Steven E. Sanderson

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Governing Design: The Management of Social Systems and Ecosystems Management

Frances Westley

What had that flower to do with being white,
The wayside blue and innocent heal-all?
What brought the kindred spider to that height,
Then steered the white moth thither in the night?
What but design of darkness to appall?-
If design govern in a thing so small

ROBERT FROST, FROM "DESIGN"

The preceding lines were penned by the poet Robert Frost, surely the greatest spokesman in the artistic world for the strange and haunting similarities between the processes of nature and the symbolic constructions of man. These lines were inspired by the discovery by the poet, in an early morning walk, of a white spider poised on a white albino flower, holding up the wings of a dead, white moth—elements in nature of death and life, camouflage and discovery. For Frost the whiteness also symbolized good against evil, light against dark. And so, in a typical Frostian twist, he sees "design," an order that joins man and nature, defying the forces of disorder and darkness and then almost self-mockingly questions his own perception: Does design operate in things so small?

This rich book of essays is about this question in its most profound sense. Is there a design that cuts across the workings of nature and the

workings of humans? Can we grasp its outlines through the careful observation of detail? Can we learn wisdom from the patterns of change and stability that we observe over time in the intertwining of ecological and social systems? In his conception of "creative destruction" Holling (chapter 1) proposes a model that he argues convincingly is a powerful explanation of processes observed across a variety of ecosystems; the material in these cases pertaining to human system suggests similar forces may be at work there. In employing this model and gathering together these case studies, this book is exemplary in its ambition to marry macrolevel theory to a level of detail, as rich as that which Frost observed. But unlike Frost, this book not only contemplates the possibility of design, but seeks to offer a ground for practical action, a stimulus for pro-active change on the part of scientists and managers responsible for the future of fragile ecosystems.

As a social scientist and researcher in the area of management of contemporary organizations, I come to this ambitious project from the opposite direction of most of the case writers. However, my aim is the same, to contribute to helping to build the bridge between the biological and social sciences in an effort to understand and perhaps better manage this interface. More specifically, I will set out in this chapter to address three themes raised across these cases, the theme of the relation between research, policy, and effective action; the theme of collaboration/consensus building; and the theme of system change and learning. My objective is to explore each of these issues from the point of view of current theory and practice in management.

Management itself is a discipline born from the coming together of old knowledge, from diverse sources, into new perspectives. It is related to and fuelled by many of the disciplines in the social sciences, but it differs from the social sciences in its overarching drive toward practice and its concern with technical knowledge in the widest sense of that word (technology as a set of knowledge and beliefs on causal relations; a logic that is complete when the system is closed [Thompson 1967]). Hence it is a discipline that, at its best, offers practical guidance as well as theoretical reflection about the challenges raised in these cases.

This chapter will begin with an exploration of the nature of planning, the ways in which conventional planning can be an impediment to organizational responsiveness, and the means researchers and practitioners have evolved to circumvent these difficulties. In particular, in this section I will deal with the following subpoints: (1) the role of planning as an intervening variable between knowledge and action, (2) under what circumstances planning is receptive to scientific knowledge,

(3) why action is so seldom an outcome of planning, (4) how vision acts as an action generator, and (5) how learning may be an effective bridge between knowledge and action.

Second, I will look at the literature in management on interorganizational collaboration and networks. As all the cases in this volume have underlined the importance of consensus building and collaboration in solving problems, it is useful to reflect on what social scientists have learned about which kind of dynamics result in successful collaborations, how interorganizational networks originate and what are the effects of these different origins, and what are the limits of consensus building and collaboration (e.g., the point at which networks of human organizations, like populations of other organisms, become overconnected and hence vulnerable).

In the third and last section I will look at the recent literature on managing organizational change, as it pertains to organizational revitalization. If organizations and social systems go through the same cycles of creative destruction that Holling and his associates have discovered in ecosystems, is there any way to short-circuit the process, to avoid or at least shorten the periods when the system is rigid and unresponsive, maximize the periods in which the system is tuned to its environment and responding creatively? As Holling (this volume) has pointed out in his essay, the ideal may be the social equivalent of the endotherm: some exchange of loss of internal variability (as long as it is associated with specific kinds of regulation), for heightened ability to explore, sense, and respond to a variety of external environments. How would these principles translate into management of change?

We shall therefore begin this chapter with a description of how responsive action is created in individual organizations, continue with how collaborations emerge, and conclude with a discussion of how a continual change in organizations as well as ecosystems can be managed. In other words, does the field of management offer any clues as to whether creative destruction of social systems as well as ecosystems can be managed, and if so, how?

Strategies for Responsive Action: Managing Small Details

One of the rewarding aspects of reading the cases and essays in this book is that they are integrated around several simple, el[illegible] models or images. The first of course is the four-box model of creative destruc-

tion that offers an integrated explanation of the dynamics of social and ecological systems. The other is a model of adaptive management and the image of organization/environment relationships implied by that model. As I read it, adaptive management is a way of managing in order to ensure that the organizations responsible for ecosystems are responsive to the variations, rhythms, and cycles of change natural in that system and are able to react quickly with appropriate management techniques. The image suggests that certain guidelines, based on a scientific understanding of that ecosystem and a related definition of ecosystem health, act as umbrella principles to integrate action.

It is a compelling image, with an appeal that transcends the management of ecosystems. In the past decade—in response to radical shifts in world economies, resource bases, population dynamics, and competitive structures—private- and public-sector organizations in all domains have wrestled with similar challenges. The field of studies in strategic management has struggled with the problem of how to position an organization, in an ever-changing environment, to ensure system health and survival. As in many of the government organizations described in the cases, the dominant focus for many years has been on control. The organization has been viewed as "a lone gunman in the wild west . . . at war with its environment. Its tools were analysis and planning . . . careful evaluation of the opportunities and threats, strengths and weaknesses . . . in an attempt to forecast the future, master and tame the environment, and use it for organizational ends" (Astley 1984). The process was viewed as deliberate: "most strategists (strategic management researchers) adhere strongly to a belief in systematic, definable strategy procedures and structures that can be measured, analyzed and compared" (Daft and Buenger 1990). The effective organization was viewed as a machine; strategic planning was the engine that ran it, rational, mechanical, analytic, and programmatic (Bowman 1990).

Recently, however, there is evidence that this paradigm is eroding in favor of an image of organizations that are much more "embedded" in their environments (Granovettor 1985) and strategy as a more natural, emergent process, the end result of the creation of meaning within the system and of ongoing learning linked to these meanings.

This fundamental shift in paradigm has been led as much by experience of practitioners as by theory in management science. North American companies have become disenchanted with strategic planning in recent years because of the low success rate in implementing them (a review of implementation rates of major corporations, conducted by

the leading business publication in the United States in the late 1980s, suggested that only about 3% of strategic plans were actually implemented), and the relatively poor showing of North American companies in a variety of industries, when compared with their counterparts in Europe and Japan (who had never practiced strategic planning with the same fervor) (Hayes,1985). Disillusioned, American corporations have abandoned their "love affair with corporate grand strategy" (Pascale 1987).

The implications of this paradigm shift are far-reaching for both theory and practice in management. The shift of focus from control to responsiveness has meant a reevaluation of the function of planning and a search for alternate processes better at generating learning and meaning (all considered key criteria of responsive action). In this section, therefore, I will begin by exploring in greater depth the problems with planning in relation to responsive action. I will continue by examining processes that (1) contribute to the generation of meaning and (2) contribute to the generation of learning. I will conclude with some thoughts of the practical applications of these processes.

Planning as Intervening Variable: The Knowledge/Planning/Action Connection

When one thinks of adaptive management, one thinks of responsive action, action that is triggered by change in the environment. The smaller or more subtle the trigger, the more "responsive" the action. But the link between stimulus and response at the level of the organization is less direct than that in single organisms (and it is far from direct even there). For in organizations, numerous actors must be coordinated to interpret the stimuli and to integrate their response. Enter the need for planning.

Modern theorists in social science argue that for conditions for social action to be optimal, three aspects of social structure must reinforce each other (Giddens 1984; Collins 1981). These three are "structures of signification" (the interpretative schemas that give meaning to our activities, sometimes identified as the myths, paradigms, mind-sets, or ideologies that "frame" our activities), "structures of legitimation" (the rules and norms that organize our activity, and that govern the routines that make up our daily life) and "structures of domination" (the allocation of resources and decision-making power that governs our ability to take effective action).

Planning, in all its forms, is a structure of signification, functioning primarily as a means of organizational sense-making. Ideally, the planning process reduces equivocality of information so that choice is possible. Planning is not in itself a paradigm. But as a technology for sense-making and choice generation, its form is fundamentally determined by the myths or paradigms that dominate a given organization, determining the perceptions of the environment and of the organization's role in that environment. So planning acts as an intervening variable between knowledge and action in large, complex systems. But under which circumstances is it a barrier and under which is it a bridge?

When Is Planning Receptive to Scientific Knowledge?

One of the issues raised in these cases is under what circumstances is policy-making receptive to knowledge generated in scientific studies. Integrating such knowledge into the planning process is only the first step in creating responsive action, but it is an important one. The answer, from both the literature on planning and that on evidence in these cases, is that utilization depends on (1) the *form* of the scientific knowledge and (2) the strength and dominance of the organization paradigm informing the planning process.

Formal planning processes, as we have noted earlier, are based on myths of the relationship between organization and environment as one of "instrumental rationality." Such exercises are highly linear processes, involving a series of preformulated steps and systematic scanning processes. Scientific information can be useful, but only if it is packaged in such a way that it is easy to plug into such formulas. It cannot be ambiguous, excessively complex, or subject to multiple interpretations. It must fit with the "mental maps" (models of reality based on past experience, assumptions, industry recipes that inform the planning processes); otherwise the information will be filtered out as not being pertinent (Aguilar 1967; Spender 1989).

This may explain the fact (mentioned in the Great Lakes case in chapter 6) that when the government commissions specific studies, it is more likely to incorporate the findings in planning processes, as these are likely structured in ways that fit with those processes. Indeed, under such circumstances, the knowledge/planning link becomes so well established as to be well worn, almost routinized. Francis and Regier (chapter 6) point out that in the Great Lakes case "governments commissioned the IJC to organize increasingly convoluted, drawn-out [studies]

ies (almost continuously over the last 25 years)." However, new theories of science, based on a view of natural systems as "emergent, evolutionary, and open" represent too great a challenge to the assumptions underlying formal planning processes to be easily entertained by these processes.

So formal planning processes are able to incorporate stimuli from the environment, in the form of scientific information, as long as that information does not challenge the paradigms upon which the planning processes are based. The stronger (strength = closed, focused, monolithic, and orthodox) that paradigm, the more unreceptive to stimuli the organization becomes. Studies of highly successful firms that create intensive focus and unified cultures indicate they do so at the expense of responsiveness. The singlemindedness that initially gives them an edge over competition and results in success, over time reduces internal diversity. Certain functions are cut, as they are not seen as core or central; disconfirming information is neither sought nor fully entertained. Deviants are expelled as extraneous, and successful routines are rigidly maintained (Miller 1992). The result is that the highly focused organization over time ceases to pick up stimuli signaling fundamental changes in the environment and gradually reduces internal diversity until it is insufficient to respond to new demands from the environment.

Fortunately for the link between knowledge and planning, the large bureaucracies, such as governments, most likely to engage in formal planning processes are also least likely to have strong and unified ideologies (Gouldner 1976). Unfortunately for responsive action, however, that same absence of strong, overt ideologies represents a positive barrier to action.

The Failure of Planning to Produce Action

Studies in strategy process have indicated that action is a fundamentally irrational process. Action is made up of two components, the motivation to act and the availability of resources to support action. The first, motivation, is grounded in emotion, as it is through emotion, not logic, that energy is mobilized (Hochschild 1983). Availability of resources depends on how physical and human resources (money, time, space, technology, authority) have been organized. Resources do not flow equally to all parts of an organization, but tend to lump in certain functional and hierarchical pockets, according to the ability of groups within the organization to claim and control the distribution of re-

sources (Ransom, Hinings, and Greenwood 1980). The link between the two is the degree of authority of dominant paradigms or structures of signification.

Contemporary literature on organizations uses such terms as *organizational cultures* (Schein 1985), *ideologies* (Brunsson 1985), or *myths* (Jonsson and Lundin 1977) to refer to these interpretative schemas that provide a unified conceptual field and a shortcut to action. Common interpretative schemas "substitute for decisions. Many organizational actions arise without decision making, because the actors perceive situations similarly and share expectations and general values" (Brunsson 1982). When all organizational actors share the same paradigm and it is strong and overt, the problem of *what* to do (choice) is greatly diminished. For example, a university department with a strong emphasis on research and a belief that certain methodological approaches are superior to others in the execution of research will find considerably fewer candidates to choose between, and the choice will be simpler. The emphasis can therefore be in "creating expectations, motivations, and commitment"—energizing organizational actors to engage in activities that will secure the chosen candidate (Brunsson 1985). Such organizational contexts are often described as strong cultures and are excellent action generators (Miller 1992; Peters and Waterman 1982).

If, however, there is much dispute among department members as to what kind of colleague is best, then the ideology is "nonconclusive," and considerable effort has to be expended on making the choice. Formal planning procedures as rationalistic decision modes are good tools for choice. Planning, as noted earlier, is a linear, rational process. At its best it scrupulously avoids the irrationalities that make for strong commitments, the synthesis that motivates social action (Brunsson 1985). The logics of choice and action are fundamentally different.

This may explain why in the Great Lakes case scientific study seemed to be carried on *in lieu of action.* Although in this case inaction was probably beneficial, since action might have resulted in the kind of engineering projects that caused problems in the Florida Everglades, the pattern of scientific study as alternative to action is similar to that which Jansson and Velner found in the Baltic Sea and Baskerville found in the forestry case. In such cases, the planning process has taken on a magical, tension-reducing function, much like witchcraft in traditional societies (Gimpl and Dakin 1984). It cycles repeatedly between information and choice; action is almost irrelevant.

Organizations that engage in formal planning processes and on

these, implicitly or explicitly, split themselves into formulators (thinkers) and implementers (doers). However, they assume that their strategies in themselves will act as a motivator for the doers. This does not generally prove to be true; instead the recipients of the strategic plans, from middle management down, often find the plans bewildering, demotivating, and alienating (Westley 1990). Evidence suggests that formal planning processes are already devoid of the richness of information necessary to generate meaning. In addition, as plans filter down through hierarchical levels they lose more nuance and the process rarely allows for face-to-face communication complex enough to generate understanding at lower levels (Daft and Lengel 1984). Unless the poverty of understanding inherent in the planning process is compensated for by clear values and ideologies, middle managers are poorly motivated to act. Powerless and alienated, they are likely to engage either in increased political activity or in increasingly bureaucratic behavior (Izreali 1975).

The Role of Vision in Generating Action

In sharp contrast to the formal planning process described earlier is the kind of sense-making generated by visionary leaders. Whereas planning is a technology for institutionalizing vision, visionary leaders shape and reshape the myths themselves. These are sense-making processes akin to second-order learning.

Studies of visionary leaders indicates a strong facility with creating and manipulating emotionally evocative symbols (Weber 1922; Conger 1989; Westley 1991, 1992). Again, symbolic language is qualitatively different from the language of science and planning. It is colorful, emotional, heavily dependent on literary devices that build a bridge between the communicator and the audience (Burke 1950). It is inspired, however, by the material at hand: The followers "lead" the visionary as much as they are led by him/her (Westley and Mintzberg 1989). Visionary leaders throughout history are brilliant *bricoleurs;* they fabricate new and vital meanings out of the fragments available (Wallace 1961). In so doing, they overcome contradictions and create new synthesis. Myths are powerful devices for reconciling seemingly paradoxical elements in cultures, for making sense of the nonsensical (Levi-Strauss 1955; Leach 1964). In addition, visionary leaders rely heavily on face-to-face exchanges and on generating intensive communication exchanges within their organizations. They appeal directly to the middl d lower "ac-

tion" levels of organizations alienated by planning processes (Mintzberg and Westley 1992; Vredenburg and Westley 1993). In visionary models of strategy the system remains flexible and responsive not because of a nested system of decision rules, but because of nested authority and meanings. Those closest to the action are empowered to act, and they do so in the interests of a common purpose and mission.

Visionary leaders play a key role in all the cases in this volume. Whether it is an Art Marshall in the Everglades or an Odén in Sweden, they have proved critical to the evolution of the social system and its relationship to the natural system. They have appeared at times of crisis, to forge new alliances between knowledge and action when the paradigms that forged old bridges had proved bankrupt as a platform for effective management of ecosystems. With time, though, these intense visionary perspectives must be routinized into less focused structures if the organization is to remain adaptive and responsive to stimuli from the environment.

In sum, then, responsiveness, if defined as the organization's ability to detect and understand changes in stimuli coming from the environment, is helped by nonconclusive ideologies and rational choice processes, such as planning. On the other hand, responsive action, defined as the organization's ability to translate the perception of changed stimuli into appropriate action, is inhibited by nonconclusive ideologies and rational-choice processes. Or put another way, strong ideologies, myths, and paradigms are important to action but potentially detrimental to interpreting and incorporating new information about the environment. It may be assumed (although we do not have enough detail to be sure) that some instances of the failure to use scientific information (New Brunswick Forestry, chapter 2) were due to the presence of strong ideologies and action tendencies in the government at the time. Conversely, the failure to act in the "Turning Green Lines into Red" era (Florida Everglades, chapter 3), despite outcry from scientists and "landmark legislation," signifies the absence of a strong ideology (perhaps due to Bill Storch's death) and a tendency for the government to engage in rational choice processes as opposed to action.

This discontinuity between knowledge and action and the role played by structures of signification presents an important challenge for those wishing to make management of ecosystems truly adaptive. It is clear that for adaptive management to succeed, organizations must find sense-making processes that *simultaneously* open the organization to new stimuli and provide strong action generation.

How Can Learning Be an Effective Bridge Between Knowledge and Action?

One of the reasons that dominant ideologies or paradigms are so resistant to change is that the dominance is taken for granted by organizational members. Normally, in most large organizations, a variety of different myths/paradigms and ideologies abound (Jonsson and Lundin 1977), each representing the viewpoint of different groups or "communities of practice" within the organization (Brown and Duguid 1991). When a single paradigm dominates an organization, this is generally because a powerful visionary or coalition has also dominated, controlling the flow of information and resources in a way that is unquestioned and unchallenged by others (Ransom, Hinings, and Greenwood 1980). Securing access to strategic conversations in order to influence interpretive schemas or to secure resources in order to fund divergent action is rarely even attempted (Westley 1990).

The organization so dominated does, as I have noted, become increasingly resistant to new sources of information, either that coming in from the environment or that coming from inside the organization. The result, as illustrated by examples, particularly from the Florida Everglades case, is management systems disconnected from the environment they seek to manage. Crisis is needed to shake such conclusive ideologies, and organizations in this state are prone either to crisis or to demise.

However, it is possible to design "changeful" organizations (as opposed to the "change-prone" organizations described earlier) (Brunsson 1985). Studies of highly adaptive systems suggest that the design need only provide mechanisms that facilitate the learning processes inherent in all human activity and that ensure the dissemination of that learning throughout the organization. Learning provides an alternative to crisis, as it introduces redundancies and inconsistencies into the structures of organizations that may serve to modify the conclusive nature of existing ideologies. Like planning processes, learning designs ensure greater receptivity to environmental stimuli. The same processes, happily, also seem to act as a functional equivalent of ideologies in generating action.

Learning and innovation as mental processes are "an almost instinctive propensity of the human organism, activated under the merest provocation of desire for a richer or more orderly experience" (Wallace 1961). The challenge is not, therefore, so much to structure organizations to learn as to structure them to take advantage of and incorporate

the ongoing learning that is occurring, what is called the "tacit" knowledge of all organizations.

Several years ago Xerox vice-president John Seely Brown commissioned a qualitative study of how "learning" occurred at Xerox. An anthropologist was hired to follow around technicians as they made service calls and product development people as they worked on new products and product modifications. What the study revealed was that (1) formal routines and procedures were used not so much to guide action but to compare end states (i.e., as justification), (2) learning was socially constructed through exchange of stories ("war stories") based on improvisations in a problem-solving context, and (3) innovators let the world do some of the work (i.e., they took their solutions from those suggested/provided by the environment, not from analytic or abstract reasoning processes) (Brown and Duguid 1991).

What these findings suggest is that at the grass-roots or "local" level, individuals in organizations constantly respond to subtle changes in their environments and that these responses represent sources of innovation and learning. Second, they suggest that informal, face-to-face conversations are the best way to transmit learning. Finally, they suggest that the rules, procedures, and routines in most organizations act as barriers to learning unless they are treated as purely heuristic. The study concluded that much innovation directly contradicts the officially sanctioned formal operating procedures of organizations, as well as the rational decision rules. Learning, like action, is an irrational, highly social activity more connected to the construction of meaning (structures of signification) than to rules or authority (Weick 1991). If organizations, particularly large bureaucratic organizations, wish to increase responsiveness and adaptability, they must harness the instinctive learning of the front lines, as opposed to actively inhibiting it (Hamel and Prahalad 1989).

Practically, implementing the preceding conclusions involves providing opportunity for face-to-face exchanges horizontally, between functions. Such horizontal, cross-functional contacts provide synergy—integration without loss of individuality. Unlike conclusive ideologies that act as "restricted codes" to limit what data are made available for interpretation, cross-functional discussions provide a forum for "elaborate codes"-discourse linked to problem solving (Bernstein,1971). Such exchanges put learnings generated at the functional and technical level into the context of the whole organization, a context in which strategic implications are clearly recognizable (Collins 1981; Westley 1990). Such

exchanges have been correlated with organizations capable of ongoing innovative action in response to their environments (Kanter 1983; Quinn 1985; Mintzberg and McHugh 1985).

Second, implementing learning systems involves structuring a vertical flow of strategic information. In an interesting study of Honda's entry into the North American motorcycle market, Pascale (1984) showed that the insight that led to the introduction of the small motorbikes that revolutionized the motor cycle industry came without any planning at all. Honda had *planned* to introduce its large machines and had sent over two salesmen to North America to set up distribution channels. After months of discouragement and on the brink of abandoning the project, one of the salesmen observed that many people had been stopping him on the street to inquire about where he got the small motorcycle he was riding (which he had brought for his own transportation). The salesmen thought that because of this expressed interest, there might be a market for the small motorbikes. On the strength of that hunch the top management of Honda decided to radically switch their "strategy" of entering the North American market. Small motorbikes were a huge success, and the motorcycle market was revolutionized.

What is useful here for the management of ecosystems is the recognition not only that the strategic innovation emerged from the lower levels of the organization (where stimulus response times are generally and necessarily shorter than those at higher levels of the organization), but that the strategic apex was so responsive to the hunches of two people close to the market but far from the top of the organization. In terms of ecosystem management, the equivalent might be the readiness of policy makers to be responsive to the input and recommendations of practitioners in the field (such as field biologists and wildlife managers) as well as to those of scientists and policy specialists.

The ability to integrate the highest and lowest levels of the organization is critical in a political system where, as is pointed out in numerous cases, the policy level is often very removed physically, conceptually, and technically from those individuals at lower levels in the system who are in touch in an immediate, day-to-day way with the environment and are hence in a position to detect changes most easily in that environment. Unfortunately, such managers are often low in status in the overall system and are disregarded as poorly trained "scientifically." Similarly, in the North American corporation there has been a tendency to ignore "intelligence" collected by those in the front

lines (Albaum 1964) not only because strategy is viewed as the purview of the strategic apex but because reliance on statistical analysis of market surveys, for example, is seen as more valuable intelligence than the "hunches" or insights of those on the front lines. Many middle- and lower-level managers are deliberately excluded from the rich, face-to-face discussions that forge the backdrop, the meanings, and the frames for policy decisions. Participation in such activity is emblematic of elite status. Instead they are presented with formal policies, sets of statistics and planning documents stripped of the context and divorced from the stimuli that occasioned them (Westley 1990).

So why was top management at Honda prepared to listen and to entertain the hunches of their salesmen? Pascale indicates two important structuring devices that the company uses to make the communication flow from the bottom up as smooth and effective in terms of action as that flowing from the top down. The first is the fact that Honda does not isolate top managers from other levels of the organization. Top managers are not even assigned offices. Instead they are given desks in the corner of workstations. Their time is seen as valuably involved in staying in touch with the ongoing activities of their workers. Second, there is a careful effort to create a balance of elites in the organization, so that no single function becomes the star function in terms of power and influence over the strategy-making process. Again in many North American corporations, as well as government organizations, finance holds sway as the important function and most decisions are made with the bottom line in view. Such dominance breeds conclusive ideologies. It also blocks learning emerging from other functional areas that have strategic significance for the organization as a whole (Kanter 1983). Finally, it prevents the cross-functional integration vital for generating innovation.

In addition to cross—functional discussions and involved top management, studies of large organizations suggest that the role of middle-level management may be crucial in ensuring responsive action (Burgelman 1983a,b,c; Nonaka 1988). Middle managers are in critical positions to act as information brokers and shock absorbers between the strategic apex and the technical core. If they are allowed to question the strategic apex about the rationale behind strategic decisions, they can understand the significance of particular innovations for overall strategic directions and can act as interpreters of strategic directions to the technical core and champions of innovations and intelligence emerging from that group. This can be facilitated if managers are better trained in symbolic as well as rational forms of discourse, a practice

common in classical training of leaders (Burke 1950) but no longer followed in modern, technologically driven organizations (Gouldner 1976).

However, no matter how skillful middle managers are as change agents, their role is restricted by the rules and norms that govern the organization. The day-to-day interactions of superiors and subordinates must be structured so that the subordinate is allowed to challenge decisions made by the superior without necessarily dominating the outcome and, equally important, be respected for the concerns and innovative capacity that such a challenge implies. Superiors who allow such challenges are more likely to have more innovative and responsive subordinates. Such conversations act to "nest" not only decision rules but meaning and authority structures (Westley 1990). Although the accusation is often made that managers and policy makers focus on the short term and therefore fall short of a vision of a management system that could encompass the scale of changes such as those in ecosystems, in fact humans tend to focus on the mesoscale, thinking in terms of structures and organizational systems. They fail equally in focusing on the microdynamics of interaction, the level at which these structural elements are produced and reproduced and where change, if it is to occur, must begin and end (Giddens 1984; Collins 1981).

Of course, in more decentralized, less hierarchical organizations such as those Mintzberg described as "adhocracies," the learning model of strategy is epitomized. Here, as in many Japanese and European organizations, strategy is never formally announced; it emerges and evolves from the collective activity. As such, it is only partially under the control of conscious thought and formulation, and implementations are virtually indistinguishable. Thus, it is the ultimately adaptive form (Mintzberg and McHugh 1985), but very remote from the bureaucratic systems that govern the management of many ecosystems. In the latter systems, discontinuities between knowledge and planning or between planning and action can best be bridged by a "learning" design-one that encourages strategic conversations across functions and levels, simultaneously regenerating meanings and transmitting learnings.

Summary

In the preceding discussion I have reviewed five themes that have implications for the cases in this book as well as for our purposes of finding practical perspectives on the challenges involved in ecosystem management. Our discussion so far has stayed at the level of single organizations

and the issue of how to link knowledge to policy and policy to action. I have suggested that for successful social action rules, resources and meanings need not only to be nested at each hierarchical level, but also to be integrated across functions with each other. In practical terms it suggests that managers wishing to ensure a more adaptive management system should be sensitive to the following process issues:

1. For management systems to be adaptive to ecosystem dynamics, formal planning procedures should be minimized, or at least treated experimentally.
2. Strong ideologies should also be treated with caution. Although forging meanings, which are nested and coupled with a more even distribution of authority across the organization, is necessary for action, these meanings should not be maintained at the expense of diversity.
3. Middle managers should be encouraged to develop symbolic skills and to act as integrators between the strategic apex and the operating core. Mechanisms should be designed to ensure strategic conversations across functions and between levels. The more the strategies of the top can be influenced by the learning of the bottom, the more responsive the organization is likely to become.

I shall now turn to the second major theme of this chapter, that of the conditions facilitating and limiting interorganizational collaboration.

Interorganizational Collaboration and Consensus: Weaving Webs

Throughout these cases the need for interorganizational collaboration is stressed again and again. This is not surprising considering the complexity of organizations and jurisdictions represented by most of these cases. We rarely find human management systems patterned in terms of an ecosystem. Instead we find a number of "stakeholders" who have a vested interest in the ecosystem (Vredenburg and Westley 1993). In the cases in this book these range from government organizations to university consortiums, international commissions, citizen organizations, public and private companies, and native peoples. Some of these stakeholders have a central concern with managing the ecosys[illegible] such

as the Corps of Engineers in the Everglades). Others are concerned with the ecosystem as a source of raw materials (as in the New Brunswick Forestry) or as a disposal site for waste (as in the Chesapeake Bay), a recreation site, or a primary dwelling place (as in the Columbia River). Overall stakeholders represent a highly fragmented group whose interests concerning the ecosystem are very diverse and differ in intensity. It is not surprising therefore that the result, as described in these cases, is one of disconnected initiatives, sometimes conflictual, rarely cooperative, that bear little resemblance to a managed entity.

Yet the need to forge collaboration and consensus is a critical one. For one thing, no one organization, even in the case of the least complex (jurisdictionally) ecosystem, can solve the problems of ecosystem management unilaterally. These are metaproblems, or problem domains that demand "cultivation of domain-based, interorganizational competence" (Trist 1983). Yet society in general is weak in these capabilities.

Although the cases here describe numerous unsuccessful collaborations and some few successful ones, little attention is given to the microdynamics of what makes a successful collaboration. We are aware, on reading the cases, that the collaborations differ in kind, particularly that some were government initiatives and others (the "shadow networks") stemmed from efforts of citizen groups or university-based scientists, but there is little discussion of how these collaborations originated or of whether these differences in origin are related to the success/failure of the collaboration. Finally, there is a general recognition that collaboration is necessary there and an implicit assumption more collaboration/consensus will make the successful implementation of adaptive management more likely. But is there a limit to collaboration? Can there be too much consensus at the interorganizational level? These are questions prompted by the descriptions of collaboration in the cases, for which research in management has potential answers. I will deal with each in turn.

What Makes a Successful Collaboration?

Considerable work on the dynamics of interorganizational collaborations has established a number of features that make for successful collaborations between organizations. In the early stages the need to define the problem is paramount (Gray 1989). Therefore the extent to which all stakeholders can be brought to the table simultaneously will impact on whether the problem is defined with a sufficien[illegible]ree of complex-

ity. The process is iterative. Problem definitions will result in more stakeholders surfacing, who will then enrich the problem definition further (Westley and Vredenburg 1991; Gray 1985). If major stakeholders are left out at the problem definition stage, however, the chances of successful problem definition are reduced (Gray and Hay 1986).

Willingness to come to the table may also be an issue, affected by such things as mutual recognition of the need for collaboration, perception of legitimacy of all involved stakeholders, and the presence of a legitimate convener (Gray 1985).

Once they are brought to the table, stakeholders will attempt to set the direction for collaboration. Whether they are successful or not will be determined by such factors as the coincidence of values and the dispersal of power. The representatives of the stakeholder organizations who come to the table are limited by such factors as the level of commitment of their home organizations, the amount of resources at their disposal with which to negotiate, and their own conflicting loyalties (Kanter 1989). Inequalities in any of these areas, a common occurrence in complex collaborations, will weaken the collaboration, signaling to the collaborators that they are not equally needy and therefore will not benefit equally from the collaboration. For example, in describing the collaborations between business leaders, government, and environmental groups on Canada's National Roundtable, one observer described said,

> It is a strange sensation. You have the provincial treasurer sitting there with his flunkies behind him, the environmental minister sitting there with his people behind him, the man from the premier's office with his people behind him, and the chairman of this or that large company with his resources all lined up on one side, and cowering at the other end of the table are the few lone environmentalists with their bits of paper. This forces the environmentalists into strange stances. They either drive toward a purely ideological stance or begin to get coopted. They tend either to get extremely obstreperous or to say, "I can't argue with this; I'll give in" or to just walk away from the table.

From the preceding it is evident that it is not only shared understandings, myths, paradigms, and values that make for successful collaborations. Power is a central and underaddressed issue in these cases. Much of the aggravation attributed to the special interest groups in the

New Brunswick Forestry case, who used the media as a tool to gain access to the public arena and lobby for single-issue reforms, is characteristic of a situation in which there is a perceived power imbalance. In such cases appeals to the media can be an effective means of righting such imbalances. However, once a problem needing collaboration moves into the public arena, stakeholders tend to become frozen in polarized positions, and any real negotiation becomes difficult (Hilgartner and Bosk 1988).

If the public arena is to be avoided, however, great sensitivity about redistribution of power on the part of those with the most resources is critical, but not easily accomplished. The tendency is toward strong demands for equality from those less powerful and little concern for equality on the part of the powerful. Members of one public service organization that I recently advised were quick to point out that other service organizations got special treatment from the municipal government because their results were easier to measure. They felt this should be changed. They greeted with alarm, however, the idea that they should take care to give credit to these same service organizations for their less visible part in emergency rescue operations. They were used to receiving the lion's share of media and public attention and were reluctant to share it. Both inequalities (distribution of government resources and distribution of media attention) were detrimental to building the ongoing collaborative structures necessary for dealing with the increasingly large scale of public disasters with which all had to contend. But most organizations hoard power.

If the organizations are successful in setting directions, there remains the task of maintaining ongoing relationships, dependent on achieving a balance of power among participants and voluntary alignment of directions (Trist 1983). In this stage problems often result from the inability of the collaborators to maintain commitment "back home." This may be particularly true of organizations in pivotal positions of bridging two previously polarized camps. Such bridging attempts are inherently fragile because the bridging organization will have more invested than other organizations and must struggle with the same need to secure the commitment of their home constituencies (Westley and Vredenburg 1991a).

In sum, most individuals socialized in hierarchical organizations are not prepared for the kind of adaptive, interactive negotiation under relatively unstructured conditions (in terms of clear authority, rules, and meanings) of the successful collaboration (Kanter 1989). Individ-

uals who work in adhocracies (and here I would include many research institutes and university settings) are used to a freer, more egalitarian setting and have less need to "represent" their organizations when they engage in collaborations outside their "home" institutions. This may account for the vitality and resiliency of the "shadow networks" described, particularly in the Everglades and Great Lakes cases. This resiliency may also be due, however, to the way in which these shadow networks originated, as compared to those collaborations initiated or mandated by the government. It would appear that the origin of the collaboration does have an impact on its trajectory.

The Origins of Interorganizing

In these cases three types of collaborations may be distinguished: those that originated by the organizing and inspirational leadership of a visionary, those that originated by being mandated by government, and those that seemed to spring up spontaneously, such as citizens movements and interuniversity networks. This is consistent with the pattern of interorganizing that we have discovered in a variety of collaborative domains. In line with the models of strategy making within organizations discussed earlier, we have termed these three, respectively, "vision-led," "planning-led," and "learning-led" forms of organizing (Westley and Vredenburg 1991b).

Each of these three forms, it would appear, has particular strengths and vulnerabilities, in addition to those described earlier, that are evident across all forms of collaboration. These become apparent when the forms are compared on the basis of the fundamental tasks that need to be accomplished for ongoing collaboration. Much has been written about the early stages of collaboration, the need for issue definition, stakeholder convening, and direction setting. However, consistent with what we know about strategic action within an organization, it is evident that in addition to the necessary structures of signification, realized collaborations must also create structures of domination (e.g., a mobilization of resources and empowerment for action) and structures of legitimization (e.g., institutionalization of the collaboration, development of norms for interaction, terminology for expectations, rules for balanced and productive participation).

The three forms of interorganizing may be said to vary in their ability to complete these four tasks (issue definition, resource mobilization, action mobilization, and institutionalization; table 9.1). The plan

TABLE 9.1
Issue Definition, Mobilization of Actions and Resources by Mode of Organizational Change

	Issue Definition	Action Mobilization	Resource Mobilization	Structuring
Planning Mode	"Public arena" dynamics may force early closure of issue definition without sufficient data	"Public area" dynamics immobilze stakeholders, making coalition cooperation difficult	Resource channels secured often in advance of issue definition	Procedures/ normal task allocations often limited to preexisting structures
Learning Mode	Incremental issue definition through individual initiative or negotiations	Commitment in advance of issue definition	Need to "piggy-back" on other institutions to mobilize. Resources may be coopted in process	Lack of resources may make structuring difficult
Vision Mode	Visionary particularly skilled in issue definition process	Link between affect and action fully utilized	Creative resource mobilization	Overdependence on visionary leader. Failure to institutionalize process or assure resource flow

mode—exemplified in this case by the various joint commissions, government tasks forces, and think tanks mandated by government—helps in the mobilization of resources and structuring; it is weaker at issue definition and action mobilization.

Issue definition and action mobilization are hampered in the planning mode by the fact that it is difficult and rare for politicians to operate out of the public arena. As noted earlier, however, decision making and negotiation in the public arena are often constrained by media coverage, which has a tendency to distort and polarize issues, and by the pressure from the public and back-home organizations of the collaborators to become paranoid about whether or not their issues are being adequately defended. Hence the issue definition may be prematurely closed to avoid undue controversy, losing in the process sufficient complexity to represent all stakeholders adequately on a

going basis.

This has a disempowering impact. Stakeholders may withdraw and feel slighted. Also, as action mobilization is dependent not only on the representatives but also on the willingness of back-home constituencies to commit energy to the ongoing collaboration, the public arena model may severely hamper implementation of decisions arrived at by the collaborators.

On the other hand, planning-led collaborations are particularly strong at resource mobilization, for government agencies can mandate the resources necessary for setting up the collaboration, and often do so before the issue definition stage begins. As far as institutionalizing is concerned, planning-mandated collaborations often use procedures set up by the government for its ongoing operations. The institutionalized collaboration is then subsumed into the bureaucracy of government, which may help perpetuate it but does not strengthen its action-generating capabilities.

In contrast, the vision-led collaborations are often strong at issue definition and action mobilization and are creative at resource mobilization. As noted earlier, visionaries excel at using symbols to capture the complex and various interests that must be integrated and forging them into a compelling scenario. Their use of symbols and emotionally evocative language and the intensity of their personal commitment create a "hunger for enactment," a powerful motivation to action, in those whom they reach (Westley 1992).

Visionaries are often also adept at creative resource mobilization. Many visionaries operating at the interorganizational level avoid more conventional channels of resource mobilization, such as government grants, out of fear of the restrictions that may accompany them (Westley and Vredenburg 1992). Instead they often mobilize sufficient commitment on the part of followers so that they are willing to divert personal and "home organizational" resources to making the vision real. This may have the negative side effect of network burnout as network participants become exhausted by the extra demands for resources that the leader inspires (Westley 1992).

On the other hand, visionaries are notoriously bad at the institutionalization tasks necessary for ongoing collaboration. As visionaries tend to resist structuring and place a high value on creativity, "routinization" processes often do not begin until after the visionary leaves the domain, that is, if the collaboration survives his or her departure. The death of Bill Storch in the No Easy Answers period of the Everglades left a void that was only filled by another visionary, Art Marshall. Mar-

shall "carried the mantle of high priest of the environmental community in Florida," and after 10 years his vision was incorporated into public policy. It would be interesting to know, however, to what extent it was Marshall himself who was responsible for the institutionalization or whether others handled the structuring issues, as is often the case with visionaries (Westley 1992). Key to the continuity over time of vision-led collaborations is the development of a stable team, capable of turning visions into structures.

Perhaps the most interesting of the three modes of interorganizing are the learning-led collaborations, partly because their origins are harder to grasp from a research point of view. Learning-led collaborations seem to emerge from a groundswell of concern, the composite of experiences, and reactions of many individuals simultaneously to certain stimuli. Under certain conditions, concern, usually stimulated by the media or by a visible crisis, will snowball into action. Clearly, the action is triggered by individuals, but they are not necessarily visionaries, and they do not use symbols to motivate action. Rather, like setting a match to dry kindling, a small initiative will result in a conflagration of like initiatives, and a direction will emerge without ever having been planned. (See Mintzberg and McHugh [1985] for an excellent case description of such emergent strategies.)

Clearly, in learning-led strategies there is no difficulty in issue definition, for by the time the issue emerges, consensus (achieved through much discussion) has already been reached. This may be helped by the fact that participants in such collaborations often consider themselves to be representing only themselves. Hence a shadow network of interested scientists does not necessarily mean that a network has been forged between institutions (X, Y, and Z university, for example). It is individuals who, as professionals, consider themselves independent agents with regard to their activity in the problem domain who unite to collaborate. The challenge of having to "sell" the collaborations to back-home organizations is therefore minimized.

On the other hand, when the coalition starts to enter into negotiations with other organizations, it may be at a disadvantage because it will be relatively resource poor. Learning-led networks or coalitions are often "thinly institutionalized" (Zald and McCarthy 1987), which means that they do not have a rich resource base, a foundation of action routines, or established structures of significance on which to draw. This means that they may be at a disadvantage when attempting to collaborate with more established organizations. Sometimes this disparity can

be outweighed by such factors as the scientific reputation of members, but with citizen groups such as those described in the New Brunswick Forestry case and the Great Lakes case, even this resource may be unavailable.

Therefore although action mobilization may precede issue definition (as emergent strategy is action followed by justification), learning-led coalitions often founder on the lack of availability of resources to fund their activities. They are forced to "piggy-back" on larger institutions (e.g., the media, the church, private-sector organizations) in order to distribute their message or underwrite their activities. In attempts to enter larger collaborations, such as those surrounding management of an ecosystem, they may find their position distorted by their associations. For example, an NGO with a government grant may lose some independence of position, for using the media as an outlet means taking on whatever distortions the media introduce. Without such associations the power imbalances described in the roundtable example earlier may result. Scarcity of resources may also hamper the development of an infrastructure to sustain the collaboration. Hence many learning-led collaborations are temporary coalitions that enter into negotiations within the problem domain for a period of time and then disappear.

In summary, then, the three different kinds of collaborations that are found throughout these cases may be characterized as planning led, vision led, and learning led. Planning-led collaborations tend to be long on resources and structuring potential; vision-led collaborations are powerful instruments for issue definition, action mobilization, and creative resource mobilization; and learning-led collaborations are strong at issue definition and action mobilization. As an actor in any one of the three types of collaborations it is helpful to recognize both these strengths and the vulnerabilities. All three types have their successes, but collaborations that are planning led must be particularly careful at the issue definition stage, those that are learning led must be careful in mobilizing resources, and ones that are vision led must be careful in institutionalizing processes.

But these cases, with their sweeping overview, offer food for thought at another level of analysis. If attempts at managing ecosystems such as these exhibit such a rich array of different forms of collaboration, all existing at the same time, what is the relationship among the social forms? Should one form supersede all others? Should there be a kind of rationalization process in the domain, with these apparently "redundant" collaborative forms merging into one central referent organization, as has been suggested by some domain theorists (Trist 1983)? How much organization is good for a problem domain, in terms of the ultimate goal of problem resolution (or adaptive ecosystem management, as is the case in this book)?

The Limits to Interorganizing

One fascinating fact about the multiple collaborations that seem to occur around attempts to manage ecosystems has to do with the relationship among the different collaborations. Is the presence of numerous networks, coalitions, and task forces at the interorganizational level a positive or a negative factor?

In the New Brunswick Forestry case it would seem evident that the presence of citizen's lobby groups was counterproductive in terms of the government's efforts to solve the problem in a sustainable manner. In fact, Baskerville states baldly, "In general, special interest groups stop things" (chapter 2). In his view the presence of multiple groups with multiple viewpoints heightens conflict. On the other hand, certainly the most "successful" case of ecosystem management would appear to be the Chesapeake Bay study, which also demonstrated the most unified action among the groups, and the highest intergroup consensus around issue definition. In fact, Constanza and Greer (chapter 4) isolate this creation of broad consensus as the primary factor in the effective action that occurred in the problem domain.

Scholars in the area of collaborative theory have long viewed networks in particular as an inherently unstable form, a stage in the development from an underorganized to an organized domain. Although such networks serve to link organizations, theorists such as Trist (1983) and Gray (1989) have argued that an attribute of successful collaborations is the establishment of more permanent, less fluid, and more centralized organizations. Ideally, such "referent" organizations are democratic, are nonhierarchical, and do not constrain members of collaborations, but they help to focus all activity on a unitary purpose: to achieve effective action within the problem domain. Networks, unless they become "centered" in such a referent organization, are "not in themselves purposeful" (Trist 1983).

Hence theory would argue with the evidence in New Brunswick (chapter 2) and the Chesapeake (chapter 4) cases: a redundancy of collaborations—planning led, vision led, learning led—merely introduce conflict and confusion into the management of ecosystem. What is

needed for effective action is greater organization among such collaborations, to avoid redundancies and create a more ordered focus.

Yet such a conclusion sets off alarm bells. For what then do we make of the Great Lakes case, where a multitude of different types of collaboration coexisted over time, often at cross purposes and with little consensus, and yet appeared to offer a rich field for action? Although the redundancy might seem dysfunctional from a system perspective, it appeared that individuals used it for their own ends. If they were blocked in one interorganizational forum, they would try another avenue. For example, individuals from the IJC who had been instrumental in innovative policies in this planning-led context, then used a coalition of senior officials of fisheries industries to introduce a similar ecosystem approach to the fisheries. Some of these same individuals also participated in the university-initiated networks, making recommendations to the GLFC (Great Lakes Fisheries Commission).

As Regier noted (personal conversation), individuals who have made their career in attempting to save and manage the Great Lakes ecosystem, might, over 20 years, move through a variety of positions in different kinds of networks, carrying with them concepts and creating delicate linkages between different types of collaborations. Activists in environmental lobby groups who propose changes go on to be the commissioners who implement those changes 20 years later. A number of the case writers in this book have themselves played different roles in initiating, supporting, and using a variety of collaborative contexts to realize their aim. In the opening paragraphs of his text, Baskerville (chapter 2) admits to being student, researcher, professor of ecology, assistant deputy minister, policy consultant to the provincial government, and chairman of the board that heard disputes with respect to Crown forest management. Cutting across the seemingly redundant collaborative initiatives are the traces of individual career paths; people use the redundancy to achieve purposes that might not be achieved in simpler, more centralized structures.

From the perspective, therefore, of the individual, redundancy and variety in types and forms of collaborative initiatives within a problem domain may provide room to maneuver. Human beings find considerable freedom in the ability to change roles and move from one context to another (Rubenstein and Woodman 1984). Such freedom is also associated with the creation of energy, energy that can be contributed to problem resolution (Marks 1977). At the micro level of human days

and ways, therefore, redundancy may be important for the creativity and energy required to solve metaproblems.

At the macrolevel, on the other hand, one is tempted to extend Holling's endotherm analogy (chapter 1) to the interorganizational domain. The larger social system represented by all the stakeholders within the domain may be more resilient if, in fact, there is a redundancy of mechanisms for sensing and responding to change. To the degree that these become rationalized and focused, the system may seem more efficient in the short run, but it may actually become more vulnerable.

Another way of looking at it is to think of the stakeholder organizations as patches in a metapopulation. Metapopulation theory suggests that it is not the survival of single patches that is important. Rather, it is the nature of the linkages between the patches that determines the survival of the metapopulation. If the contact is too restricted, the isolated patch may be short-lived; but if the contact is too dense, the metapopulation is also at risk (Shaffer 1985; Oliveri et al. 1990).

In short, there may be limits to the amount and kind of consensus and focused collaboration that is desirable. It is preferable to have redundancy if that allows creative individuals multiple avenues to reach their ends and increases the amount of energy in the system. It is better to have imperfect consensus, even conflict, if that maintains a situation of some diversity of approach and hence flexibility in the system to explore radical options. As in the case of the excellent organization that fails by the same means that it succeeded (Miller 1992), an overly organized problem domain with a high level of consensus may be less responsive to ongoing change than one that is less organized.

This leads us to consider the interorganizational domain as a system in its own right and to wonder about long-term system dynamics in terms of Holling's four-box model. Perhaps at their optimum level, many learning-led networks, such as informal collegia of scientists, act as a resource and a fertile redundancy, "advancing fundamental reframing and innovation" (Everglades case). Systems in which the variety of coalitions and collaborative forums offer this stimulating and healthy kind of exchange may well be in the box 4 "reconfiguration" phase.

However, as such groups continue to proliferate, as the domain becomes more organized, issues become more clearly defined and viewpoints become more entrenched (Westley and Vredenburg 1991). As in the exploitation stage (box 1), either the appearance of a visionary provides a centralizing and integrating momentum (as was the case with

an Art Marshall), a strong, planning-led initiative demands integration across initiatives, or the groups themselves will begin to act competitively and opportunistically to secure resources (niches), with manifest conflict (as in the Forestry case). Ultimately, there will be a shakeout, as the stronger coalitions survive and the weaker ones are eliminated.

If the first or second form of exploitation occurs, the result may be highly productive consolidation (box 2), of the kind seen in the Chesapeake Bay case. However, the dynamics of Holling's model would suggest that this consolidation, although seemingly effective, may not in fact be as resilient as the system in a box 4 or in box 1. As Baskerville notes in chapter 2:

> Attention to structures that facilitate all party learning is urgent. There is a need to learn how to embrace error and to break from the "priesthood" approach where only a single group or agency holds wisdom. Clearly the forest will continue to change *whatever policy is in place*, and industry will change in response to the forest and in response to international market pressures, as well as in response to public policy. The key issue will be the degree to which these policy and forest management changes are reasoned (adaptive).

It is probable that a consensus of all parties around an adaptive management approach is likely to be more resilient than a consensus among all stakeholders around, say, a control and harvest approach, as the former puts emphasis on scanning, testing, and responding to changes in the ecosystem and the latter is concerned with controlling the variability within the ecosystem to ensure a steady supply for human consumption. However, it is important to realize that consensus on *any* policy if it includes the whole interorganizational domain represents a state of consolidation and conservation and will tend to become increasingly centralized, routinized, fixed in single-loop learning, and committed to fixed allocation of authority and resources. In short, consensus and consolidation go hand in hand. And as we discussed earlier, such systems, be they single organizations or interorganizational systems spanning problem domains, are more vulnerable to crisis. A boundary created around an interorganizational system, by the simple mechanism of strong ties within the system (ties of meaning, resource exchange, or norms of action) is still a boundary. The bounded system is vulnerable to crisis coming from outside its boundaries.

In a landmark study Granovettor (1973) compared two communities in the Boston area, both threatened with urban renewal plans that would destroy their integrity. One was a close-knit ethnic community with many bonds of kinship, shared culture, and clear social norms. The other was a middle-class "bedroom" community with very little internal organization. Although the shared value systems and tight organization of the ethnic communities would suggest that they would be better able to mobilize to react to the crisis, it was the middle-class community that survived. Granovettor attributes this to the "looser ties" that connected the middle-class residents not only to others within the community *but also to those outside the community*, whose influence and resources they were able to tap to stop the project. There seems to be an inverse correlation between how dense the ties or connections are within a bounded system and how many "loose" ties exist between members of that system and others outside it. If change therefore is coming from outside the social system (influences from other social systems, for example) or crisis to the natural system originating outside the ecosystem, the interorganizational domain in a box 2 "consolidation" state will be more vulnerable than those in a box 4 or box 1. Redundancies, as long as they represent multiple sensitivities and the ability to explore other "environments" for opportunities, may be as important for social systems as for organisms. Disorder in problem domains may be as valuable as order, diversity as important as consensus.

Summary

In this section I have again explored a literature that has developed separately but in parallel with the work on adaptive management: that concerning the microdynamics of successful collaboration, the origins and types of collaborations, and the relationship between the pattern of collaborations and system health. These cases offer a rich description of the multitude of collaborative initiatives, networks, and coalitions that spring up in attempting to negotiate problem domains as complicated as the management of ecosystems. The following are some practical lessons that can be drawn from analyzing the social system dynamics from a management point of view:

1. Although consensus building is clearly a critical issue in the management of successful collaboration, power dispersal is equally important. Actors involved in collaborative efforts must

ensure that some equal access to resources is provided, even if this involves designing processes that give a higher profile to stakeholders who are weak but important to problem resolution or sensitizing powerful stakeholders to the need to share resources.

2. A variety of different kinds of interorganizational collaborations can be recognized in these cases. We have identified three generic types: *planning-led* collaborations, which tend to take the shape of task forces, roundtables, committees; *vision-led networks*, associated with the activities of single visionaries and their supporters; and *learning-led networks*, which take the form of social movements, scientific consortia, community forums. Over time all three, if successful, have a tendency to crystallize into formal organizations. However, each of the three has different vulnerabilities. Actors involved in planning-led initiatives should be aware that such initiatives need careful attention to issue definition, to avoid premature closure and alienation of important stakeholders. Those involved in vision-led initiatives should be aware that the demands for resources of time and money may exhaust network members. Burn-out is common, and the visionary is unlikely to be concerned with evolving institutional structures to support his or her ideas. Finally, those involved in learning-led initiatives must recognize that the crucial challenge is to secure enough resources to survive; "piggy-back" arrangements may be necessary and should be pursued as far as possible without compromising the issue at hand.
3. Looked at from the macroperspective, the interorganizational domain is a larger social system and therefore may be affected by the same system dynamics that affect single organisms or ecosystems. Although consensus and organization at the domain level are clearly desirable, too much consensus and organization may make the interorganizational system vulnerable. For the actor in such systems, therefore, it is important to resist too much organization and centralization. Shadow networks should perhaps resist being turned into task forces; task forces should perhaps resist being turned into intergovernmental committees. Although the idea that policy should be treated as experiment is a brilliant one, it is difficult to achieve. Scientists should continue to be wary of politicians prepared to turn theory into policy. A healthy tension between the two, a redundancy of efforts and activities may offer the most fertile ground for individuals to manage the process of change.

But how manageable is this process? In this final section I shall address my third and last theme: Can (and should) human systems be managed to avoid the cycles of creative destruction?

Managing Cycles of Change: The Grand Design

Anthropologists, economists, and sociologists interested in change at the macrolevel have long recognized cycles of change similar to those that Holling's model captures at the ecosystem level. In addition to Schumpeter (1934), scholars such as Weber (1922) and Wallace (1966) have postulated that social systems go through a round involving (1) the creation of a new social order, often associated with a visionary leader, that is then encoded and institutionalized, a pattern Weber refers to as the "routinization of charisma." Eventually, it becomes (2) consolidated into an organized set of structures containing action routines, taken-for-granted assumptions about the meaning of such routines, and patterned flows of resources and authority. Such highly structured systems are not devised for learning; rather, they are devised for efficiency and routine (Weick 1991). It seems that as the consolidation progresses, adaptability decreases. However, change continues outside the system, and if the organization fails to adapt, it will become increasingly cut off or closed and subject to entropy. Eventually, (3) a crisis is produced both at the individual and at the organizational level. At the level of the organization this is often experienced as a sudden dropoff in performance and accounted for by such phrases as "the market suddenly dried up" or "the market moved out from under us." At the level of the individual, this is often experienced as a crisis of meaning. Rituals and routines that sustained daily life and guided daily contact seem suddenly meaningless or to break down altogether, occasioning acute psychological distress (Geertz 1976). In some cases the organization or social system goes into slow or rapid decline. In others, however, a period of (4) revitalization or reorganization occurs. This is characterized by highly individualistic, apparently chaotic behavior. A plethora of new ideas, initiatives (say, in the area of start-up ventures), and myths seem to circulate, some of which are imported from other systems and others

of which are forged by individual actors within the system. Many of these initiatives seem contradictory. The possibility of conflict and generalized disorder is high, and there is an absence of overall direction in the system. Despite the learning going on, for new order to emerge, these learnings must be reintegrated into a new vision or myth and encoded in a new organizational structure. This often occurs because of the intervention of a visionary, and the cycle starts again (figure 9.1).

It is easy enough to overlay this cycle of social change onto the four-box model of ecosystem change. It has in it the same sense of inevitability, of natural rhythm that the ecosystem cycles contain. But from the point of view of the actor, of the manager existing within a system and attempting to solve such problems as how to manage an ecosystem adaptively, this similarity is not comforting. For we seek from our social systems the same overall stability that natural resource managers have sought for in ecosystems: change, yes; growth, yes; learning, yes—but against a stable backdrop, a structured order.

Perhaps this is a mistake. Perhaps the crisis and renewals that occurred in the Florida Everglades management systems are as natural

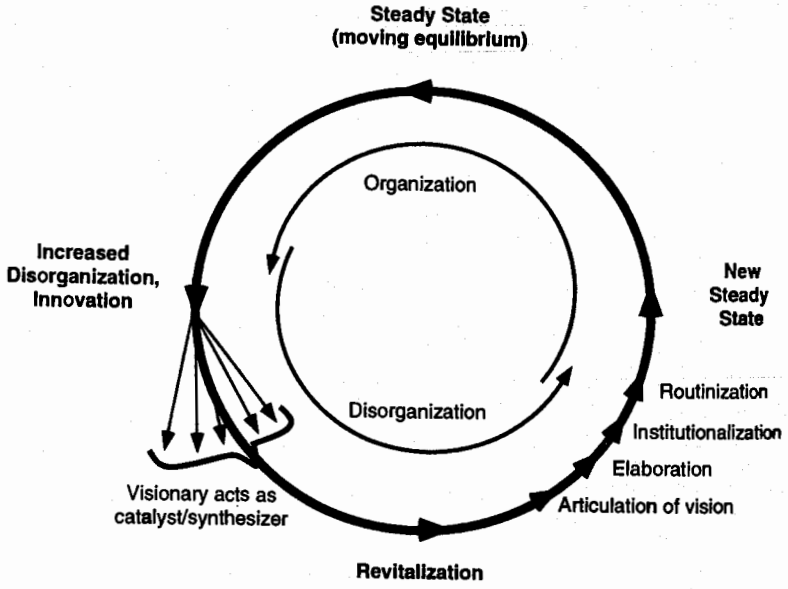

FIGURE 9.1
Cycle of revitalization (Wallace 1966).

and as *healthy* as those occurring in the Florida Everglades. Perhaps, as we have suggested earlier, no one-policy approach, even an adaptive one, should dominate for too long a time. Maybe *should* is irrelevant because the cycles are inevitable.

On the other hand, longitudinal studies of organizations have suggested that those that survive over long periods of time *do* find ways of managing (rather than avoiding) such cycles. The key seems to be in avoiding the extremes of order and structuring, on the one hand, and of disorder and confusion, on the other.

Earlier in this paper we noted that strategy within organizations can be characterized as vision, learning, and planning. These three tendencies can also be recognized at the interorganizational level. Overlaying these tendencies on the cycle of change we can see that the stage of reorganization is dominated by learning processes; that of consolidation, by planning processes; and that of renewal/exploitation, by visionary processes (figure 9.2). Clearly, each process has a role in the overall cycle. If the organization is to survive, however, the planning stage can never become so rigid as to prevent adaptation completely, and the learning stage can never dominate so completely that coordinated social action becomes impossible.

A series of longitudinal studies of strategy as a pattern in a stream of activity carried out at McGill University suggests a number of different configurations equated with survival. Three of these concern us here: the pattern of periodic bumps, the pattern of oscillating shifts, and the pattern of regular progress (Mintzberg and Westley 1992; figure 9.3).

In the pattern of *periodic bumps*, organizations go through long periods of stability and then experience a quantum shift, a sudden reorganization. Such organizations do not adapt easily. Change and adjustment are avoided in favor of routine and stability until, no longer avoidable, comprehensive change of the nature of a turnaround, or revolution is effected (Mintzberg 1978; Mintzberg and Waters 1982; Miller and Friesen 1984 for case descriptions of this kind of change). When viewed closely, however, it appears that when such sudden shifts occur, incremental adjustments through grass-roots learning have undoubtedly been going on for some time. As in the case of individual conversion, months of internal reorientation lead to a moment of gestalt shift, experienced as a sudden and dramatic change (Westley 1977; Gerlach and Hines 1970). Like the carapace of the spider, however, which falls off in an instant, a new one hidden under the old is ready to take its place. Before a radical change new myths abound in organizations,

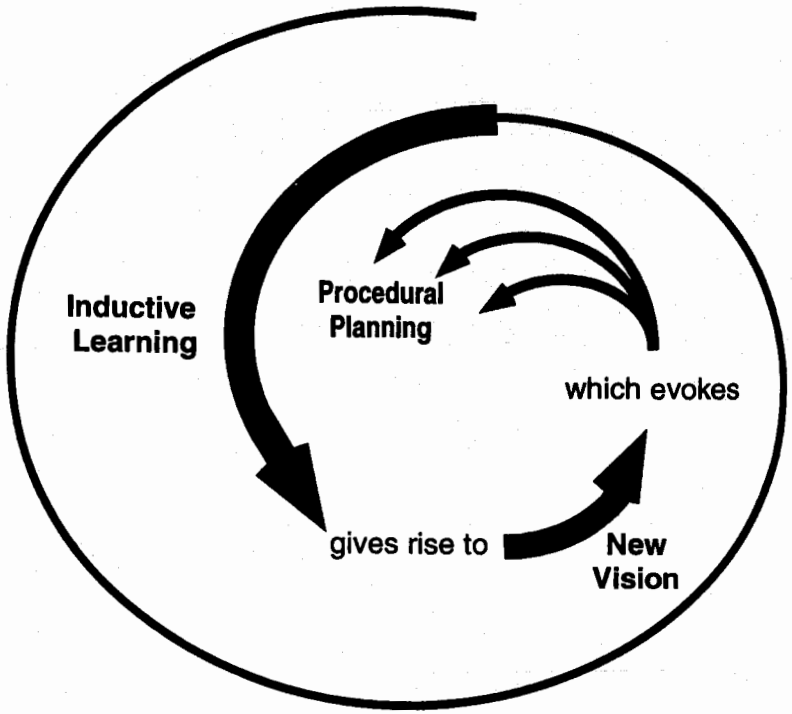

FIGURE 9.2
Sequences of the means of change (Mintzberg and Westley 1992).

each one a candidate for dominance (Jonsson and Lundin 1977). When crisis occurs, and the old myth disintegrates, another is ready to take its place. Still, when looked at over time, such periodic bumps appear as long periods of stability followed by sudden shifts. The moment of shift is perilous. Those organizations that survive are often dependent on leadership with the vision to make new sense out of the diversity.

The pattern of *oscillating shifts* represents a less radical or extreme form of change. An example of an organization that has demonstrated this pattern is the National Film Board of Canada. A publicly owned documentary film company, the film board is organized in terms of studios, each of which provides a basis for independent film makers. The film makers have complete latitude as to the films they make. The result of all this independent activity, however, when viewed over time, is a pattern of startlingly regular cycles with convergence around a particular theme occurring for about 6 years followed by 6 years of divergence and experimentation. None of the convergence was leader led. Rather, it happened spontaneously because of the tendency for film makers to interact and learn from each other (Mintzberg and McHugh 1985). The particular structure of the film board (an adhocracy) was loose enough to allow for divergence without falling apart, tight enough in terms of structures of signification, interactive norms to stimulate repeated convergence. The pattern was learning led, therefore, but with

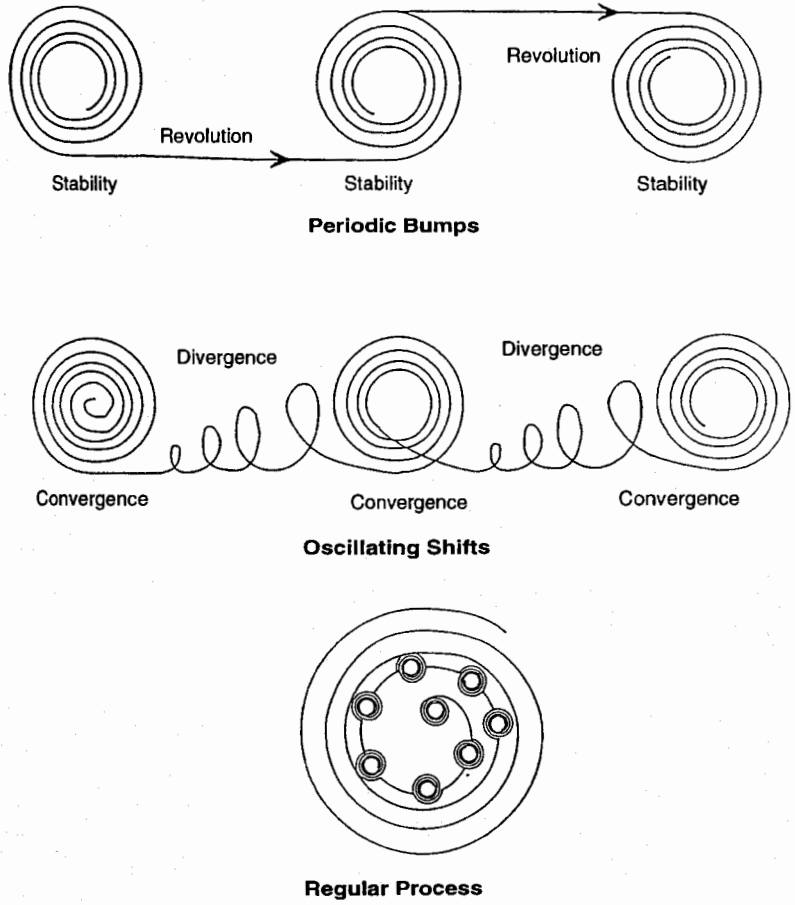

FIGURE 9.3
Patterns of organizational change (Mintzberg and Westley 1992).

enough planning on the part of management to ensure the maintenance of a stable resource base to support the experimentation.

The last pattern, one of *regular progress,* is one of continual and regular revitalization. One good example of such an organization is the Catholic church, which has survived for centuries, partly because of the (intermittent) ability of the popes to manage innovation in an enlightened way. At several important junctures, notably during the early thirteenth century and in the twentieth century, the church was headed by excellent administrators who carefully monitored new (potentially heretical) initiatives within the church and, instead of ignoring or expelling such movements, found a way to incorporate the new initiatives into the existing structures of the church, infusing the latter with new energy (Mintzberg and Westley 1992).

Another example is provided by McGill University, in which the activities at the grass roots are allowed to shape the direction of the university and the planners work not to control but to nourish and shape that activity. Such organizations change continually inside without changing position in a radical sense. Adjustment is continuous. The adaptation of the organization is led by the adaptation of responsive individuals connected to the environment (social) through a variety of professional networks (Mintzberg and Rose, in progress).

In each of these different patterns the balance between change and continuity is achieved in a different way, through gradual, hidden diversity and sudden shifts, through a rhythm of convergence and divergence resulting from patterns of interaction and patterns of creativity, through planned cultivation of creativity. In all three, however, there is exhibited a continual tolerance for diversity coupled with a positive response to orchestration. As Clark said of ecosystems, so one could say of social systems: The metaphor of the garden seems to work best. Resilient social systems, like resilient ecosystems, seem to be managed by people who ask, "What kinds of gardens do we want, and what kind can we get?"

It appears, then, that despite the fact that social systems, like ecosystems, evolve through a four-box cycle of creative destruction and that these are to some extent inevitable, it is possible for actors within these systems to manage in such a way that the crises are minimally destructive and the rigidity is not excessive, while the regenerative learning and sense of direction remain strong. Finding the balance point is a continual process of adjustment; however, the job is never finished.

And now I have come full circle in my discussion as well. For the

key lies in the way in which process is designed in such organizations. Some organizations are more highly structured and hierarchical: For them the challenge is to create and maintain mechanisms for influence and communication from those levels where change and adjustment are a part of everyday life. Other organizations, such as adhocracies, seem to create themselves new everyday. For such organizations the challenge lies in creating enough structures so that convergence and direction are possible. The same processes that will allow the social system to remain resilient will also allow it to respond to the ecosystems it seeks to manage: tolerance for diversity, openness to new ideas and information, balance between efficiency and redundancy, willingness to move in new directions while maintaining internal stability. As one commentator on business and the environment noted:

> Companies that take the environment seriously change not only their processes and products, but also the way they run themselves. Often these changes go hand in hand with improvements in the general quality of management. Badly managed companies are rarely kind to the environment; conversely,companies that try the hardest to reduce the damage they do to the environment usually manage well. Why the link? . . . (such) goals demand a tolerance for ambiguity that irritates most managers . . . state-of-the art management tools to handle complexity . . . the skills to deal with multiple stakeholders and to think in networks, not hierarchies [Cairncross 1992].

It would appear that not only do dynamics in social systems create crisis in ecosystems and vice versa but also that the same means must be employed to create organizations capable of managing ecosystem resiliency and organizations capable of resiliency in their own right. Barren, overly structured organizations create barren, brittle ecosystems. Green, growing organizations may be able to manage green, living ecosystems. The clue to understanding this similarity lies in the construction of models, such as those in this volume, which charts this parallel on a grand scale. The key to managing this similarity lies in the design of the details within organizations and networks, where the grand order is founded in small processes.