systematic Systems Approach* (1982), points out several important steps that have been virtually ignored in the past. For example, because the systemic practitioner is attempting to effectively organize diverse systems, there is a need to enlist important stakeholders for their view points and definitions of the problem, to involve them in constructing viable alternatives, and to recognize their

role in getting the solution implemented. Athey also states that a greater emphasis on the feedback process can be incorporated by establishing standards of performance. This would help conclude the loop from effecting the solution to detecting and measuring its impact, thereby becoming a truly cybernetic system.

Athey presents the following approach which includes both traditional systems analysis plus more specific procedures for decision making and feedback:

- * Formulate the problem
- * Gather and evaluate information
- * Develop potential solutions
- * Evaluate workable solutions
- * Decide on the best solution
- * Communicate the system solution
- * Implement the solution
- * Establish performance standards

Athey's approach (Figure Three) is likely the most definitive and complete systematic process developed thus far for addressing complicated systems problems. Typical issues management systems, using traditional systems analysis as their basis, include most of these important steps, but lack in their completeness for addressing important cybernetic notions of problem-solving or may ignore certain steps completely.

Table Two compares Athey's systematic systems approach with the Chase's issues management system. The intention is to see what these two author's believe are the

TOTAL SYSTEM PROBLEM-SOLVING CYCLE

Figure Three

important steps, how the two methodologies overlap, and how they may be lacking.

Table Two

<u>Athey</u>	<u>Chase</u>
* formulate the problem	* issues identification
* gather & evaluate info	* issues analysis
* develop potential solutions	* issues change strategy option
* evaluate workable solutions	
* decide on best solution	
* communicate system solution	* issue action program
* implement solution	
* establish performance standards	* evaluate results

In formulating the problem the practitioner is trying to understand the problem situation. The most apparent problems are those that are immediately affecting operations, or they may be strategic concerns. In issues management terms this is identifying the issue. In both cases, the practitioner is trying to gather enough information to perceive the nature of the problem and to establish what questions need to be addressed.

Issues analysis defines the state. To get a holistic view, the systemic practitioner emphasizes understanding the system's important components, their interactions, major sources of change, and probable impacts.

The issue change strategy option phase develops and elects the desired course of action. Athey's methodology

breaks this phase into three more specific and detailed steps: (1) developing a variety of potential solutions or approaches that could be used to solve a particular system problem; (2) evaluating these alternatives by setting up objectives and working through various options to determine probable outcomes; and (3) choosing the best solution in terms of its expected performance.

Communicating the system solution is the process of getting key decision-makers to buy in. This is important to get people motivated to change. Chase acknowledges the need for involving upper management, but doesn't incorporate this as a specific step into his methodology.

Both discuss the need for a plan for implementation. This involves enacting a policy to support the selected strategy and coordinating the necessary resources. Program managers then monitor and evaluate real - versus - intended results of these plans. Athey goes further with the implementation phase by prescribing some useful methods to measure any change.

Step by step, Athey and Chase seem to be relatively comparable. The differences lie mostly in their theoretical approach. A public relations practitioner, for example, may look at problems within well-established guidelines and accept certain aspects as given. Athey, however, recognizes

that real-world problems do not have unequivocal definitions. Therefore, his methodology is open to a variety of perceptions and examines the environmental contexts in which they arise. Chase focuses on those areas of problem-solving that are concerned with effecting strategy and managing public policy. Athey's methodology is a total problem-solving cycle that moves from the problem definition phase through the successful marketing, implementation, and evaluation of the problem solution.

Apart from the differences between Athey and Chase, neither includes a stage that is equivalent to the processes of double-loop learning. A comparison stage is needed to juxtapose the stated goals and objectives against the 'what is' in the real-world. The comparison stage would check on the appropriateness of current models of operation and allow unexpected answers to emerge as to desirable and feasible changes. This stage is the learning component of the problem-solving cycle and would take advantage of the cybernetic system's ability for (r)evolutionary growth.

Process

Figure Three shows the systems study as an opening spiral. The spiral represents the continually expanding knowledge that is acquired about the problem and its

solution (Athey, 1982, p. 6). Other conceptual depictions may be helpful in connecting the immediate problem at hand with the systems study and design processes.

The systems approach to problem-solving should be a creative endeavor that is self-organizing, reflective, and iterative. By using a combination of expertise, science, intuition, and improvisation, the practitioner can move through the complexity of a multi-dimensional problem. Complexity tends to promote unforeseen consequences. As the problem-solver moves through the various stages, the constant feedback makes it natural to be always looping back to check on previous steps and discoveries. Knowledge is acquired and progress made after reaffirmation of certain mutual-causal relationships. For example, it isn't possible to detect potential external problems unless corporate goals, objectives, and ideals are clearly defined. Yet these have to be shaped in context with environmental constraints.

Some authors describe the problem-solving process as a dynamic balance between expansion and contraction, freedom and limitation, and convergent and divergent modes of thought and action (Reckmeyer, 1989; Koberg and Bagnall, 1976; Schon, 1983). For example, Koberg and Bagnall (1976, p. 9) note that the

... attributes of creative behavior follow from that "alternation" requirement. Active CURIOSITY, a divergent behavioral characteristic, leads to factual discovery and the relaxed security of KNOWLEDGE, a convergent mode; knowledge begets INVENTIVENESS (divergence) and the search for varied applications of the known. Variety suggests DECISION and selection (convergence). Decisiveness leads to ACTIVITY (divergence). And the consequences of action bring out VALUATION (convergence). Back and forth we must go to achieve our balanced view.

By combining the hard and soft, the linear with the more subjective rationalities, the problem solving process forms a methodology that is both specific and progressive. The scanning and monitoring phase, in its exploration of its environment, is a very divergent activity. The analysis phase, which seeks to limit data by defining the situation, is a convergent activity. Back and forth it goes, through varying degrees of observation and discovery and science and limitations, with each stage helping to increase the understanding and awareness of the practitioner.

Systemic Issues Management

Taking the above into account, the following issues management methodology is meant to be a set of guiding principles (Figure Four). A good process will depend on the ability of top management to interpret the conditions facing the firm and to effectively organize a system that achieves a balance or compatibility between the problem at hand, the

SYSTEMIC ISSUES MANAGEMENT

Figure Four

strategy of upper management, the structure of the organization, the commitments and needs of the people, the external environment, and the techniques available. The aim is to mold the methodology to achieve a good fit. Thus the following is meant to be a purposeful activity, one that is flexible and open to change, rather than a cookbook recipe.

Identify Issue

The prerequisite to control and adaptability is familiarity with the system's environment. This is achieved through continuous scanning of subsystems (technical, economic, political, and cultural) for concerns or trends that may affect the corporation or its divisions. Other information may come from unforeseen events or catastrophic flips.

This data is concentrated and then focused as specific concerns are identified. An issue is identified by assessing an organization's strengths and weaknesses, and comparing these to either external or internal phenomena. Issues will be those unsettled matters that may be developing into a threat or opportunity in relation to the organization's stated missions, goals, and objectives. These issues are then prioritized as to their probability of

occurrence, time horizon, and importance of impact. They are then monitored for further development.

Ideally, the scanning and monitoring functions would be performed throughout the organization as a regular part of daily activities. The participation of a variety of staff members from the start will give a richer perspective of potential concerns and issues. In theory, the information generated by the various departments will be linked, thus ensuring the integration of the concerns of the stakeholders into future decision-making and corporate planning processes.

Issue Analysis

Issues analysis is the transformation of identified issues into a more complete knowledge and understanding of the situation. By exploring the spatial and temporal qualities of the issue, a tentative definition can be made about the subject situation and its probable impacts.

In *The Systems Approach* (1979), Churchman discusses what he describes as the "environmental fallacy" - which is the attempt to solve problems on the basis of themselves while ignoring the environment in which they arise. The theories of cybernetics show that complex systems cannot be understood by looking at simple "cause" and "effect"

relationships; rather, complexity emerges from "causes that cause causes to cause causes" (Wilden, 1972). The spatial analysis of an issue attempts to identify and map principal systems relations by looking at the inputs, outputs, subsystems, information flows and transformations that express the issue, its immediate suprasystem, and the subsystems that will be impacted.

Temporal analysis includes gathering information on how the issue has developed in the past. What have been the major inputs driving change in this issue and how has the organization traditionally dealt with similar situations? With information drawn from the spatial and historical analysis the issue can begin to be evaluated for its present state with the principal objective being to identify sources of technological, cultural, and economic impacts, and potential crises points.

The above procedures can provide a synthesis of the sources of change and the structure of the issue. Through this process patterns will emerge showing a link between where the issue has been and where it is likely to go. Scenarios of probable future impacts can be developed from these patterns.

There are many techniques, both quantitative and qualitative, that are applicable to the analysis stage.

These are discussed thoroughly elsewhere (Coates, 1986; Powers, 1987). Some examples are Delphi and other group techniques, computer-assisted techniques, and cross-impact analysis. The depth of the analysis can vary from a conceptual sketch on a pad to formal structural models, flow charts, computer simulations, causal loop diagrams, etc. The level of detail will depend upon the complexity of the issue, the time at hand, and the information available.

Because it is impossible to know everything about a situation, it is easy to imagine the analysis process as being endless. The complexity of the analysis can be dampened by confining the study to only the critical systems levels involved and to relevant systems components.

Coalescence

The issue as defined is then compared to corporate goals, objectives, and ideals. These have been established either formally as part of a strategic plan or, perhaps, implicitly through the corporate culture. Conflicts, constraints, and opportunities become more apparent. It is time to question how this issue will affect the vision of the future and what may be the ideal corporate objective in this emergent reality.

More than any of the other steps, this step is an iterative and reflective process. Through analysis, reflection, and reanalysis, the data begins to unify and the issue's potential becomes clearer. The natural progression will be to first look for similarities with the past - this tells the practitioner what part of current knowledge and practice is relevant and what may be lacking. This comparison points to which current normative goals and objectives which may no longer fit. The next step is to develop some conceptions of what the ideal future could be in this emerging reality. By going through this exercise, suitable solutions may begin to emerge. Finally, the practitioner will need to go back and reanalyze the issue in an iterative fashion, seeking more relevant objectives and future goals.

Koberg and Bagnall (1976, p. 55) describe this analysis-synthesis-reanalysis process in terms similar to Argyris and Schon's double-loop learning:

When our new discoveries are fed back to clarify the basic objectives, those objectives will then guide us into ever new territory as in a chain reaction. In the end objectives that have been expanded as far as possible become our specifications for the improvements we seek. The more we expand and clarify them, the closer we get to the realization of the solution itself.

The solution is always dependent upon the practitioner's theory of reality that has been constructed over time. The

comparison process may be a guide to revising obsolete theories.

Design Solutions

The next step is to decide upon a strategy and develop a plan of action to improve the situation that will lead toward the fulfillment of the organizational ideal. The strategy and the plan for action are interwoven, and depend upon the precision of the issue and the cultural and personal character of the organization and people who will be responsible for carrying it out. The various approaches to strategy - the inactive, reactive, preactive, and interactive - have been discussed earlier. The objective is to generate alternative ways that fit within these strategic policies.

The alternative chosen needs to fit the issue as a system. The task is to discover which particular selection and arrangements of system components will manage the stated mess. The planned interventions of the systemic practitioner should act to modify the positive and negative feedback loops by reducing or increasing existing linkages and adding or removing others. This perspective goes back to the previous discussions of morphostatic and morphogenic changes - realizing that local action can reverberate

throughout the whole, the intervenor will give particular attention to restricting or amplifying the connections between different subsystems. The plan should minimize any changes to the successful parts of the autopoietic system.

Creating alternatives should be an active and creative venture, using tools such as brainstorming, analogy building, and making morphological connections. The important stakeholders should make contributions.

Two more systems concepts will also be helpful in the generation of alternatives. The concept of equifinality states that the same final state may be reached from different initial conditions and in different pathways; while the concept of equipotentiality states that there are any number of potential finales from the same starting point. With this in mind it helps to see the paradox in normative problem-solving approaches, where the journey is often started with the thought that there is but one way to the destination. Each problem solver has his or her own set of blinders that have been ingrained from disciplined education and departmental isolation. Since issues are unique and multi-dimensional, so should be the direction taken. Searching for alternatives should be a creative enterprise that exercises the freedom of choice which is available when traveling in the mind, before the solution needs to be implemented.

Systems Objectives

The issues analysis process is designed to study the key variables of the problem situation and determine its relationship with its environment. With this information it is possible to determine the deviation from the desired state from the actual state of affairs (Ackoff, 1981; Athey, 1982; Checkland, 1981; Clemson, 1984). Derived from these new perceptions comes a set of systems objectives, which are the desired standards of performance for the overall system (Athey, 1982, p. 108).

Generally, there will be several systems objectives and they will be broad in scope. Examples will probably include areas such as market position, employee attitudes, community acceptance, productivity, and compatibility with long-range goals. The systems objectives will have various levels of importance, many will not be able to be described in precise terms, such as a percent increase in profits, and some will potentially be conflicting.

Alternatives are compared to these systems objectives for their compatibility. New alternatives may come apparent and a sequence of options may be developed that meet the most important consequences of the issue. Different responses can be used in combination to create an overall

strategy to address short-, mid-, and long-range problems by priority.

The decision made will probably not be the most efficient or effective. People-based systems do not always reach the most rational decision, as they are dependent on such subjective notions as the acceptability and feasibility of the political and cultural subsystems, the decision-maker's orientation, and management style.

Implement

At one level implementation requires assigning and organizing physical resources (financial, human, project, and information) to carry out plan. This can usually be done by time and task schedules. Another level of implementation requires motivating the social fabric to overcome inherent resistances to change. Identifying an issue and devising a plan may be the easy part; implementing change is usually more difficult. There are some general rules that help in implementation (Athey p. 257). First, goal congruence within the implementing group increases the likelihood of the solution's acceptance. Congruence is more likely when the stakeholders have been involved throughout the decision making process. Second, the more pressure that is on a group to change, such as during a crises situation,

the more willing they will be to try something new. Third, there is need for leadership that is able to communicate the vision and the relative advantage of a solution. Fourth, the solution should minimize any required behavioral changes by the implementing group.

Connect

Few companies systematically go back to evaluate their performance on socio-political issues. This step connects and corrects by evaluating the attained changes with the stated and planned changes. The issues manager needs to look at both the quantity and quality of the achievement, the unforeseen benefits, and any unforeseen problems. He then works to correct any undesired results, control unwanted deviations, and work to break the constraining factors. This step is a continual process of iteratively monitoring and adjusting the activities as needed.

Because the alternative chosen is a plan for the future, things will rarely turn out exactly as planned. New objectives will be discovered, knowledge acquired, attitudes will be altered or reinforced, and new skills developed. The cybernetic cycle then continues to learn, self-organize, and grow.

Conclusion

Stafford Beer defines cybernetics as the study of effective organization. To be effective, systemic issues management would include a process that is cybernetic in its design - detecting, selecting, and effecting in a connective manner; recognizes the role of critical stakeholders and explicitly incorporates them into the decision-making process; and, of course, is a self-referential, learning, and continuous system.

CHAPTER V

CONCLUSION

Diagnosis and Implementation

When issues hit hard and fast it may difficult to implement such concerns as double-loop learning or involving the critical stakeholders, let alone convince the uninitiated. At other times, the theories and methodologies of cybernetics and general systems theory may seem too broad to handle 'your' particular problem with any precision. Another disadvantage is that a well-bred systemic issues management process would take more time and money to research and implement at first. In the long term, however, by using these procedures as the underlying basis of daily work there would generally be fewer issues to contend with. An effective organization is one that is in tune with its environment and uses management procedures that can handle the variety and turbulence of those environmental demands.

There are certain practical aspects of getting an issues management program started and implementing it at a daily level. These aspects seem to revolve around the following obstacles (Chase, 1986; Johnson, 1983; Buckholz, Evans & Wagley, 1985). Although every issue situation has its unique qualities, there are similarities among

individuals and organizations that enable an intervenor to make valid plans regarding diagnosis and implementation.

First, there is little understanding of the need and possibilities of issues management. Issues management, as a fairly new field, lacks credibility among line managers. Adding to this is the difficulty of quantifying the benefits of managing socio-political problems.

Second, Howard Chase points out that typically there is a Neanderthalian urge to fight fire with fire. As the logic of managing socio-political issues is not yet ingrained in upper management, these issues are seldom regarded in the implementation of business plans and strategies. Instead the strategy is to scramble to deal with them after they have arisen.

Third, when performed, scanning and monitoring functions are usually only undertaken on a committed basis by a few staff departments, such as public affairs or corporate planning. Sometimes a group is put together to deal with specific issues (the task force), but only on an ad-hoc basis. Outside of these fairly narrow agendas there is little communication or coordination between departments regarding the identification, prioritization, or analyzing corporate issues.

Fourth, internal systems of reward and punishment, corporate politics, and the more implicit structures of power and culture often act as forces that develop a resistance to innovation and change. Whether it is the introduction of an issues management program or any subsequent changes involved in the implementation of strategy, new methods or processes create a disruption in the status quo. Conservative organizations prefer incrementalism to innovation.

Fifth, once a crisis is settled, there is a tendency for dynamic conservatism in an organization - the same rules and norms generally surround the new position as they did the old. Individual, group, organizational, and cultural forces are intimately connected and self-reinforcing (Schon, 1983).

Sixth, the identification and analysis of issues then often reflects only the concerns of certain departments or task forces. Issue analysis by the public affairs department may document socio-political aspects, but lack an appreciation of the operating dimensions of those issues. Conversely, where operating managers contribute analyses, they usually reflect a lack of knowledge of an issue's public affairs dimensions, etc.

These problems have many variables that are mutually inclusive. Cybernetics suggests that it is systemically wiser to focus on defining and challenging constraints rather than imposing more rules. With this in mind the following discussion may help to overcome some of the above impediments.

Effective implementation of issues management requires leadership at the strategic level that is fully committed and supportive. Only then can they begin to act as the driving force that motivates and integrates the company as a whole. The problem is mostly ignorance on the part of operating managers of issues management as a management tool. Assuming there is some motivation within the corporation, the first step is to familiarize upper management levels with the issues management process through management development programs and convince them that they, their employees, and their organization can appreciably benefit by using the process.

Politics, power, and culture are the foundation of many of the normative problem-solving approaches. Double-loop learning draws attention to problems of change as being a result of the logic of these normative systems. Therefore, the only way to deal with these complex problems is to restructure the logic of the internal social system.

This problem can be partly addressed by looking at management's inherent ability to lead and motivate its people through transformations. However, there is a more fundamental requirement for management to operate under a philosophy that is openly reflective and accepts error and uncertainty as an inevitable feature of life. Additionally, all those involved need to be exposed to the perspective, skills, and commitment that encourage some alteration of their own theories-in-use which may be inhibiting their abilities to learn and grow. As a self-organizing system it is important for an organization to devise means by which intelligence, wisdom, and direction can emerge from ongoing organizational processes.

The hierarchical and horizontal divisions of information and knowledge in organizations act to discourage the free flow of information. Organizational goals, objectives, structures, and roles create clearly-defined patterns of attention and responsibility, fragmenting interest in and knowledge of what is going on. As a result, different sections operate with their own pictures of the total situation. Such fragmented structures of thought leave employees feeling powerless to create systemic change. A flatter organizational structure that does away with many of the functional barriers and first-line supervisors would

increase heterarchical interactions and foster communication and coordination between different areas (marketing, manufacturing, planning, purchasing). The various parts of the system then would interact to develop relationships that would work effectively toward resolving interdependent concerns. Such a structure would have the additional benefit of being more flexible and adaptive.

Given the dynamic interrelationships within an organization and between it and its environment, there is a need to do learn how to double-loop learn in groups (Powers, 1987; Reckmeyer, 1989). A participative approach to the analysis and solution of complex problems recognizes the importance of exploring different viewpoints. The use of interdisciplinary, self-managed teams made up of both organizational figures and critical stakeholders from the outside could be used to leverage the diverse skills and problem-solving abilities of those involved. Through this diversity, many more variables will be available for the creation of new ideas, visions, and missions that are necessary for managing unique situations. Another way to view this is that a participative approach to problem-solving would act to dampen the inherent complexity of issues.

Group problem-solving has the additional advantage of creating the shared image and buy-in necessary for effective implementation. Motivation will be magnified as stakeholders exercise their right to take part in the control of change by helping formulate and determine on new policies or modifications of existing ones. By virtue of the participation of the critical stakeholders in the issues management process, management should see positive results through their contribution to the corporation, feeling of increased power in their working environment, ownership of these new management tools, and accession of their own career aspirations.

Significance of Study

In the past, there have been many cosmologies based on different logical models of change. The Parmenidean universe was of static permanence. The Heraclitean universe of incessant change did not specify the direction of change - the quote from the *Kabala* in the frontpiece of this thesis is an example of this cosmology. The medieval theologians formulated a hierarchical universe with a creator and prime mover. The second law of thermodynamics, and the later theory of information by Shannon, were based on the assumption that the most probable state of the universe is

that of a random distribution of events - each of which tends to behave with its own probability independently. Their universe was an ever-decaying one. Cybernetics brought forth the logical model of mutual-causal loops to describe change within a system. The first phase of cybernetics studied systems dominated by negative feedback, which were deviation-counteracting and equilibrium-seeking. The second phase studied deviation-amplifying, mutual causal systems with internal positive feedback loops. Such systems lead to either runaway situations or evolution. The third phase, what I have termed Cybernetics III, studies systems that are self-referencing and self-generating. Such systems are not reactive victims to change, they have some control over their goals and can be active in directing change and creating their own desirable future.

With the development of cybernetics an ontology of change was available to describe how systems perform certain transformational processes. Authors, such as Bell (1973), Toffler (1980), and Henderson (1981) interpreted the effects of morphogenesis on socio-technical systems and foretold of an era of unprecedented change. In turn, as the impacts of rapid change permeated organizational boundaries, a plethora of management texts (DeGreene, 1982; Drucker, 1980; Kanter, 1983; Tichy, 1983) were published on the subject of

mastering change and managing transformation. Some focused on leadership, others on research or various control mechanisms.

The work on this thesis began by trying to create a system for problem-solving and decision-making that consciously oriented itself into the future, while being holistic in its treatment of the wide range variables inherent in dynamic systems in flux. I found that Argyris' and Schon's discussions on learning to learn were the most apropos, for they dealt with the periodic need for self-questioning during the problem-solving cycle. I felt that the reflective decision-making system, which essence I have described by the term Cybernetics III, was applicable to many management situations where new emerging realities needed to be taken into account.

To limit my lofty aspirations, I chose issues management because of its tie between the organization and its environment and because of its link between problems which are operational and immediate with long-term concerns and strategies. Powers (1987) defines an issue as a complex array of synergistically interacting variables that are of sufficient concern to warrant action, but which conventional management approaches are ill-equipped to handle. The inherent diversity required in managing issues through to

completion proved to be an ideal subject for developing a reflective management approach.

I brought into this work my own multiplicity of concerns and biases stemming from previous work in both business and the environment. For me this thesis was an attempt to put some architecture onto a jumble of experiences and perceptions that ranged from business, and the short-term economic and political realities of the profit and loss sheet, to the somewhat more subjective, long-term causes of the ecological movement. I wanted to create a system for inquiry that was firmly based in science with an imprecise expectation of combining such theories as autopoieses, self-organization, and co-evolution from cybernetics, biology, ecology, and anthropology into a general framework for managing issues in a holistic manner.

The outcome is an approach to issues management that has as its foundation the necessary ingredients for any general system of inquiry into social problems. This claim is based on the purposeful combination of epistemology, ontology, and methodology as a nonseparable unity within the approach. Epistemologically, I have shown that there is a need to reflect on current theories-in-use. Issues arise when individual and organizational norms are out of 'sync' with the changes in the internal and external environment.

Reflecting in action is, therefore, the critical foundation for subsequent organizational learning. Ontologically, I have described an issues management system that is an ideal-seeking system guided by images of its future. It is an open system which functions as a window to its environment, giving the organization the ability to shape its external and internal relationships in a co-evolutionary manner. As such, it exhibits the qualities of self-regulation, self-reference, and self-direction. It is open to self-transcendence and to reorganization at higher levels of complexity. Methodologically, I have provided a tool for instituting organizational learning. It is thorough in its approach by explicitly incorporating each step of the cybernetic cycle, and involves the critical levels of the decision-making process.

The implications of this approach for issues management is that, while the area of inquiry into complex issues is filled with uncertainty and the totality of impact is unknowable, the way one goes about the research can be reasonably stable. The practitioner of systemic issues management uses a methodology that is based on science, but his competence and expertise guides him through the various phases. This is a methodology that focuses on the practitioner, where process of his or her inquiry is more

important than the content, the methodology rather than the findings (Ackoff, 1981; Checkland, 1981).

Finally, as I have focused on world-image, connectiveness, and approach, it is important that this work was derived through a true learning process of research, reflection, science, and action. I have concluded that the essential ingredients of 'a systems approach' to any system of inquiry are continuous learning, openness, and communication. With these basics, the systemic practitioner will have greater power over her own evolution.

SELECTED BIBLIOGRAPHY

- Ackoff, Russell L. *Creating the Corporate Future*. New York: Wiley, 1981.
- Ackoff, Russell L. *A Guide to Controlling Your Corporations Future*. New York: Wiley, 1984.
- Ansoff, H. Igor. *Implanting Strategic Management*. Englewood Cliffs, NJ: Prentice Hall, 1984.
- Argyris, Chris. *Reasoning, Learning, and Action*. San Francisco: Jossey-Bass, 1983.
- Athey, Thomas H. *Systematic Systems Approach: An Integrated Method of Solving Systems Problems*. Englewood Cliffs, NJ: Prentice Hall, 1982.
- Bateson, Gregory. *Steps to an Ecology of Mind*. New York: Ballantine, 1972.
- Bateson, Gregory. *Mind and Nature*. New York: Bantam Books, 1979.
- Beer, Stafford. *Decision and Control*. New York: Wiley, 1966.
- Beer, Stafford. *Brain of the Firm*. New York: Knopf, 1972.
- Beer, Stafford. *The Heart of Enterprise*. New York: Wiley, 1980.
- Bell, Daniel. *The Coming of the Post-Industrial Society*. New York: Basic, 1973.
- von Bertalanffy, Ludwig von. *Robots, Men and Minds*. New York: Braziller, 1967.
- Boulding, Kenneth E. *The Image: Knowledge in Life and Society*. Ann Arbor: University of Michigan, 1956.
- Boulding, Kenneth E. *Evolutionary Economics*. Beverly Hills, CA: Sage, 1981.

- Bukholz, R.A., Evans, W. D., & Wagley, R.A. *Management Response to Public Issues: Concepts and Cases in Strategy Formulation*. Englewood Cliffs, NJ: Prentice- Hall, 1985.
- Cassidy, John C. and Halstead J. Phillip. *Strategic Issues Management and Productivity in Corporate Public Affairs*. Unpublished manuscript, 1987.
- Chase, W. Howard. *Issue management: Origins of the Future*. Stamford, CT: Issue Action Publications, 1986.
- Checkland, Peter B. *Systems Thinking, Systems Practice*. New York: Wiley, 1981.
- Churchman, C. West. *The System Approach*. New York: Simon & Schuster, 1979.
- Clemson, Barry A. *Cybernetics: A New Tool for Management*. Tunbridge Wells, Kent: Abacus, 1984.
- Coates, Joseph F. *Issues Management: How You Can Plan, Organize and Manage for the Future*. Mt. Airy: Lomond, 1986.
- DeGreene, Kenyon B. *The Adaptive Organization: Anticipation and Management of Crises*. New York: Wiley, 1982.
- Drucker, Peter F. *Managing in Turbulent Times*. New York: Harper & Row, 1980.
- Duke, W. E. "Demystifying the Issues in a World of Transition." *Public Relation Journal* 39 (1983): 17-18.
- Ehling, W. P. & Hesse, M. B. "Use of 'Issue Management' in Public Relations." *Public Relations Review* 1 (1983): 18-35.
- von Foerster, Heinz et al. (eds.). *Cybernetics of Cybernetics: Or the Control of Control and the Communication of Communication*. Urbana: Biological Computer Laboratory/University of Illinois, 1974.
- van Gigch, John P. *Applied General Systems Theory*. New York: Harper & Row, 1978.

- Gollner, Andrew B. *Social Change and Corporate Strategy: The Expanding Role of Public Affairs*. Stamford, CT: Issues Action Publications, 1983.
- Heath, Robert L. & Nelson, Richard A. *Issues Management: Corporate Public Policymaking in an Information Society*. Beverly Hills, CA: Sage, 1986.
- Henderson, Hazel. *Politics of the Solar Age*. New York: Doubleday, 1981.
- Jantsch, Erich. *The Self-Organizing Universe: Scientific and Human Implications of the Emerging Paradigm of Evolution*. New York: Pergamon, 1980.
- Jantsch, Erich & Waddington, Conrad H., (eds.). *Evolution and Consciousness: Human Systems in Transition*. Reading, MA: Addison-Wesley, 1976.
- Johnson, Jon. "Issues Management -- What are the Issues?" *Business Quarterly*, (1983, Fall): 22-31.
- Johnson, Richard A.; Kast, Fremont E.; and Rosenzweig, James E. *The Theory and Management of Systems*. New York: McGraw-Hill, 1973.
- Kanter, Rosabeth Moss. *The Change Masters*. New York: Simon and Schuster, 1983.
- Koberg, Dan and Bagnall, Jim. *The Universal Traveler: A Soft-Systems Guide to Creativity, Problem-Solving, and the Process of Reaching Goals*. Los Altos, CA: Kauffman, 1976.
- Koontz, Harold and O'Donnell, Cyril. *Essentials of Management*. (2nd ed.). New York: McGraw-Hill, 1976.
- Kuhn, Alfred. *The Logic of Social Systems: A Unified, Deductive, System-Based Approach to Social Science*. San Francisco: Jossey-Bass, 1974.
- Kuhn, Thomas S. *The Structure of Scientific Revolutions*. Chicago: University of Chicago, 1970.
- Laszlo, Ervin. *Introductions to Systems Philosophy: Toward a New Paradigm of Contemporary Thought*. New York: Harper & Row, 1972.

- Maruyama, Magorah. "The Second Cybernetics: Deviation Amplifying Mutual Causal Processes." *American Scientist* 51, (1963): 164-179.
- Maturana, H. and Varela, F. *Autopoiesis and Cognition: The Realization of the Living*. London: Reidl, 1980.
- Miller, J. G. *Living Systems*. New York: McGraw-Hill, 1978.
- Morgan, Gareth. *Images of Organization*. Beverly Hills, CA: Sage, 1986.
- Pask, Gordon. *Conversation, Cognition, and Learning*. New York: Elsevier, 1976.
- Peters, Tom. *Thriving on Chaos*. New York: Knopf, 1987.
- Powers, Patrick E. *Systemic Issues Management: An Interactive Approach*. Unpublished doctoral dissertation, Saybrook Institute, San Francisco, 1987.
- Prigogine, Ilya and Stengers, Isabelle. *Order Out of Chaos: Man's Dialogue with Nature*. New York: Bantam, 1984.
- Probst, Gilbert J. B. "New 'Second-Order' Cybernetics Against Mismanagement." *Cybernetics and Systems Research: Proceedings of the Sixth European Meeting on Cybernetics and Systems Research*. Edited by Robert Trappl, pp. 437-447. Amsterdam: North-Holland Publishers, 1982.
- Quade, Edward S. *Systems Analysis Techniques for PPBS*. New York: Rand Corp, 1966.
- Reckmeyer, William J. *The Emerging Systems Paradigm: An Historical Perspective*. Unpublished dissertation. Ann Arbor: University Microfilms, 1982.
- Reckmeyer, William J. "Managing Complexity in the Systems Age: A Renaissance Systems Perspective." In *A Science of Goal Formulation*. Edited by Stuart A. Umpleby and Vadim N. Sadovsky, pp. 157-172. New York: Hemisphere, 1989.

- Renfro, William L. "Merging Two Futures Concepts: Issues Management and Policy Impact Analysis. *The Futurist*, (1982, July-August): 54-56.
- Schoderbek, Peter P.; Schoderbeck, Charles G.; and Kefalas, Asterios G. *Management Systems: Conceptual Considerations*. 3rd ed. Plano, TX: Business Publications, 1985.
- Schon, Donald. *The Reflective Practitioner: How Professions Think in Action*. New York: Basic, 1983.
- Taylor, Alastair M. "Process and Structure in Socio-Cultural Systems." In *Evolution and Consciousness: Human Systems in Transition*. Edited by E. Jantsch and C. H. Waddington, pp. 169-182. Reading, MA: Addison-Wesley, 1976.
- Tichy, Noel. *The Transformational Leader*. New York: Wiley, 1986.
- Toffler, Alvin. *The Third Wave*. New York: Morrow, 1980.
- Ulrich, H. and Probst, Gilbert J. *Self-Organization and the Management of Social Systems*. New York: Springer, 1984.
- Varela, F. *Principles of Biological Autonomy*. Amsterdam: Elsevier, 1979.
- Zeleny, Milan and Pierre, Norbert. "Simulation of Self-Renewing Systems." In *Evolution and Consciousness: Human Systems in Transition*. Edited by E. Jantsch and C. H. Waddington, pp. 150-167. Reading, MA: Addison-Wesley, 1976.