

2 Sustainability: A Wicked Problem Needing New Perspectives

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Introduction

The degree of structure inherent in a decision situation is often a consideration for classifying problem types. One common framework to distinguish problem types uses the dichotomy ‘well-defined’ and ‘ill-defined. At the extreme of ill-defined problems lies the special case of ‘wicked problems.’ For organizations, the issue of sustainability is clearly an ill-defined problem within the special case constituting wicked problems: it incorporates conflicting worldviews, it is dynamic, has unclear objectives, and it is important. It is a strategic problem where the central question is ‘What shall we do?’ rather than ‘How shall we do it?’

Understanding sustainability as a wicked problem and the challenges this poses for business requires a broad perspective, one that the complex adaptive systems (CAS) view of organizations provides. The CAS perspective involves a different approach to leadership because it represents a significant shift in the mental models of both individual managers as well as the organization as a whole. It also has implications for leadership and communication. Leadership must be consistent with the constraints imposed by the dominant world-view employed in “managing” the system. Thus, leaders must be aware of the importance of communication competencies when it comes to successful sustainability strategies.

Complexity and sustainability

The United Nations 2030 agenda for sustainable development outlines a plan of action for people, planet and prosperity. According to the agenda, “the goals and targets will stimulate action over the next fifteen years in areas of critical importance for humanity and the planet.” From the perspective of business, “sustainability” is a difficult concept. One common and traditional context for addressing sustainability in the corporate world is the so-called triple bottom line concept constituting performance evaluations along three main dimensions: financial, environmental, and social. The financial dimension may include costs, revenues and growth; the social dimension fair trade, donations or employee value; and the environmental dimension wastewater, resource use, consumption, etc. Firms are expected to manage the interaction of these dimensions in a manner that is sustainable, i.e. is good for people, the planet and prosperity, all within an ethical framework. Figure 2.1 schematically illustrates the managerial challenge that is presented by sustainability. In this figure, the triangle’s vertices represent the sustainability dimensions. The three coils that connect the vertices to the circle are ‘springs’ that pull managerial attention towards each dimension. The result is an equilibrium position that depends on the relative strengths of the three springs. A relatively ‘stiffer’ spring will draw the circle towards that dimension, which results in a new equilibrium position with respect to the other dimensions.

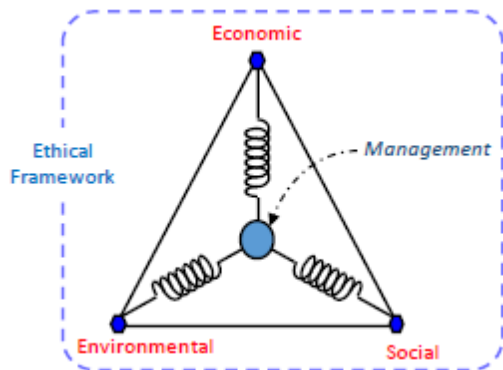


Figure 2.1: The sustainability triad and managerial dilemma

Traditionally, the managerial ‘equilibrium’ point, i.e. balance, has been pulled much closer to the economic corner, with historically little attention paid to the environmental and social dimensions. While the three dimensions are naturally interrelated, the primary focus of business is on economic sustainability. Two elements, hyper-growth in production rates and the focus on short-term earnings, contribute to the dominance of the economic dimension. These measures capture the notion of scope and scale, respectively. Scope represents the variety of products as measured by stock keeping units (SKU). Scale can be indicated by firms’ annual earnings.

The average urban New Yorker navigates through an economy estimated to contain 10^{10} SKUs (Beinhocker 2007). This quantity represents an eight-fold increase in the order of magnitude that has mostly occurred during the last 300 years. The scale of economic activity is equally impressive. Using 2011 data, Business Insider magazine (www.businessinsider.com) compared major corporations’ annual revenues with leading countries’ gross domestic products. In this ranking, Walmart Corporation’s revenues were greater than the GDP of Norway, making Walmart the 25th largest “country” in the world.

Naturally, there have been reactions to this growth. The effects of resource scarcity and increased pollution have resulted in the establishment of comprehensive environmental protection laws and institutions. Similarly, the consequences on the social dimension have resulted in calls for increased corporate social responsibility (CSR). Taken together, the interactions between these three dimensions define the scope of the sustainability challenge, and the daunting task facing managers.

Organizational objectives from the traditional economic perspective of maximizing shareholder wealth are clear: a manager’s role is to identify and implement the course of action that most efficiently achieves the firm’s goal. While there may be many alternative paths to achieving that goal, there is a clear primary stakeholder, the shareholders, and a limited set of action options available to accomplish the task. This problem may be complicated, but it is well-structured, or ‘tame.’ When the objectives expand to include social issues such as outreach to local communities, donations to charities, codes of conduct, stakeholder inclusion, etc., managerial tasks become more difficult. There are several reasons for this. First, the lack of a clear understanding and consequently different interpretations of exactly what social issues entail stems partly from an increased set of stakeholders and their varied expectations. Most of these stakeholders do not share the shareholders’ single objective of maximizing wealth. Second, the “system” that management has direct control over, the firm, now needs to be understood with respect to how it interacts with other systems, for example the local community or other institutions. These new actors introduce additional objectives that may be in conflict with the shareholders’ goals. Despite the increased

complexity that social issues introduces, considerable progress has been achieved in adjusting business strategy to include it in managerial policymaking. The popularity and number of reputation measures is an indication that there is an emerging consensus on many important social performance measures.

The inclusion of the environmental dimension radically expands the complexity of the problem. While social issues in the form of CSR have the advantage of being conceptually closer to business activities, the traditional attitude towards the environmental dimension has been limited to seeing it only as a means to achieving an economic end. Extending the sustainability discussion beyond simply accessing resources to include ecological biosystems, with the attendant issues of biodiversity and the status of non-human stakeholders, introduces additional complications that are very distant from the managerial mindset and demands a view of sustainability within the special case constituting wicked problems.

Sustainability as a wicked problem

After almost 40 years, sustainability still defines itself by the statement of the UN World Commission on Environment and Development, *Our Common Future* (1987):

“Sustainable development is development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs.”

While this is an inspirational statement, the task of translating the spirit into strategy is not obvious. The absence of a more definitive expression of sustainable development has not been the fault of lack of effort. Writing in 2003, Parris and Kates (2003) reported that over 500 efforts had been devoted to developing quantitative indicators of sustainable development. They concluded that there were three primary reasons for the difficulty in achieving consensus: the ambiguity of the sustainability concept, the different purposes of measurement, and confusion over terminology and methods.

Given the nature of the sustainability challenge, these results are to be expected. This is because sustainability has all the characteristics of a class of problems called ‘wicked problems,’ first categorized by Rittel and Webber in 1973. They identified ten criteria that are associated with this type of problem, all of which sustainability satisfies. See Table 2.1, which illustrates how the entire range of wicked problem characteristics affects sustainability. For example, a wicked problem is one that, among other things, has no definitive formulation. This is true for sustainability as multiple stakeholders have different values and objectives on the subject leading to different views/definitions. Wicked problems have no stopping rule; sustainability is dynamic and the time horizon is indeterminable. Every wicked problem is a symptom of another problem: issues around sustainability are consequences of nested and dynamic nature of the multiple systems involved.

Furthermore, there are no unique, clearly best solutions for wicked problems. For sustainability, the entire concept of a solution is meaningless and needs to be replaced with an appreciation that working towards a less unsustainable state (Ehrenfeld 2005) is a continuous learning process.

The table also clarifies that stakeholders play a prominent role in wicked problems. The effect of multiple stakeholders, all of whom are embedded in their own systems, is the tendency for

everyone to be completely attentive to their own local needs, goals, and actions. This intense focus, in conjunction with a simplified, event-oriented problem-solving perspective, tends to blind both external stakeholders and internal decision-makers to the unintended consequences of their actions. The result includes counterintuitive behaviors and policy resistance as other affected stakeholders attempt to meet their own objectives (Sterman 2000).

Table 2.1: Characteristics of “wicked problems” and their relationship to sustainability.

Wicked Problem Characteristic (from Rittel and Webber 1973)	Sustainability linkage
1. There is no definitive formulation of a wicked problem.	A consequence of multiple stakeholders with differing values and objectives.
2. Wicked problems have no stopping rule.	The context is dynamic, composed of many interacting systems operating under different constraints, including decision-making time horizons.
3. Solutions to wicked problems are not true-or-false, but good-or-bad.	Many of the needed choices are sensitive to the stakeholders’ values and ethical perspectives.
4. There is no immediate and no ultimate test of a solution to a wicked problem.	A consequence of the process focus.
5. Every solution to a wicked problem is a “one shot operation;” because there is no opportunity to learn by trial-and-error, every attempt counts significantly.	A learning orientation is required, supported by an analysis paradigm based on systems thinking perspective.
6. Wicked problems do not have an enumerable set of potential solutions, nor is there a well-described set of permissible operations that may be incorporated into the plan.	The complex interactions of social, ecological and economic systems result in a high degree of causal ambiguity, making standard perspectives and approaches to decision making less valid.
7. Every wicked problem is essentially unique.	This places weight on the ability to learn and to experiment because previous experiences generally do not extrapolate to new conditions.
8. Every wicked problem can be considered a symptom of another problem.	A consequence of the nested and dynamic nature of the many systems involved.
9. The existence of a discrepancy representing a wicked problem can be explained in numerous ways. The choice of explanation determines the nature of the problem’s resolution.	Different stakeholders’ mental models will selectively choose different information and process them in accordance with those mental models. There are no guarantees that these are co-oriented (see Newcomb 1953).
10. The planner has no right to be wrong.	The consequences can be dramatic for one major stakeholder – people inhabiting the planet.

By itself, a wicked problem presents decision-makers with unique challenges that do not exist in well-structured or tame problems. Structured problems have stable parameters, clearly defined boundaries, relatively few and homogeneous stakeholders, and relatively well-understood causal relationships. These all lead to a clearly recognized optimal solution. Wicked problems, in contrast, have no clear stopping point, due in part, to the presence of multiple heterogeneous stakeholders who have different and/or conflicting viewpoints and interests.

Dealing with the wicked problem of sustainability

As noted previously, sustainability is a complex, wicked problem due to two primary influences: 1) the relationships between the economic, environmental, and social dimensions shown in Figures 2.1, and 2.2) the presence of multiple heterogeneous stakeholders. The relationships between the economic, environmental, and social dimensions are not simply complicated, as represented by the number of elements in each dimension, they are complex. Removing one dimension has enormous impacts on the others. As noted by Levin (1999), “removing one such element destroys system behavior to an extent that goes well beyond what is embodied by the particular element that is removed.” (p.9)

The second influence is the presence of stakeholders (referred to as ‘agents’) in the systems that make up the three dimensions. In general, agents are individuals or entities that have the ability to collect and process information and adapt their behavior in ways that enable them to maintain desired conditions (Beinhocker 2007). For example, in the economic system are investors and customers, the social dimension comprises communities, activist groups or employees, and the environmental system comprises various kinds of ecosystems (marine, arctic, woodlands, etc.). Sustainability arises from the interactions of these numerous types of dynamic systems. The existence of these sometimes opposing ‘agents’ require organizations to be adaptive, to be able to change over time.

Simply put, these are all dynamic systems that, according to their internal logics, attempt to harmonize with their external environments. That is, they seek an equilibrium state. In the absence of competing external influences this state is generally achieved. Sustainability considerations arise when the success of one system comes at the expense of another one. Within each of the three dimensions this competition is resolved either by accommodation or by extinction of the weaker system. This is clearly seen in the economic dimension, where it is encouraged through market competition, and in the environmental sector with predator-prey dynamics. It is also found in the social sector with the rise and fall of philosophies and religions. However, when the whole system, comprised of all three dimensions, are intimately connected and mutually reliant on each other, then accommodation is the only permissible outcome. As there are many subsystems under each dimension that are involved in this world, a single stable equilibrium does not exist. Consequently, the desired ‘sustainability state’ will continuously shift in response to the innumerable individual local actions taken within each dimension. The main driver is, of course, the overwhelming dominance of activities within the economic dimension and their effects on the whole.

A complex system, as described above, that can change its structure and behavior over time in response to changes in its environment is a complex *adaptive* system (CAS). While many of the principles and theory of CAS developed in the physical and natural sciences, Eidelson (1997)

provides a review of applying the CAS perspective in the behavioral and social sciences, of which management theory is a part.

Applying the CAS perspective to the wicked problem of sustainability suggests a way to engage with the multidimensional aspects of organizational performance. As noted by Clemente and Evans (2014), “wicked problems take root and flourish precisely because they exist in a complex system that adapts to internal and external changes, and therefore wicked problems and complex adaptive systems are complementary frameworks of analysis” (p. 5). The complex adaptive systems view, however, is not a single encompassing theoretical perspective. It describes a worldview that enables business organizations to improve their mental models of how their activities affect the broader world of social and ecological stakeholders. The deeper understanding provided by the CAS approach can contribute to aligning business strategies with the realities of the natural and social worlds that lie beyond the firm’s traditional boundaries.

Survival strategies and fitness landscapes

Organizations can no longer survive by simply adapting to today’s world (landscape) or forecasting the future based on the current situation. New survival strategies are needed and these can only be developed through application of different mental models. In the case of sustainability, radical innovation is an imperative if the vision of the UN Agenda 2030 is to be met. The CAS view offers a way to map potential survival strategies that are available to the system through the concept of a *fitness landscape* (Kauffman 1995).

A fitness landscape is an abstract representation of the search space in an optimization problem. Graphically it has the appearance of a topographical map, as shown in Figure 2.2. The optimization problem here is that of developing business strategies for the economic dimension that are compatible with the needs, constraints and goals of the social and ecological dimensions. Every business strategy traces a path through the landscape that is defined by the three dimensions. Similarly, activities in the other dimensions also define paths through the common landscape. The fitness landscape brings out the differences in the so-called fitness of a solution to the problem under study. Those solutions that are better than others are higher on the landscape. In the case where an optimal solution does exist, it will be the highest point on the landscape where the height of a peak indicates the fitness of the system: the higher the peak, the greater the fitness.

In the search for sustainability there is no one optimal solution and the best solution at any point in time will not necessarily be best the next time. Thus, the managerial task is that of engaging with a complex process in the hope of improving the situation. The task is wicked, in part because there is no end in sight, but also because there is no agreement on what is an acceptable solution (despite the optimistic words of the UN 2030 agenda) and actions taken now will likely create new challenges in the future.

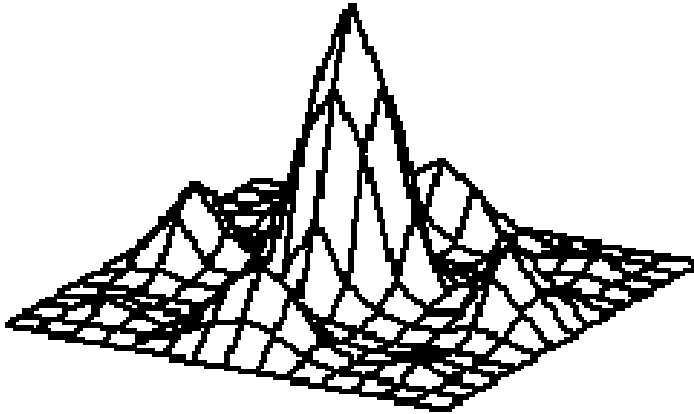


Figure 2.2: A fitness landscape (Adapted from Chan 2001)

The development of a system and its evolution can be seen as a journey through a fitness landscape in search of the highest peak that provides greatest fitness and thus the greatest chance for survival. In this journey, it is possible that the system becomes stuck on the first peak it encounters. This represents a local optimal fitness level that is better than any of the nearest neighboring peaks. However, this local peak may not be the best possible survival strategy because, over time, conditions may change enough to require a new strategy. If the system uses an incremental improvement approach, then it may not be possible to find better peaks that are farther away from the current location. The alternative is to “jump” away from the current state to distant regions in the landscape. These strategies correspond to the strategic business management approaches of exploitation and exploration (March and Simon 1958), respectively.

A complicating feature of the fitness landscape of a particular problem is that the landscape is also affected by the actions of other systems. Systems within the sustainability dimensions continuously change in response to internal and external influences. To the extent that the various subsystems are interrelated, the systems’ landscapes coevolve and mutually affect their fitness. There are no optimal fitness solutions but despite the complications resulting from the interaction of multiple complex adaptive systems, there is frequently considerable order in the world; whether it is the biological or the social worlds.

Challenge of mental models

Management’s basic purpose is to ensure the continued success of the organization by planning, directing, organizing and coordinating activities in the fitness landscape. The additional challenges imposed by demands for sustainable performance requires a re-evaluation of business strategy. Additionally, the new features in the business environment are such that incremental strategic changes will be insufficient to assure long-term success. Incremental changes imply only small scale adjustments from an existing strategic position. This approach to decision making implies that the underlying basis for the decision has not changes. That is, the mental model has essentially been unchanged by feedback from previous decisions.

In his studies of decision making behavior, Simon (1957) formulated the concept of “bounded rationality” to describe the effect of the limited capacity of the human mind to access and process the enormous amounts of information that define many types of complex problems. In such cases,

the decision maker relies on simplified models of reality, called mental models, as the basis for structuring, diagnosing and taking action. Mental models are influenced by, for example, education, experiences, social roles and culture and assumptions regarding the cause and effect relationships relevant for the problem. As models, they are by definition wrong, but they can be useful (Box 1976). They are simplifications that enable people to function in a seemingly rational manner (see Argyris and Schön (1978) for a comprehensive discussion).

In 1958, Ashby formulated the “law of requisite variety” for complex systems. This law has several interpretations, but the most direct is that a model system or controller can only represent or control something (the focal system) to the extent that it has sufficient internal variety to represent it. In managerial terms, the controller (manager) must have a mental model (the ‘model system’) that includes all of the relevant aspects of the system to be controlled in order to be effective. The consequences of Simon’s observations is on the decision maker’s limited cognitive attributes implies that she must rely on simplified models of the situation. Ashby’s focus is on specifying the requirements for the content of the manager’s mental models in order to be able to control the system.

Many factors shape mental models, but organizational culture and education are key drivers that influence individuals’ worldviews. Mental models encompass the decision-maker’s understanding of causality in the situation, as well as the underlying assumptions and beliefs. For example, if the dominant organizational mental model does not include elements from the non-business sustainability dimensions then one cannot expect effective organizational sustainability performance. For example, in cases involving environmental management, the prevailing mental models of key stakeholders may not be helpful. The relationship between business and environmentalists is frequently complicated as a result of each stakeholders’ mental models being in complete in fundamental ways by not recognizing the mutual dependency of the economic and environmental dimensions. Environmentalists often do not acknowledge the importance of the market in making things happen; economists frequently have unrealistic assumptions regarding natural resource availability being only a function of price.

Consistent with the notion of systems leverage points (Meadows 1997), the most effective method of ensuring significant systemic change is through changing the mindset or paradigm (mental models) from which the goals, rules and feedback structures that drive the system to be controlled are derived. Adopting the CAS perspective enables development of richer models of the relationships among the sustainability dimensions. Figure 2.3, below, relates different levels of abstraction with the theoretical perspectives that are commonly applied to organizational strategy and policy making. The theorizing perspectives are essentially formalized mental models of organizations. The range of application to organizations provided by the Complex mode indicates that this perspective supplies the requisite variety needed to inform managerial mental models.

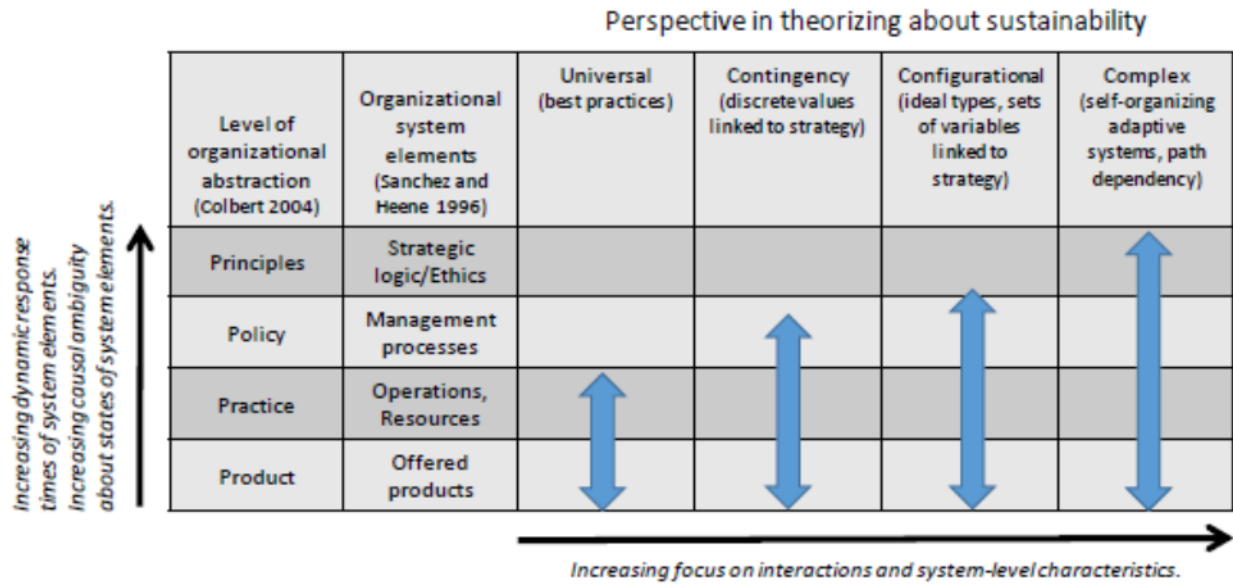


Figure 2.3: Organizational abstraction and theories of sustainability (adapted from Colbert (2004) and Sanchez and Heene (1996))

Figure 2.3 shows how the complex adaptive systems perspective differs from the more traditional business modes of theorizing about organizational strategy and change. The theorizing perspectives and the levels of abstraction that frame the figure identify a continuum of issues that distinguish important aspects of the organization’s sustainability challenge. The continuum of theoretical perspectives spans the range from static reductionist theories (the Universal mode) on to the higher-level systems thinking model (the Complex mode). The other continuum combines the issues of dynamic response time of the system to perturbations and the causal ambiguity associated with different levels of abstraction, or organizational hierarchy. Conceptualizing the dimensions in terms of complex adaptive systems provides a common language with which to investigate the interactions among the sustainability dimensions.

As the level of abstraction increases, the nature of causality becomes more ambiguous due to the increased complexity of additional elements and their interrelations. The system’s dynamic response time also increases. For example, it is much easier and quicker to make a production line change than it is to modify an organization’s culture. In the former, there is no question about how a technical process functions and replacement is a physical operation. Changing an organization’s culture, on the other hand, cannot be described in a handbook or through a set of equations.

High level organizational change, on the other hand, is shrouded in causal ambiguity that opens for multiple, plausible interpretations of the causal relationships. Achieving a useful degree of agreement on the essential relationships is a delicate negotiation process, even when there is general agreement on the objectives. When the stakeholders’ goals are contested and possibly in conflict, the process is elevated to an entirely different level. The change processes needed for systemic improvement now involves psychological process (See, for example, Flood and Carson (1993) and Casti (1990) for overviews of methods for working with complexity.).

Leadership for sustainability using CAS

Taking a CAS perspective on leadership is a relatively new approach where there is less reliance on managerial authority derived from formal hierarchical structures. Leadership that is confined to ‘working within the system’ is restricted by the formal rules and structures of the organization and consequently will not be as influential in shaping the firm’s behavior. The independence from direct formal authority suggests that distributed CAS leadership may directly influence the emergence of new behaviors in the adaptive organizational system.

Schneider and Somers (ibid: p. 356) compare the term leadership and leader: leadership is used to “connote the often indirect, catalytic process within organizations – which might be performed by people in rotation or in tandem – to the term ‘leader,’ which might falsely signal that there are individual and positional factors that strictly distinguish leaders from others.”

Management and leadership needed for engaging in the wicked problems of sustainability place new demands on the individuals responsible for these functions. Leadership and sustainability in organizations entails finding a balance between exploiting existing organizational competencies and competitive advantage, on the one hand, and exploration of new “territory,” on the other. The exploitation strategy prioritizes the short-term time horizon and the status quo. Exploration is riskier in that its time perspective is longer, the outcomes more uncertain, and the existing organizational skills may no longer be an advantage or even relevant. At worst, they may be counterproductive to the goal of improved performance. Exploration breaks with the status quo and often generates internal resistance to change.

The ‘roads,’ or strategies, to improved sustainability performance involves the search for a higher peak in the fitness landscape. Since the Industrial Revolution the economic dimension, represented by business organizations, has found a relative peak in the sustainability landscape and expanded rapidly to take advantage of the benefits afforded by that location. Conditions have changed, however, due to a confluence of many factors and forces that indicate the need for change, which will require a leadership style that is compatible with this challenge. The historical success of strategies based on the priority of the economic dimension makes it very difficult to break out of this type of behavior. Regardless of the diversity and individual differences exhibited by business organizations, their overall behavior is generally similar. This similarity condition is called an ‘attractor.’ Given an organizational intervention (merger, acquisition, etc.) that changes the state of the organization, there will be a period of behavior, a path, which differs from the pre-intervention patterns. This transient period ends when the organization returns to its ‘normal’ behavioral state. The final state may differ from the initial condition, but it will still conform to the conditions imposed by the larger economic system within which the firm operates. An attractor is said to have steep walls if it is difficult to escape from the conditions that define it. The cumulative effects of economic performance on the other dimensions have made it impossible to ignore the larger set of relationships. Stakeholder awareness and actions have introduced the need for broader measures of system performance. The triple bottom line accounting and management tools like the balanced scorecard have broadened the set of state variables that are relevant for monitoring organizations. Introducing these variables has the effect of making the attractor walls less steep, thus easing the transition to alternate attractors that include variables from the social and environmental dimensions.

The leadership requirements in the transition from one attractor to another, seeking a higher peak in the fitness landscape, was described by Metcalf and Benn (2013) as a process of influence, following Yukl’s (2001) definition of leadership. Unlike the traditional understanding of leadership as being associated with individual actors in hierarchical positions, the complex adaptive systems view is that leadership can be distributed among the agents involved with the

system. These agents can be internal to the focal system, or external to it, such as stakeholders from other affected systems.

Metcalf and Benn's leadership theory involves the transition from the initial attractor, which is based on the logic of leadership of convergence and system stability achieved by social structures and rules. In this condition, the dominant strategy is likely based on exploitation of hard-earned organizational competencies. As conditions defining the system become more untenable, either through declining performance on normally accepted state variables or by the recognition and acceptance of new variables that were previously ignored, the need for change becomes more apparent. Eventually, the previous attractor becomes easier to escape and the search for a new attractor basin is initiated. Key in this phase is a leadership style that focuses on variety and innovation. This requires a strategy that emphasizes experimentation.

Finally, a new 'normal state,' paradigm, is found. Business strategies that are compatible with the new paradigm will represent higher peaks in the fitness landscape. This new resting place will be characterized by an expanded set of state variables that will include elements from other sustainability dimensions. In this state, a new leadership orientation is needed. This one will require a focus on providing a new unity and consolidation. Throughout this dynamic process it is crucial to recall that the organization must continue to create value for its customers. The redesign process can be likened to the problem of rebuilding an airplane while it is flying. Stopping is not an option.

One of the central insights regarding managerial engagement from seeing the sustainability challenge as a wicked problem is the focus on the process. There is no optimal solution, nor is there a static solution. In addition, given the vast number of stakeholders, the likelihood of achieving a consensus with respect to what constitutes a sustainable state is very small. Consequently, the organization and its leaders should encourage an active learning environment within their organizations.

Learning is a dynamic feedback process that involves choice, action, observation, reflection, and choice. There are two modes by which learning takes place (Argyris and Schön 1978): single loop and double loop learning. Single loop learning disconnects decision-makers' mental models from the feedback loop. The result is that discrepancies between observations and expectations are resolved by incremental actions. The guiding mental model is unaffected by the differences and not updated in line with experience. Double loop learning actually involves testing and updating the mental model as anomalous observations are detected. This process of revising the mental model expands the range of options from which to select. For a competitor, the resulting behavior may be radically innovative, and different, and difficult to predict. This contributes to organizational fitness.

The organization's ability to reflect on its worldview and make changes is the key element for surviving and flourishing in a wicked problem environment. Experimentation is a basic characteristic of double loop learning organizations. Successful learning is a function of having both an organizational culture that supports learning and managerial and leadership capabilities that facilitate the learning process (Nevis, DiBella, and Gould 1995). Among the specific facilitating factors, two stand out as having specific relevance for the leadership function. The first is to develop a climate of openness in the organization. This involves sanctioning and encouraging debate and conflict as acceptable ways to address and resolve problems. In this way, encouraging a climate of openness contributes to involving all organizational members to become engaged in the transition from the old to the new attractor, and enhances the experimentation required during the transition.

The second factor is having an involved leadership who interact frequently with organizational members and who are engaged actively with the transformation process. Together these factors enable the development of the distributed leadership style that characterizes systemic leadership in complex adaptive systems.

Communication

Metcalf and Benn (2013) make the point that leading successful sustainability strategies or initiatives in organizations requires managers 'of extraordinary capabilities' (p. 381). One of these is the capability to engage groups both internally and externally, essentially by being a bridge-builder and interpreter. The interpreter role includes, among other things, linking through what the authors call stakeholder interviewing. Viewing sustainability as a wicked problem also emphasizes a much more active role by leadership in engaging with many and varied stakeholders through negotiating and effective communication. This implies additional extraordinary capabilities for interpersonal communication.

Communication comes from the latin *communicare*, to make common, to share. It is the activity of conveying information through the exchange of thoughts, messages, or information, as by speech, visuals, signals, writing, or behavior. The interpretive view of communication sees it as a meaning-based process of coordinating and organizing actions. Communication is a dynamic process: the meaningful exchange of information between two persons or a group of people. People interact with and through symbols to create and interpret meanings (Wood 2013) in a systemic process. Organizational communication as a field assumes that organizations are fundamentally communicative creations. This is because organizations are "social units of people systematically structured and managed to meet a need or to pursue collective goals on a continuing basis", (Shockley-Zalabak 2012). It focuses on general communication processes and dynamics within organizations.

Management communication fundamentally deals with how managers/leaders develop and disseminate knowledge. Focus is on how they as individuals build relationships with employees, with other managers and with important external organizational stakeholders. Objectives of management communication include developing a shared vision of the company/organization, establishing and maintaining trust in leadership, initiating and managing change processes, and empowering and motivating employees. It demands understanding of the importance of the movement of information and the skills that facilitate it, in addition to understanding language and the power it has. Management communication is seen as developing into leadership communication when individuals are able to use communication to create visions, to motivate, to instill new cultures, and to mobilize and focus energies (Shockley-Zalabek 2012).

Mintzberg (1973) suggests that managers are almost constantly engaged in communication; most managerial roles are communication roles and all roles have communication elements. Interpersonal roles include those of figurehead, leader and liaison. The informational role is that of monitor, disseminator and spokesperson, and the decisional role comprises entrepreneur, disturbance handler, resource allocator and negotiator

Leadership and management communication also "influences decision-making, transmits communication rules and contributes to the shared realities that becomes the organization's culture or cultures helps organizational members" (Shockley-Zalabak p. 213). It also helps organizations in setting priorities and determining what is needed. Management communication is tightly

associated with theories of leadership and management, and personal traits, preferences for leadership styles or approaches, and responsiveness to leadership requirements have an enormous impact on managers' communication effectiveness and in the end the outcomes of their leadership.

Leadership style and communication that promote common understanding does not just happen. Leadership style and organizational success are tightly coupled with studies of organizational and leadership communication. Of fundamental importance is the notion of mental models, essentially a personal theory of how things work. Influential models include stakeholder theory, Argyris and Schön's mutual learning, and McLeod and Chaffee's (1973) co-orientation model. Lastly, because, we will look at the communication function and its role in supporting organizational leadership with respect to different aspects of sustainability.

McLeod and Chaffee's (1973) coorientation model illustrates the need for mutually beneficial communication. A coorientational approach includes four points of analysis: (1) the organization's view, (2) others' views (3) the organization's perception of others' views, and (4) others' perception of the organization's view. The interaction between these variables creates three measures of coorientation – agreement, accuracy and congruency. "Agreement" indicates the degree to which the organization's view matches the stakeholder's view. "Accuracy" indicates the degree to which the organization correctly perceives the stakeholder's viewpoint, and vice versa. "Perceived agreement" (or "congruency") is the degree to which the organization's view matches its perception of others' viewpoint, and vice versa.

Dozier and Ehling (1992) suggest four co-orientation states: a state of true consensus, a state of dissensus, a state of false consensus, and a state of false conflict. True consensus exists when both parties have a similar understanding and agree on their view or evaluation of the issue discussed. Dissensus occurs when the parties hold conflicting views and are aware of their differences. A false consensus exists when the leader believes that a stakeholder agrees with him/her when in fact they do not. Managers may believe that someone defines something the same way they do, when in fact they do not. The same is true if stakeholder mistakenly believes that the firm leader holds the same view that they do. Similarly, this state also exists if both mistakenly believe that they agree on an issue when in fact they do not. A state of false conflict exists when the leader and stakeholders believe that they disagree on an issue, policy or action, when in fact they agree. The coorientation model helps to remind organizations to check whether their perception of their stakeholders' views is accurate – or not. Those who take the trouble to check often find lack of accuracy between their perception of what the other party thinks and the actual position of the other party. This is when the need for better and more effective communication is revealed.

The danger in complex situations is that people have the natural tendency to assume that others see the situation in the same way as they do. This phenomenon is why the co-orientation model is useful; it clearly identifies the various states of misinformation that can arise between two or more agents (stakeholders) who do not clarify their interpretations of a complex situation of common interest. At the heart of the co-orientation framework is the notion of mental models (Senge 1993) and the recognition that in order for any interaction to be effective, these models must be 'oriented' properly (Brønn and Brønn 2003). The ability to communicate with others who share similar mental models and understandings of the world is easier than communicating with someone who does not share a common conceptual structure. Not having a common starting point on important factors leads to misunderstandings and disagreements between the communicating parties. However, the simple fact of having similar mental models in no way guarantees that this model is

‘correct’, i.e. a true representation of the situation. It only ensures that there is similarity in the conceptual structures that organize the world, the individual’s particular world-view.

Three specific communication skills that enable communication managers to engage stakeholders in a meaningful dialogue, and thereby enhance the effectiveness of the organization’s communication efforts are reflection, inquiry and advocacy (Brønn and Brønn 2003). Reflection is an internally focused skill whose objective is to make the practitioner more aware of his or her own thinking and reasoning processes. Inquiry engages the two parties of the communication process in a joint learning process where the objective is to understand the thinking and reasoning processes of the other party. Advocacy is the process of communicating one’s own thinking and reasoning in a manner that makes them visible for others. The reflective communicator seeks to find a balance between inquiry and advocacy. Too much advocacy results in one-way communication with little feedback, too much inquiry means being bogged down.

It is obvious that the incorporating the principles of co-orientation and advocacy and inquiry requires an organization-wide approach that considers the role of all individuals within the organization, particularly leaders. It is their interpretation of issues and their ability to be reflective that determine the success of organizational efforts. It is the leader’s role to engage all stakeholders and to encourage everyone in the organization to communicate, with each other and with the outside world.

Conclusion

The business organization is a central element in the sustainability *problematique*. Much of the complexity of organizations is that they are formal systems that span the economic and social dimensions of sustainability, thus incorporating many of the aspects of these areas. The additional feature that they are purposive systems (Checkland 2000) introduces a bias in the goals of the system. In the case of business organizations, the bias is toward the optimization of the economic dimension.

In terms of complex system behavior, the concept of an attractor describes a set of values toward which a system tends to evolve for a wide variety of starting conditions of system variables. In this sense, economic factors dominate the attractor for business systems. This attractor ‘basin’ has relatively steep walls so that it is relatively stable. External forces may perturb the system, but not enough to move it out of the influence of the economic attractor. In a sense, the attractor is a metaphorical paradigm for organizational behavior, in this case dominated by economic consideration. In the old paradigm, the values for environmental and social variables were set to zero; the dominant mental models did not include these influences.

An erosion of the economic attractor’s walls is a result of changes in society and in the environment, influenced significantly by economic behavior. As the walls erode, the slope becomes less steep, making it easier to escape the attractor, and making a leap to a new paradigm less arduous. Metcalf and Benn (2013) argue that different leadership styles are required for successful management of the system’s evolution away from the outmoded paradigm, through a transitional phase, and finally to a new and more sustainable attractor basin. Ideally, a broader range of variables drawn from the previously underutilized sustainability dimensions would define this new attractor. This requires new thinking, new mental models, and real jumps in innovation.

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