

# **Organizational Change and Innovation Process: Theory and Methods for Research**

*Marshall Scott Poole, et al.*

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# Organizational Change and Innovation Processes



Theory and Methods for Research

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# Preface

THIS BOOK WAS BORN in the challenges that confronted the Minnesota Innovation Research Program, which began in 1983 with the objective of developing a process theory of innovation in organizations. Fourteen research teams, involving more than 30 faculty and doctoral students at the University of Minnesota, conducted longitudinal studies that tracked a variety of new technologies, products, services, and programs as they developed from concept to implementation in their natural field settings. Initial findings were published in *Research on the Management of Innovation: The Minnesota Studies*, edited by Andrew Van de Ven, Harold Angle, and Marshall Scott Poole (Ballinger/Harper & Row, 1989 and reissued by Oxford University Press, 2000). By documenting the historical and real-time events in the development of a wide variety of innovations, this first MIRP book provided a rich empirical database for subsequent analysis and grounded theory building.

At the time of the MIRP studies, two major tasks lay before us. First, how were we to theorize change processes? Most current theories of change did not address *how* change occurred, but rather focused on identifying *causes* of change. As we pursued our research, we became convinced that such theories were unsatisfactory because they did not take into account important characteristics of change processes, including their path dependence, the powerful influence that a single critical event often had on the direction and impacts of change, and the role of human agency in molding change according to plans or implicit models. The few theories that explicitly focused on change were also unsatisfactory because they oversimplified, typically positing relatively simple stage models of change. While such models captured some aspects of change, our studies and personal experience suggested that change processes were much more irregular and complicated than the models allowed. We became convinced that a fundamentally different explanatory framework was needed to capture change.

We found a solution in the process approach to explanation, first defined by Lawrence Mohr. The process approach attempts to account for how changes unfold over time and incorporates path dependence and the impact of critical events. Mohr's early conceptualization can be broadened by recognizing that a more general concept—a theoretical narrative—underlies process explanations, an insight we owe to the seminal work of Andrew Abbott. As we attempted to spell out the characteristics of narrative explanation, we realized that it constitutes a complementary alternative to causally based variance explanations. Another piece of the puzzle was provided by our work on process theories and motors of change, first published in a chapter of *Research on the Management of Innovation*, and elaborated in a 1995 article in *Academy of Management Review*. The multiple motors provided a range of theoretical narratives, and our analysis suggested that in many cases, more than one motor was in operation. The complexity observed in organizational processes could be explained in terms of switching from one motor to another as conditions changed or by complex, recursive interaction of two or more motors. We believe that the process approach, narrative explanation, and multiple motors of change offer a general theoretical framework that can provide new insights into change and innovation processes. We hope that this will ultimately translate into better understanding and improved practice.

The second challenge was to link these theoretical narratives to historical narratives, that is, to the actual unfolding of observed change processes. It is the task of research methodology to determine how to do this. At the outset we decided that it was important to go beyond single case studies and historical methods. While these approaches have produced profound insights, we believe that a comparative approach is more likely to help us identify the variables and processes that make a difference. We also wanted to design studies that include as many cases as possible, so that we can be confident that results generalize and are not artifacts of the cases at hand.

Turning to quantitative methods, we found that the most common and popular methods were framed around testing causal hypotheses and are not well-suited for the study of processes. These methods were designed to support the testing of hypotheses about relationships among well-defined variables, and most are not designed for important tasks required for process research, including identification of key events in an unfolding process, recognition and categorization of patterns in long series of events, evaluation of hypotheses about sequences and patterns of events or behaviors over

time, linkage of multiple types of data, and evaluating hypotheses about narratives.

In the end, it became apparent that we needed methods that enable the deep, sensitive attention to details of the particular context that is traditionally associated with qualitative case studies or ethnographies, and also allowed testing specific narrative explanations on the larger samples needed to support generalization. This was a tall order, and it posed an intriguing challenge. This challenge was met by methods developed in a range of fields concerned with processes—child development, group communication, industrial engineering, occupational sociology, demography, biology, computer science, history. Methods like Markov analysis, phase mapping, and time series analysis, used properly, enable researchers to identify characteristics of event series that afford systematic specification and testing of narrative explanations. We experimented with these methods to determine how to use them in ways that retained some of the sensitivity of the narrative method, yet enabled us to systematically deal with larger and longer event sequence data in order to analyze complex processes and derive testable generalizations. We found it necessary both to extend traditional quantitative methods and to introduce some new approaches for diagnosing nonlinear dynamic patterns in our event sequence data on innovations.

While developing these methods we conducted research workshops in 1993, 1995, and 1997 at the University of Minnesota, each attended by 50–70 researchers interested in process research methods from universities throughout the United States and Europe. These workshops made us aware of a much larger community of researchers commonly interested in studying processes of organizational change but searching for methods to do so. Workshop participants encouraged us to document and distribute the process research methods we were developing. The result was this volume.

While this book is grounded in the study of organizational innovation and change processes, we believe that the theory and methods discussed here apply to all types of processes, not just those in organizations. So we hope to repay the scholars we have learned from in fields such as human development, group communication, and industrial engineering by advancing an informed view of processes that can clarify and inspire their research.

We are indebted to a number of people and organizations who supported this work. The Office of Naval Research supported the Minnesota Innovation Research Project with a grant from 1983 to 1986. The Decision, Risk and Management Science program of the National Science



Foundation, and in particular its director Arie Lewin, provided encouragement and support for the first conference that introduced these methods. The second and third conferences were sponsored by the Consortium of Centers for Organizational Research and the Strategic Management Research Center of the University of Minnesota.

Several individuals have exerted important influences on this project. Most significant was Andrew Abbott of the University of Chicago. His many articles on narrative positivism were inspirational, and this book owes a great debt to him. To Larry Mohr we owe the genesis of this project. His seminal and insightful book of twenty years ago set the stage for whatever contribution this volume holds. Dean Hewes of the University of Minnesota was an important part of two workshops, and his thinking on retrodution and mastery of Markov analysis helped us to understand their importance to our endeavors. Ken Koput contributed important insights about nonlinear modeling in our third workshop, and his thinking on this subject certainly informed our analysis of this matter. Joe McGrath of the University of Illinois read the first draft of the manuscript and provided very useful suggestions.

In preparing the book we were ably assisted by the superb professional editing of MaryBeth Branigan. Her patient review of the entire manuscript improved the clarity and style of presentation tremendously. We are truly grateful that Herbert Addison and Oxford University Press has agreed to publish our book. Herb provided us with wonderful encouragement, guidance and support in preparing this work. In his distinguished career as Oxford's executive editor of business books, Herb has made major contributions to management and organization science. He has truly made a difference.

We dedicate this book to our families and significant others. They are what make us what we are, and whatever insights there may be in this book depend on their support and inspiration.

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# PART I THEORY

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# 1 Perspectives on Change and Development in Organizations

**E**XPLAINING ORGANIZATIONAL CHANGE has been an enduring quest of scholars in many disciplines. Change and development processes are central to such organizational phenomena as careers, group decision-making, organizational strategy formation, innovation, and interorganizational networks. Contemporary intellectual currents, exhibited in the rising interest in such topics as individual and organizational life cycles, structuration theory, and nonlinear systems thinking, echo Heraclitus's claim that "nothing is permanent save change." These positions view even seemingly stable phenomena such as industry structures, which appear to change slowly if at all, in terms of continuous processes that maintain stability under current conditions, but are capable of effecting broad, rapid change if circumstances change. They are consistent with Hernes's (1976) stricture that an adequate theory should explain stability and change in terms of a common process theory.

To understand how organizational changes unfold, researchers have borrowed many concepts, metaphors, and theories from other disciplines, ranging from child development to evolutionary biology. These include punctuated equilibrium, stage models of growth and decline, population ecology, and chaos theory. The resulting theoretical pluralism has produced intriguing insights into organizational change and developmental processes.

However, without a suitable infrastructure of research strategies and methods, such borrowing is more likely to generate metaphors than testable propositions. Testable propositions require the combination of well-defined theory with methodology appropriate to the theory. No matter how fertile their theoretical ideas, only with methods in mind can researchers generate precise, meaningful models and hypotheses.

Most current social scientific methods are not particularly well suited for research on change and development processes. Both quantitative and case

methods have shortcomings. Most quantitative methods, including classical and modern measurement theories (e.g., Crocker & Algina, 1986; Cronbach, 1990) and statistical analysis using the general linear model, are designed for analysis of static patterns rather than the dynamics of change (Abbott, 1988). Case methods are more sensitive to the many nuances of change, but their major drawback is small sample size, which renders them vulnerable to sampling error and limits generalizability. While several promising approaches to multiple case analysis (e.g., Leonard-Barton, 1990; Miles & Huberman, 1984, 1994) have been developed, none afford the definitive, clear tests of hypotheses that are the hallmark of the quantitative methods.

This book provides an introduction to research methods specifically designed to support the development and evaluation of organizational process theories. Some of the ideas and methods we cover are emerging from the struggles of various researchers to make sense of mountains of process data. Others represent novel adaptations of traditional methods. In trying to place these methods in the proper context, we defined four criteria that adequate research on change and development processes should satisfy. The book is organized around these criteria.

First, *explanations of change and development should incorporate all types of forces that influence these processes*. The predominant research strategy and its methods, which Mohr (1982) called the *variance approach*, are well suited for continuous change driven by deterministic causation. However, this conceptualization of change is limited. Change and development processes are also influenced by critical incidents that may suddenly alter the course of a given case, by the particular historical context of the case, and by general formative patterns that give overall direction to development, yet do not entirely determine what happens at the microlevel. The *process approach*, first described by Mohr (1982) and enlarged here in our account of narrative explanation, is a complement to the variance approach. It offers an explanation of development and change that encompasses continuous and discontinuous causation, critical incidents, contextual effects, and effects of formative patterns. The process approach promises new and more satisfactory theories that enable researchers to express the narratives underlying organizational change processes.

However, we must address two shortcomings in most previous research on narrative in such fields as history, literature, and psychology. Most narrative studies focus on specific individuals or cases, and narrative research

has tended to emphasize the idiographic over the nomothetic (Polkinghorne, 1988). What is required in our case is a conception of narrative explanation that emphasizes generalizability and abstract narratives. We will explicate a process perspective that supports the discovery and testing of general theories of development and change.

A second shortcoming is the lack of processual models suitable for the study of organizations. This leads to our second criterion: *Explanations of change and development should incorporate generative mechanisms suitable for organizational contexts*. Based on Van de Ven and Poole (1995), we will delineate four fundamental motors that drive organizational change and development. These motors, and combinations of them, define general narratives that explain specific organizational processes. The typology of change motors also provides a unifying scheme to clarify similarities and differences among theories. It enables researchers to discern common points and to achieve theoretical integration that leads to a more comprehensive understanding of organizations and related phenomena.

In the long run, the best theory is only as good as its evidence. This implies a third criterion: *Research designs should capture data directly from the process through which development and change occurs*. Process theories of development and change can be adequately evaluated only if research is focused where the "action" is. In most process theories the appropriate unit of analysis is the event, the smallest meaningful unit in which change can be detected. Hence, development and change can be studied in the sequence of events an entity participates in or experiences. Events often consist of individual or collective actions, but they may also bring about changes in context that influence the developing entity. Through events the various forces that influence development and change, continuous and discontinuous, local and general, come into play. Taking the event as the basic unit of analysis requires special methods and raises problems somewhat different from those addressed by classical and modern measurement techniques, as we will see.

Along with a different type of data comes a need for different approaches to analysis, suggesting a final criterion: *Analytical methods should be able (a) to discover patterns in complex process data and (b) to evaluate process explanations*. Both discovery and evaluation are important phases of process studies. Studies of event sequences typically generate long data series which offer the opportunity to discover variations among cases. Methods are needed to help researchers work out typologies that reflect different devel-



opment sequences. Event sequence data is also typically rich and voluminous. Methods are needed to help researchers discover patterns in complex datasets. Both typological and pattern recognition analyses afford the opportunity for discovering new relationships and models. Testing process hypotheses also requires specialized methods. Process theories generate predictions that require the analysis of lengthy series of event data. In some cases, these predictions pertain to event-to-event (act-to-act) relationships, either causal or sequential. In other cases, the predictions may be about the series of steps or phases development follows. In still other cases, predictions about long-term properties of the event sequence, such as the shape of the developmental curve, are of interest. These and other predictions require methods adapted to the study of dynamics rather than statics.

These four criteria suggest the need for new methods and a revised conception of theory and method. This book attempts to explicate the foundations of a growing body of process-oriented research on organizational change and development. In so doing, we hope to encourage more researchers to venture into this area. The theory and methods discussed in this book are fairly abstract and at times quite difficult, so it will help to have a concrete example to follow throughout. To illustrate the different approaches research on organizational processes can follow, let us now turn to an example.

## CONTRASTING RESEARCH STRATEGIES

Let's take a not-so-hypothetical case of researchers interested in the role of the planning and implementation process in new business startups (Van de Ven, 1980a, b, & c). They decide to study the startup of state-funded child-care programs and are successful in gaining access and funding to support their research. They consider two different explanations for the effectiveness of new business startups. First, they hypothesize that startups that conform to a normative model of the startup process will be more effective than those that do not. The normative model of program planning they are testing posits a five-step planning process:

1. *Planning Prerequisites*: Build community support; form a cohesive planning team; establish a planning policy board to ensure the program meets community needs; identify and counteract possible foes.
2. *Problem Analysis*: Conduct broad and careful assessment of community needs, with input from planning policy board, community, clients, and state and local officials.

3. *Knowledge Exploration*: Identify priority problems and alternative ways to solve them by surveying perceptions of experts in the problem area; planning board should review expert recommendations; distribute report of expert opinions to community, clients, and state and local officials.
4. *Program Design*: Design a program that realistically responds to problems identified in Phases 2 and 3; conduct workshops and problem-solving meetings with community, clients, and other agencies who have to coordinate with the program; conduct review of program by planning policy board and state and local officials; modify plan to satisfy diverse constituents.
5. *Program Implementation, Evaluation, and Operation*: Implement proposed program on a pilot basis; evaluate and fine-tune program; initiate broader scale implementation; operation and continuous evaluation and adjustment of program. (Delbecq & Van de Ven, 1971)

This model is designed to improve planning by ensuring participation of stakeholders and resource controllers, separating ideation from evaluation, retarding speedy convergence on less-effective alternatives, providing for critical review of ideas and alternatives, and ensuring an open and participatory process. The researchers hypothesize that startups that follow this sequence of phases will be more effective than those that do not because they will avoid problems that often arise and impede nascent community organizations.

The second hypothesis is that organizational characteristics of the startups will influence their effectiveness. Greiner (1972) comments that a common characteristic of unsuccessful innovations is that attempts are made to implement new programs on a large-scale and global basis. Hence, we might expect that programs that start small and gradually increase in size, number of service sites, and service provision would be more effective than those that attempt full-scale, broad implementation from the outset. A second characteristic of effective social service startups should be increasing formalization over time. Documentation of effective procedures and good record keeping are critical to certification and interorganizational relationships for public agencies, and these will gradually be built into procedure manuals. Third, a high level of staff participation should help decrease employee resistance to innovation and build employee "ownership" of the endeavor. Finally, highly qualified and talented staff would be expected to enhance startup effectiveness.

How could the researchers test these hypotheses? Three research strategies can be distinguished.

## CROSS-SECTIONAL SURVEY

A common approach would be to conduct a single-shot survey of a large sample of state-funded childcare programs. The researchers might conduct survey interviews with directors of 300 childcare programs in several states. The interviews would gather data to indicate whether the program followed the tenets of the planning model and to gauge organizational structure. Indicators of planning include questions or indices that assess participation level, nature of board (if any) which oversees the effort, nature of the planning team (if any), degree of technical assistance for the programs, and steps taken to put the program into action. Indicators of structure include measures of size, participation, formalization, and staff characteristics. In addition, data on the effectiveness of the programs could be gathered by assessing variables such as number of units of service provided, financial independence, perceived effectiveness by peer organizations, efficiency, and number of implementation barriers or obstacles encountered.

The large sample size would ensure the inclusion of programs at a variety of stages of development. Classifying these by age and level of development would enable researchers to generate cross-sectional descriptions of programs at various stages of development. In essence, this would generate “pseudo-longitudinal” data. Process hypotheses could be tested by examining patterns across cases of different ages and at different levels of development. For example, we would expect the formalization-by-age interaction to predict effectiveness. We might also expect that effectiveness would be positively associated with amount of time devoted to problem identification/analysis behavior in young programs, and to have a weaker association in older programs.

A major strength of the single-shot cross-sectional approach is large sample size. The large sample and quantitative measurement employed in the single-shot case study enable researchers to use a whole array of statistical techniques that have been developed for parametric analysis. Careful validation of measurement instruments (e.g., Van de Ven & Ferry, 1980) and survey design ensures that data from many disparate cases is captured so that all observations are comparable and can be aggregated into a single dataset with many datapoints. This supports the clear, definitive tests of hypotheses that are a major strength of cross-sectional surveys. This design also controls for sensitization effects, since only a single questionnaire is distributed. The information this design yields about organizational change and development processes stems from a comparative analysis of cases at a single

point in time, but if the general patterns conform to expectations, this type of study can provide useful evidence for a process model.

However, cross-sectional studies of change and development processes have three shortcomings. First, researchers must infer much of what has happened in the startups, because the variables used to assess processes are surrogate or summary indicators. Knowing the level of formalization of the startups and their age gives researchers an indication of whether formalization increases as startups mature, but it reveals little about how startups introduce formal structure or about the course that formalization takes. Knowing that startups which formed policy boards are more effective after one year than those which did not indicates that boards help, but it reveals little about the process by which boards were set up or about how boards interact with startups over the course of time. In general, single-shot cross-sectional data gives researchers little knowledge of the actual process that startups go through, the particular course of critical events or stages startups follow. On the basis of this design, researchers would be warranted to claim that their results are consistent with the process model, but they would not be warranted to claim that they had tested the model directly.

A second problem relates to measurement. Survey respondents must recall events which may have occurred months before. Hence, the data are subject to all the biases associated with recall. Respondents may fall prey to the tendency to remember what fits well-known patterns better than what deviates from them. They are more likely to recall events that relate to the planning model, which follows prescriptions of rational procedure, than to recall things that do not fit any larger pattern. Respondents may also supply missing parts of the pattern. Additional biases may be introduced by respondents' self-presentation efforts, or by their attempts to reconstruct events to fit their own theories about what "went right" or "went wrong."

Third, because there are no longitudinal data, inferences about causality are necessarily weak. One of the canons of causal inference is that the cause must be shown to precede the effect, and it is impossible to determine whether this is the case from single-shot data. The only temporal inferences that can be drawn are based on the comparison among programs of different ages. These causal claims, however, are weakened by cohort effects. It is possible that the four-year-old programs experienced very different economic and social historical situation than did the one-year-old programs in the sample. As a result, the two sets of programs are subject to a very different constellation of causal forces, and any inferences about causality are challenged by alternative explanations.

Because it does not give researchers direct access to the process, the single-shot cross-sectional design affords limited insight into change processes. Relationships are explained with stories which describe the processes that *should be occurring* to generate the relationships. However, the stories themselves cannot be evaluated without direct research on the process itself. They are speculative, and the only evidence researchers can provide for these stories is to measure surrogate variables which tap static results of the stories. To illuminate the stories that articulate the change process, a longitudinal design must be employed.

### PANEL SURVEY

This longitudinal survey design avoids some of the limitations of the single-shot survey. As Van de Ven (1980a) did in his study of Texas child care organizations, this design gathers data at three or more points in time using the same survey interview described above. Respondents are asked only to recall events for the period between survey administrations. The sample size for this design might have to be somewhat smaller than the ambitious 300 envisioned for the single-shot study, because it would take extensive resources to garner such a large sample three times (Van de Ven's panel study examined 14 organizations). Even if the researchers started with 300 organizations, by the third wave they would have a good deal fewer because some organizations would go out of existence and others would decide that participation was no longer in their best interest.

The longitudinal panel survey supports stronger causal claims than the single-shot cross-sectional survey, because longitudinal data enables investigators to establish temporal precedence, a requirement of causal analysis. It also gives researchers better insight into the nature of the processes involved in startups. This design yields three or more cross-sectional "snapshots" of the process, so researchers can directly track changes in organizations during startup. Theories about the nature of the process can be evaluated against longitudinal patterns. For example, to determine whether the startups followed the five-step planning process, researchers could assess whether successive waves of data showed progress through the steps. If the planning process was followed from initiation, wave one data would reflect problem definition and diagnosis activity, wave two solution development and testing activity, and wave three implementation activity.

By tracking the same cases across time, researchers become aware of changes they might not notice in the single-shot design. For example, researchers might find two or more different stage patterns: one pattern

might follow the hypothesized sequence, another might start with solution development and implementation and then diagnose the situation only as problems arose, while a third might skip the stage setting and problem diagnosis stages and commence from knowledge exploration (Nutt's [1984b] research uncovered a pattern quite similar to the second one in strategic decision making, which he labeled the "off-the-shelf" approach).

This design shares with the single-shot cross-sectional study the advantages of large sample size and standardized, controlled measurement of variables. Statistical methods for testing causal relationships over longitudinal data are well developed. Provided they have chosen the intervals between observations judiciously, researchers have a good chance of identifying important temporal patterns.

However, longitudinal panel designs are still subject to some important limitations. While gathering data at three or more points in time does get researchers closer to processes, they must still infer what occurred between measurements. As is the case for single shot, cross-sectional designs, process explanations of change and development rely on stories which explicate *what should happen if the hypothesized relationships held*. In this instance, the stories concern the processes that should be occurring between time A and time B if certain relationships are found. These stories are still speculative, even if all the evidence is consistent with them, because the researcher has no way to unpack the "black box" of events that are occurring to move the organization from time A to time B.

As we have noted, an important advantage of the longitudinal design over the cross-sectional design is that it yields a more differentiated account of development or change that is not subject to cohort effects. However, both designs may miss important aspects of the process that their instruments are not designed to measure. Researchers employing either design must be to some extent clairvoyants, in that they must anticipate which variables are important enough to measure. The good news in this is that theory must guide the selection of variables. The bad news is that most information not anticipated by the researchers' theory is lost, because no provision is made for gathering it. Important information about the process may also be lost if the researcher has not chosen the proper temporal interval between measurements. It is possible that a conclusion of "no change" based on measurements six months apart might instead be interpreted as "moderate change," if the interval were set at eight months. Since most theories do not give much guidance as to what interval should transpire between measurements, this is a thorny problem for longitudinal surveys.



The only way to overcome these limitations is to get much closer to the changing phenomena and to measure at shorter intervals. If researchers' observations occur on the same metric as the change process unfolds, that is, through significant events, then the researchers are likely to have much more direct access to the "story" of the change process. To do this researchers must employ a third research strategy.

## PROCESS STUDY

In this research strategy, investigators gather data that indicate how the process unfolds over time. Some of this data could be in the form of quantitative measurements of key variables, but other data would consist of detailed descriptions of the events that constituted change and development of the entity under study. Based on these descriptions, researchers construct a timeline of events that were significant in the development and change process. Each case will have a unique timeline, and real or apparent differences among cases are a major focus of the study. Instead of treating unique features of a case as sampling error, a process study attempts to identify the circumstances that created the particular twists and turns in each case. The flow of events and the conjunctions of causal forces that move the developing entity through its sequence are captured in a narrative that explains the case.

Of course, it is important to go beyond explaining a single case. A process study aims to find a general narrative that offers a common explanation for a range of cases. Finding such a general narrative requires matching specific cases to the general pattern. Cases that follow the same pattern may differ, however, in a number of respects. The same type of event may have a different duration in different cases; for example, one startup may consult with an expert for only one day, while another may consult with experts for a period of months as it attempts to define a workable program. Events that perform no function relevant to the startup may occur in one case, but not in another; these "nuisance" events, which neither help nor hinder the startup, make the two cases look different, but are unlikely to introduce substantive differences between cases. One case may have many more events than another, but the two may display similar overall patterns after they are normalized to the same length. Methods of analysis that can identify or test for common patterns are important tools in process research.

Process analysis takes the history of each case seriously. One of its guiding assumptions is path-dependence, that an entity's current state can be understood only in terms of the history of events that preceded it. Path de-

pendence implies that each case may have a somewhat different set of forces acting on it, depending on the specific events that occur during its development. Hence, explanation in process theories does not rely only on causal diagrams, but rather on the narrative that explains what led to what. The narrative captures the particular causal factors that influenced the case, the order in which they occurred, and how long they operated.

For example, if the social service startups unfold according to the narrative implied in the five-stage implementation model, community conflict is likely to have a strong effect on the startup in stages one and two because it will interfere with development of a clear picture of community needs and with the formation of a board. The influence of community conflict will wane once the startup reaches stage three, because the change unit will be consulting outside experts and focusing on locating a plausible solution. Community conflict will wax strong in stage four, since community constituencies must be involved in design and testing of the program. And, in the final stage, community conflict will move into the “background” as a less important causal force, but it might once again loom larger, given the proper conjunction of events.

The narrative provides a larger frame that lends coherency to the event sequence and to the causal forces that come to bear through these events. Narratives give a sense of the whole, the “big picture” that gives individual events and causes their significance. Narratives tell in abstracted form how the entity got from point a to point b to point c on the timeline. To the extent that researchers can find narrative patterns which transcend individual cases, they move to the level of scientific explanation, which depends on generality.

A process study not only supports causal inferences, but also has the additional advantage of enabling researchers to trace the mediating steps through which causes act. In principle, researchers can track how forces or influences initiated in one event are transmitted or dissipated in subsequent events. They can also trace how conjunctions of events produce interactions among causal factors that build momentum or lead to decay in the developmental process. These moves can greatly enhance the precision of tests of developmental models.

Another advantage of the process strategy is that in some cases there is sufficient information to determine the weights that should be accorded to various events and the causes embedded in them. Researchers can use the rich information gathered by this design to identify critical events—“turning points”—in the process under study, and subsequent analysis can es-



tablish the forces or influences that these events set into motion. Hence, rather than according all events and causes equal status or sorting them out statistically into rough precedence orders, researchers can make much finer discriminations concerning the importance of specific events and their associated causal factors.

The rich data afforded by process analysis opens the door to unexpected or unplanned-for findings. Unanticipated factors or issues may be uncovered, and these may lead to the identification of novel developmental patterns. The level of detail in event sequence data is much greater than that provided by cross-sectional or panel survey data. As a result, the possibility of surprise is much stronger in process research. Further, different variants and deviations from expected patterns can be identified, facilitating the creation of typologies of development and change patterns.

In process research sample size is determined by *the number of events observed over time* on a relatively small number of cases, whereas in cross-sectional and panel studies sample size is determined by *the number of cases observed*. Process studies emphasize temporal development, while cross-sectional studies emphasize comparisons at a given time. The intensive longitudinal data collection efforts required to sample and observe numerous events over time constrains a researcher's ability to examine many cases. As a result, studies of temporal processes do not enable researchers to track as many cases as commonly observed in cross-sectional and longitudinal panel surveys. Depth of analysis takes the place of large samples in process research.

A second issue in the process strategy pertains to how to cope with the massive amounts of data it generates. In principle, this data allows greater discrimination and enhances discovery of new patterns, but in practice, it is a challenge to find the forest in the huge stand of trees. Rich data makes a wide variety of patterns possible, and researchers must find ways to sort out the significant from the incidental. Development of suitable methods for process research is just beginning and forms the main subject of this book.

How do the three research strategies relate to each other? Is one preferable to another? Can they coexist? We now turn to these complicated questions.

## RELATIONSHIPS AMONG THE THREE STRATEGIES

Rather than advocating the process strategy over the other two, we believe that the three approaches can be complementary. As Table 1.1 shows, each strategy has strengths that compensate for weaknesses in the others, but no strategy has an across-the-board advantage.

**Table 1.1 Comparison of Research Designs for the Study of Change and Development Processes**

DESIGN	STRENGTHS	WEAKNESSES
Cross-Sectional	Large sample size No history effects Limited sensitization effects Systematic, valid measurement Measurement facilitates quantitative analysis	No direct access to process Reliance on recall Weak causal inference
Panel	Large sample size Systematic, valid measurement Measurement facilitates quantitative analysis Stronger causal inference	History effects possible Sensitization effects possible Only sporadic observation of process Reliance on recall Time interval between measurements usually arbitrary
Process	Strong causal inference Access to detail of process Ability to weight individual causal factors Possibility of unexpected discoveries	History effects possible Small sample size Must transform event data into format suitable for quantitative analysis Massive data analysis task

Any well-specified theory of change or development can generate predictions which can be tested in cross-sectional or longitudinal research. For example, the program startup model posited that programs with citizen boards would be more effective and survive longer than those without boards. Further, if the implementation model holds, then we should expect that respondents would report more problem definition and diagnosis activity at the beginning of a startup than later on, more design and expert consultation at the midpoint than in the beginning or ending phases of the startup, and more testing and implementation activity in the ending phase than in the first two. Cross-sectional and longitudinal survey strategies are well suited for testing these types of predictions. In general terms, the first two research strategies can test predictions about (a) conditions that are necessary for a process to occur, (b) social or organizational structures generated by a process, (c) global descriptions or perceptions of the process, and (d) accumulating outcomes of the process.

Cross-sectional and longitudinal studies yield only indirect evidence for

process models, but they have an important place in process research because they offer a reliable, “first-cut” evaluation of whether a given model is worth pursuing. Strengths of the two survey designs, including large sample size, control through design, and the ability to assess measurement adequacy eliminate a number of confounds and competing explanations. In view of the extensive time and effort involved in a process study and the difficulty in coping with the large quantities of data generated by process research, it is very useful to have strong preliminary evidence that rules out some models and supports others. Our judgment is that if a process theory has sufficient explanatory power to be of interest to us, its operation will probably be reflected in surrogate variables that can be gauged in surveys.

However, evidence from cross-sectional or longitudinal studies is not sufficient. To understand development and change processes it is necessary to study directly the actions and events that enact the process as it unfolds. The process strategy tests the stories created to support the conclusions of cross-sectional and longitudinal studies. Process studies also enable researchers to discover novel patterns and influences, leading to improved theories. Direct observation and analysis of change and development processes must be the final arbiter in process research.

At the pragmatic level, then, it is evident that the three research strategies may be complementary and have synergistic potential. However, the three strategies imply very different modes of thinking about process. It is useful to consider different conceptualizations of process and their connections to the three strategies.

### THREE CONCEPTIONS OF PROCESS

We can distinguish three ways in which “process” has been used in organizational research (Van de Ven & Poole, 1995): (a) as a logic that explains a causal relationship between independent and dependent variables, (b) as a category of concepts or variables that refer to actions of individuals or organizations, and (c) as a sequence of events that describe how things change over time. The three research strategies have affinities to different conceptions of process.

#### PROCESS AS EXPLANATION FOR A VARIANCE THEORY

In terms of an input-process-output model, the first definition uses a process logic to explain a causal relationship between observed inputs (independent variables) and outcomes (dependent variables) in a variance the-

ory, as discussed by Mohr (1982). In this usage, a process story or logic is used to explain why an independent (input) variable exerts a causal influence on a dependent (outcome) variable, but there is no direct observation of the process. For example, to explain why an increase in organization size increases structural differentiation at a decreasing rate, Blau and Schoenherr (1971) invoked a process story that describes the sequence of events in which labor is progressively divided as additional personnel are hired with different skills in an organization.

In general, process explanations are commonly used to explain causation between independent and dependent variables. But, as Van de Ven and Huber (1990) discuss, such process explanations typically entail highly restrictive and unrealistic assumptions about the actual nature of events in organizations. One way to improve the robustness of process explanations in variance theories is to explicitly observe the process argument that is assumed to explain why an independent variable causes a dependent variable. To do so requires opening the proverbial "black box" between inputs and outcomes, and conducting direct observation of process. This involves a transition to the second view of process.

## PROCESS AS A CATEGORY OF CONCEPTS

The second and most frequently used meaning of process is as a category of concepts of individual and organizational actions, such as communication frequency, work flows, decision making techniques, as well as strategy formulation, implementation, and corporate venturing. In this usage, process refers to a category of concepts that can be distinguished from other categories of concepts, such as organizational environment, structure, and performance. Like these other categories, process concepts are operationalized as constructs and measured as fixed entities (variables), the attributes of which can vary along numerical scales from low to high.

Studies that adopt this definition of process typically examine research questions dealing with the antecedents or consequences of organizational changes. These questions call for a variance theory explanation of the causal factors (independent variables) that statistically explain variations in some outcome criteria (dependent variables). Process variables are assumed to mediate or to moderate the causal relationships between input and outcome variables. Special tests for mediating and moderating relationships are conducted to clarify the role of process variables in the theory (e.g., Baron & Kenny, 1986; James & Brett, 1984). For example, a typical formulation of the research question might be: "Does having a citizen advisory board to

oversee a startup social service program (an antecedent factor) increase participation of stakeholders and boundary spanning (mediating process factors), which increase organizational effectiveness and likelihood of survival (the consequent outcomes)? To answer this question, existence of a board, stakeholder participation, and program effectiveness are operationalized as exogenous independent, endogenous independent (mediating), and dependent variables, respectively, which are measured on numerical scales at different points in time. Changes in states of these variables can be calculated as the differences between scores obtained at various points in time on each variable. The researcher can then use statistical techniques to determine how board activity precedes changes in stakeholder participation, which in turn precede corresponding changes in a lagged program effectiveness variable.

Such studies of the mediating relationship of participation level between advisory board and startup effectiveness imply at a conceptual level that a sequence of activities or events go on in establishing and engaging an advisory board and in definition, design, and implementation of social program startups. However, these activities or events are not directly examined (as they are in the third definition of process, below). Instead, these process constructs are operationalized as variables. Abbott (1988) argues that this transforms the constructs into attributes of fixed entities that interact, in causal or actual time, to create outcomes, themselves measurable as attributes of the fixed entities. The variable attributes have only one causal meaning (one pattern of effects) in a given study. As a consequence, when process constructs are represented into this entities/attributes model of reality, one can only measure *if*, not *how*, a change occurred in a variable measured at different points in time. To understand how a change occurred requires a story that narrates the sequence of events that unfold over time.

In response, researchers wedded to defining process as a category of concepts may argue that one can decompose the innovation process into a series of input-process-output analyses by viewing each event as a change in a variable (i.e., as the difference between nonexistence at the beginning state and existence at the ending state of each event) and then determining whether state transitions are explained by some other variables (such as stakeholder participation or board activity). From this perspective, events represent changes in process and output variables in an input-process-output model and the essential influence can be captured through measuring these variables.

However, if the research question is *how*, not *if*, a change occurred, we will need a narrative that encapsulates the sequence of events that unfolded as an innovation emerged. Once the sequence or pattern of events in a developmental process is found to exist, one can turn to questions about the causes or consequences of events within the process pattern. Thus, to understand how an organizational change occurs, researchers should alter their typical methods of analysis. Rather than first generalize in terms of variables, researchers should first generalize in terms of a narrative history or a story. Only in this way will the key properties of order and sequence of events be preserved in making theoretical generalizations about processes of organizational change.

### PROCESS AS A DEVELOPMENTAL EVENT SEQUENCE

The third, and least understood, meaning of process is a coherent sequence of events or activities that describe how things change over time. This sequence of events can represent any process, from a cognitive train of thought or an underlying pattern of psychological transitions in individuals as they deal with an issue, to a series of actions and decisions taken in a strategic planning group, to the events occurring during an organizational reengineering effort. Whereas the second definition of process examines changes in variables over time, the third definition of process takes a historical developmental perspective, and focuses on the sequences of incidents, activities, or stages that unfold over the duration of a central subject's existence. Table 1.2 exemplifies this third meaning of process by outlining a sample of well-known developmental process models pertaining to strategic decision making (Cohen, March, & Olsen, 1972; Mintzberg, Raisinghani, & Theoret, 1976; Quinn, 1980), strategic planning (Gluck, Kaufman, & Walleck, 1980; Lorange, 1980), and organization development (Greiner, 1972; Scott, 1971).

While the process models in Table 1.2 are concerned with the development of very different things, they are strikingly similar in form. In contrast with the second meaning of process as a category of variables, variables are not the centerpiece of the process models in Table 1.2. Instead, the central focus of developmental process models is on progressions (i.e., the nature, sequence, and order) of activities or events that an organizational entity undergoes as it changes over time. As the table exemplifies, a linear sequence of stages or phases of development is a common form of progression in these process models. For example, a rational process of decision making is typically viewed as a sequence of separable stages (e.g., need recognition,

**Table 1.2 Stage Models of Development in Organizational Studies**

AUTHORS AND SUMMARIES	BEGINNING	ACTIVITY PHASES OR STAGES	END
<b>STRATEGIC DECISION MODELS</b>			
Mintzberg et al. (1976) Field study of 25 strategic, unstructured decision process	1. Identification phase <i>Decision recognition routine</i> <i>Diagnosis routine</i>	2. Development phase <i>Search routine</i> <i>Design routine</i>	3. Selection phase <i>Screen routine</i> <i>Evaluation-choice routine</i> <i>Authorization routine</i>
Cohen, March, and Olsen (1972) Garbage can model of decision making	Decisions are probabilistic intersections of relatively independent streams within organizations of: <i>choices</i> .....> <i>problems</i> .....> <i>solutions</i> .....> <i>energy of participant</i> .....>		
Quinn (1980) Case studies of nine major corporations	Fourteen process stages beginning with need sensing and leading to commitment to control systems. Flow is generally in sequence but may not be orderly or discrete. Some of the process stages are the following: 1. Sense need      2. Develop awareness and understanding      3. Develop partial solutions      4. Increase support      5. Build consensus      6. Formal Commitment		

### STRATEGIC PLANNING MODELS

Gluck, Kaufman and Walleck (1980) Study of formal planning systems in 120 companies	1. Basic financial planning <i>meet budget</i>	2. Forecast-based planning <i>predict the future</i>	3. Externally oriented planning <i>think strategically</i>	4. Strategic management <i>create the future</i>	
Lorange (1980) Normative model of corporate strategic planning	1. Objective setting <i>identify relevant strategic alternatives</i>	2. Strategic programming <i>develop programs for achieving chosen objectives</i>	3. Budgeting <i>establish detailed action program for near term</i>	4. Monitoring <i>measure progress towards achieving strategies</i>	5. Rewards <i>establish incentives to motivate goal achievement</i>

### ORGANIZATION DEVELOPMENT MODELS

Scott (1971) Stages of corporate development	1. Single product, channel, and entrepreneurial	2. Single product, channel, and functional structure	3. Multiple products, channels, and divisionalized structure		
Greiner (1972) Stages of organizational growth through evolution and revolution	1. Growth through creativity <i>Leadership crisis</i>	2. Growth through direction <i>Autonomy crisis</i>	3. Growth through delegation <i>Control crisis</i>	4. Growth through coordination <i>Red tape crisis</i>	5. Growth through collaboration <i>Crisis of ??</i>



search, screen, and choice activities) ordered in time and with transition routines to make adjustments between stages (March & Simon, 1958).

A second characteristic of most models in Table 1.2 underscores the need to develop methods for the study of process. With the exception of Cohen, March, and Olsen's (1972) garbage can, all the other process models were developed inductively based on cross-sectional observations or retrospective case histories in a variety of companies. The stages or phases of activities in each model were inferred either from company historical self-reports or by categorizing cohorts of companies into the stages or phases. In no instance was any one company or organizational unit actually observed over time to go through all the stages or phases of a model. Thus, there is a great need for systematic longitudinal research to substantiate and elaborate these process models of development.

## DEFINITIONS OF PROCESS AND RESEARCH STRATEGY

It should be clear that the first two definitions of process are most compatible with the cross-sectional and longitudinal survey strategies, while the third definition is most compatible with the process strategy. Hence, if research guided by the third definition is most likely to yield meaningful insights into development and change—and we believe it is—then the process research strategy is an essential part of any program of research in this area.

However, the other two definitions also have their own parts to play in process research. To understand their contribution, it is useful to map the three definitions into each other. The third definition of process can be mapped into the second (which regards process as a category of concepts and variables referring to individual or organizational actions) by defining variables that describe attributes of the event sequence. For example, event sequences can be described in terms of the property of cyclicity, which refers to the degree to which sequences of events repeat over time. On the second view of process, cyclicity would be a variable describing the process occurring between inputs and outputs. To illustrate, we might predict that the greater the political opposition to a social service startup (an independent input variable), the greater the cycling through the stages of the planning model (a mediating process variable). In turn, we might predict that the number of cycles through the planning model is negatively related to the time taken for the startup to achieve financial independence (an outcome variable). These predictions encapsulate global descriptions of the process that can be tested with traditional variable-analytic methodologies.

The third definition can also be mapped into the first one (which views process as a logic explaining causal relationships between independent and dependent variables) by distilling the general narrative from the event sequence to create a “story” that accounts for the impact of a variable earlier in the sequence on subsequent dependent variables. For example, one general narrative that would serve as a good story posits that creating a citizen’s advisory board enhances the effectiveness of startup programs by increasing boundary spanning. Members of an effective advisory board would circulate through the community, collecting intelligence about problems and opportunities, which they would then bring to the board and use to ground policy mandates for the program. This circulation would also “stir up” those interested in the program, and they would interact with development team and offer feedback and suggestions. Elements of this interested audience would also form the first clientele for the program, ensuring robust usage and possibly even the critical mass of clients needed to get the program to “takeoff” phase.

Mapping from the third to the first and second views of process involves “simplification” of the event sequence either by summarizing it into variables or by translating it into a general story. However, mapping in the “opposite” direction, from the first and second to the third views, is indeterminate, because there is less information in the first and second descriptions of process than in the third. In principle, a very large number of specific event sequences are consistent with any general process description derived under the first or second definitions of process. With only the resources of theory, there is no way to move directly from a process description cast in either the first or second views to a description consistent with the third definition. At best, the information in the first or second definitions can be used as parameters to guide the direct contact with process data that is necessary to create an event-level description.

One implication is that the process research strategy is not just desirable, but *essential* to develop adequate theories of process. As we concluded in discussing research pragmatics, direct study of the process must be the final arbiter of process theories. A second implication is that the first and second views of process contribute by suggesting parameters or boundaries for the process research strategy. They indicate the most promising subset of all possible process descriptions, thereby greatly reducing the work involved in direct study of the process.

A more sobering implication derives from tendencies currently at work in the organizational research community. Methods for conducting re-

search driven by the first two definitions of process are much more accessible and much better disseminated than are methods for conducting event-level process research. As currently conceived, courses in theory construction, research design, and statistics emphasize methods best-suited for analyzing correlational and causal relationships among variables. They have much less to say about the analysis of event sequences or narrative models. With no straightforward alternatives, the dominant tendency is to frame process questions in terms of the first or second definitions rather than the third. This reduction of processes to variables or speculative stories so dominates thinking on the subject that researchers have generally been satisfied with what current methods and research strategies afford, and relatively few venture to attempt direct study of processes.

This tendency is understandable given the general dearth of process methods in the social sciences. However, several specialized areas of study, including quantitative history, developmental sociology, child development, group communication, and organizational innovation, have worked out methods applicable to process research. This book is dedicated to laying a theoretical groundwork for these methods and to describing how they might be used in the study of organizational change and development processes.

## WHY DO PROCESS RESEARCH?

It is evident from our description that a process study is quite demanding. Researchers must gather masses of data over extended periods of time, derive an event sequence from this data, code events, analyze complicated data structures, and employ a very different mode of explanation. Why should we do this when traditional, widely accepted approaches require less time and effort?

This entire chapter, in a sense, makes an argument for the process approach, and it is useful to put some of the benefits noted here into perspective by organizing them under three general advantages of the process approach. *First, the process approach offers a flexible mode of inquiry that is ideally suited to explore critical features of change and development.* When undertaking a process study, researchers focus directly on the details of the change or development process, the stream of events through which the process unfolds. This fine-grained view affords researchers the ability to identify and explore the path the process follows, taking into account path-dependence. As succeeding chapters will show, multiple theories of the

process can be compared using the rich event sequence data, and this enables researchers to work toward an adequate model by ruling out some theories in favor of others. It also encourages the development of “hybrid” theories that combine two or more explanations of development and change. The fine-grained view afforded by the process approach also opens up the possibility of discovering new patterns which have not been previously considered. The flexibility of the process approach is illustrated, finally, by the fact that variance-based analyses can be conducted on data derived in process studies (whereas process research cannot utilize data from variance studies). In view of the complexity of organizational change and development processes, the more flexible the approach taken, the more likely research will develop useful theories that are commensurate with the phenomenon.

*A second advantage of the process approach is that it completes variance theories.* Variance theories depend on stories or narratives that recount why variables are related to one another and how causal processes unfold. However, important aspects of these stories often remain untested and unexplored because the variance approach is not geared to study the essential components of stories, their narrative structure, and the uneven impact of causal factors on the narrative. Variance research strategies can be used to investigate such aspects of narratives as the assumptions underlying a story—for example, that planning policy boards are active in the initial period of program startup—and the consequences of a narrative—for example, that startups with active planning policy boards are more effective than those without. However, variance research is not suited for following the flow of the story or for identification of temporal structure in this flow—for example, the phase sequence through which the startup progresses. In contrast, the process strategy is designed to directly interrogate the structure and implications of stories. Its goal is to identify the form of narratives and their generative mechanisms and to test their plausibility and generality. And because it develops specific, systematic procedures for evaluating explanations against plausible alternatives, the process research approach does not sacrifice the rigor normally associated with variance research. As such, process research is an important complement to variance research. Indeed, insofar as we believe that the story is *the* most important aspect of a variance theory, process research is the most important and fundamental type of research endeavor.

*A third advantage of the process approach is that it develops a social scientific explanation that acknowledges the human hand in development and*

*change*. Actors' decisions and plans play an important role in organizational change and development processes not only because they have immediate causal impact on what people do, but also because these plans and choices are premised on goals or visions of what the final product will be. Its ability to conceive of and bring into being actions and structures that conform to a preordained form or purpose distinguishes human action from the effects of inanimate or suprahuman forces. The process approach explicitly incorporates explanations based on form and purpose. It does not, however, presume that such explanations must be cast up in unique, idiographic accounts. The goal of the process approach is to develop general explanations, and it stresses systematic investigation and evaluation of narrative explanations.

Of course, no brief hymn to the benefits of any approach should be sufficient to win conversion. This book is intended to convince readers of the virtues of the process approach by elaborating its theoretical and methodological stance and to promote process research by introducing specific methods for collecting and analyzing process data.

## PLAN OF THE BOOK

This book is divided into two parts. In the first, we develop theoretical underpinnings of process research. This chapter has compared three different approaches to research and the corresponding definitions of process. We have attempted to motivate the need for process research that is richer and more definitive than the most commonly used social scientific methods allow. Chapters 2 and 3 take this argument a step further and introduce a theoretical framework for process research.

Chapter 2 explicates the variance approach, the predominant theoretical paradigm in the social sciences, and contrasts it with the process approach. Following on the themes of this chapter, we believe that variance and process approaches are complementary and that each can illuminate organizational change and development. Ultimately, however, explanation of change and development processes will drive us to a narrative explanation, which can be mapped onto variance models for purposes of research.

Chapter 3 introduces an integrative framework that develops a number of options for process theories. Based on Van de Ven and Poole (1995), it explicates four basic types of process theories that explain how and why change unfolds in social or biological entities. These four types represent fundamentally different event sequences and generative mechanisms—we

will call them “motors”—to explain how and why changes unfold. These four ideal type process theories form a typology if we distinguish the level and mode of change to which each theory applies. This typology is useful for understanding a variety of specific theories of change processes in organizations. Our contention is that specific theories of organizational change and development are built from one or more of the four basic types. While some theories express one of the four motors, in other cases they are predicated on the interplay of two or more motors. Narrative explanation and the four motors, respectively, describe the form and content of developmental and change theories. Together they suggest requirements for methods adequate to the task of process research.

The second, and longer, section of this book deals with how to do process research. Chapter 4 provides an overview of process research methods and introduces a dataset that will be used to illustrate process research applications. Chapter 5 is concerned with research design. We discuss alternative process research designs and issues that should be considered in the design phase. Chapter 5 also considers how to gather event data and the reliability and validity of such data.

Once the researcher has event sequence data, attention turns to analysis, and in chapters 6 through 9 we introduce four methods for the analysis of process data. These methods are presented in order of increasing scope of analysis.

Chapter 6 describes the use of Markov models and their relatives to model event-to-event relations. These models map event patterns at the microlevel, facilitating both descriptive and causal analysis. They help researchers uncover recurrent event sequences that describe larger dynamics; as these dynamics change, so too the patterns change, and Markov models can divulge significant changes. The description of event patterns can also be used to test hypotheses about narratives or the motors or other causal forces that drive them.

In chapter 7 we move to a more global level of analysis and consider the use of phase analysis. Phases are molar patterns of events that exhibit developmental progressions. Phase analysis allows description of developmental patterns and comparison of these patterns to those displayed by developmental motors or more complex theories. It also supports creation of typologies of developmental patterns that classify variants of ideal models.

Chapter 8 describes event time series models, which enable researchers to describe and to test hypotheses about whole event sequences or major segments of them. Time series models can be used in process studies to de-

scribe long-term developmental patterns, to uncover causal and other types of relationships among developmental constructs, and to test the plausibility of individual generative mechanisms or motors.

Chapter 9 introduces and applies recent advances in the theory and methods of nonlinear dynamic systems to process research. It discusses how to identify whether an observed pattern in an event time series reflects either (a) an orderly periodic progression of stages or phases, (b) a random sequence of chance “blind” events, or (c) a seemingly random process of chaotic or colored noise events. The chapter introduces and exemplifies a number of new diagnostic methods to empirically distinguish periodic, chaotic, colored noise, and truly random patterns in event time series data. Knowing what pattern exists in an event time series is important for knowing what types of models are appropriate to explain the observed dynamics.

Chapter 10 develops a summary considering how the methods enable researchers to build process theories, to test generative motors, and to discover novel patterns that inform later theorizing. This chapter also considers some general properties that process methodologies must have.

The four methods discussed here clearly do not exhaust the repertoire. Although modest in scope, they provide a foundation for guiding researchers in studying processes of change and development in organizations. Undertaking such studies will, no doubt, stimulate the development and application of other methods.

In 1980 John Kimberly wrote:

I am convinced that the generally moribund state of much current organizational theory and research is owing to the lack of appreciation of the role of history in, and the effects of context on, organizational life. And I believe that there is a tight coupling in science between content of understanding and method for understanding. (p. 13)

We believe that the process approach and the methods elaborated in this book address the malaise Kimberly describes. We hope this book will inspire others to take the challenging but rewarding path of process research.

## 2 Process Theories and Narrative Explanation

WHILE THE VARIANCE APPROACH offers good explanations of continuous change driven by deterministic causation, this is a limited way to conceptualize change and development. It overlooks many critical and interesting aspects of change processes. However, because most organizational scholars have been taught a version of social science that depends on variance methods and because methods for narrative research are not well developed, researchers tend to conceptualize process problems in variance terms. One can see the “law of the hammer” in operation here: Give a child a hammer, and everything seems made to be hit; give a social scientist variables and the general linear model, and everything seems made to be factored, regressed, and fit.

Consider some alternatives to the variance approach. History conceives of the past in terms of successions of events. Successions are explained by historical narratives that indicate the significance of the events and the forces—human and otherwise—which influenced them. While some causal forces operate continuously, others influence the sequence of events only at particular points in time. For example, it makes no sense to say that Peter the Great caused the cold war; he had been dead for centuries before it started, and any direct causal influence would be impossible. However, Peter the Great took actions that set into motion historical events that promoted the unification and modernization of Russia. Without Peter, it is possible that Russia would have developed differently and that the cold war would not have occurred. Peter’s actions exerted an influence in this case, but it is not the type of direct, continuous causal influence that most variable-based social science theories rely on.

Biology explains human development partly in terms of chemical fields and physical processes that operate continuously to shape the embryo. But there is also a preexisting genetic blueprint in the fertilized egg. This blueprint does not cause the organism to emerge, but provides a form or code



that is enacted through biological, chemical, and physical processes. Biological development is not captured by continuous changes only, but in a series of stages or phases that mark qualitative differences in the organism. As in history, the direction of development is shaped by the context in which the developing entity lives and the particular conjunctions of forces that come together at critical developmental junctures. Depending on the forces operating at a given nexus, one embryo is set on a course for a healthy birth, while another develops spinal bifida.

Developmental psychologists and historical sociologists, too, lean heavily on the concept of stages or phases in their depictions of psychic or societal development. Indeed, the problem of how quantitative change may result in qualitative change—or if indeed it can—has been central at least since the writings of Marx. Both disciplines also acknowledge the importance of “idiographic” cases that recount the life history of individuals or societies in order to grasp the variety of individuals and the impact of multiple influences on actual cases.

These alternative perspectives suggest that in addition to continuity and calculus, our theories of change and development must be able to encompass discrete events, qualitative difference, conjunctions, context, intermittent causality, and formative influences. The *process approach* employs narrative explanation that notes the contributions actions and events make to a particular outcome and then configures these parts into a whole episode (Polkinghorne, 1988). It enables us to address both qualitative and quantitative aspects of development and change. Narrative explanation involves different assumptions about the relationships among constructs and the nature of explanation than does variance explanation. This chapter will explicate the process approach and the theoretical and empirical requirements for employing narrative explanation in research. We will also contrast process and variance approaches in order to highlight the nature of narrative explanations.

## VARIANCE AND PROCESS APPROACHES

Several scholars have elaborated a distinction between two very different approaches to social science. Mohr (1982) first distinguished variance and process theories in the explanation of organizational behavior. In developing a formalism for the representation of social action, Abell (1987) contrasted variance and narrative approaches. Abbott (1984, 1990) compared stochastic and narrative explanations in sociology. Polkinghorne (1988) presents a general introduction to theories of narrative in the human sci-

ences, in which he highlights differences between narrative explanation and traditional social science. The common thread running through these works is the difference between scientific explanations cast in terms of independent variables causing changes in a dependent variable and explanations that tell a story about how a sequence of events unfolds to produce a given outcome. We will refer to these divergent explanations as variance and narrative explanations, respectively. They constitute the foundation of the variance and process approaches to the study of change and development. The following discussion, which draws extensively on Abbott's work, contrasts variance and process approaches to social scientific research.

### THE VARIANCE APPROACH

This perspective explains outcomes as the product of independent variables acting on dependent variables. The underlying causal process that generates the outcomes is presumed to operate continuously over time. Variables are defined and carefully distinguished from one another both in theory and in the operations used to measure them, and the character of the variables themselves is assumed to remain constant over time. Any unexplained variance is assumed to result either from misspecification (the omission of important independent variables or improper specification of relationships among variables) or from random error.

To continue with our example of new program startups from chapter 1, a researcher using a variance approach might define one dependent variable as the number of clients served per month. The next step would be to define independent variables that influence number of clients served, for example, degree of stakeholder participation or client-orientation. These variables might be measured at one, two, three, or more points in time, depending on the design. Regardless of when the measurement occurred, the assumption would be that the *same* thing is being measured—for example, that client service meant the same thing at time 3 as it did at time 1. Moreover, while the action of the independent variables on the dependent variable may change in level or degree, there is an assumption that this does *not* change the character of the dependent variable. Once defined and measured, clients served is clients served regardless of how much it has been affected by the independent variable, regardless of which independent variable influenced it, and regardless of when it was influenced by the independent variable. This approach regards unexplained variance in clients served as the result of measurement unreliability, other random errors, and mistakes in the hypothesized causal model.

Generally, more than one independent variable is included in the causal