Time as a Trigger for Organizational Change

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ABSTRACT

In this paper, we integrate findings from four field studies of change processes in technology-intensive organizations. Our findings suggest that temporal shifts -- i.e., events that alter normal rhythms or that insert a complete break in the action -- can be powerful triggers for organizational change. By contrast, problems (even when they were well-recognized) noticeably failed to generate active adaptation. In each of the cases studied, change efforts did not begin unless and until some event occurred that altered the rhythm of daily activities. We find that such breaks in the action forced people or groups to change their pace of work and the temporal focus of their work, and that only once this occurred could people devote attention to outstanding problems. Specifically, temporal shifts altered time in four important ways to enable change. (1) Time as a trigger: temporal shifts woke people up from their routines and refocused attention on possibilities for change; (2) Time as a resource: temporal shifts provided actual or perceived "time-outs" from regular, productive activities to undertake reflection and change; (3) Time as a coordinating mechanism: temporal shifts enabled all members of a group or organization to focus collectively on a change agenda; and (4) Time as symbol: temporal shifts stood as a powerful symbol of management's commitment to the need for change.
A fundamental message in the literature on organizations is that while routines, scripts, and repertoires that develop over time tend to constrain adaptation, the eruption of a problem can shift attention away from routines to elicit change (March and Simon, 1958; Cyert and March, 1963). Indeed, an enormous amount of the organizational literature can be seen as discussions on this theme. Thus, we have a considerable literature on the difficulty of noticing problems (e.g., Kiesler and Sproull, 1981), other work that examines the sorts of problems or discrepancies that tend to get noticed (e.g., Louis and Sutton, Sitkin 1992, Feldman, 1981), and still other streams of research explaining how and why discrepancies between expected and actual outcomes lead to organizational search and adaptation (March and Simon, 1958; Cyert and March 1963, Lant 1992)-- or how this process can go astray (e.g., March and Olsen 1975; Levinthal and March, Lant and Mezias).

In this article we argue that while the focus on problem centered search has yielded enormous insights, it also systematically obscures certain other phenomena that help to trigger organizational change or adaptation. Our argument stems from the fact that in many cases, organizational adaptation occurs but is not triggered in any direct way by problems or other discrepancies. Indeed, in the four organizations described here, underlying problems were known and they significantly predated change efforts. They noticeably failed to generate active adaptation unless and until some event occurred that altered the rhythm of daily activities. We find that such breaks in the action forced people or groups to change their pace of work and the temporal focus of their work, and that only once this occurred could people devote attention to outstanding problems. Specifically, temporal shifts altered time in four important ways to enable change. (1) Time as a trigger: temporal shifts woke people up from their routines and refocused attention on possibilities or needs for change; (2) Time as a resource: temporal shifts provided actual or perceived "time-outs" from regular, productive activities to actually undertake reflection and change; (3) Time as a coordinating mechanism: temporal shifts enabled all members of a group or organization to focus collectively on a change agenda; and (4) Time as
symbol: temporal shifts stood as a very powerful symbol of management's commitment to the need for change.

We begin this paper by outlining some of the vast literature on problem centered search and its role in organizational adaptation. We note the enormous effort that has gone into developing and refining this model, and we also highlight a far smaller set of work suggesting that time -- specifically, interruptions or other temporal breakpoints -- plays a critical role in instigating change in organizations. We then analyze data from four separate studies where it appears that search (and subsequent adaptation) were not triggered by the appearance of problems per se. Rather, temporal interruptions served as "triggers" that focused attention on problems that had previously been ignored. By juxtaposing these four studies, we discover significant commonalities in the ways that temporal breaks in the action both triggered change and shaped or supported change activities. We also note significant differences across our cases. For example, in some cases the temporal break took the form of a full stop to routine activities, while in others it meant a shift in the rhythm or the time horizon of ongoing activities. Also, while "change" sometimes consisted of fundamental shifts in the organization's core beliefs, in other cases it was limited to the alteration of specific technologies or operating parameters.

Based on both the similarities and the differences among our four cases, we develop a new way of thinking about organizational change that emphasizes the key role of temporal events such as interruptions or shifts in rhythm. We close by comparing our new model to the more widely accepted notion of problem centered search. We argue that our model does not compete with the existing view, but rather that it complements traditional approaches. It enriches theories of problem-driven search because it helps to explain not only why change occurs, but also when conditions allow change to happen in groups and organizations. An approach that focuses on temporal events also enables us to better understand some organizational phenomena -- such as search that is broad, not local to a particular problem area -- that are not well explained using accepted notions of problem-driven search.
LITERATURE

1. Problem-Centered Search and Adaptation. A number of authors have contributed to an organizational learning perspective which suggests that the experience of failure is central to organizational search and adaptation. In this view, organizational success leads to repetition and routinization of activities. Organizational search and adaptation are costly and often aversive (Nelson and Winter 1982; Cyert and March 1963; Kiesler and Sproull, 1982), and thus they will be avoided in the absence of powerful motivators. Failure experiences, however, especially sudden and unexpected failure, can induce organizations to search for new ways of doing things and to undertake change (Cyert and March 1963, March and Simon 1958, Argyris and Schon 1970, Levitt and March 1988). Thus, the link between failure and adaptation is a logical one: failure triggers a realization that existing routines are insufficient, and this realization engenders willingness to invest time and other resources in search and adaptation activities.

However, the relationship between failure experiences and organizational adaptation is not simple. First, the "failure" must be noticed as such. This is problematic given the tendency to ignore disconfirming or very discrepant information by both individuals (Darley and Gross, 1983; Feldman, 1981) and organizations (Kiesler and Sproull, 1982). Major failures, far from encouraging adaptive responses, often lead to greater rigidity and therefore persistence with existing action programs (Staw, Sandelands, and Dutton 1982). Small failures, or those which carry minor consequences for the person(s) involved, are also likely to be ignored (Louis and Sutton, 1981; Van de Ven, 1980; Isabella, 1990.). Thus, it appears that only certain kinds of failures (those which are surprising but not too discrepant, significant but not overwhelming, carry personal implications but are not overly threatening) will be noticed.

Further, since failure is essentially a gap between expectations and outcome, failure can be defined away by altering expectations to fit actual outcomes. Research suggests that change in aspiration levels frequently suppresses adaptation behavior (Lant 1992).

Another major problem in learning from failure is the difficulty of interpreting what happened and why, given uncertainty, ambiguity, and
constrained action in organizations. Failure may indeed induce change, yet the learning underlying that change may be superstitious, assuming action-outcome linkages that do not in fact exist (March and Olsen 1975 and etc.). Interpretations may also be overly narrow, so that change is undertaken only in the procedures immediately related to the failure, without examining the deeper organizational norms, assumptions and processes that generated those procedures (Hedberg, Nystrom and Starbuck, 1976; Argyris and Schon 1978).

In sum, the bulk of the literature on organizational learning as a basis for organizational change suggests that, despite the difficulties of limited rationality among organizational actors and ambiguity in the events they experience, failure (unmet expectations) triggers organizational change by making problems obvious and salient. While existing routines are normally assumed to be adequate for achieving organizational goals, a major gap between expectations and outcomes helps actors to realize that routines must be adapted. This provides the motivation to engage in information search and adaptation of routines or even rules, despite the very real costs and risks involved in such change measures.

2. The Role of Time in Organizational Change. The idea that temporal breaks can serve as a trigger for search and adaptation has not received much attention. Nonetheless, various aspects of this concept have surfaced in the organizational literature. The most explicit treatments of this idea are Gersick's work on temporal milestones (1988, 1989, 1994), Weick's (1990) discussion of the impact of interruptions, Tyre and Orlikowski's (1994) research on windows of opportunity for technical change, and Barley's (1988) description of how temporal changes helped to shift the social order in hospital radiology departments.

Gersick (1988, 1989, 1994) has suggested that clock-based events or milestones, like the midpoint of a time-limited exercise, or the five-year mark in a new venture, can turn the focus of activity from normal routine to reevaluation and change. Here, the focus is not on events that alter the actual rhythm of work, but rather on temporal markers. Gersick suggests that important milestones often focus a group's or organization's attention on its deadlines, and that this serves as a problem-signal that initiates
change. In other words, organizational members "use time as a heuristic for deciding how long to remain on the same track" (1989:303).

Weick deals more closely with events that create a break in the action. He focuses on unexpected stochastic events that interrupt work with new technologies. Drawing on experimental research in psychology (Lewin via Marrow, 1969; Mandler and Watson, 1966), Weick argues that interruptions are key because they create an alarm signal which evokes high emotion (in Abelson's (1963) words, "hot cognition"). Since the breadth of attention varies with the level of emotion, Weick suggests that adaptive effort is likely to increase with increased emotion, at least up to some maximum point, after which arousal can actually disrupt adaptive activity.

Tyre and Orlikowski (1994) build on Weick (1990) and others to focus on the particular power of new beginnings. They show that technology users do actively adapt their process technologies, but that these changes occur in discrete spurts following users' first experience with a new technology, or following some disruptive event that renews users' relationships with their tools.

Dutton (1993) has also argued that an unexpected event -- whether understood as a problem or an opportunity -- can create change partly by demarking a sharp break in the flow of time. She argues that such events shift people's attention from the present -- everyday pressures and routines -- to the future, thus making it possible for people to see the value of investing time now to effect future improvements.

Barley (1988) uses data from his ethnography of technical change in hospital radiology departments to show how new technologies can alter the "socio-temporal order" of a workplace. Specifically, he shows that when CAT scan equipment entered hospitals, it altered the rhythm of radiologists' work (from hectic, short-attention span work in traditional xray departments to less frenetic, longer attention span in CAT scan groups), thus paving the way for larger changes in the radiology departments' social order.

Other researchers have made the point that some slack time or buffer time is needed in order to consider changes to routine and to effect them. March and Simon (1958) and Scribner and Gutek (1987) note the importance of some organizational slack or buffer time for making changes:
Hedberg (1981) suggests substantive change is unlikely without some pause in routine activities. Lounamaa and March (1987) add that while change can proceed without a pause, it may fail to lead to performance improvements unless actors take the time needed to assess past change actions and their impacts.

While many of the papers cited above have received considerable scholarly attention, none has attempted or achieved an integrated theoretical perspective for understanding how temporal breaks in the action can create opportunities for search and adaptation. Each deals with a different aspect of the power of time and breaks in time for enabling organizational learning and change.

In the balance of this paper, we attempt to provide a more integrative theory to explain the role of temporal breaks in enabling and encouraging organizational adaptation. In order to do this, we draw on data from four different organizations undergoing distinct kinds of change, that all illustrate the importance of a temporal break in the action for opening up the change agenda. In each case, problems existed and were recognized by organizational members, but they noticeably failed to trigger search and adaptation. A temporal shift or break in the action not only enabled change by creating some slack time, but actually triggered the change process by shifting the focus of attention from routine activities to potential improvements.

Nature of the Data

The results reported in this paper come from four separate studies, each examining a different context and each focusing on a different kind of "break in the action". Together, they show more powerfully than separate papers could the relationship between a temporal break in the action and various types of organizational change.

Each of the studies included here is a field study examining one or more successful examples of organizational change inside a particular company. Thus, while different kinds of change were achieved and while
the precursors of change were different across the cases covered here, in
each case there was evidence of significant, documentable change in the
organization following the event we label a "break in the action". Also,
each of the studies is an in-depth case study, so that details about the
nature of the change and insights about the causality behind it are
available. In addition, each of the organizations studied is an
acknowledged leader in terms of market share, quality, and
innovativeness. Thus, while the actions and reactions described here may
not be responsible for that success, they may represent one of the ways in
which companies bound for long-term survival recuperate from long-
-ingrained problems.

These cases were selected for inclusion because, while focusing on a
common theme, they collectively cover a useful spectrum in terms of both
the settings involved, the nature of the "break in the action" observed, and
the type of organizational change that resulted. Table 1, below, provides
an overview of the dimensions along which our cases vary. In the section
below, we describe the methods used in each study. Next we present the
main results from each study regarding the way that a break in the action
led to significant change. Finally, we integrate these findings, compare
them to existing literature, and use them as the basis for developing a
theoretical understanding of how temporal shifts can help to bring about
organizational change.
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**RESEARCH DESIGN AND METHODS**

1. Study of software product development teams at Microsoft

This study centers on application and operating system software development projects at the Microsoft Corporation. One question the researchers sought to address was: how does a company like Microsoft balance rigorous planning during the development of very complex software products with the flexibility necessary to respond to market shifts, unexpected events and errors of commission and omission? The traditional model of software development consists of a linear sequence of activities with little iteration among phases. The outcome is therefore
heavily contingent on the accuracy of up-front planning activities. This approach tends to produce robust and reliable products, but at the cost of a relatively long and inflexible development cycle. At the time of the study, Microsoft was experimenting with several alternative development approaches and practices that would provide greater flexibility without sacrificing reliability. The present research analyzes the impact of inserting “buffer” time periods in the development schedule.

During the initial phase of investigation, two senior researchers conducted 40 interviews with team members and managers at Microsoft (Cusumano & Selby, 1995). The goal of these interviews was to develop detailed knowledge of Microsoft's history and development process across the company. During the second phase of research, a research associate spent two and one-half months on site at Microsoft. During this period she focused on 7 projects currently in development and interviewed 34 people across the projects. The projects were selected to represent the major product areas (e.g., desktop application, operating system, tools and components). The projects also varied in terms of their size and complexity (the amount of code or number of components in the software product as well as team size and structure), legacy factor and performance. The second round of interviews therefore permitted a detailed examination of actual development practices in selected projects which complemented the broader perspective taken in the first phase of the investigation.

Several points speak to the validity and reliability of the data collected. First, 74 interviews were conducted by three different researchers yielding over 200 hours of taped conversations (ultimately transcribed). These interviews were distributed across functional areas and levels of experience. Over all, data on approximately 60 different projects throughout Microsoft's history are represented in this study.

The researchers were also granted access to various forms of documentation. For example, postmortem project reports yielded a rich history of data on how development practices at Microsoft had changed over time. These postmortems are written by team members at the end of a project and candidly discuss both the successful and less successful aspects of the project. They also usually include detailed performance data such as development cycle time and testing results. These reports
therefore served to corroborate and augment evidence collected during the interviews and yielded some rich examples of actual experiences on different projects. (For further details, see Cusumano & Selby (1995)).

II. Study of technologies-in-use at BBA

Design and Sampling. The second study was undertaken at BBA (a pseudonym), a European-based manufacturer of precision metal components. This study investigated problem solving around new process technologies. Thus, it focused on the incidence of small-scale changes made by users of the technologies (e.g., improvement in machine mechanisms or the procedures for using the machines) as well as larger organizational changes that may have been triggered by experience with the new technology (e.g., new ways of organizing production, new practices, altered technologies).

At the same time, BBA was a desirable setting for the research, because the high-volume, high-precision, relatively automated nature of production placed significant time pressures on technology users. This made it challenging for users of new technologies to find time and resources for ongoing adaptation. Yet significant adaptation did occur: BBA is a world leader in its industry with a reputation for excellence in process technology.

The study was carried out in three major geographic divisions--Italy, West Germany, and the United States--and involved eight different plants. Forty-eight projects involving the introduction and use of new process technology (production machines and systems) were studied; due to missing data in seven cases, forty-one cases are included in the current sample.

Projects were studied using three types of data. Description and experiences were obtained from detailed, semi-structured interviews. Interviews lasted from one to four hours and occurred between zero and 18 months after project completion. These one-on-one interviews were supplemented by multi-participant discussions whenever possible. Respondents included project managers, operating and technical personnel, and plant and division managers. Project activities and their timing were
reported on written questionnaires (see below). Participants were interviewed both before and after completing questionnaires to clarify their responses. In addition, the researcher had access to historical data in company and plant documents. (For further details, see Tyre and Hauptman, (1992) and Tyre and Orlikowski, (1994).)

**Definition and Measurement of Organizational Change Activities.** Adaptation activities at BBA were defined as actions intended to modify the new technology or relevant aspects of the operating context (including users' skills or procedures, how activities were organized, etc.). Examples include debugging machine software, designing new tooling, training machine operators, or developing new maintenance procedures. Activities were considered part of normal production when the new technology was used with no effort to alter the hardware, software, or related context and procedures.

As part of the written questionnaire at BBA, respondents rated the level of effort devoted to adaptive activities such as modification of machine software or change in factory procedures. Respondents also filled out a project history in the form of a time-line, showing when activities were undertaken, and when unusual events (e.g., arrival of additional new equipment) took place. For each activity mentioned, respondents noted the level of adaptive activity during the period (rated as high=3, medium=2, low=1, and not significant or none=0). Based on this information, the level of monthly adaptive activity in each project was computed as the sum of the scores for activities noted during that period. Respondents also used the time-line to note major project milestones, including date of equipment installation, date when new equipment was considered "production worthy" (i.e., when it was producing parts on a consistent basis) and date when the new equipment was considered fully integrated (i.e., satisfactory efficiency and quality achieved; operating parameters fully defined). During interviews, respondents also described the specific problems they had dealt with, and when they were resolved.
III. Study of Time Use at Ditto, Inc.

This study took place at Ditto (a pseudonym), a major manufacturer of office equipment, and involved intensive study of a single group of software engineers working on the creation of a new color laser printer. The purpose of the study was to better understand how people use time at work (and at home), and to see if this could be improved such that people could accomplish the same amount of work, but also have more time to spend outside of work.

The researcher observed the software group for nine months from the date funding was committed to the development project in September until the product launched in June. The researcher spent an average of four days a week on site observing engineers in all aspects of their work. The researcher also interviewed all 17 members of the group on multiple occasions (as well as 15 other members of the division), and "shadowed" each member of the software group for at least half a day, writing down each activity as it occurred.

The exploratory intervention described in this paper took place approximately midway through the study period (January-March). During the intervention, all 17 engineers agreed collectively to restructure their time. Whereas normally engineers could and did interact with and interrupt one another at any time that a colleague was working, the intervention established certain blocks of time when engineers could not interact ("quiet time").

At the end of the intervention, the researcher administered a questionnaire to developers to assess the perceived productivity impact of the restructuring of their worktime. Furthermore, the researcher was on site throughout the intervention and for two months following it. She recorded all changes that she observed. Moreover, she interviewed engineers on multiple occasions before, during and after the intervention about their work patterns and any changes they observed. (For further details see Perlow (1995)).
IV. Shift in Work Practices and Attitudes at Motorola

This study examined Motorola's Arcade plant in Western New York, a 30 year old plant producing automotive components such as alternators and regulators. The research focused on the changes in work practices and work attitudes that occurred prior to the plant's move to another location. Specifically, the researcher asked the question, what motivated the change, and how did it occur?

Data were gathered retrospectively, after the plant's move from Arcade to Elma (also in Western New York). The researcher spent seven weeks in total at the Elma facility during 1992 and 1993. The resulting narrative of the move from Arcade to Elma is based on oral histories gathered from 40 employees (supplemented by information from over 200 additional employees), as well as on archival materials such as reports, memos, and presentations. The Elma employees with whom the researcher spoke covered a wide spectrum. The researcher interviewed the plant manager, most members of the plant staff, the manager for empowerment, engineers, production workers, team leaders, and members of support functions such as human resources and finance. The researcher also talked to a number of former Motorola employees and with three employees who had moved from Arcade or Elma to other Motorola facilities.

While collecting this data, the researcher spent full working hours at the facility, including attendance during all shifts. Early on, the researcher received plant and line tours from key team leaders. The researcher also worked on several production lines. The researcher consistently attended meetings of all kinds -- the daily meetings of production teams, the weekly meetings of committees, the weekly off-site meeting of plant staff, and so forth. The researcher also participated in a number of social activities outside working hours. (See Wasson (x) for further details.)
RESULTS

In this section, we first describe the overall sequence of events at each of the organizations studied. Then we analyze the data from each setting to identify how, if at all, temporal breaks in the action helped to trigger or enable organizational change.

1. Temporal Shifts in Four Organizations

Microsoft. The case of Microsoft is in many ways the most straightforward. A central problem in product development is how to create opportunities for reevaluation and revision without sacrificing production efficiency. In response to this challenge, some teams at Microsoft began experimenting with inserting temporal "space" in their product development cycle by creating specific "buffer times" in the schedule. The insertion of buffer time was intended to enable team members to periodically stop software production and instead turn their collective attention to broader issues such as the need to revise product strategy, schedule or design.

To do this, the implementation phase of a project was typically broken down into three segments. Each segment consisted of several weeks of regular development time (during which planned coding and testing of features occurred), followed by one to two weeks of unallocated buffer time. The exact ratio of implementation to buffer time varied depending on the complexity and degree of uncertainty of the product. Project managers deliberately left the tasks to be performed during this buffer time unspecified, insisting that their ability to forecast the future was limited in the fast changing world of PC software. As one team leader explained,

"I've been in situations ... where you present a schedule to [the manager] with some buffer space and he says 'What, are you guys just going to go fishing or something? What are you going to do in that buffer space?' ... Well, if I could tell you exactly what I was going to do, I'd tell you what the tasks are... But trust me .. I don't know what [buffer time is] going to be needed for, but time and time again, I know it's needed."
Analysis indicated that, in fact, buffer time was typically used for several kinds of activities. Buffers enabled the teams to capitalize on unexpected competitive events in the fast-moving PC industry, new customer demands or even new ideas they acquired by "learning by doing" during production. Buffers also enabled teams to deal with internal events that often wreak havoc with pre-planned schedules, such as an unanticipated illness or vacation. Buffer times also provided a mechanism to overcome the biases and limitations of human analysis. As one worker noted, "there's also the inevitable things-- 'Oops, we didn't think of that.' And the 'oops we didn't think of that' is what the buffer is there for."

Teams that experimented with buffer times attributed several benefits to their use. First, team leaders were able to schedule and predict market launch dates more accurately, and thus to better meet customer expectations. Second, teams found that adding buffer time did not in fact lengthen the schedule; it only appeared to do this if one based the comparison on unrealistically optimistic estimates for projects without buffers. Finally, by monitoring what activities ended up filling the buffers, Microsoft improved its problem-solving process. As one manager explained, by examining how projects use buffer time, "[we come to] understand what are the risks on the project...and to take a look at where [problems] are clustering..."

As a result of this success, most projects have voluntarily adopted the buffer time practice, although there is variation across the firm in both the success rate and popularity of the concept.

**BBA.** At BBA, the central problem was, how to find opportunities for ongoing improvement to technologies-in-use, given the pressures on production workers and engineers to focus on current production requirements. Regular use of the technologies was not consistent with the kind of mental and physical effort required to develop and implement new ideas (Tyre and Orlikowski, 1994). Production schedules and efficiency requirements left little or no time or attention for experimentation and adaptation. Routines became established and, even when they were recognized as flawed or inefficient, they were protected if they served to get the work done.
Adaptation did occur, however, during brief and intensive spurts of activity that were almost always triggered by some disruptive event. Significantly, events that disrupted the normal production schedule were only occasionally problems in and of themselves. More often, they were events which interrupted the normal flow of production by necessitating a temporary line stoppage, but which did not signal a new problem with the technology itself. These events included the introduction of new machines or tools (14 cases, or 40% of all instances observed), the addition of new product requirements (6 cases, or 17%) or permission from management to take the machine temporarily off line (6 cases, 17%). Occasionally, disruptive events were themselves problems, such as a sudden machine breakdown (2 cases, 6%). In each of these cases project teams not only dealt with the immediate problem (corrected the source of the breakdown), but they also attended to outstanding problems that had been ignored during normal production, but which had caused chronic inefficiencies or inconveniences.

Of the 41 examples of new technology studied at BBA, 88% of all the reported adaptation activity occurred following such disruptive events: thus, only 12% of technical changes were accomplished in the absence of some kind of break in the action.

Managers often recognized in retrospect that specific breaks in the action proved beneficial for a given project, often enabling a team to make significant improvement to the technology. However, not one engineer or manager who was sampled questioned entrenched assumptions about the need for uninterrupted production. Thus, no one saw a way to change the situation so that "breaks in the action" could be instituted as a legitimate and ultimately efficient mechanism for enabling technological improvement.

*Ditto.* At Ditto, the fundamental problem was that no one could get their work done in a "reasonable" amount of time; engineers had to come in early, stay late and work weekends in order to get sufficient time to complete their own work. These efficiency problems also adversely affected the product development process itself, although these effects were not as apparent to the members of the organization.
The researcher observed that engineers continually complained about their lack of uninterrupted time to work. Together with the software group, the researcher helped create an opportunity for engineers to collectively examine their work patterns. Blocks of time during the day when engineers could not interact were established. "Quiet time" was created both as a way to provide individuals with blocks of time to get their work done, but also as a way to encourage individuals to recognize the value of interactions. At the end of the intervention period, the formal schedule dictating "quiet time" and "interaction time" was lifted. Yet, even once interruptions were not constrained to certain periods of the day, there was still evidence of a lasting shift in attitudes and assumptions. One engineer wrote: "I believe people have begun to respect others' work time. The focus has moved from themselves to the team. Interruptions still occur, but people take the time to think about what they are doing before interrupting." Indeed, most engineers at Ditto agreed that the quiet time intervention changed their ways of thinking about productivity -- from an individual phenomenon, to a group one.

Managerial assumptions were also altered. The software manager said: "The value was that I learned to define a task and then just give the engineers time to do it without constantly inspecting." The engineers noticed this change as well. One engineer said: "I do not feel like I am constantly looking over my shoulder. Managers are not constantly standing over me pulling me to do other things."

_Motorola:_ The question investigated in this study was, how does a plant move from traditional work practices to an empowered, involved workforce? From 1955 until the late 1980s, the Arcade plant operated in a traditional manner. It presented an appearance of great stability to its workforce. Employment, work practices, and technology, though all subject to incremental changes over time, were relatively stable, and ties between the plant and its local community were strong. However, in 1987, the management of the Automotive Group decided to pull out of New York state and to close the Arcade plant. It sold some assets and product lines to a local company, and announced that other product lines would be manufactured in more efficient plants. One reason for this was Motorola's
rebirth as a purely high-tech producer, and thus its move away from the relatively low-tech products produced at Arcade. Also, the Arcade facility was old, out of date, and increasingly unprofitable.

Six months later, however, the decision to pull out of New York state was reversed, partly due to lobbying efforts by major customers. Instead, management decided to build a new facility nearby, and to manufacture a line of high technology products there. They eventually selected a site in Elma, some 26 miles away from Arcade.

This second announcement marked the beginning of a specific time period (about 14 months) during which plant personnel would have to develop a new production system, and to ready themselves to become a productive team. As part of this process, the plant manager introduced a massive "empowerment" or involvement program. As a result, employees' daily rhythms were radically altered. Whereas before the announcement production workers' sole responsibility was their limited production routines, they now were required to spend considerable time on three additional activities. First, employees at all levels were involved in designing the layout of the new facility. Second, employees participated in extensive training in technical and organizational skills. Third, schedules were altered to make time available for a large number of meetings. For example, at least 35 new teams were created (including, e.g., safety, housekeeping, peer review, empowerment roadmap, etc.) and each required frequent cross-functional meetings. For the first time, workers were required to make decisions about how to allocate their time among these multiple, competing demands.

In short, during the time when the plant was readying for the move, existing temporal rules and rhythms were discarded. On the one hand, workers were encouraged and even required to make time for the many meetings and training sessions which were previously squeezed out by rigid production schedules. At the same time, however, employees had to deal with considerable time pressure and uncertainty about how to use their time. After all, customers still expected regular on-time deliveries. Thus, there was a constant and unprecedented tension between the temporal demands of production and "involvement" or empowerment activities.
This shift in the plant's temporal rules and rhythms affected worker behaviors and attitudes. The initial change was a new awareness among employees; they moved from taking the workplace and its routines for granted, to serious reflection about the future of their employment and what it would require from them. This new awareness appeared to encourage long-term employees to adopt the kind of work practices and attitudes which can generally only be introduced successfully at greenfield sites. Thus, the temporal shifts following announcement of a new plant apparently led to major behavioral changes in work practices and to changes in workers' attitudes toward their work.

2. How Time Enabled Change

Time As A Trigger

Production stoppages or rhythm changes created distinct interruptions in the midst of familiar work patterns. Such interruptions forced people to focus on underlying problems, partly because people could not easily use perpetual busyness as a way to ignore problems. By increasing uncertainty and by cutting people off from familiar temporal boundaries, these interruptions may also have helped to increase openness to change.

For example, at Microsoft, engineers agreed that without buffer time, team members tend to become so focused on meeting specific project goals that they forget or are unable to reflect about what they are doing and what is happening in their environment. According to one,

"[With an] end-date motivated schedule...developers were so busy meeting deadlines that there was no time for the reflection on 'where we stand'...[We] did not stop and reassess problems... [just] plunged ahead."

By contrast, the insertion of a buffer time within a project enabled teams to actively "shift gears" during development from a mode of
implementation to one of reflection, awareness and analysis. In the words of one engineer.

"[Buffer times] are a time for stopping and insisting that developers pull their heads up from their work for a reality check on progress.... Too often, teams are too close to projects to see (and admit) where they are falling behind."

Similarly, at BBA breaks in the action spurred unusual levels of analysis and change, even though this was not an intended outcome of random production stoppages. For example, one project manager noted that:

"We did not really focus on [the remaining] problems until the new placer was brought in [and the line was shut down for two weeks]; that sort of focused our attention."

Significantly, the addition of the new placer not only triggered work on the specific problem raised by the new placer (the need to run the line at faster speeds), it also helped the project team stop and reassess several other, previously-ignored operating issues. In another project at BBA, an engineer explained that bringing in new tooling was a critical point of inflection in the project:

"[When the new tools came in and the line was stopped], we were forced to take the time to do a great deal of mental testing of the ideas suggested from [all] sides. So instead of running parts, we had to go through a lot of "what -ifs" in our minds."

During these "mental simulations", project members went back through project logs and their own recollections of events; they ended up not only developing a successful new tooling package, but also addressing some outstanding problems with the new technology.

Shifts in temporal patterns and schedules, like those at Ditto and Motorola, also created a trigger for change because they showed that accepted, taken-for-granted rhythms could be altered. Thus, people were forced to entertain the possibility that other aspects of their work settings could change, and that they could effect change. For example, the "quiet time" intervention at Ditto provided engineers with the blocks of
uninterrupted time that they desired, but also forced them to realize that not all work could be done in isolation. They came to realize both the importance of interactions, and the fact that interactions could wait. Furthermore, they came to recognize that they were doing to others exactly what they didn’t like others doing to them, namely, interrupting others. They therefore became more conscientious about their interaction patterns.

In sum, temporal breaks -- whether full stops to normal productive activities, or shifts in the accepted rhythms of work -- triggered change because they forced people to make uncomfortable decisions about how to use their time. As Barley (1988: 125) points out, the most powerful technique for banishing uncertainty in organizations is to treat even random or "self-imposed temporal boundaries as inviolable external constraints." In each of the four cases studied, temporal breaks forced organization members to actively make decisions about how to use time, because normal temporal boundaries and constraints were temporarily suspended.

At Microsoft, for example, managers deliberately avoided specifying the activities to be accomplished during buffer times, realizing that buffer time could only function if decisions about how to use the time were left to the team. Thus, teams had to determine for themselves what to do with the temporal space as it occurred. At BBA, production halts were not planned; they had the effect of throwing people out of the extremely well-structured world of production schedules, and into a temporal void that they had to decide how best to fill. At Motorola, employees who had been used to relying on a rigid production schedule to structure their time suddenly had to make decisions about how and when to trade off attention to production, to training, and to planning for the new plant. While the pace of work did not slow down -- if anything it was faster during the transition time than it had been previously -- it was also much more complex to manage than what workers had been used to.

In one way, the shift in rhythm at Ditto provided more, not less structure to team members' days because of the imposition of rigid quiet time. However, this new structure forced people to recognize that multiple ways of working exist; the old assumption (that interruptions can and must happen whenever a need arises) had been broken. Engineers also began to
experience a feeling of empowerment for the first time. Managers learned that engineers could be trusted to do their work and, as a result, managers trusted engineers to determine their own usage of time. As the software manager said: "I learned to define a task and then just give the engineers time to do it without constantly inspecting" One engineer explained: "Managers are not constantly standing over me pulling me to do other things."

Table 2 provides some summary examples of how time acted as a trigger for change at each site.

Table 2: Time as a Trigger for Change in Four Organizations

<table>
<thead>
<tr>
<th>Organization</th>
<th>Representative Quotes or Evidence</th>
</tr>
</thead>
<tbody>
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<td>Microsoft</td>
<td>&quot;[Buffer times] are a time for stopping and insisting that developers pull their heads up from their work for a reality check on progress.&quot;</td>
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<tr>
<td>BBA</td>
<td>&quot;We did not really focus on [the remaining] problems until the new placer was brought in [and the line was shut down]; that sort of focused our attention.&quot;</td>
</tr>
<tr>
<td>Ditto</td>
<td>People were forced to reflect on their current ways of working; &quot;It made me think about making any interruption first.&quot;</td>
</tr>
<tr>
<td>Motorola</td>
<td>&quot;People are having to take on more responsibilities as part of their basic jobs...&quot; This complexity in schedules caused some pain, since people did not know how to juggle meetings, experiments, and regular production. But, they believed that this &quot;pain drives change.&quot;</td>
</tr>
</tbody>
</table>
Time as a Resource

One of the most obvious but nevertheless valuable aspects of a break in the action is that it provides the time to undertake change activities. This is most clear at Microsoft and at BBA, where temporal shifts involved a full break in the forward action of production. For instance, one project leader at BBA was very explicit about the importance of making time for adjustments to new technology:

"[During the time when the line was stopped] we were able to set aside time and effort to a special job [involving adjustments to tooling and procedures]...That gave a calm environment for doing the work, and the people involved [could] work very hard."

At Motorola and Ditto, where there was no break in the action, temporal shifts still provided pockets of time to undertake new kinds of work. For instance, at Motorola there was a sense that even though it was hard to find the time to attend to diverse new activities, it was possible to make time for these because old temporal routines were already being radically altered. At Ditto the engineers were under immense pressure to get the product to market. They suspended their normal ways of working in order to implement periods of "quiet time" because of their desire for uninterrupted time. Quiet time, however, not only provided such uninterrupted blocks of time to work on technical problems, but also provided time to reflect on interaction patterns, and to realize the impact they were having on others.

Besides simply providing a calm period in which to consider and accomplish change, temporal breaks also provided resources for change at a more conceptual level. At all four companies, managers and employees were normally so focused on speed and time efficiency that they ended up conceiving of time only as a constraint or outcome measure. However, once they began to experience breaks in the embedded rhythm of these activities, organization members began to see that time is both an outcome measure, and a variable that can be used to control what happens in a project. For example, at Microsoft a project manager explained, "The big secret that we did when we finally started shipping things on time -- [is]
we finally put time in the schedule." As he explained, this was not done by simply adding weeks to the schedule -- what he termed "lazy and stupid buffer" -- but rather by using time in novel and creative ways. This freed people up, and enabled them to do a better job in the same amount of time.

Table 3 summarizes the evidence supporting the use of time as a resource for change.

Table 3: Time as a Resource in Four Organizations

<table>
<thead>
<tr>
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<tbody>
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<td>Microsoft</td>
<td>&quot;The big secret is that...we finally put time in the schedule...&quot;</td>
</tr>
<tr>
<td>BBA</td>
<td>&quot;...[During the time when the line was stopped] we were able to set aside time and effort to a special job [involving adjustments to tooling and procedures]...That gave a calm environment for doing the work..&quot;</td>
</tr>
<tr>
<td>Ditto</td>
<td>Managers and engineers set aside blocks of time each week to try new ways of working and to reflect on the effect. &quot;...quiet time has enabled me to get rid of a lot of unproductive things I used to do that were unnecessary.&quot;</td>
</tr>
<tr>
<td>Motorola</td>
<td>Even though it was hard to find the time to attend to diverse new activities, it was possible to make time for these because old temporal routines were already being radically altered by the impending move.</td>
</tr>
</tbody>
</table>
Time as a Coordinating Mechanism

Because schedules, deadlines, and temporal rhythms are such a strong means of organizing human activity, shifts in these temporal structures served to coordinate the shift to nonroutine activities across a workgroup or even an entire plant. By contrast, without some temporal break it is often hard to capture the attention of the critical mass of people necessary to accomplish real change. According to one experienced project manager at BBA,

"From the time the equipment was delivered, we could see that we needed to change the way that the machine was configured. But until we were forced to take the machine off line we could not get [the necessary people] to go back and reexamine some of those basic engineering decisions. For all the high-level managers and technical experts associated with this machine, we were not able to get them to focus on the specific problem of internal configuration until that point. So, we wasted a huge amount of time fixing things on the shop floor instead of attacking the real problem at the level of the technology. The whole process was very frustrating...we wasted a lot of time."

At Microsoft, buffer times served as important "re-synching" points during product implementation. As engineers concentrate on coding and testing individual pieces of a product, there is a tendency for things to "drift apart." For example, a minor change made in the one area fails to get communicated to others who are impacted by that change. Or a major design change is only noticed by one-half of the team (it happens). By temporarily, but collectively, stopping to reassess project status at buffer points, team management ensured that the whole team was on track.

Table 4 provides evidence of time acting as a coordinating devise.
Table 4: Time as a Coordinating Mechanism in Four Organizations

<table>
<thead>
<tr>
<th>Organization</th>
<th>Representative Quotes or Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft</td>
<td>&quot;First you finish [individual software features] 100%...Then, [during buffer time], you reevaluate where you are&quot; as an integrated product.</td>
</tr>
<tr>
<td>BBA</td>
<td>&quot;For all the high-level managers and technical experts associated with this machine, we were not able to get them to focus on the specific problem...until we were forced to take the machine off line.&quot;</td>
</tr>
<tr>
<td>Ditto</td>
<td>Left alone, engineers interrupted each other without even being aware of the effect they had on each other. Shifting to established quiet times changed this because it forced engineers to change their patterns of behavior simultaneously. If individuals had tried to set their own quiet time, one would be left with business as usual or with no way at all to get their work done.</td>
</tr>
<tr>
<td>Motorola</td>
<td>Given the more complex set of activities to be completed before the move, the entire group of employees who were moving from Arcade to Elma had to coordinate their activities closely. Coordination efforts enabled smooth completion of tasks, and it also created a social bond among employees.</td>
</tr>
</tbody>
</table>

Time as a Symbol

In each of the companies that we studied, time had enormous symbolic value. There was an emphasis on maximizing speed to market or meeting tight production schedules. Thus, anything that broke the smooth flow of time was also symbolically important.

This was especially true at Ditto and Microsoft, where time was considered the most valuable and scarce resource of all and where breaks in the normal rhythm of work were intentionally created, and not just unintended accidents. In the software industry, the notion of deliberately
inserting unallocated "buffer" time into the development schedule runs directly counter to current industry practices. Most software companies focus on compressing the development cycle. Time is a scarce and precious resource, usually allocated down to the task level, and no excess "slack" or "waste" is tolerated. As one Microsoft engineer explained,

"[Traditionally.] what happens is when you schedule in buffer time ... everyone goes crazy! They say 'you bozo, you idiot, how could you schedule [that]? That pushes our ship date way past the point we want it, get rid of that!'"

Thus, by legitimizing breaks in the normal schedule despite crisis mentality and very busy schedules, management ensured that people took notice. At Ditto, for example, the fact that quiet time could be executed during a high-pressure period of product development was a strong symbol of management's commitment to addressing the problem that individuals could not get their work done during the normal (9-5) day. At both Microsoft and Ditto, by explicitly and deliberately slowing or changing the pace of work, managers were signaling their belief in the importance and ultimately the utility of reflection and change. This symbolic role of time further reinforced its role as trigger, as resource, and as coordinating mechanism.

At BBA and Motorola, the events we studied were driven by exogenous changes in technology or competition: they were not intended to "do" anything in particular to the technologies or work practices already in place. Still, temporal shifts carried symbolic weight. In both settings the need to meet production goals was considered overriding. Thus, the normal flow of production symbolized "business as usual". Anything that broke that flow signaled a shift from entrenched assumptions and embedded routines.

Table 5 summarizes the evidence for time acting as a symbol of change.
Table 5: Time as a Symbol in Four Organizations

<table>
<thead>
<tr>
<th>Organization</th>
<th>Representative Quotes or Evidence</th>
</tr>
</thead>
<tbody>
<tr>
<td>Microsoft</td>
<td>Managers use buffer time as a way to signal to team members that while short development cycles are important, people also need to look for and sometimes respond to the unexpected. &quot;Once you admit you don't know everything about the future, it's like an alcoholic that says, 'Yes, I have a problem.' &quot;</td>
</tr>
<tr>
<td>BBA</td>
<td>In a typical project there is &quot;plenty of money but no time ... for trying new solutions. Once we get into production I can't do any more [to improve the technology], only try to attend to everyday issues&quot;. Thus, when a break in the action occurs, it stands out as a highly unusual opportunity.</td>
</tr>
<tr>
<td>Ditto</td>
<td>The fact that quiet time could even be implemented was a strong symbol of management's commitment to addressing the problem that individuals could not get their work done during the normal work day.</td>
</tr>
<tr>
<td>Motorola</td>
<td>Employees felt that &quot;our business is very competitive&quot;...&quot; I feel that there will be a move south of the border if they can't squeeze water from a stone...&quot;. Thus, it was remarkable to people that management was willing to make time for training and employee involvement in planning for the move.</td>
</tr>
</tbody>
</table>
Discussion: A New Model of Change

The data above suggest a model of how temporal shifts help to bring about change in organizational settings. It is notable that, in contrast to established theory, in none of our cases was organizational search and change primarily problem driven. Problems were obviously relevant: they were generally well-recognized and openly discussed -- sometimes incessantly -- by people at every level, but they somehow failed to provoke change. Thus, the source of any organizational inertia was not that problems were unrecognized. Rather, until there was some sort of break in organizational rhythms, the people involved felt and acted as if there was no way to change their situations.

Temporal breaks or shifts appeared to enable change in several ways. First, a break in the action made time -- which was normally assumed to be inviolable, unchangeable, and unrelenting -- become a trigger for change. When a break in the action occurred, people suddenly found themselves cut loose from regular routines or assumptions. Even where these events were not themselves problematic, they served to jolt people out of an everyday mental frame that said, "problems are just there", and into a frame that said, "it's time for a change!".

Second, breaks in the action provided time as a resource. One of the reasons why well-recognized problems went unresolved for so long was that people felt they were simply too busy to attack them. But a break in normal action provided the slack time or reflective time -- or the ability to create such time -- necessary to assess problems and to resolve them. Indeed, temporal breaks and shifts often created the experience of "more time" without actually adding to the elapsed time for accomplishing certain tasks. Thus, for instance, developers at Ditto and at Microsoft found that they could get more work done in a given time period once they inserted a break in the action during product development.

Third, breaks or rhythm changes in the regular flow of activities operated as a coordinating mechanism. Change in organizations is a collective event, and pacing, rhythm, and temporal milestones are among the most powerful forces for organizing and coordinating a group of people
(Zerubavel, 1981). By the same token, breaks in the normal rhythm of the group disrupt all group members at the same time. This facilitated change by ensuring that readiness for change was synchronized among all of those who needed to be involved.

Finally, a break in the action frequently carried enormous symbolic power which reinforced its role as trigger, as resource, and as coordinating mechanism. For example, at both Microsoft and Ditto, time was considered the most valuable and scarce resource of all. By explicitly and deliberately "slowing" the pace of work in these settings, managers were signaling their belief in the importance and ultimately the utility of reflection and change. At BBA and Motorola, pauses in production were symbolically important because they so directly contradicted the iron rule of focusing only on maintaining the production schedule.

Figure 1 summarizes how temporal shifts led to change in the four cases studied here.
Figure 1: Temporal Triggers for Organizational Change

**BREAK IN PRODUCTION** vs. **ALTER WORK RHYTHMS**

**BREAK IS INTENDED AS TIMEOUT**

**Microsoft**

*Trigger:* Signaled people to look up from their work; assess status.

*Resource:* Freed from production work.

*Coordination:* Buffer time brought the entire team together; a common focus.

*Symbol:* Acceptance by management was seen as an admission that change is inevitable.

*Result:* Significant changes to schedules and project parameters. Mixed results in changing how projects managed and structured.

**Ditto**

*Trigger:* Change in daily schedules people think twice about impacts of "routine" interactions.

*Resource:* More work accomplished in less time; people find time for reflection.

*Coordination:* Quiet time affects all team members; it works because all members follow the "rules".

*Symbol:* Management acceptance signaled commitment to solving the "time problem".

*Result:* Imposed behavior changes during; intervention lead to longer-lived attitude changes and new interaction patterns within the team.

---

**BREAK IS NOT INTENDED AS TIMEOUT**

**BBA**

*Trigger:* Forced to stop production, enter more unstructured time.

*Resource:* Freed from production work for a short time.

*Coordination:* Production halts idled members of the whole group.

*Symbol:* Production halt signals urgency and novelty; attracts attention.

*Result:* Significant changes to technology and use procedures, but no real change in attitudes and routines for technology use.

**Motorola**

*Trigger:* To prepare for new plant, workers forced to figure out how to juggle routine work with "involvement" activities.

*Resource:* Legitimizes taking time away from routine production.

*Coordination:* Disrupts all affected employees; must work together to develop new routines.

*Symbol:* Management's willingness to make time signaled a shift in thinking.

*Result:* Behavioral change in the form of "involvement practices" adopted. Also, changes in employee attitudes and commitment to the firm.
It is important to point out that we are not proposing that a time-driven model of organizational change should replace existing theories of problem-driven search and change. Rather, our model is complementary to existing theory -- both because it enriches the explanatory power of the latter, and because it explains certain phenomena that are not well understood using accepted notions of problem-driven search. We build on existing theory to show that one of the reasons why problems can provoke adaptation is that problems often create temporal breaks. Thus, problems may be powerful agents of change not just because they force people to notice weaknesses in existing routines or assumptions, but also because they insert a break in the action (whether a full stop or a restructuring of time). This provides both a trigger to recognize the need for change, and a critical resource -- time -- required to undertake change efforts.

Furthermore, in this paper, we have highlighted several cases where search and adaptation were clearly not primarily problem-driven; problems were well-recognized, but they failed to trigger change until events created some break in the action. Yet even in these cases, it is clear that both problems and temporal breaks contributed to the changes we described. As outlined in Figure 2, one might ask in any particular case to what degree change is instigated by problem occurrence or by temporal shifts, rather than assuming that only one of these is at work.

Figure 2:
Temporal Triggers and Problem Triggers as Complementary Forces

(HIGH)^

Motorola

v (LOW)

^

BBA

v

^

Microsoft

v

v (HIGH)

(LOW)^

Ditto

CHANGE IS

TRIGGERED BY

PROBLEMS

CHANGE IS

TRIGGERED BY

TEMPORAL BREAK
Thus, we suggest that temporal breaks can be important triggers for change in and of themselves, or a temporal break can be a powerful aspect of problems that helps to initiate organizational adaptation. For example, in Meyer's (1982) paper on "jolts", it is conceivable that the doctor's strike created opportunities for organizational change not only by creating an immediate problem (lost revenues, etc.) as Meyer describes, but also by slowing the pace of work. The latter both created a trigger for change, and provided the temporal space to effect it.

Our theory may also help to account for cases where search is not problemistic in the sense of remaining local to the problem (Cyert and March, 1963). In our studies, we witnessed situations where, following temporal shifts that broke normal routines and constraints, people turned their attention to a wide spectrum of issues that had previously been suppressed or ignored. This finding points to what may be a fundamental difference between the mainly rational process of problem-driven search, and the more affective impact of temporal shifts. The appearance of new problems tends to focus attention rather narrowly on the issues at hand (Cyert and March, 1963; March and Simon, 1958). But the effects of temporal shifts may be more diffuse; they appear to decrease certainty (Barley, 1988) and to increase arousal and awareness, at least up to some point of inflection. Thus, temporal shifts may lead to a broadening, and not a narrowing of attentional focus (Weick, 1990).

Our theory may also complement existing work dealing with the role of time in organizations. For example, Gersick (1988; 1994) has suggested that certain clock-based events or milestones (like the midpoint of a time-limited exercise, or the five-year mark in a new venture) can also turn the focus of activity from normal routine to reevaluation and change. Thus, Gersick highlights clock time -- but not necessarily temporal shifts -- as a trigger, and, to a certain extent, as a symbol. We might suggest that time as a coordinating mechanism, and time as a resource, are also powerful in the cases that she studies. For example, at key milestone points teams or organizations often create temporal breaks; they stop work to evaluate progress, go on retreats, etc. Yet these forces have not received much attention, and the independent effects of temporal markers and temporal breaks have not been teased apart.
Another stream of research examines the fruitfulness of beginnings for supporting search and adaptation. At the start of a new project, the hiring of a new employee, the formation of a new team, or the introduction of a new technology, there is often an intensive flurry of formative or adaptive activities (Weick, 1990; Bettenhausen and Murningham, 1985; Tyre and Orlikowksi, 1994). According to these researchers, beginnings support rapid structuration and change because norms, routines, and assumptions are not yet set. Therefore, people have the freedom to ask new questions and to try new things; organizations and technologies are unusually malleable (Weick, 1990; Tyre and Orlikowski, 1994). An often overlooked aspect of beginnings, however, is that at the beginning of a project the pace is relatively relaxed; schedules have not yet been set, commitments have not yet multiplied, and deadlines are not pressing. A new employee not only has license to ask "dumb" (and sometime subversive) questions, but also has more time to think and converse than does the experienced worker. In other words, during beginnings people simply have the time to notice things, to ask questions, and to make changes that get squeezed out during later, more hectic periods.

Temporal breaks in the action may also help to explain the adaptive potential of transition points in organizational life. Transitions such as changing jobs (for an individual) may help to trigger change simply by necessitating that difficult questions (e.g., regarding capabilities and preferences) move from the background into the foreground for discussion and consideration (Schein, 1978; Louis and Sutton, 1991). But transition experiences also have a temporal effect. They require a change in the tempo or pace of work. A job-seeker may be newly laid off, or may slow down from full-time, full-speed involvement in her current job during the search process. We suggest that these sorts of changes in pace help to make possible the reflectiveness and adaptability often observed among individuals and groups in transition. Indeed, without such a break in the action, simply surfacing difficult questions would be unlikely to lead to any change, since there would be no time or flexibility to seriously consider the issues.

Our findings also relate to research on organizational entrainment. In recent years, organizational theorists have begun to take seriously the
notion that human activity is innately rhythmic (McGrath, Kelly and Machatka (1984); Ancona and Chong (1996), Gersick, 1994). In particular, these authors have focused on entrainment processes, or the adjustment of the pace or cycle of one activity to match with the pace of another, stronger one. In this paper, we examine the power of moving a given activity out of step with its own accustomed pace or rhythm. We show that insertion of a break in the entrenched rhythm of daily activities can be a powerful way of helping individuals and groups recognize and deal with problems that are ordinarily carefully suppressed or ignored. This suggests that just as an organization's dominant rhythms can, like a metronome, serve to entrench the tempo and even the content of various routines and procedures, so changes in these rhythms can undermine such stability and enable new questions to surface.

Our analysis also raises interesting questions about the origins of different kinds of change. Across the four cases studied in this paper, we identified different kinds of change resulting from breaks in the organizational rhythm. In some cases, temporal breaks led to fundamental shifts in people's attitudes or in the way the organization approached problems, whereas in other cases change was more limited to behavioral adaptation in specific circumstances. What explains these differences? Our analysis indicates that they cannot be neatly explained by the type of break in the action (stop production versus shift temporal structures), nor by the intention behind the break ("time-out" was intended versus unintended). What does seem to make a difference is what people learned about time itself from experiencing a break in the action. Specifically, in each of the settings where we observed significant change in people's basic attitudes and assumptions, the break in the action that people experienced taught them that time is not immutable and absolute (as they had assumed), but rather is malleable. People learned that they could actually change the way that time is experienced and the amount that appears to be available. For example, engineers at Microsoft and at Ditto learned that by shifting their usage of time, they could "create" additional time in a product development project. At Motorola, people learned that they could choose to devote time to "nonproductive" activities -- and that this could in fact prove to be productive. But at BBA, people were not able to generalize their experiences with time-outs from production or to reframe their
assumptions about time itself. While they benefited from breaks in the action to complete needed technological improvement activities, there was no evidence that they recognized such breaks as a tool they could use to break out of entrenched but unproductive patterns of behavior.

Conclusion

One of the most puzzling features of the findings we present in this paper is, surprisingly, how sensible they are. In each case, we witnessed processes that strike us as terribly ordinary. At Ditto, developers were given a new schedule with the intent that they explicitly consider how they spend their time -- and they did. At Microsoft, management forced engineers to stop their normal work as a way of making time to respond to changes in their environment -- and this occurred. Even at BBA, the fact that people used breaks in the action to undertake needed changes is hardly surprising. Indeed, in everyday life, when we want friends or colleagues to revisit their assumptions, the first thing we are likely to say is "Hold on just a minute...".

Yet, despite its apparent ordinariness, this power of temporal pauses or shifts is not incorporated into accepted theories of organizational search and change. In this paper, we suggest that these theories would be both stronger and more robust if they included not only a sophisticated understanding about how problems can trigger organizational change, but also took account of the role that temporal breaks and shifts play in this process. In this way, we might be able to better address questions not just of why organizations change, but also of when change might occur. In particular, we think that the idea of time as a trigger for change has unique power to explain cases where problems have existed for a long time, yet they have failed to generate search or change. If the multitude of studies on organizational inertia are any indication, this situation is not only common, but is also highly threatening to organizational survival. In this paper, we propose only that the most ordinary of human processes may have important contributions to make toward understanding and even resolving questions about organizations' ability -- or inability -- to change.
Acknowledgments:
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