Strategy process research is at a crossroads. We are continually bombarded by an ever-increasing number of strategy concepts and frameworks. Some of these concepts and frameworks are normative whereas others are descriptive. Some are anchored at the individual level of analysis whereas others recognize the collective and distributed nature of strategy and strategizing. It is easy to get lost in this complexity.

The proliferation of strategy concepts and frameworks is perhaps a reflection of key changes that are occurring in our environment. First, the pace at which products, technologies, organizations, industries, and economies are changing is increasing. In some cases, change has become so rapid that a new term has been coined – internet time. Second, interdependencies between economic and social agents are becoming increasingly complex. In many instances, boundaries between once distinct entities (vertically integrated firms, for example) are blurring to such an extent (as, for example, in virtually integrated networks) that it is difficult to discern where one entity begins and another takes over (Davis and Meyer, 1998; Garud et al., 1998a).

Historically, strategy process has been viewed as a logic used to explain a causal relationship in a variance theory, or a category of concepts dealing with the actions of leaders or organizations (Van de Ven, 1992). These perspectives were sufficient for examining change as a discrete shift from one stable state to another. However, the increasing pace of change and complexity of operation leads us to recognize change as an ongoing dynamic journey, not a discrete event shifting from one unfrozen state to another frozen state (Van de Ven et al., 1999).

Under these conditions, it is more productive to view change as nested sequences of events that unfold over time in the development of individuals, organizations, and industries. In these settings, we are challenged to examine how different mutually dependent groups co-evolve in their efforts. No longer is it appropriate to view organizational change as produced solely by full-blown strategic plans in response to industry life cycle dynamics or as adaptations and partisan mutual adjustments amongst conflicting entities within an evolutionary process (Chakravarthy and Doz, 1992). Instead, organizational change is more appropriately characterized as a ‘duality’ (Giddens, 1979) wherein organizations are shaped by a continual flow of events that they, in turn, help to shape (Garud and Karnoe, 2000).

Our objective is to explicate this notion of organizational change as duality. To do so, we begin with a review of four basic process theories of change. Van de Ven and Poole (1995) point out that each theory has an implicit ‘motor’ driving change. An explication of these motors provides a way to systematically explore strategic change processes.
In doing so, we can generalize insights between settings driven by similar motors. Moreover, scholars and practitioners can generate additional insights by combining motors to explore more complex processes. Illustrative of such complex processes are non-linear dynamics that are representative of strategic change in contemporary environments; processes that we explore in the conclusion of this paper.

**Change Theories**

Most organizational scholars would agree that change is a difference in form, quality, or state over time in an entity. The entity may be a strategy, an individual’s job, a work group, a strategic business unit, the overall organization, or an industry. Change in any entity manifests itself in differences on a set of dimensions across time.

Much of the literature on organizational change focuses on the nature of these differences, what produced them, and the consequences. The literature offers several useful distinctions about change: planned or unplanned, incremental or radical, evolutionary or revolutionary, emergent or realized, induced or autonomous, recurrent or unprecedented, and more (cf. Burgelman, 1983; Mintzberg and Waters, 1985; Pettigrew, 1985; Tushman and Anderson, 1986). As is apparent from even this short list of distinctions, explaining how and why organizations change has been a central and enduring quest of management scholars and in other social science disciplines (see reviews in Sztompka, 1993; Van de Ven and Poole, 1995).

Van de Ven and Poole (1995) propose a typology of this literature by categorizing change processes along two dimensions: *mode of change* and *unit of change*. *Mode of change* distinguishes between change sequences that are constructed and emergent in contrast to change sequences that are prescribed *a priori* by either deterministic or probabilistic laws. *Unit of change* distinguishes between change processes that involve the development of a single organizational entity in contrast to
processes that involve interactions between two or more entities.

By cross-classifying these two dimensions, Van de Ven and Poole identified four ideal theories that are often used to explain how and why organizational changes unfold – life cycle, teleology, dialectics, and evolution (Figure 10.1). We review these four theories here, for they represent fundamentally different bases for strategic change. Each theory focuses on a different set of change generating mechanisms and causal cycles to explain the processes that unfold.

**Teleological Theory**

Van de Ven and Poole (1995) describe a teleological theory as based on the assumption that change is guided by a goal or desired end state. It assumes that the organization is populated by purposeful and adaptive individuals. By themselves or in interaction with others they construct an envisioned end-state, take action to reach it, and monitor their progress. This approach underlies many organizational theories of change, including functionalism, decision making, adaptive learning, and most models of strategic choice and goal setting.

Teleological theory views development as a cycle of goal formulation, implementation, evaluation, and modification of goals based on what was learned or intended. The theory can operate in a single individual or among a group of cooperating individuals or organizations who are sufficiently like-minded to act as a single collective entity. Since the individual or cooperating group have the freedom to set whatever goals they like, teleological theory inherently accommodates creativity; there are no necessary constraints or forms that mandate reproduction of the current entity or state.

Teleology does not presume a necessary sequence of events or specify which trajectory development will follow. However, it does imply a standard by which development can be judged – development is that which moves the entity toward its final state. There is no prefigured rule, logically necessary direction or set sequence of stages in a teleological process. Instead, theories based on teleology focus on the prerequisites for attaining the goal or end-state: the functions that must be fulfilled, the accomplishments that must be achieved, or the components that must be built or obtained for the end-state to be realized. These prerequisites can be used to assess when an entity is developing; it is growing more complex, it is growing more integrated, or it is filling out a necessary set of functions. This assessment can be made because teleological theories posit an envisioned set of functions. This assessment can be made because teleological theories posit an envisioned end state or design for an entity and it is possible to observe movement toward the end state vis-à-vis this standard.

While teleology stresses the purposiveness of the individual as the generating force for change, it also recognize limits on action. The organization’s environment and its resources of knowledge, time, money, etc. constrain what it can accomplish. Some of these constraints are embodied in the prerequisites, which are to some extent defined by institutions and other actors in the entity’s environment. Individuals do not override natural laws or environmental constraints but make use of them in accomplishing their purposes.

**Life Cycle Theory**

Van de Ven and Poole (1995) observe that many management scholars have adopted the metaphor of organic growth as a heuristic device to explain changes in an organizational entity from its initiation to its termination. Witness, for example, often-used references to the life cycle of organizations, products, and ventures, as well as stages in the development of individual careers, groups, and organizations: startup births, adolescent growth, maturity, and decline or death.

Life cycle theory assumes that change is immanent; that is, the developing entity has within it an underlying form, logic, program, or code that regulates the process of change and moves the entity from a given point of departure toward a subsequent end that is already prefigured in the present state. What lies latent, rudimentary, or homogeneous in the embryo or primitive state becomes progressively more realized, mature, and differentiated. External environmental events and processes can influence how the immanent form expresses itself, but they are always mediated by the immanent logic, rules, or programs that govern development.
The typical progression of events in a life cycle model is a unitary sequence (it follows a single sequence of stages or phases), which is cumulative (characteristics acquired in earlier stages are retained in later stages) and conjunctive (the stages are related such that they derive from a common underlying process). This is because the trajectory to the final end-state is prefigured and requires a specific historical sequence of events. Each of these events contributes a certain piece to the final product, and they must occur in a certain order, because each piece sets the stage for the next. Each stage of development can be seen as a necessary precursor of succeeding stages.

Life cycle theories of organizations often explain development in terms of institutional rules or programs that require developmental activities to progress in a prescribed sequence. For example, a US legislative bill enacting state educational reform cannot be passed until it has been drafted and gone through the necessary House and Senate committees. Other life cycle theories rely on logical or natural properties of organizations. For example, Rogers’ (1983) theory posits five stages of innovation – need recognition, research on the problem, development of an idea into useful form, commercialization, and diffusion and adoption. The order among these stages is necessitated both by logic and by the natural order of Western business practices.

**Dialectical Theory**

A third family, dialectical theories, is rooted in the assumption that the organization exists in a pluralistic world of colliding events, forces, or contradictory values that compete with each other for domination and control. These oppositions may be internal to an organization because it may have several conflicting goals or interest groups competing for priority. Oppositions may also arise external to the organization as it pursues directions that collide with those of others (see Burawoy and Skocpol, 1982).

Dialectical process theories explain stability and change by reference to the relative balance of power between opposing entities. Stability is produced through struggles and accommodations that maintain the status quo between oppositions. Change occurs when these opposing values, forces, or events gain sufficient power to confront and engage the status quo. The relative power of an opposing paradigm or antithesis may mobilize to a sufficient degree to challenge the current thesis or state of affairs and set the stage for producing a synthesis. More precisely, the status quo subscribing to a thesis (A) may be challenged by an opposing entity with an antithesis (Not-A), and the resolution of the conflict produces a synthesis (which is Not Not-A). Over time, this synthesis can become the new thesis as the dialectical process recycles and continues. By its very nature, the synthesis is something created new that is discontinuous with thesis and antithesis.

Creative syntheses to dialectical conflicts are not assured. Sometimes an opposition group mobilizes sufficient power to simply overthrow and replace the status quo, just as many organizational regimes persist by maintaining sufficient power to suppress and prevent the mobilization of opposition groups. In the bargaining and conflict resolution literature, the desired creative synthesis is one that represents a win–win solution, while either the maintenance of the status quo or its replacement with an antithesis are often treated as win–lose outcomes of a conflict engagement. In terms of organizational change, maintenance of the status quo represents stability, while its replacement with either the antithesis or the synthesis represents a change, for the better or worse.

**Evolutionary Theory**

Van de Ven and Poole (1995) restrict ‘evolution’ to cumulative and probabilistic changes in populations of organizational entities. As in biological evolution, change proceeds through a continuous cycle of variation, selection, and retention (Hannan and Freeman, 1989). Variations, the creation of novel forms, are often viewed to emerge by random chance; they just happen. Selection occurs principally through competition among forms, and the environment selects those forms that are best suited to the resource base of an environmental niche. Retention involves the forces (including inertia and persistence) that perpetuate and maintain certain organizational forms. Retention serves to counteract the self-reinforcing
loop between variation and selection (Aldrich, 1979). Thus, evolutionary theory explains changes as recurrent, cumulative, and probabilistic progression of variation, selection, and retention processes.

Alternative theories of social evolution distinguish how traits can be inherited, whether change proceeds incrementally or radically, and whether the unit of analysis focuses on populations or species. A Darwinian perspective argues that traits can be inherited only through inter-generational processes, whereas a Lamarkian argues that traits can be acquired within a generation through learning and imitation. A Lamarkian view appears more appropriate than strict Darwinism applications of social evolution theory to organization and management (March, 1997). As McKelvey (1982) discusses, few solutions have been developed to operationally identify an organizational generation and an intergenerational transmission vehicle.

Social Darwinian theorists emphasize a continuous and gradual process of evolution. In The Origin of Species, Darwin (1936) wrote, ‘as natural selection acts solely by accumulating slight, successive, favorable variations, it can produce no great or sudden modifications; it can act only by short and slow steps.’ Other evolutionists posit a saltational theory of evolution, such as punctuated equilibrium (Gould, 1989), which Tushman and Romanelli (1985) introduced to the management literature. Whether an evolutionary change proceeds at gradual versus saltational rates is an empirical matter, for the rate of change does not fundamentally alter the theory of evolution – at least as it has been adopted thus far by organization and management scholars.

**Summary**

Life cycle, teleology, dialectics, and evolutionary theories provide four useful ways to think about and study strategic change in organizations. The relevance of the four theories varies depending upon the conditions surrounding organizational change. Specifically, Van de Ven and Poole (1995) posit that the four theories explain processes of organizational change under the following conditions. *Life cycle* theory explains change processes within an entity when natural, logical, or institutional rules exist to regulate the process. *Teleological* theory explains change processes within an entity or among a cooperating set of entities when a desired end-state is socially constructed and consensus emerges on the means and resources to reach the desired end-state. *Dialectical* theory explains change processes when aggressor entities are sufficiently powerful and choose to engage opposition entities through direct confrontation, bargaining, or partisan mutual adjustment. *Evolutionary* theory explains change processes within and between a population of entities as they compete for similar scarce resources in an environmental niche.

These theories are a useful way of thinking about strategic change. In this chapter, we use these theories to understand how change is ‘driven’ by underlying motors or generative mechanisms. These motors, as we have described earlier, are inferred from a systematic analysis of the sequence of events underlying the development of phenomena. Such an assessment reveals a set of motors that determine the scope and nature of strategic change.

In our use of strategic change one can see how we both build upon and depart from common uses of the term in the strategic management field. For instance, strategic change has been commonly used to denote ‘key’ organizational changes. Complementing this view is the use of strategic change as being purposive and goal oriented. Strategic change has also been used to denote changes undertaken to align an organization with its environment. The perspective that we have adopted suggests that one applies the theory that best fits the specific conditions to explain change processes.

**Implications for Strategic Change**

Each theory has important implications for strategic change in organizations. For instance, the notion of teleology has been central to the field of strategy as it offers a way of building theories that celebrate human agency (Child, 1972). In such theories, strategic choice is a key motor driving change with humans possessing an ability to plan and the power to shape economic, social and technological systems. Human agency becomes
progressively circumscribed as we begin introducing other change motors. For instance, strategic initiatives may need to be conditioned by life cycle dynamics. Or, change processes could be circumscribed and shaped by a multitude of conflicting social forces that deny planners an ability to unambiguously navigate a stream of unfolding events. Or, change can unfold within an even larger evolutionary process of variation, selection and retention.

Strategic change processes are fundamentally different within each of these theories. Change driven by teleology is planned and deliberate, based on an assessment of the possibilities involved. Change driven by life cycle dynamics represent transitions from one stage to another as an organization progresses along a prescribed sequence and adapts to forces. With dialectical theories, change as adaptation gives way to political processes of partisan conflicts and mutual adjustments among opposing parties. Finally, evolutionary theory examines processes of variation, selection, and retention of alternative organizational forms as generated by competition for scarce resources among competition for processes, adaptation and adoption occur as organizations cycle between periods of exploration and exploitation within an overall punctuated equilibrium process.

We delve deeper into these motors in the rest of this section (Table 10.1). Our objective is to provide readers with a way of thinking about strategic change based on the kinds of motors that one might encounter in different settings. In doing so, we also offer readers with an illustrative survey of the literature on strategic change.

**Strategic Issues Associated with Teleology**

Of the four change theories, teleology has been the most frequently used theory by strategy scholars and practitioners. This is not surprising as the field of strategic management is presupposed on the assumption that humans are purposeful with a capacity to make strategic choices. Indeed, these approaches underlie most models of strategic choice and goal setting. These models include what Mintzberg and his colleagues label as the positioning, design and planning schools of thought (Mintzberg et al., 1998). It also includes Allison’s (1971) Model I that ascribes rationality to purposeful actors pursuing goals and objectives as they attempt to make consistent value maximizing choices within specified constraints. Indeed, these assumptions have been used by many game theorists in the field of strategy to model strategic behaviors (Schelling, 1960; Camerer, 1991; Postral, 1991; Saloner, 1991).

Common to rational models of choice is a synoptic view of strategic decision making. In such a perspective thinking is separated from doing as decision makers apply a rational calculus to make optimal choices. However, because decision makers have limited information processing capabilities, most rational choice models accept Simon’s (1957) perspective of bounded rationality.

The adaptive learning school is an important extension of this basic teleological model (March and Simon, 1958; March and Shapira, 1987; Levinthal and March, 1981; Lant and Mezias, 1992; Mezias, 1998). Changes in organizations are viewed as movements towards a desired purpose, goal, function, or aspiration. The ability of an organization to meet the aspirations of top managers has an impact on their risk preferences and, consequently, on how the firm might behave in the short run. In the long run, organizational decision makers may adjust their aspiration levels based on the organization’s long run performance capabilities.

Those employing strategy theories around teleology often describe the genesis of novelty as being serendipitous (Garud and Karnøe, 2001). Variations from existing plans and standards of measurement are ‘mistakes’ that only by chance become successful. This is the benign side of such these theories. A more pernicious side is evident when an application of these theories results in the active resistance to any deviations from existing standards (Garud and Rappa, 1994; Christensen, 1997). In doing so, practitioners may stamp out the very sources of novelty.

Perspectives on organizational change based on teleology possess many strengths. Most important is that they provide a way of thinking of change as being purposeful, one based on a rational calculation of contexts and contingencies. However, the emphasis on rationality
<table>
<thead>
<tr>
<th>Process model</th>
<th>Motor</th>
<th>Definition</th>
<th>Strategic organizational change issues</th>
</tr>
</thead>
<tbody>
<tr>
<td>Teleological</td>
<td>Purposeful enactment and social construction</td>
<td>Is based on the assumption that change proceeds toward a goal or end state. It assumes that the organization is populated by purposeful and adaptive individuals. By themselves or in interaction with others they construct an envisioned end state, take action to reach it, and monitor their progress.</td>
<td>Ex-ante attempts to weigh pros and cons and manage trade-offs employing a rational calculus; Strategic choices dictated by an understanding of interdependencies and end-state outcomes as in game theory.</td>
</tr>
<tr>
<td>Life cycle</td>
<td>Compliant adaptation to rules and routines programmed into or outside of the system.</td>
<td>Assumes that change is imminent; that is, the developing entity has within it an underlying form, logic, program, or code that regulates the process of change and moves the entity from a given point of departure toward a subsequent end that is already prefigured in the present state.</td>
<td>Context monitoring and matching; Managing transitions and inflexion points.</td>
</tr>
<tr>
<td>Dialectical</td>
<td>Confrontation and conflict among pluralistic entities.</td>
<td>Is rooted in the assumption that the organization exists in a pluralistic world of colliding events, forces, or contradictory values that compete with each other for domination and control. These oppositions may be internal to an organization because it may have several conflicting goals or interest groups competing for priority. Oppositions may also arise external to the organization as it pursues directions that collide with those of others.</td>
<td>Change as negotiated settlement, strategy as representation and governance, resolution of paradoxes and tensions with the articulation of higher order constructs and super-ordinate goals.</td>
</tr>
<tr>
<td>Evolutionary</td>
<td>Resource scarcity, competition, and environmental selection</td>
<td>Change proceeds through a continuous cycle of variation, selection, and retention. Variations, the creation of novel forms, are often viewed to emerge by blind or random chance; they just happen. Selection occurs principally through the competition among forms, and the environment selects those forms that optimize or are best suited to the resource base of an environmental niche. Retention involves the forces (including inertia and persistence) that perpetuate and maintain certain organizational forms.</td>
<td>Trial and error adaptation and adoption processes.</td>
</tr>
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</table>
places a heavy burden on strategists to have a comprehensive view of the many contingencies that they may encounter in the future (Simon, 1957). They may also assume that interdependent actors will subscribe to the same set of goals and react to the same set of stimuli and information – see Zajac and Bazerman (1991) for situations with games between interdependent parties with competitive blind-spots. Social construction (Berger and Luckmann, 1966; Latour, 1986; Law, 1992; Callon, 1996) and enactment (Weick, 1979) theories relax these assumptions and adopt an interactionist perspective in which organizational purposes and meanings emerge from shared reflections among decision makers.

### Strategic Change Issues Associated with Life Cycle Dynamics

The genesis of life cycle dynamics in the strategy literature may be traced to early work in technology studies. Two counter-forces shape the development and diffusion of technological systems. One is a ‘law of progress’ (Adams, 1931) that points to an exponential growth in the development of a technological system after a relatively slower start. A second force is the ‘law of limits’ that represents the physical limits one invariably confronts with the performance of a technological system. Together, these two forces combine to prescribe an ‘S’ shaped curve in the development and diffusion of a technological system (Foster, 1986).

Life cycle dynamics implicit in the ‘S’ shaped curve were productively employed in other disciplines as well. In the marketing literature for instance, these dynamics are manifest in product life cycle issues (Kotler, 1994; Mahajan et al., 1990). In the economics literature, life cycle dynamics are apparent in the works of economists such as Vernon (1966). In the organizational field, life cycle dynamics can be found in conceptualizations of organizations progressing from one crisis to another as it grew in scale and scope (Greiner, 1972). They are also implicit in the contagion models that have been employed in diffusion studies and the creation of bandwagons in the development of fads and fashions (Abrahamson, 1991; Rogers, 1983). Clearly this is not an inclusive but an indicative list of those who have contributed to this way of thinking. However, as is apparent from even this short survey, life cycles unfold at various levels.

Several issues confront practitioners associated with processes exhibiting life cycle dynamics. First, there is a need to determine the stage in the life cycle of the organizational entity that is undergoing change. Monitoring internal and external contexts is an approach...
that has been advocated for this purpose. Although monitoring might appear to be a routine task, cognitive biases may create many difficulties in accomplishing this task (Kahneman et al., 1982; Kiesler and Sproull, 1982; Dutton and Jackson, 1987). Despite these difficulties, some tell-tale signs that have been employed to determine what stage an industry might be in its development are product price, the level of commoditization, the number of new entrants and exits.

In addition to correctly recognizing the stage of development of the entity being examined, another managerial challenge is determining the appropriate mode of operation in each stage of a life cycle. For instance, Utterback (1994) suggests that strategy implies competition based on functionalities during a ‘fluid’ stage of technology development whereas it implies competition based on reliability, quality and price during a ‘specific’ stage of development. Similar considerations have led others to suggest that a firm should be organized to ‘explore’ during early growth stages and organized to ‘exploit’ during later stages (March, 1991).

The most difficult challenge in managing processes driven by life cycle dynamics is to make transitions in between stages. Transitions are difficult as they imply changing one set of competencies well suited for one stage of operations to a different set of competencies required for a different stage of operations. Indeed, appropriate forms of behavior at one stage of operation may be the very forces that prevent organizations from transiting to the next stage. In other words, transitions become difficult as competencies at one point become traps (Levitt and March, 1988; Leonard-Barton, 1992).

While life cycle models are seductively simple to understand, they are easy for managers to misread. For instance, in the development of cochlear implants (a bio-medical prosthetic device), proponents of the single-channel device that gained early FDA approvals concluded to their peril that industry dynamics had switched to a growth and maturity stage (Garud and Van de Ven, 1992). This belief turned out to be misplaced when other firms continued developing their cochlear implant under the assumption that the industry was still at an introductory stage.

In a similar vein, Henderson (1997) illustrates how beliefs about the limits of a technology based on its internal structure can be misleading. Using the development of optical photolithography as an example, Henderson shows how the ‘natural’ or ‘physical’ limits of the technology were relaxed by unanticipated progress on three fronts: significant changes in the needs and capabilities of users, advances in the performance of component technologies (lenses), and unexpected development in the performance of complementary technologies. These observations lead Henderson to caution against using a life cycle model to predict the limits of a technology. Such predictions must be tempered by a recognition that many other factors (beyond the immediate grasp of those forecasting) may play a role in extending the life of a technology.

Life cycle dynamics are at play in a key field that drives change in contemporary times – semiconductors. For about three decades, Moore’s law described progress that has been made with semiconductor chips – a doubling of the number of chips that might fit into a silicon chip every 18 months. Announcements by scientists at Intel suggest that the silicon substrate may be reaching its limit (Markoff, 1999). In Grove’s terminology, these limits may represent the onset of a strategic inflexion point with the potential to create a ‘10X change’ (Grove, 1996). As this limit is reached, semiconductor firms will have to decide whether to continue with silicon chips, shift to a new architecture or to a new substrate. To ensure that Intel makes appropriate decision as it encounters this and other such inflexion points, Grove and his colleagues have put in place ‘dialectical processes’ that shape decision making at Intel. We explore issues associated with dialectical processes as they pertain to strategic change in the next sub-section.

Strategic Change Issues Associated with Dialectical Tension

Since Barnard (1938), organization and management theorists have largely accepted the premise that cooperation and consensus among organizational members are prerequisites for achieving organizational goals. This ‘consensus orientation’ views conflict between organizational constituents and disagreement about organizational direction as counterproductive
activities that divert organizational resources from the coordinated and efficient attainment of commonly accepted goals. Proponents of a consensus orientation cite empirical research demonstrating that organizational performance is facilitated by executive consensus on means (Bourgeois, 1980), consensus regarding both means and ends (Dess, 1987), and that cognitive diversity inhibits comprehensive and thorough long-range planning (Miller et al., 1995).

An alternative perspective suggests that unity and consensus among organizational members is only effective in stable environments and for unambiguous or routine organizational tasks (Nemeth and Staw, 1989; Jehn, 1995). According to this alternative perspective, disagreement about goals and direction may be a critical organizational dynamic leading to innovation, change, and renewal (Coser, 1957). Organizations that squelch disagreements and foster consensus become rigid and myopic, unable to adapt to changing circumstances or respond to competitive threats. In the words of Dahrendorf (1958: 170), a consensus orientation can answer the question ‘What holds organizations together?’ but only an orientation that includes conflict and disagreement can answer the question ‘What drives organizations on?’.

Dialectical change processes are becoming increasingly relevant as organizations become complex and pluralistic. Dialectical processes are generated as actors with different bases of power and from different cultures interact with one another to influence organizational directions and compete with one another for scarce organizational resources. In a multi-cultural context, a change effort may answer the question ‘What holds organizations together?’ but only an orientation that includes conflict and disagreement can answer the question ‘What drives organizations on?’.

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Dialectical tensions between people with different values and preferences automatically increase as an organization opens up to change and pluralism. Opening up a firm to multiple constituencies raises a fundamental question – ‘In whose interest should a firm be run?’. Pursuing such a question takes us to a stakeholder view of the firm (Cyert and March, 1963; Freeman, 1984; Dunbar and Ahlstrom, 1995; Garud and Shapira, 1997; see the AMJ issue on stakeholders, social responsibility and performance edited by Harrison and Freeman, 1999).

In such a view, a firm consists of multiple constituencies, each with different interests and values. Organizational actors act in their self-interest, and in doing so, may be in opposition to one another (Pfeffer and Salancik, 1978). An organized entity, then, is not necessarily a unitary actor with an unified purpose. Instead, it consists of many actors with different value systems and preferences who act in their best self-interests.

From this perspective, a firm is a forum for facilitating processes that generate superordinate goals from the meaningful representation of different stakeholders. However, such a synthesis is not always assured. Sometimes one group may gather sufficient power to suppress and prevent the mobilization of opposition groups. Those in authority and power can address conflict in two ways. First, they can use the ‘hierarchy’ to address conflicts at one level through command and control exercised at a higher level. Or, they can use ‘time’ to address conflicts through the sequential attention to goals (March and Simon, 1958).

A different set of issues surface as one considers the oppositions that firms encounter as they pursue courses of actions that collide with those pursued by other firms (Van de Ven and Garud, 1993a, b; Garud and Rappa, 1994). For instance, the directions that any firm may pursue along a technological trajectory may be in opposition to those pursued by rivals. Each technological trajectory trades off one dimension of merit for another, thereby generating multiple and conflicting cues.

The presence of multiple and conflicting cues generates ambiguity (Daft and Lengel, 1986). In the presence of resources such ambiguity generates ‘action persistence’ (Brunsson, 1982; Garud and Van de Ven, 1992; Starbuck, 1983). Researchers developing cochlear implants encountered these conditions in the 1980s (Garud and Van de Ven, 1992). Their response was to close themselves from feedback. Metaphorically it was akin to saying ‘damn the torpedoes, full steam ahead’. Indeed, where future states may be enacted in a self-fulfilling manner, such action persistence may be appropriate.

However, as was the case with cochlear implants, these dynamics can result in an escalation of commitment (Staw, 1976). To avoid this eventuality, proactive firms may institute checks and balance to reduce the possibilities
of needless escalation of commitments. For instance, Intel has put into place internal mechanisms to engage in critical inquiry (Argyris et al., 1985). Not only do they have mechanisms in place to discuss contrarian inputs from their employees, but their CEO also engages in ‘discrediting’ (Weick, 1979) by being ‘paranoid’ (Grove, 1996).

A broader principle implicit in Intel’s practices is that ambiguous, uncertain, and changing situations, require a more pluralistic leadership structure that encourages the requisite variety of perspectives needed for learning by discovery (Hedberg et al., 1976; Van de Ven and Grazman, 1997; Van de Ven et al., 1999). The value of conflict and disagreement in organizations is based on the assumption that the consideration of multiple perspectives is a critical requirement for effective decision making. Organizations and groups that foster multiple points of view are less likely to overlook critical competitive contingencies that affect their ability to accomplish goals and are more likely to anticipate the need for changes in organizational strategy and structure (Bantel and Jackson, 1989; Lant et al., 1992; Wiersema and Bantel, 1992). They are also more likely to develop creative ‘syntheses’ (Bartunek, 1993) and less likely to suffer from problems like groupthink (Janis, 1972).

In this regard, Van de Ven et al. (1999) offer insights on the virtues of fostering pluralistic leadership processes. They suggest that the roles of sponsors and champions be countered by a critics’ role. It is through the dynamic interplay between these different leadership roles that strategy is forged over time.

However, internal diversity is difficult to maintain. Depending upon the nature of diversity and how it is managed, ‘vicious’ cycles may emerge (Raghuram and Garud, 1995). Perhaps, this is why organizations with executive teams that value contradictory perspectives and keep them in balance are seldom observed. However, studies of these exemplary outliers provide some useful clues. First, Levinthal (1996) discusses structural mechanisms for maintaining diversity within the firm by establishing multiple sources of resources and bases of legitimate authority that promote multiple communities of practice or learning groups (Brown and Duguid, 1991). Second, Bartunek (1993) points out that achieving balanced internal diversity requires strong institutional leadership to tolerate the ambiguity of holding multiple perspectives, to be able to truly balance the power between managers with different perspectives, and to enable their interaction toward a creative outcome.

**Strategic Issues Associated with Evolutionary Processes**

At first blush, evolutionary theories challenge the applicability of teleology as a driver of strategic organizational change. Perhaps this is because evolutionary theories are indifferent or ‘blind’ to the source of variations. As Campbell (1969) discussed, blind variations may reflect purposeful creative acts of individuals, or a mutation of a life cycle process, or a dialectical synthesis from conflict and confrontation between opposing groups. Traces of evolutionary thinking are commonly embedded in emerging perspectives on strategy (see for example the *SMJ* special issue edited by Barnett and Burgelman, 1996).

Indeed, the applicability of evolutionary theories to strategic organizational change can be seen at various levels of analyses. For instance, at a very macro level, technological change can be conceptualized as proceeding through cycles of variation, selection and retention (Tushman and Anderson, 1975). Blind variations are the genesis of novelty, punctuating existing equilibrium that defines status quo. An era of ferment presages the emergence of a selection environment that is manifest in the form of a dominant design (Utterback and Abernathy, 1975). After the emergence of a dominant design, technological change takes on an incremental character as retained competencies and practices are fine honed. The cycle repeats itself as new variations disturb the equilibrium established by old technologies.

Another application of evolutionary theory can be found in the structure–conduct–performance (SCP) perspective as proposed by industrial organization economists such as Bain (1959) and Mason (1957). The SCP perspective attempts to explain inter-industry differences by examining industry structures that, in evolutionary terms, determines its carrying capacities. Specifically, industry structure influences firms’ conduct which in turn dictates firms’ performance (Porter, 1980).
Random variation, as manifest in technological innovations, often emanates from the ‘outside’ (Kamien and Schwartz, 1975). Selection environments (the industry structure) are exogenous. And, firms are powerless to abandon their retained competencies, thereby making it difficult for them to change their membership from their strategic groups.

A different application of evolutionary theory can be found in the resource-based view of the firm (Barney, 1986; Conner, 1991; Dierickx and Cool, 1989; Penrose, 1959; Rumelt, 1984; Wernerfelt, 1984; Garud and Nayyar, 1994). Over time, a firm accumulates resources, capabilities and organizational routines for developing new capabilities (Nelson and Winter, 1982; Teece et al., 1997). These core competencies develop in a path dependent manner, thereby making them somewhat unique (David, 1985; Arthur, 1988).

Such uniqueness is a cushion for firms against imitability. However, because of this very uniqueness, a firm’s competence may become mismatched with the environment within which it operates (Dunbar et al., 1998). Consequently, firms attempt to shape and co-opt their environments to gain legitimacy (Hirsch, 1975; Hamel and Prahalad, 1994; Porac and Rosa, 1996; Baum and Oliver, 1991; Rao, 1994; Aldrich and Fiol, 1994; Van de Ven and Garud, 1993a). Others may embed themselves in a constellation of relationships (Granovetter, 1985; Uzzi, 1996; Gulati, 1998). Successful firms gain a competitive advantage. Others may try to adapt themselves to their broader realities, and if successful, are able to overcome competency traps and core rigidities (Levitt and March, 1988; Leonard-Barton, 1992).

At the organization level of analysis the firm itself can be viewed as a selection environment (Bower, 1970; Burgelman, 1983). A firm’s administrative context powerfully shapes resource allocation. Innovation within firms occurs through processes that are autonomous and emergent even as they are shaped through processes that are strategically induced by top management (Burgelman, 1983; Mintzberg, 1978; Noda and Bower, 1996).

Applications of evolutionary theory at different levels of analysis often produce different stories of strategic change. Organizational learning provides a good example. Learning is seldom invoked to explain evolution at a population level. Whole species of firms may appear and disappear depending upon contextual changes that are oftentimes exogenous to firms’ choices. Strategy implies stumbling onto a situation of competitive advantage and then protecting the resource niche. Firms protect their niches by actively managing the forces (from rivals, suppliers and buyers, substitutes and new entrants) that might dissipate their profits (Porter, 1980). However, other scholars entertain the possibility of inter-generational learning. Individuals and firms do not passively react to the environments that they confront. Instead, they are capable of adapting to their environments as they learn across different generations of technologies and products (Udayagiri and Schuler, 1999; Garud and Kumaraswamy, 1996).

A Lamarckian view of evolution admits to learning processes within generations. Innovation can be a systematic learning process as firms employ dynamic capabilities (Teece et al., 1997). Moreover, firms attempt to shape emerging structures to complement their competencies (Porac and Rosa, 1996; Garud et al., 1997). In addition, firms may possess ‘meta-capabilities’ that provide them with an ability to change the genetic code driving innovation (Garud, 1999).

**Dynamic Interactions Between Change Process Theories**

Most processes of strategic change that have been systematically observed in field studies are far more complicated than any one of the four process theories that we have discussed so far. Van de Ven and Poole (1995) say this is so for two reasons. First, strategic change extends over space and time in any specific case. Spatial dispersion means that different influences may be acting simultaneously on different parts of the organization, each imparting its own particular momentum to the developmental process. In some cases more than one change motor may influence development and change. Development and change also take time to occur. As time passes, there is opportunity for different motors to come into play, especially given the dispersion of influences. For these reasons, resulting processes are multi-layered and complex.
The complexity of contemporary phenomena is well illustrated by a study of innovation in the development of a biomedical technology, the cochlear implant (Garud and Van de Ven, 1992; Van de Ven and Garud, 1993b). This innovation was shaped by change processes occurring on numerous fronts. A teleological process seemed to explain the course of development of the implant in the firm’s R&D lab. The action of top managers in purposefully selecting and funding the program was also consistent with a teleological model. However, the decision premises and timing of managerial interventions moved at a different pace than the pace of efforts of the development team. At a certain point in its development, the product had to achieve FDA approval, which required a sequence of proposals, clinical trials, and regulatory reviews and approvals. This prescribed sequence, which embodied a life cycle motor, came into play later than the teleological motors, but it was so important that the other two spheres of change had to rearrange their efforts to meet its requirements. A fourth influence operated at the larger field of researchers and clinicians concerned with hearing health. The firm’s pioneering implant design was initially supported by the field, but evidence mounted which led most researchers and clinicians to switch allegiance to a competing firm’s design. The complex interplay of these different motors, which operated in different times and places, created a complicated developmental sequence that was difficult to understand until these diverse influences were sorted out.

A second reason for the complexity of specific strategic change theories is the inherent incompleteness of any single motor. Each theory has one or more components whose values are determined exogenously to the model. For example, in the evolutionary model, variations are assumed to arise randomly, but the process that gives rise to variation remains unspecified. In the dialectical model, the origin of the antithesis is obscure, as is the source of dissatisfaction in the teleological model, and the processes which trigger startup and termination in the life cycle model.

In this regard, generative mechanisms from one theory can be used to account for exogenous components of another. For instance, the selection process in the evolutionary model can be used to account for termination in the teleological cycle. So also, the implementation step in the teleological cycle can trigger the startup event in the life cycle and the antithesis in the dialectic. The synthesis in the dialectic could be the source of variation in the evolutionary cycle. There are many other possible interrelations. In short, events from one model can be used to remedy the incompleteness of another model of change.

It is for these reasons that Van de Ven and Poole (1995) suggested that most specific theories of organizational development and change are actually composites of two or more ideal type motors. Observed change and development processes in organizations are often more complex than any one of these theories suggest because conditions may exist to trigger an interplay between several change motors and produce interdependent cycles of change. While each of these types has its own internal logic, complexity and the potential for theoretical confusion arise from the interplay among different motors. In the remainder of this chapter we focus attention on the complex non-linear dynamics that may be produced by interplays between the theories of change.

Complex Non-Linear Dynamics

A dynamic model is one where the variables (here the operation of different change processes) at a given time are a function (at least in part) of the same processes at an earlier time (Koput, 1992). Complex dynamics are generated because of non-linear positive or negative feedback. Non-linearity implies that the response is not directly proportional to the feedback stimulus. Van de Ven and Poole (1995) point out that temporal shifts in the relative balance between positive and negative feedback loops in the operation of different change motors can push an organization to flow towards a fixed-point equilibrium, oscillate in a periodic sequence between opposites, bifurcate far from equilibrium and spontaneously create new structures, or behave in a random fashion.

**Fixed-Point Equilibrium**

Organizational stability occurs when a negative feedback loop exists between the operation of prescribed (outcomes determined or governed by probabilistic laws) and constructive
(outcomes ‘enacted’ as change unfolds) motors of change. For example, the institutional routines or the established goals of the organization are sufficient to keep the creation of new programs or conflicts between alternative programs within limits so that the organization does not fly apart from too much novelty, and thereby produce incremental adaptations flowing toward a stable equilibrium.

Oscillation in a Periodic Sequence
Organizational cycles, fads, or pendulum swings occur when the relative influence of positive and negative feedback loops between change motors alternate in a periodic pattern and push the organization to oscillate somewhat farther from its stable equilibrium orbit. Such recurrent cycles are exemplified in some models of vicious circles in organizations (Masuch, 1985), group entrainment processes (McGrath and Kelly, 1986), and creative destruction (Schumpeter, 1942).

Bifurcation far from Equilibrium
Organizational transformations and spontaneous novel structures can be produced when strong imbalances occur between constructive and prescribed change motors, which may push the organization out of its equilibrium orbit and produce bifurcations (Prigogine and Stengers, 1984) or catastrophes (Zeeman, 1966) leading to chaotic patterns of organizational change.

Random Behavior
The behavior of change motors in a developing organization may be so complicated and indeterminate to render deterministic modeling infeasible – the best one can do is to stochastically model the behavior as a random process. Stochastic models based on the theory of random processes allow us to make better predictions than we could make with no model at all (Eubank and Farmer, 1990: 76).

As this discussion suggests, a major emerging direction for scholarship on strategic change is studying nonlinear dynamical systems models of organizational change and development (see the Organization Science issue on complexity edited by Anderson et al., 1999 and the journal on Emergence edited by Michael Lissac). When we move from a world that is linear to one that is non-linear, we need a different way of describing processes associated with strategic change. Paraphrasing Pettigrew (1992), we need a way of explaining phenomena in a manner that: acknowledges the embeddedness of actions, explores temporal interconnections between processes, provides a role in explanation for context and action, is holistic rather than linear, and links process analysis to the location and explanation of outcomes. We direct our attention to these facets of an emerging paradigm.

Implications of Non-linear Dynamics for Strategic Change
Contemporary phenomena are driven by dynamics that arise from rich connections between economic and social agents. Partly induced by the introduction of new information technologies, these rich connections are blurring the boundaries between once distinct spheres of activities across technological, organizational and cultural domains. Elements that may once have functioned independently of one another are now become coupled. With such coupling, changes in one entity can trigger changes in others in a domino fashion. Indeed, because of interactive complexity (Perrow, 1984), the system begins exhibiting complex non-linear dynamics. As a result, the system becomes prone to processes that can generate vicious or virtuous circles (Masuch, 1985). Continual change is a key part of this new landscape. To keep up with change, any actor, in an interactively complex landscape, has to draw upon others’ capabilities, thereby establishing links with them. And, in the very process of doing so, these inter-linked actors foster greater change The reciprocal relationship between change and interdependence is a key facet of network fields such as computer hardware and software (see for instance, Garud and Kumaraswamy, 1993; Garud et al., 1998a).

Change and interdependence point to another facet of contemporary phenomena – the value of belonging to a network with members who subscribe to a common architecture. Belonging to a common network gives rise to positive externality effects. Specifically, as the size of the network increases, so do the benefits to members because of knowledge
spillover or module substitution effects (Garud and Kumaraswamy, 1995; Katz and Shapiro, 1985; Farrell and Saloner, 1986). Indeed, these benefits increase at an increasing rate, a path-dependent dynamic that has been labeled as representing increasing returns (Arthur, 1988).

Phenomena with increasing returns are path dependent and sensitive to initial conditions (Arthur, 1988). This means that small initial differences or fluctuations in trajectories of variables may grow into large differences over time, and as they move far from equilibrium they bifurcate into numerous possible pathways resembling a complex decision tree in a chaotic fractal structure. In a chaotic state the pathways that are taken in the branching cannot be predicted; they represent spontaneously-created new structures that emerge in a seemingly random order (Ginsberg et al., 1996). However, such chaotic processes have a hidden order which typically consists of a relatively simple nonlinear system of dynamic relationships between only a few variables (Eubank and Farmer, 1990: 75). Underlying the indeterminate and seemingly random processes of strategic change processes often observed in organizations there may be such a relatively simple system of nonlinear dynamic relationships between a few of the motors of change examined here.

How might one navigate a flow of events that exhibit complex nonlinear dynamics? An answer lies in appreciating the dualities associated with interactively-complex systems. Duality alludes to the mutual dependence of agency and structure wherein structure is both medium and outcome of practices (Giddens, 1979). Any action produces a ripple effect on interdependent actors – the ‘structure.’ This ripple effect, in turn, shapes actions. Stated differently, any activity occurs and unfolds within an overall landscape that represents the residuals of prior actions. In other words, actions are embedded in the structures that they generate.

One way to think about the nature of embedding is to appreciate the ‘dimensionality’ space within which action unfolds (Dooley and Van de Ven, 1999). Dimensionality space represents the degrees of freedom that are available for strategic choice. To the extent that the dimensionality space for strategic choice is small (phenomena are ‘over embedded’) there are few degrees of freedom to maneuver. In contrast, to the extent that the dimensionality space is large (phenomena are ‘under embedded’), there are larger degrees of freedom to maneuver.

The nature of embedding of actions in structures has a bearing on the type of dynamics that may unfold (Garud and Jain, 1996). For instance, if actions are unconstrained by existing structures, random (or path independent) behavior is likely to unfold. Random behavior is likely to unfold as the residues from the past have little influence on present outcomes. There are many techniques to foster such ‘dis-embedded’ processes. One technique is to engage in re-engineering, a technique that advocates beginning afresh by obliterating the past (Hammer and Champy, 1993). Another technique is to embrace an outsiders’ perspective. And, often associated with these techniques is an infusion of resources to sponsor initiatives that have the potential to breakthrough existing structures.

A different set of path-dependent dynamics ensue when actions are totally constrained by the structures that they generate. Rather than possibilities of the future, sediments of the past shape action. Such systems are governed by ‘periodic attractors’ wherein any perturbation sets in motion a counter reaction that brings the system back into equilibrium. It is not uncommon to find such systems in situations that demand reliability and standardization. Such systems are typically governed by institutionalized rules and routines accumulated over time. Indeed, many firms that adopted mass production systems are examples of such ‘over embedded’ systems designed to celebrate the past.

Thus, we suggest that the nature of embedding is a strategic variable. The extent to which a system is designed to exhibit one or the other dynamics is partly dependent upon how the organizational system is designed. In this context, strategic organizational variables that can be manipulated are the level of resources deployed for exploration, the number and kinds of rules that are in play, the flexibility in the interpretation of rules, rules for changing the rules, and the like. Such processes are being observed in a study of semiconductor architectures (Garud and Kumaraswamy, 1995) and browser architecture (Garud et al., 1998a).

If the nature of embedding is a strategic variable, is it possible to design systems that
are neither over embedded nor disembedded but, instead, lie somewhere in between? If we can accomplish such ‘just’ embedding, then, it may be possible to generate dynamics that are neither random nor determined (Garud and Jain, 1996; Baum and Silverman, 2001). Instead, they may be characterized by path creation processes that harness continuity and change at the same time.

Organizational systems designed to spawn actions that are neither constrained nor unconstrained by the structures that they generate are poised at the ‘edge of chaos’ (Stacey, 1995; Cheng and Van de Ven, 1996; Polley, 1997; Brown and Eisenhardt, 1998). The extent to which resources are allocated to a set of activities and the number and type of rules that shape them are strategic variables that can be manipulated to shape the dynamics that are set in motion. In addition, the type of coupling between activities is another strategic variable (Weick, 1979). ‘Loose’ coupling between activities sponsors co-evolutionary dynamics where there are slippages in time and space between actions in one arena of activities and actions in another.

Systems characterized by such embedding are driven by ‘strange attractors’ and exhibit chaotic behavior. The nature of these processes are such that the structuration landscape bifurcates as agents make choices. Any action builds upon the past and yet departs from it. Indeed, any action opens up several associated possibilities almost in the form of a complex decision tree. Within such a tree, any path can be traced to an earlier path but cannot be predetermined by it. That is, it may be possible to trace existing choices to earlier choices, but it may not be possible to predict future choices based on present choices. This is because future states are based on possibilities that have yet to be realized based on choices yet to be exercised. More importantly, these future possibilities are enacted at any point in time in a self-fulfilling manner as resources are deployed to undertake an initiative. In other words it is possible to trace a ‘pattern’ but not predict the exact ‘path’ (Dooley and Van de Ven, 1999).

These dynamics have important implications for strategic organizational change. New landscapes emerge in the very act of ‘trying’ something. This structurating facet of action rationality (Brunsson, 1982; Pettigrew, 1992; Polley and Van de Ven, 1995) places a premium on trying something rather than endlessly analyzing a situation for an optimal course of action. Such an action rationality allows one to probe the system even as it is being created. Feedback that is generated from such a probe becomes the basis for making appropriate changes as new possibilities open up.

These processes are illustrated in several studies including a study of the development of VCRs (Rosenbloom and Cusumano, 1987), a comparative study of wind turbine development in the US and in Denmark (Garud et al., 2000), the emergence of brightness enhancement films at 3M (Garud, 1999), the emergence of browsers (Garud et al., 1998a), and the emergence of ‘new media’ initiatives in Silicon Alley (Garud and Lant, 1999).

Action rationality, however, can lead to an escalation of commitment to a failing course of action. Consequently, a key question is ‘How large should these action steps be?’ One answer is to keep action steps as small as possible to avoid an escalation of commitment yet large enough to gain meaningful feedback. Such a process embraces a ‘real options’ approach to the navigation of complex dynamic flow of events (Kumaraswamy, 1996; Garud et al., 1998b). Options value is realized because investments in any step generates an outcome that serves as a bases for deciding in real time whether or not to continue, modify or abandon a course of action. In this way, a practitioner navigates a flow of events by generating a set of compound options that represents a sequence of steps that evolves through the choices made by practitioners at each stage of a complex journey.

The creation of a landscape even as agents probe their embedding structures represents a process of ‘path creation’ (Garud and Karnøe, 2001; Karnøe and Garud, 2000). Those who attempt to create new paths are embedded in existing structures even as they attempt to embed out of these structures. Mindful of these processes, those attempting to create paths take steps that are able to mobilize rather than alienate interdependent actors. Moreover, such steps are taken consistent with the time and resources required to complete each step.

It is here one can begin seeing how the four motors (teleology, life cycle, dialectics and evolutionary) apply, albeit in different ways. For instance, teleology, in this context, is
‘muted’ agency as agents attempting to create paths come to realize that they are enabled and constrained by the structures that they are embedded in. Indeed, actions and structures co-evolve, thereby creating a duality. The embeddedness of any strategic initiative is underscored by the responses that are evoked with any initiative; the trick being to take appropriate steps that mobilize rather than alienate interdependent constituencies. Indeed, managing the thin line between initiatives that can mobilize as compared to those that can alienate is a critical factor in determining whether practitioners harness increasing returns associated with growth or fall prey to the diminishing returns associated with maturity and decline. In other words, life cycle issues are manifest in the ways in which practitioners shape emerging structures and actions so as to benefit from increasing rather than diminishing returns.

Implicit in action rationality and the process of path creation is strategy as bricolage (Garud and Karnøe, 2001). Bricolage is a French word with two meanings. One meaning is of a process connoting resourcefulness and adaptiveness. A second meaning is of a final product created with materials at hand. Such a dual meaning is similar in intent to dual meanings associated with words such as ‘building’, ‘construction’ and ‘work’, designating both a process and its finished product (Dewey, 1934). As Dewey explains, for these words ‘Without the meaning of the verb that of the noun remains blank’ (Dewey, 1934: 51).

It is as both noun and verb that we introduce strategy as bricolage. Bricolage embodies loose coupling between actions and structure (Giddens, 1979), wherein actors probe their worlds even as they create it through a process of negotiation with others. It is this structuring quality that we want to capture with our use of the term bricolage where strategic organizational change represents a duality. In this conceptualization, actors navigate the flow of events by being mindful of when to persist and when to desist, when to credit and when to discredit, when it might be possible to make changes in the boundary conditions – all the while cognizant of the fact that they are placing bets, the outcomes to which can be only described in probabilistic terms. When we allow for practical experimentation coupled with thoughtful modifications, a process of bricolage, we allow for the evolution of a system in an emergent way.6

Such a process of bricolage is similar to processes observed by other scholars. For instance, recognizing the challenges of navigating through complexity, scholars have offered notions such as the ‘science of muddling through’ (Lindblom, 1959) or ‘logical incrementalism’ (Quinn, 1978). Mintzberg et al. (1976) are additional process proponents who recognize the importance of bricolage for dealing with emergent strategies. In a similar vein, Burgelman’s (e.g. 1983) work offers considerable insights on autonomous approaches in contradistinction to the notion of induced approaches. More recently, Brown and Eisenhardt (1998) offer observations on how product development efforts can unfold in an emergent fashion within minimal structures across product generations.

**Research Agenda**

We encourage scholars to place study of strategic change processes high on their research agenda, for an understanding of how organizations change lies at the very core of our discipline. Van de Ven and Huber (1990) note that study of strategic change tends to focus on two kinds of questions: What are the antecedents or consequences of strategic changes? How does a strategic change process emerge, develop, grow or terminate over time?

Although the vast majority of research to date has focused on the first question, we encourage much greater research attention to the second question. The ‘how’ question is concerned with describing and explaining the temporal sequence of events that unfold as a strategic organizational change occurs. Process studies are fundamental to gaining an appreciation of dynamic organizational life, and to developing and testing theories of organizational adaptation, change, innovation, and redesign.

The change topics that might be included in this research agenda are limitless, and can vary greatly in scope, complexity, and novelty. For example, to stay in business, most organizations follow routines to reproduce a wide variety of recurring changes, such as adapting to economic cycles, periodic revisions
in products and services, and ongoing instances of personnel turnover and executive succession. These commonplace changes within organizations are typically programmed by pre-established rules or institutional routines and can be analyzed and explained using a life cycle theory of change. At the industry or population level, competitive or environmental shifts in resources typically govern the rates of reproduction (and resulting size and number) of various forms of organizations. Evolutionary theory is useful for explaining these population-level changes as the probabilistic workings of variation, selection, and retention processes.

Occasionally, organizations also experience unprecedented changes for which no established routines or procedures exist. They include many planned (as well as unplanned) changes in organizational creation, innovation, turnaround, reengineering, cultural transformation, merger, divestiture, and many other issues the organization may not have experienced. These kinds of novel changes can be usefully analyzed and explained with a teleological theory if they are triggered by a reframing or frame-breaking strategy of powerful people in control of the organization. Alternatively, a dialectical theory might better explain the novel change process when conflicts and confrontations between opposing groups occur to produce a synthesis out of the ashes of the conflict engagements.

The processes through which these novel changes unfold are far more complex and unpredictable than routine changes because the former require developing and implementing new change routines, while the latter entail implementing tried-and-tested routines. Novel changes entail the creation of originals, whereas routine changes involve the reproduction of copies. Novel changes are strategic innovations, whereas routine changes are business as usual.

Having said this, it is important to recognize a caveat. Existing theories of strategic organizational change are explanatory, but not predictive. Statistically, we should expect most incremental, convergent, and continuous changes to be explained by either life cycle or evolutionary theories, and most radical, divergent, and discontinuous changes to be explained by teleological or dialectical theories. But these actuarial relationships may not be causal. For example, the infrequent statistical occurrence of a discontinuous and radical mutation may be caused by a glitch in the operation of a life cycle model of change. So also, the scale-up of a teleological process to create a planned strategic reorientation for a company may fizzle, resulting only in incremental change.

Studies of more complex strategic organizational changes are often more challenging to explain because several generative mechanisms may be driving the underlying dynamics of the specific change being investigated. An appreciation of these complexities is useful for identifying the scope of the research, including issues such as the research question, the levels and units of analysis, the granularity of the data that must be gathered and the time frame within which data must be gathered.

For example, consider a large scale project that we have tracked over a decade – the development of cochlear implants. Our early preliminary discussions with those associated with cochlear implants revealed that this was a field where the Food and Drug Administration (FDA) played a key role in the strategic success and failure of products and firms. At that time, the FDA ‘life cycle’ motor involving Investigational Device Exemption (IDE), clinical trials, and ‘Pre Market Approval’ (PMA) could take seven years or more. Recognizing this fact, 3M Corporation set aside a 10-year time frame for its cochlear implant program.

To be sure, there were intermediary milestones indicative of the sub-processes and motors unfolding within the larger ‘unitary’ FDA driven sequence. For instance, one could see teleological driven change as 3M practitioners allocated resources to develop single-channel devices based on their judgments as to what would benefit the profoundly deaf the most. Or one could see dialectical change processes as opposing approaches to the development of cochlear implants informed and shaped emerging regulatory mechanisms. Or one could see evolutionary processes at play as institutional and technical environments co-evolved.

We studied all these processes in our 10-year longitudinal research program with cochlear implants. We started our study in the early 1980s when 3M was initiating its cochlear implant program and when the cochlear implant industry was just starting to emerge. We concluded our longitudinal
study in 1989 when a dominant design emerged at a ‘consensus development conference’ organized by NIH/FDA and when 3M decided to withdraw from cochlear implants. Along the way, the specific sub-processes that we observed (within the overall FDA logic) guided the type of questions we pursued, the level of granularity of data that we gathered and the approaches to the analysis of the data that we adopted.

This heuristic of developing a research agenda based on an unfolding understanding of the main and sub-drivers of a phenomena is a useful strategy for research in any setting. In the rest of this section, we will offer additional thoughts on the kinds of research questions, data collection approaches, analytical schemes and interpretive mechanisms that are appropriate. They are discussed in greater depth by Poole et al. (2000).

**Research Questions**

Because of its strong teleological underpinnings, strategic management scholars tend to gravitate towards studies that seek answers to our first type of question about the antecedents and consequences of strategic changes. Answers to this kind of question invariably drives us to take a variance approach (Mohr, 1982). Variance studies are concerned with establishing necessary and sufficient causation between dependent and independent variables. Such an approach to knowledge creation is valuable in contexts that are stable and where the boundaries of the phenomenon under consideration are clear. However, such an approach is less useful for examining process questions about the order and sequence of events that unfold in a change process being studied.

A process perspective is implicit in a ‘how’ question, such as ‘How does a strategic change process emerge, develop, grow or terminate over time?’ Process theories explicate the confluence of forces that are individually necessary but only collectively sufficient for the occurrence of an outcome (Pettigrew, 1987; Tsoukas, 1989; Van de Ven and Poole, 1995; Drazin and Sandelands, 1992). Process theories offer a story of how these events occur – what are the necessary conditions, and how do they co-occur and interact in a probabilistic manner to yield the manifest phenomena that we now observe? The basis of explanation is probabilistic combinations of precursors and focal units in such a way as to yield the outcome (Poole et al., 2000).

**Nature of Generalizations**

The bases of generalization in most process theories is not from a sample to a population but from a case to a theory (cf. Garud and Rappa, 1994). The way this is accomplished is not by teasing out efficient causation between variables, but, instead, by teasing out the deeper generative mechanisms that account for observed patterns in the events. And, these drivers can only be explicated if we have recorded events over time. That is, rather than look at co-variations between observable variables at a point in time, this approach attempts to look at the deeper drivers that account for the co-variations of variables over a point in time.

The ‘degrees of freedom’ required to make generalizations from an in-depth process study is different from those required to generalize from a large sample variance study. Specifically, as Campbell suggests:

In a case study done by an alert social scientist who has thorough local acquaintance, the theory he uses to explain the focal difference also generates predictions or expectations on dozens of other aspects of the culture, and he does not retain the theory unless most of these are also confirmed. In some sense, he has tested the theory with degrees of freedom coming from the multiple implications on any one theory. The process is a kind of pattern-matching in which there are many aspects of the pattern demanded by theory that are available for matching with his observations on the local setting. (Campbell, 1975: 181–2)

**Data Collection**

Gaining access to longitudinal data is a key requirement for conducting process research. Equally important is to study ‘phenomenon-in-the-making’. That is, researches must be able to consider possible states as they unfold from the point of view of the actors involved at that point in time. Under these circumstances, potential successes and failures have to be studied symmetrically (Bijker et al., 1987).
Ideally, this task would require data gathering on a real time basis. This can be time consuming and difficult task to accomplish. A viable alternative would be to track events on a ‘seemingly’ real time basis based on archival data. That is, researchers would have to put themselves at the time of the event without knowledge of the end-states that emerged.

These deliberations lead to another methodological facet – event neutrality (Garud, 1999). An event that occurs at any point in time has to be understood from a larger perspective spanning time and interpretive systems. For instance, the value of an event may differ over time, across levels of an organizational hierarchy and across the interpretive frames of different firms. It is for these reasons that what may appear to be a neutral event to a key stakeholder at one point in time may set in motion a sequence of events that shapes the evolution of phenomena in the future (Arthur, 1988; David, 1985).

Event neutrality has several implications for data collection. Besides gathering data over time, it is key to gather data from multiple sources and from multiple levels of analyses. Such a strategy allows the researcher an opportunity to track both continuity and change. Specifically, tracking events over time offers an opportunity to perceive and record change as a departure from existing forms and functions. Tracking change from multiple perspectives offers an opportunity to view who perceives change when. And tracking change at multiple levels offers an opportunity to see how change at one level of analyses unfolds with continuity at a different level of analysis.

Data Analysis

In preparation for a more detailed analysis of the data (as discussed by Poole et al., 2000), there are several basic steps one might take. A first step is to generate a chronology of events within and across constructs of the interest. A simple eyeballing of this chronology might reveal patterns that provide a clue as to the types of drivers at play. To supplement this effort, one might generate plots of events across constructs of interest. These plots can provide a visual representation of rates and directions of change of events within and across constructs.

These analyses serve as groundwork for a more detailed analysis of the data. Three strategies cover the many variations of more detailed data analysis. The first is to begin forming connections between concepts and identifying the complex feedback connections between them. Eventually, these cause maps can be displayed as a graphic and presented in the form of a narrative (Garud and Van de Ven, 1989; Van de Ven and Garud, 1993b).

In contrast to this qualitative process research approach, the variance theory approach begins identifying relationships between variables appropriately lagged in time by employing structural equations and other similar statistical tools (Garud and Van de Ven, 1992). More recently, Poole et al. (2000) describe how it is possible to identify the ‘attractors’ that might underlie the events applying advances in non-linear dynamics to management research (see also Baum and Silverman, 2001).

A third strategy is to run computer simulations that might reveal the evolution of phenomena that exhibit complex non-linear dynamics. For running meaningful simulations, one has to have a sense of the range of values that simulation parameters can take. Data that has been gathered can serve as a good starting point for establishing the range. Mezias and Eisner (1997) have employed such a strategy to show that the interaction between levels of competition and imitability in the context of complex population dynamics can produce surprising patterns of innovation and refinement of technology.

CONCLUSION

It is easy to get lost in the complexities theories and observations of strategic organization change processes unless we possess a systematic way of understanding this ever growing literature. We adopted Van de Ven and Poole’s (1995) typology to make sense of this literature and to compare change processes in terms of the generative motors that derive from four theoretical perspectives – teleology, life cycle dynamics, dialectical processes and evolutionary processes. Each theory has different implications for strategic change. For instance, strategic change associated with teleology occurs in response to preset plans and
goals. Strategic change associated with life cycle dynamics occurs in response to the changes in the stages in the life cycle of an entity that occurs because of an inherent life cycle logic. Strategic change associated with dialectic processes occurs through mutual partisan adjustment of pluralistic entities. And strategic change in response to evolutionary processes occurs in response to firms’ attempts to endogenize variation, selection and retention processes.

As organizations open themselves to a multitude of stimuli, change processes will become more complex than any of these four pure forms can suggest. Under these conditions, it is important for us to have a way of thinking about strategic change that matches the complex environments that we have to navigate. We would indeed be conducting a procrustean transformation if we were to use a uni-dimensional motor as the basis for the articulation of strategic change when the phenomena itself asks for a more sophisticated analysis involving the interplay of more than one motor.

In this regard, we showed how the interactions between motors can generate complex non-linear dynamics. These dynamics challenge us to think about strategic change in ways that are different from those we may encounter in traditional settings. Specifically, we must conceptualize strategic change as a fluid emerging process that is closer to a process of bricolage than it is to brilliance. We suggest that this represents a new view of strategic organizational change as duality. Understanding strategic organizational change as duality represents a central and productive challenge for strategy and management scholars.

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NOTES

1 These complex dynamics are created because of non-linear feedback. Feedback can be negative or positive. Non-linearity implies that a response is not directly proportional to the feedback stimulus. Non-linear feedback produces complex dynamics in organizational systems.

2 Recent work on intra- and inter-generational learning holds the promise for developing such solutions (Garud and Kumaraswamy, 1996; Garud and Nayyar, 1994; Udayagiri and Schuler, 1999; Wade-Benzoni, 1999).

3 We use the term structure synonymously with context. Strategic choice by one actor manifests itself as context when viewed from the perspective of another interdependent agent. Another way of looking at this is to recognizes the existence of reciprocal interactions between a group of variables wherein one variable affects, and is in turn affected by, another variable (Maruyama, 1963).

4 This structuration process is illustrated in several studies including emergence of wind turbines in Denmark (Garud and Karnøe, 2000), the emergence of cochlear implants (Van de Ven and Garud, 1993; Garud and Rappa, 1994), the co-evolution of CT Scanners and radiology departments (Barley, 1986), the co-evolution of organizational forms and technologies (Orlikowski, 1992).

5 This process is illustrated by dynamics of change associated with the microreplication technology platform as described in ‘3M innovation: a process of mindful replication’ (Garud, 1999).

6 These processes are explicated in greater detail in a paper that explores path creation and path dependence in the emergence of wind turbines (Karnøe and Garud, 2000).

REFERENCES


Dahrendorf (1958: 170)


STRATEGIC CHANGE PROCESSES


