

# Business Process Redesign: Radical and Evolutionary Change

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*We explore the nature of change when firms engage in business process redesign (i.e., reengineering). According to the proponents, business process redesign is an all-or-nothing affair. Numerous books and articles on the topic promulgate the notion that reengineering is nothing short of a revolution. But the rhetoric can be daunting—and may mislead managers planning to reengineer their organizations. Our field research on 15 business process redesign projects suggests that only one of the two phases of reengineering effort needs to be revolutionary for the project to reach field implementation. Reengineering involves both the design—the blueprint for change—and the implementation of those plans. Reengineering design phase must have elements of radical change. The radicalness instills motivation in ways that more evolutionary projects cannot. But as companies implement the plans, they can—and many do—use a more evolutionary change process, and still gain effective results. Our results provide support to the emerging body of literature that argues that organizations combine evolutionary and radical change harmoniously.* J BUSN RES 1998, 41,15–27. © 1998 Elsevier Science Inc.

## Reengineering Rhetoric versus Reality

Judging from the rhetoric of its proponents, reengineering is an all-or-nothing affair. Numerous books and articles on the topic promulgate the notion that reengineering is nothing short of a revolution (Hammer, 1990). To reengineer properly, a company must radically redesign its processes into cross-functional ones, and change its organization structure, culture, incentives, and information technology (Hammer and Champy, 1993). This is not an activity for the timid (Johansen and Swigart, 1994). Less than revolutionary changes are almost as bad as not changing at all (Hall, Rosenthal, and Wade, 1993). The reengineering landscape is littered with failures, say the loudest proponents of reengineering,

because too many companies lost their nerve, compromised their efforts to change, and therefore gained minimal advantages for their efforts, no benefits at all, or even did harm to themselves (Hammer and Stanton, 1995; Champy 1995; Hall, Rosenthal, and Wade, 1993).

Some of the academic writers on change resonate the reengineering rhetoric; others contradict it. The revolutionary theorists, particularly Nadler, Shaw, and Walton (1995), argue that for a radical change to occur, the change has to be driven by top management. Also, a performance crisis is required to motivate an organization to undertake radical changes (Gersick, 1991). A crisis might be created by a major change in an environment (Romanelli and Tushman, 1994) or by large and sustained performance declines (Tushman and Romanelli, 1985). An anticipated as well as reactive crisis can be a motivator for radical change (Tushman, Newman, and Romanelli, 1986). Radical theorists also argue that radical change must be effected quickly (e.g., Gersick, 1991, 1994; Nadler, Shaw, and Walton, 1995; Tyre and Orlikowski, 1994).

Beer, Eisenstat, and Spector (1990) provide a contrasting view. They maintain that for a major change to occur, the change must start at the periphery, not at the apex of the organization. Rather than drive change, senior management must ensure a climate and context that promote action from the grassroots level. In fact, some of the critics of reengineering paint a picture that reengineering stifles the organization's capacity for change. Reengineering is labeled as a highly mechanistic, nonhuman approach to accomplish short-term financial gains for the long-term detriment of organizational innovation and change (Shaw and Maletz, 1995). Reengineering creates excessive anxiety and disruption. Unlike reengineering that promotes top-down programmatic change, real change is argued to come from nonprogrammatic, bottom-up or middle-out efforts (Beer, Eisenstat, and Spector, 1990). Such an approach presumably increases a firm's readiness and capacity to change in the future.

The results from case studies on 15 business process proj-

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ects in eight different organizations is quite contrary to either of the two polar views. Reengineering emerged to be revolutionary during design and evolutionary during implementation. Organizations were willing to use much more revolutionary tactics in design because design tended to occur quickly, was somewhat self-contained, and typically had a punctuated end point. Organizations were unwilling to adhere to revolutionary tactics in implementation because of the cost and risk of the revolutionary approach in terms of financial, organizational, and human assets. The revolutionary tactics required greater intrepidity than the organizations were willing to exercise.

The next section of the article contrasts the revolutionary and evolutionary theories of organizational change. We then describe the methodology of the longitudinal case studies followed by results. The implications attempt to integrate radical and evolutionary change.

## Revolutionary versus Evolutionary Change

Change in successful organizations has been depicted as "ambidextrous"; that is, "periods of incremental change punctuated by discontinuous or revolutionary change" (Tushman and O'Reilly, 1996). Business process reengineering is seen as an approach to accomplish radical change (Stoddard, Jarvenpaa, and Littlejohn, 1996; Stoddard and Jarvenpaa, 1995; Gallivan, Hofman, and Orlikowski, 1994). Hammer and Champy (1993) argue, "Reengineering isn't about making marginal or incremental improvements but about achieving quantum leaps in performance." Similarly, Davenport (1993) wrote, "Process innovation (i.e., reengineering) is intended to achieve radical business improvement. . . ." The necessary conditions for successful reengineering closely parallel those associated with radical organizational change: top-down driven and directed change that is motivated by a performance crisis.

The recent empirical evidence, however, suggests that the outcomes of reengineering appear to be at best evolutionary (Cooper and Markus, 1996; Stoddard and Jarvenpaa, 1995). Stoddard and Jarvenpaa (1995) describe three reengineering projects where tactics for change became more and more evolutionary over time. Cooper and Markus (1995) describe how a Japanese firm accomplished major change via "humane" reengineering by focusing the change on soft systems (people, values, behavior) rather than hard systems (processes, technology, and structures) that tend to be the focus of classical reengineering (Hammer, 1990). Humane reengineering however, takes a long time, "several years to complete." By contrast, the classical reengineering advises that "Twelve months should be long enough for a company to move from articulation of a case for action to the first field release of a reengineered process" (Hammer and Champy, 1993, p. 212). Sviokla (1996) and Caron, Jarvenpaa, and Stoddard (1994) along with

Tyre and Orlikowski (1994) emphasize the need to act swiftly in radical projects.

Cooper and Markus (1995) as well as Davenport (1993) maintain that the dichotomy of radical and evolutionary change is false. Davenport argues how a firm needs to excel in incremental change to accomplish radical change and vice versa. Cooper and Markus found that within a change program, both radical and incremental techniques were used and both radical and incremental tactics within them. This article explores the radical and incremental dichotomy in terms of the phases of the projects rather than across projects or across techniques used.

### *Evolutionary Change*

Different elements of the evolutionary change are described in such writings as Beer, Eisenstat, and Spector (1990); Kanter, Stein, and Jick (1992); Jick (1993); Leonard-Barton (1988); Liker, Roitman, and Roskies (1987); and Cooper and Markus (1995) (see Table 1). The evolutionary change model embodies the sociotechnical change approach. Change unfolds as a recursive interaction between hard and soft system changes. The model assumes that people who are the recipients of change must design and implement the change. Hence, change should be promoted from within. Change is managed with the current leadership and employees. The communication about change is broad and open. Change must be adapted to the pace and capabilities of people and hence, milestones and yardsticks are flexible. The motivation for change arises from local, internally felt dissatisfaction and a desire to do better. The new processes are piloted and put in place before IT is used to cement the new processes. The pace and nature of change is adapted to be comfortable for the current personnel of the organization and to the other external and internal constraints that the organization faces. Evolutionary change inherently assumes that change is best accomplished in small increments at a time.

### *Revolutionary Change*

The revolutionary change theories based on the punctuated equilibrium paradigm (Gersick, 1991; Tushman and Romanelli, 1985) conceptualize radical change to be interspersed between long periods of incremental change. Radical change changes the deep structure of the organization. Such a change unfolds rapidly and alters fundamentally the basic assumptions, business practices, culture, and organizational structure. High levels of identity crisis, disorder, and ambiguity are associated with radical change.

Radical theorists describe such change to be led by the CEO, be externally imposed, and require external resources and the outside viewpoint (Nadler, Shaw, and Walton, 1995; Gersick, 1991; Tushman, Newman, and Romanelli, 1986). Senior management must drive the change by providing the right vision, creating the right culture, and building the necessary political alliances (Nadler, Shaw and Walton, 1995; Etlie,

**Table 1.** Alternative Change Theories

Element	Evolutionary Change	Revolutionary Change
Leadership	Insiders	Outsiders
Outside resources	Few, if any, consultants	Consultant led initiative
Physical separation	No, part-time team members	Yes, Greenfield site
Financial crisis	None	Poor performance
Rigid milestones	Flexible milestones	Firm milestones
New reward/compensation	No change	New scheme
Simultaneous IT/process change	Process first	Simultaneous process and IT

Bridges, and O'Keefe, 1984). Outsiders, who have no fear of challenging the status quo, are brought in to lead and participate in the change initiative. The outsiders may be consultants or executives new to the company, function, or a process being reengineered. Sometimes they may be employees from other parts of the organization who have no "old" knowledge of the processes being reengineered. The change team is small, dedicated, and isolated from the rest of the organization to protect them from being "contaminated" by the old way of doing work. The communication about the forthcoming change is limited and on a need-to-know basis only. The change is motivated by a crisis. Yardsticks and milestones are firm so that it is clear when the old ways are gone and the new ways are in place. The reengineered processes assume the availability and existence of new advanced information technology. The organization qualifies each and every employee for the new organization. The message to employees is, "The train is leaving the station and there is limited seating available. If you'd like to board, prove to us that you have the skills and capabilities to occupy one of the seats."

Revolutionary change promotes heroism and tough decisions, for example, relentless cost cutting, downsizing, and organizational structure changes that bend the backbone of the company (Nadler, Shaw, and Walton, 1995). The advantage of the revolutionary change tactics is that change is accomplished quickly (Stoddard and Jarvenpaa, 1995). The disadvantage is that revolutionary tactics unduly increase project risk (Nadler, Shaw, and Walton, 1995). Revolutions can lead to chaos and organizational and individual loss of identity (Gersick, 1991; Clemons, 1995).

Most good managers loathe the revolutionary tactics for implementation because they challenge much of what we know about managing and motivating people (Pfeffer, 1994). Tushman and O'Reilly (1996, p. 28) acknowledge that radical change projects require managers to "cannibalize their own business." The tactics promote exclusion of much of the current organizational expertise, secrecy, supremacy of those who have been selected to create the future vision, unyielding milestones, and a simultaneous change of work roles, organization structure, and technology. Employees who are left out become insecure about their role within the organization and form roadblocks to inhibit change. Secrecy about the project builds further resistance and reduces potential "buy-in." The

tactics require strong control from the top. Hence, the tactics go counter to the very values that most organizations want to institutionalize: empowerment, self-management, and innovation from the bottom up. The revolutionary tactics also require the daily personal involvement of top management. As their time is consumed by inwardly focused change activities, they have limited time to devote to the fast moving marketplace which might lead to lost market opportunities or misaligned corporate strategy.

The major advantage of the evolutionary tactics is that the overall risk of failure is lowered and the continuity of change is maintained because a larger number of current organizational members have the opportunity to participate in and feel ownership for the changes taking place. The evolutionary tactics also increase the overall organization's capacity for change. Employees participating in implementation, both at the front line and in middle management, regularly acknowledge how they have grown by leaps and bounds in improving their understanding of the organization and customers. One stated, "Before, I never questioned or challenged the broader set of issues." Additionally, the translation of the radical vision into a series of intermediate targets helps the organization get started with the change program that might otherwise seem insurmountable.

The major disadvantage of the evolutionary approach is that it takes a long time to accomplish the vision and the vision must be kept alive and refreshed as market conditions change. The proposed changes unfold incrementally over a long period of time. With time, the organization might lose sight of the motivation for its radical vision. The organization might declare victory and shift focus to other initiatives after the initial, modest improvements. For example, after two years of successful reengineering, the president of an organization noted, "It is just as difficult to keep a major change initiative going as it is to get one started."

## Research Methodology

To explore the dichotomy of radical and evolutionary change, we report data on our multiyear research study on managing change in business process reengineering. The research study had multiple phases. The first phase involved a retrospective analysis of three reengineering projects in three companies.

The change management tactics used in the projects were identified and categorized to help build a theoretical "lens" for the research (see Stoddard and Jarvenpaa, 1995).

The second phase involved a field survey with 35 companies on their reengineering projects. The companies studied were selected because they claimed to have one or more reengineering projects that were underway or had recently been completed. The following definition, which was used to screen and select reengineering projects for the third and final phase of the research project, was one of the main outcomes of this phase. A reengineering project was defined in terms of the initial objectives of the project. It was an effort that the management in the company launched as a radical organizational initiative. The projects had the following characteristics:

- A cross-functional scope (more than two functional areas)
- A business process focus (versus, for example, a technology, information, or organizational structure focus)
- Involved a simultaneous change in: organization design (e.g., teams, delayering, consolidation of functions); information technology; and/or culture
- Radical performance improvements (over 50% improve-

ment in cost, quality, cycle time, customer satisfaction, and/or market share, etc.)

During phase 3, the researchers engaged in studies of 15 business reengineering projects in eight organizations, five of which are service organizations and three of which are manufacturing organizations. All 15 projects shared the four project characteristics described above. Table 2 outlines the business process, the elements of planned change, and the realized time line of projects. We deliberately sought diversity in the context and settings of projects studied so as to broaden the insight gained and the generalizability of the findings. Settings also varied in terms of their geographical span. Whereas some projects were concentrated to one locale, others were spread across the United States or the world. Of the 15 projects, ten were longitudinal, providing us the ability to examine the tactics used over time, without us knowing the outcomes of the change project being studied. The other five studies were retrospective in terms of the design and pilot phase and relied on project documentation and key personnel's memories on design and pilot activities.

Participants in the longitudinal case studies received site

**Table 2.** Projects Studied in Phase 3

Project	Type of Organization	Process	Objectives	Start Date of Project, Start Date of Pilot, Start Date of First Field Implementation
1	Midsized financial services	Customer service	Cost reduction and cycle time improvement	Q4'90, Q4'93, cancelled
2	Midsized financial services	Customer service	Implementation of radical new strategy	Q4'90, Q4'91, Q3'93
3	Midsized financial services	Product development	Implementation of a new strategy	Q3'93, Q2'94, on hold
4	Large financial services	Order fulfillment	Reduction in costs; integrated systems to improve workflow and customer satisfaction	Q4'89, Q4'90, Q1'91
5	Large financial services	Order fulfillment	Cost reduction and cycle time improvement	Q4'91, Q1'92, Q3'92
6	Large financial services	Order fulfillment	Cost reduction and increase in customer satisfaction	Q4'92, Q4'93, redesign started Q1'94, field implementation Q1'95
7	Large defense contractor	Purchasing	Cost reduction	Q1'90, Q2'91, Q2'92
8	Midsized financial services	Order fulfillment	Cost reduction, cycle time, one-stop service	Q2'92, Q1'93, Q1'94
9	Large hi-tech company	Order fulfillment	Cycle time	Q2'91, Q4'92, Q3'93
10	Large hi-tech company	Product development	Profitability, cycle time	Q3'91, Q1'93, cancelled
11	Large hi-tech company	R & D	Cost reduction, cycle time	Q3'92, redesign Q1'94, cancelled Q1'95
12	Large defense contractor	Equipment reuse	Cost reduction, cycle time, elimination of layer of management	Q4'92, Q4'93, Q1'95
13	Midsized hi-tech company	Order fulfillment	Cost reduction, cycle time, quality, customer satisfaction	Q4'92, Q3'93, Q4'93
14	Large telecom services	Order fulfillment	Cost reduction, quality, cycle time, customer satisfaction	Q1'91, Q1'92, Q4'92
15	Midsized food manufacturer	Plant management processes	Cost reduction, quality, cycle time	Q4'89, Q1'91, only the first phase of the project implemented in Q2'93

visits every three to five months. Site visit interviews lasting between 30 minutes to three hours involved organizational members such as the senior management of the firm, executive project sponsor, senior operating management of the project, reengineering project participants, and internal and external customer representatives of the process. Additionally the researchers conducted 30- to 60-minute phone conferences with the project manager or project leader on a bimonthly basis. Most of the data came from these semi-structured interviews with open ended questions focused on how and why certain developments had taken place. In each firm, we interviewed between ten and thirty-five people over a two-year period. Typically we became involved in a project during the design process and followed the project through initial field implementation. Implementation was defined as the actual deployment of the new process to accomplish an organization's work. Early in implementation, organizations often established prototypes or pilots where a small portion of the actual work was completed in the new way. Design constituted all project activities up to the implementation (visioning, process mapping, simulations, etc.). In all firms, we had access to the senior executive who had championed the effort as well as the people affected by the change. In our assessment of the projects' success at the time of field implementation, we relied on the perception of the champion. In addition to the interview data, we had access to project documentation and internal correspondence in some of the cases. The unit of the analysis is the business process redesign project.

The projects, or cases, were analyzed in terms of the change management tactics used during the design and implementation phases. The two researchers independently coded all 15 cases and then resolved any conflicts through discussion. Table 3 summarizes the questions that guided the analysis to determine if the change tactics used were revolutionary or evolutionary.

## Results and Discussion

Table 4 reports on the nature of tactic—evolutionary or revolutionary—during design and implementation for each of the projects. If in the design phase, four or more of the seven tactics were revolutionary, the design phase was considered revolutionary. If in the implementation phase, four or more of the seven tactics were revolutionary, the implementation phase was considered revolutionary. In our discussion of results, we will report on all 15 cases and then report detail on two cases. The first case, Pacific Bell (Project 14), was rather typical of a project that followed radical design with evolutionary implementation. The second case, Siemens Rolm (Project 13), was characteristic of a project that followed radical design with somewhat more radical implementation. Clearly, evolutionary and revolutionary change are ends of a continuum and most projects fall somewhere in the middle of the continuum both in design and implementation.

**Table 3.** Questions Used to Code the Change Tactics in the Reengineering Projects

Area of the Tactic	Question Examining if a Radical Tactic
Leadership	Were the champions and sponsors from outside or recent newcomers? Were the champions and sponsors part of the management board?
Outside resources	Were employees excluded? Were a lot of outsiders such as consultants or recent newcomers to the organization employed?
Physical separation	Was the project team isolated from the rest of the organization?
Financial crisis	Was there a financial crisis or an anticipated financial crisis threatening the survival of the organization?
Rigid milestones	Were there stated milestones for the field implementation and were they adhered to?
New rewards/ compensation	Were there new compensation schemes or rewards?
Simultaneous IT/ process change	Was the IT change to occur and did it concurrently with the other hard system changes such as process and organization design (i.e., team) changes?

Combining the time line dates from Table 2 and the results from Table 4, we find that those projects that had used evolutionary tactics during design were more likely to be put on hold or discontinued than those projects that deployed radical tactics during design. Hence, our tentative results suggest that reengineering design must be radical; that is, deploy radical change tactics. Projects with evolutionary tactics during design did not have enough momentum to reach the phase of field implementation. By contrast, many of the projects that were considered successful by the company management were evolutionary during implementation. Hence, our results suggest that organizations can combine both radical and evolutionary tactics within a single project as long as the design phase involves primarily radical tactics coupled with radical visions.

### *Reengineering Designs are Radical in Projects that Reach Field Implementation*

An example of a radical design project was the global virtual factory developed by a high tech manufacturing company which sought to reduce lead times from 180 days to 15 days for product lines that faced short lead times and had highly specialized requirements (Project 9). A benchmark study revealed that a global competitor filled orders in one fifth of the time for comparative product lines. In three months, the dedicated and isolated design team came up with a breakthrough design which assumed that the firm's eight manufacturing locations around the world actually existed under one roof. The design proposed a "virtual factory" that would allow the company to dynamically manage its global manufacturing and logistics. The design team, which included nonmanufac-

**Table 4.** Nature of Tactics Used in the Design/Implementation of Reengineering Projects

Project	Leadership	Outside Resources	Physical Separation	Financial Crisis	Rigid Milestones	New Rewards/ Compensation	Simultaneous IT/ Process Change
1	E/E	R/R	R/R	E/E	E/E	E/E	R/E
2	R/R	R/E	R/E	R/E	E/E	R/E	R/E
3	E/E	R/R	R/R	E/E	E/E	E/E	E/E
4	R/R	R/R	R/E	R/R	R/R	R/R	R/R
5	R/R	R/R	R/R	R/R	R/R	R/R	R/R
6	E/E	E/R	E/E	E/E	R/E	E/E	E/E
7	E/E	R/R	R/E	R/R	R/R	R/R	R/R
8	R/R	R/E	R/R	E/E	R/E	R/R	R/E
9	E/E	E/E	R/R	R/R	R/E	E/E	R/E
10	E/E	E/E	R/E	R/R	E/E	E/E	E/E
11	E/E	E/E	E/E	E/E	E/E	E/E	E/E
12	E/E	E/E	E/E	E/E	E/E	E/E	R/E
13	R/R	R/E	R/R	R/R	R/R	R/R	R/E
14	R/E	R/E	R/R	E/E	R/E	R/E	R/E
15	R/E	R/E	R/E	E/R	R/E	E/E	R/E

E = Evolutionary tactics; R = Revolutionary tactics. The first letter in each column refers to Design; the second letter refers to Implementation.

turing employees and consultants, seeded the idea and pushed it through the management ranks.

The radical design was implemented via evolutionary tactics. The evolutionary implementation approach allowed the manufacturing firm to take advantage of interim "quick hit" changes (such as the development of an IT supported demand queue which enable production load balancing), to reduce product lead time from 180 days to 50 days, and to bring the company into par with its fiercest competitor. It was estimated that it would take seven years to accomplish the structural and brick and mortar changes to realize the virtual factory.

Similar to the manufacturing company, Pacific Bell (Project 14), a subsidiary of the Pacific Telesis Group and one of the seven Regional Bell Operating Companies, developed a radical vision for a new process via revolutionary tactics, but implemented via evolutionary tactics. Pacific Bell chose the evolutionary implementation tactics because there was no immediate crisis felt by the operating units. However, there was a threat on the horizon that MCI or some other player would compete with Centrex, its flagship digital offering to business, or offer a bypass to Pacific Bell's infrastructure.

**PACIFIC BELL CENTREX REENGINEERING.**<sup>1</sup> In 1991, the Centrex order fulfillment process took five to 15 days. Centrex offered a number of features from which the customer could choose, hence it was a complex product to configure and the order fulfillment process was error prone. In some regions, less than 50% of the orders were fulfilled correctly. Customer marketing and operations data clearly communicated that if Centrex was to remain competitive, the cost effectiveness and quality of the order fulfillment process would have to improve dramati-

cally. A small band-aid would only make matters worse. A totally new rethought process was required.

The Centrex order fulfillment process had numerous hand-offs leading to communication breakdowns. An order often touched 11 different information systems, several paper-based systems, and involved eight to 10 people from different functional areas who did not function as a team. Rework and finger pointing were the order of the day. The sales staff were experiencing ever more demanding customers, yet felt powerless. One sales person noted, "Our hands were tied. If the customer called for a 2-19 line order, the mandatory due date was 5 days. Anything over 19 lines was 15 days. We would do nothing on the spot for the customer."

The reengineering design team adopted radical goals: service would be provided when the customer wanted it; internal costs would be cut 75% to 80%; orders would have zero defects; and customer satisfaction would be no less than 100%. Within 60 days, the design team assumed two scenarios: a "Flow Through Scenario" and a "Virtual Team Scenario." Under the "Flow Through Scenario," an order would be fulfilled by a single person, the customer service provider who would fulfill orders from an inventory of preprovisioned packages.<sup>2</sup> The team estimated that 80% of the Centrex orders could be handled via this scenario. In light of the number of individuals and departments that were involved in each order prior to reengineering, the notion that one person could provision a Centrex order was radical.

The other scenario, "The Virtual Team," was equally radical. When a package did not exist to fulfill the customer request,

<sup>1</sup>For a more detailed description, see Stoddard, D.B., and Jarvenpaa, S.L., 1995.

<sup>2</sup>A Centrex package was a set of lines, e.g., 5, 10, or 20 lines. A preprovisioned package was one where phone numbers had been predefined and the central office switch had been programmed to associate with that phone number a set of Centrex features (e.g., call waiting, call forwarding, and conference calling).

then a "Virtual Team Scenario" would go into effect. Under this scenario advanced IT would be leveraged to "virtually" assemble a team of four or more geographically dispersed people to fulfill the order. The team members would work on the provisioning task concurrently, rather than serially as in the past. The team also considered a third, more radical scenario where the customer would enter his or her order directly into Pacific Bell's system and thereby cause a virtual team to be formed, if necessary, without the intervention of a customer service provider.

The Centrex team designed the new process and work roles assuming, for each scenario, the availability of a new complex information system. Under the Flow Through Scenario, expert systems capabilities would be required to assist the Centrex Service Provider. To facilitate communication and information flow among the virtual team members the team envisioned a real-time groupware system which would allow multiple users to simultaneously access and manipulate information. Also, the old legacy systems would be front-ended with graphical workstations to provide a seamless, single image of transaction data.

Pacific Bell developed this radical vision by following the revolutionary tactics during the design phase: outside consultants were used heavily; many of the existing Centrex employees were excluded; firm milestones were established; a crisis mentality existed; and the design was accomplished unencumbered by constraints, such as union obligations, legacy systems, organization structures, culture, and compensation schemes. Much of the vision could be traced to an external benchmark trip to an insurance company.

**SIEMENS ROLM: INTEGRATED LOGISTICS CORE PROCESS REDESIGN.**<sup>3</sup> Similarly, SIEMENS Rolm (Project 13), which manufactured and sold telephone and communications, is another example of a company which followed revolutionary tactics to its reengineering design. ROLM management initiated a total company plan to bring the company back to profitability. At the time, the organization was losing money and had recently been purchased by Siemens (*San Francisco Chronicle*, 1989).

One process that was radically redesigned was the order fulfillment process. Traditionally, ROLM allowed the customer a great deal of flexibility when placing an order for a telephone switch. The customer had until installation to make final decisions on the features and equipment associated with orders. Given the lack of specifications from the customer, the ROLM installation representative would place an order based on his or her assumptions about what the customer needed. As a result, many telephone switches had to be reconfigured after they shipped to the customer. It was not uncommon to have to air ship parts and personnel at the last minute. Further

local offices had to maintain large local inventories of parts and equipment.

The company initiated a team to redesign the order fulfillment process. The initial goals called for 50% cost savings and quality improvements within 24 to 36 months in a 5,000 person organization.

Within 90 days, ROLM developed a radical design using revolutionary change tactics. The team members, consisting of the best and brightest, were brought from the field and worked with outside consultants to benchmark the processes against the best in class. The initiative was sponsored by an executive whose roots were in the new parent company, not at ROLM. The champion, who had previously managed a turnaround in the manufacturing side of the business, had no field operations experience. The 10-member design team was relieved from daily operational responsibilities and charged with designing common repeatable processes for all 35 field locations. Management and the team acknowledged that ROLM did not have the time to allow its field locations to "reinvent the wheel." One team member remarked, "We felt we were the 'Highway to Heaven' team on a mission to save the company."

The radical design which resulted from the process treated the customer as a partner. The new process required customers to sign a statement of work up-front that specified the requirements of the order. The factories could then build the CBX with some assurance that the order was correct and rework would not be required. Given this new level of confidence, the factories were willing to offer shorter lead times. Additionally, the new process assumed that the customer, not ROLM personnel, would use a glossy workbook supplied by ROLM to decide what features and peripheral equipment they needed and where the various pieces of equipment would be installed. Further, the vision eliminated 60% of the local service office's spare parts inventory; parts would be supplied on demand from a centralized facility using an express delivery firm.

In summary, both Pacific Bell and Siemens Rolm used revolutionary tactics in the design phase. Revolutionary tactics are required in the design phase. The revolutionary tactics bring the necessary outsiders and build the enthusiasm and excitement that induce "out of box thinking." One design team member noted, "We were told, do whatever it takes to get the job done on time. We had access to unlimited resources. If we needed something, we got it." Another team member described the design stage, "We worked 16 hour days for several weeks to complete the design. The intensity of the effort helped to come up with a breakthrough design which when implemented will result in significant benefits to the organization."

There were some dangers lurking in following revolutionary tactics in design. The design teams tended to develop "group think" over the immediacy of needed change. Teams began to believe that there was only one set of tactics for successful reengineering implementation—the revolutionary

<sup>3</sup>For a more detailed description, see Stoddard, D.B., and Jarvenpaa, S. L., 1995.

tactics—and that change must and can occur quickly and be free from current organizational realities. Evolutionary implementation tactics resulted in an initial emotional let down and in some cases resulted in the departure of valued employees. One team member noted, “We have proven that the concept [design] works. Why doesn’t the president say that this is a better approach and make the offices change?”

Although radical designs were the payoff from reengineering, the radical designs were rarely implemented in one step. Whereas design can be time-boxed, implementation rarely can be. The challenge was to move toward the radical vision over time. Because of existing external and internal commitments and constraints, the implementation tended to follow evolutionary tactics. This required continuous renewal of the motivation for change. Also, a high-level executive or some other institutional means had to be present to “keep score” and acknowledge what changes had been accomplished and what changes remained to be made.

### **Reengineering Implementation Often Uses Evolutionary Tactics**

Our results in Table 4 suggest that during implementation the radical nature of the project was often modified or compromised. Why should compromises be viewed as the sign of a well managed implementation?

During reengineering design, team members can assume a clean slate and develop the design unencumbered by organizational realities. However, these organizational realities must be often considered during implementation. We found that few organizations had the luxury to open new facilities, hire all new employees, and use parachute systems and culture to enable the implementation of a radical design. Rather, radical visions had to be converted into a series of planned changes that could be digested in a managed fashion. For change to occur, current employees had to feel dissatisfied, desire to improve, and be blessed with the time and resources to acquire new skills and roles. It took time to unfreeze—to create a “felt need” in a large organization. And it took even more time to transition employees to the change.

When Pacific Bell started its Centrex reengineering project, the sponsor assumed the new process would be implemented in the seven operating regions within 24 months. After 35 months, five out of the seven regions fulfilled orders with a “variation” of the new process; the remaining two had plans underway. No region fully implemented the new process. For example, none of the regions had implemented the single person customer service provider case worker approach. Rather, the customer was serviced by a collocated team (three or four people rather than one). Some of the teams had taken on the new job roles, whereas others only implemented a team approach within the existing job descriptions. Most members had new Windows-based workstations technology allowing data from the legacy systems to be accessed from a

**Table 5.** Pacific Bell Objectives: Design versus Realized

Objectives	Design	Realized
Cost reduction	80%	35%
Quality	100%	95%
Cycle time	Same day	3 days
Customer satisfaction	100%	95%

single screen. However, contrary to the initial plans, the data from the systems had not yet been integrated.

Despite these compromises, Pacific Bell considered the effort a success. They had anticipated a crisis and improved the situation via evolutionary tactics before an imminent crisis occurred. At the end of 1994, the regions that had implemented a variation of the new processes had realized significant, although not dramatic, performance improvements (Table 5).

**PACIFIC BELL'S IMPLEMENTATION REALITIES REQUIRED EVOLUTIONARY TACTICS.** At Pacific Bell, the compromises made good business sense because of the cultural initiative that had started prior to reengineering. During the late 1980s, Pacific Bell established seven decentralized regional business units (RBU) in order to promote an entrepreneurial spirit within the firm. RBU management had autonomy over the service delivery process within their region. That autonomy had promoted different regional business practices. Although senior management felt that “The regions are more similar than they are different,” senior management did not mandate the new process since a mandate would have been inconsistent with the ongoing cultural transformation that encouraged regional entrepreneurship and initiative. The reengineering team leader explained the management rationale, “We [corporate management] have provided the vision for the new process and have proven the concepts and benefits. Process implementation must be the decision of a particular region.”

Existing union commitments were another organizational reality that Pacific Bell management faced. Seventy percent of Pacific Bell's workforce was represented by a union. Many of the changes proposed by the Centrex reengineering team would require changes to job descriptions which needed to be approved by the union. Union contracts could not be repealed overnight. However, in some regions the union and management had outstanding relationships. Those regions were able to forge ahead with pilots of the proposed process. In other regions change unfolded much more slowly or not at all. For example, one region that had initially implemented the new work roles and procedures had to revert back to the old job descriptions because of pressure from the local union.

Another organizational reality which argued for evolutionary tactics was the significant investment in training that would have to be made to implement the new process. In some regions, only simple orders were passed through the new process initially to ease the training burden. Also the concept



of the virtual team (i.e., an *ad hoc* team where physically dispersed members would be brought together to design a custom solution) assumed the ability to manage and control remote workers and the capability to track work orders and flows as well as analyze and solve problems without face-to-face contact among team members. A compromise solution—the collocation of team members in the same facility—put less pressure on workflow management and teaming skills, and promoted relationship building. Many felt those relationships could be later leveraged in the virtual setting. One manager remarked, “There was a lot of energy around teams. In our region, 80% of the improvements occurred because of collocation and teaming.”

Information technology constraints also required the use of evolutionary tactics. The concept of the case worker, which was central to the design, depended on expert systems that embodied wide ranging knowledge of orders, customers, products, and local service delivery capabilities. The concept also assumed seamless information flows across a dozen legacy systems that in 1991 existed on incompatible platforms. The concept of the virtual team, in turn, relied on real-time groupware systems that in 1991 were “bleeding-edge” technology. Since the lead times to develop technologies were expected to be three to five years, team structures and job roles were modified to be less dependent on technology. This also allowed the requirements of the systems to be developed in light of the actual experiences of the new work roles and procedures.

There is another reality with radical designs themselves. The radical designs must endure a test of time. They can at best provide a framework for the new processes; the specifics of how the work is carried out will depend on employee knowledge and skill levels, IT capabilities, and customer expectation—all of which are moving targets. The design is also a moving target as the marketplace changes.

**ROLM'S MORE REVOLUTIONARY TACTICS RESULTED IN A FASTER IMPLEMENTATION.** Compared to Pacific Bell, ROLM used more revolutionary tactics to reengineering implementation. Contractors, consultants, and purchased software were used to a much greater extent than at Pacific Bell. The senior management took a hands-on attitude during implementation. The reengineering sponsor kicked off every key effort in the field and was known to sit with account managers to show them the value of the new technology tools. The president did not let the work force forget that a similar change had been successfully accomplished in another business unit of the parent company. Moreover, each year management set more aggressive and time-boxed goals for the effort. ROLM's management also audited field offices monthly to ensure compliance to the new processes. The more revolutionary tactics made sense because a true crisis existed at ROLM whereas at Pacific Bell the crisis was only lurking on the horizon.

The use of more revolutionary tactics led to faster imple-

**Table 6.** Implementation Timetable: Pacific Bell versus ROLM

Stage	Pacific Bell	Stage	ROLM
Design	2 months	Design	4 months
Trial development	5 months	Trials and pilots	10 months
Trial	4 months		
Trial analysis	2 months		
Pilots (5)	18 months		
Elapsed time until field implementation	33 months	Elapsed time until field implementation	14 months

mentation at ROLM compared to Pacific Bell (Table 6). After 18 months, costs, cycle time, and errors had decreased by 25%, 36%, and 51%, respectively, and 80% of the 5,000 person work force had been impacted by the change. By contrast, after 33 months, Pacific Bell's Centrex reengineering had impacted less than 2,000 people.

Although ROLM faced a financial crisis, implementation realities still prevented a pure radical approach. For example, field employees were extensively involved in the implementation; their input was used to modify the design during implementation. The new work processes were initially implemented without the planned information technology support (the purchased software was undergoing modifications). The new compensation scheme was being rolled out slowly. After the first 24 months of reengineering, only 60–70% of the field offices were consistently following the new processes.

Similar to Pacific Bell, ROLM faced realities that required compromises. Whereas the design of new processes had occurred using the best and brightest, the implementation required “buy-in” from existing employees. Without the “buy-in,” the field offices reverted to old procedures as soon as corporate management attention was directed elsewhere. Also, because ultimately all employees who were retained had to understand and embrace change, a broad communication program was employed, which extended the timetable of the overall effort. The reengineering team members and senior executives tirelessly presented the reengineering vision at training classes and various meetings at headquarters and field offices.

ROLM management involved a number of employees in the implementation process by soliciting field and customer feedback on the process designs prior to the pilots. Two regions were then asked to serve as pilot sites, one for the order fulfillment process and the other for the new service parts process. During implementation, weekly conference calls were conducted with the field offices. Senior executives and the reengineering team members toured the offices and solicited feedback which in some cases resulted in changes in the details of the processes. The involvement was seen as critical for sustained change, although it obviously lengthened the overall rollout. One manager noted, “People resist when

**Table 7.** Transitions States for Reengineering Implementation

Firm Feature	Design Vision	Initial Implementation (Transition State)	Final Implementation
Structure/location	Virtual	Physical colocation	Virtual?
Measures	Skill-based	Team-based	Skill-based?
People	Collaborative	Cooperative	Collaborative?
Process	Cross-functional	Bi-functional	Cross-functional?
Roles	Case worker with technology	Team	Case worker with technology?

change is forced upon them. They are much more willing to implement changes that they have had a hand in proposing.”

The regional and local offices were responsible for developing their own implementation strategy which included a timetable within which the changes would unfold. This promoted field ownership and accountability for the changes although it lengthened and delayed initial implementation. Yet, once the milestones were set, the ROLM senior management relentlessly enforced the yardsticks and milestones that each field office had set for itself. The first milestones kept the project on track and moving, even when some people in the field resisted the proposed changes.

Similar to Pacific Bell, heavy training requirements called for extended time lines. The reengineering design assumed a new generalist role for those traditionally trained as specialists. Specifically, three installation specialist roles were collapsed into one role. In the initial implementation, two of the three roles were collapsed; the third role was added after mastery of the first two. For most employees, the consolidated roles meant months of training. The new generalist role also assumed the existence of new information systems that were still under development as the roles were being implemented.

In reality, one can neither quickly move from being a specialist to a generalist, nor can most organizations quickly develop the necessary IT systems to enable such a role transformation. Instead, we found that many projects reorganized into collocated cross-functional teams that allowed individuals from different specialties to work as a team and to learn the other individuals' job by working together. This kind of cross-functional team became an invaluable resource to provide requirements to those developing the new IT-based application. The IT-based application would hopefully enable the generalist or case worker concept. Consequently, the generalist role vision had to be compromised initially by implementing a transition state. Similarly, whereas the radical design assumed a virtual location, groupware and a collaborative culture, the initial transition state in implementation for those design features tended to be physical colocation, asynchronous electronic mail, and a cooperative culture, respectively. Table 7 illustrates some of the early transition states that we observed. Only through iterations of transitions would the firm reach the ultimate design vision. Our research has not yet been able to determine how close firms will ultimately get to their initial design vision.

### ***When Are Revolutionary Implementation Tactics Appropriate?***

Revolutionary implementation tactics tend to be appropriate under special conditions. In our cases, the projects that were able to proceed with revolutionary implementation had the following conditions: (1) a true performance crisis existed; (2) the change took place in a small self-contained unit; (3) the organization had deep pockets (e.g., a resource rich parent); and/or (4) the organization was free from not-invented-here syndrome and was consequently able to “borrow” and replant solutions such as purchased software packages from the outside (Table 8).

One project that successfully utilized a radical approach was Project 4 in a division of a large insurance corporation. At the start of its reengineering initiative, the division had less than 200 people. The entire project was completed, from start to finish, within 27 months, and involved dramatic changes to the division's structure, work roles, compensation, and IT.

The reengineering initiative was started because a strategic planning process suggested that the mix of business in the division's portfolio needed to change and its IS applications were out of date. A benchmark study also suggested that administrative expenses, prices, and staff counts were all too high; one competitor accomplished 10 times the volume of work with the same number of people. Rumors were circulating that unless the unit could improve its performance, it would be the next in line to be sold.

The division relied heavily on consultants for their change management, “process” expertise, and new client server systems development. The division was willing to bring change from outside if the internal capabilities did not exist. Also, the cost of the initiative, including all new information systems was borne by the parent corporation. For example, in systems a totally new group replaced the existing development staff. In 12 months, the division had downsized by 40%, with everyone required to reapply for their jobs. New work roles were defined and supported by new information technology. A major change was a new culture that emphasized accountability and customer orientation.

Arguably, the unit was successful with its radical tactics because the change took place within a small self-contained divisional context and a true business performance crisis existed. Because the unit stepped up to serve as the corporation's

**Table 8.** Approaches to Reengineering Implementation

Approach	Implementation Tactics	
	Evolutionary	Revolutionary
Incremental improvement	Quality, not reengineering Anticipated strategic crisis, no operational crisis Limited funds Downwardly managed project risk	Don't do
Radical breakthrough	Preferred approach Anticipated strategic crisis is translated into a cumulative series of operational crises The change program is self-funding Organizational culture of continual improvement	Use only in special cases A true performance crisis exist; a daily battle for survival A small organization unit Deep pockets Ability to "borrow" and replant solutions from outside

pilot site for reengineering, the cost of the initiative including new information systems was borne by the parent corporation. The crisis in turn allowed outsiders to bring solutions to the firm that were initially developed elsewhere. Strong control from the top tempered resistance and "not invented here" cries.

Whereas the insurance unit met the conditions for radical tactics, most of the companies that we have studied do not meet the conditions. For example, some companies in our research database view reengineering as synonymous with business transformation and thereby attempt to "reengineer" the whole business. In these companies, reengineering starts with a lot of fanfare, and although many achieve success that far exceeds what they have accomplished with their prior quality programs, most find that it takes a lot longer than planned and that they can only get to their ultimate vision if they break the initiative into logical slices. Each slice is treated as a separate, but interlocking, reengineering initiative. Also, each slice is tied to clear short-term operational goals. Accomplishment of one slice helps to fund the next slice, and so on. For each slice, a momentum for change is managed. For example, a reengineering design team at Project 9 developed a radical design which would allow the firm to reduce the cycle time to produce its customer chips from 180 days to 15 days by 1997. By the end of 1993, the group had slashed cycle time by 50%. The implementation was guided by a framework which divided the initiative into a number of projects that were related to the overall objectives. As one of the objectives was achieved, emphasis was shifted to the remaining ones. For example, the objective for 1991 was on-time delivery; in 1992 it was order fulfillment cycle time; for 1994 it was waste reduction, or process yield.

Organizations may attempt revolutionary implementation tactics even though they are not on the brink of death. In our study we found that these organizations typically had been involved in quality programs and sought to achieve change of a greater magnitude or at a faster pace than had traditionally been possible with quality. In these companies, employees or other stakeholders resisted the dramatic changes because there

was no immediate crisis. Radical tactics raised the risk level of the project over the potential short-term benefits given that there was no immediate crisis. This is analogous to conducting triple bypass heart surgery on a healthy patient whose genetic heritage might suggest such surgery might be needed in 10 years.

## Conclusion

Radical design is at the heart of reengineering. Organizations that seek to reengineer must start with the radical design phase. The radical design phase creates the enthusiasm and momentum needed for the change to unfold. Reengineering implementation is not necessarily radical, however.

When starting a reengineering program, management needs to assess the appropriate tactics to implementation. If the organization is in the midst of a survival crisis, that change may have to unfold in a revolutionary fashion. However, if the organization has time, a more evolutionary implementation approach can allow the organization to move forward in a managed and measured fashion.

Only one of the two stages of the engineering effort needs to be revolutionary. Reengineering involves both the design—the blueprint for change—and the implementation of those plans. Reengineering designs must be radical: breakthrough designs provide a long-term road map for change at a company and instill motivation in ways that more moderate plans cannot. But as companies implement the plans, they can—and many do—compromise them, and still gain effective results. Instead of pushing through major change in a short period of time, companies may take their time unfolding the changes, compromise goals, and take the time to involve more staff in the effort. They may not gain "10×" improvements, but nonetheless reduce costs by 30–50%, and dramatically improve their quality and service to customers. Changes like these may be more modest than earth shattering, but they aren't to be dismissed lightly.

Moreover, few companies can afford to fully implement their radical designs the first time around. Revolutions are

disruptive, costly, and generally viewed as unduly risky and counter-cultural. When such revolutions occur, sudden unplanned executive changes may stop the change program altogether. One CEO of an insurance company that had undertaken reengineering reflected on his experience:

A board of directors' maximum time span to accomplish radical change is 2 years but the minimum time for significant reengineering is 5 years. You can do reengineering in a shorter amount of time, but it must be a blood bath. You have to employ primarily outsiders and take a greenfield approach. It takes a lot of time to convert existing employees to the new way of doing business. But starting fresh means a new business and entrepreneurs; yet most boards are intolerant of entrepreneurial ventures and they are particularly impatient with false starts. Moreover, while reengineering you cannot increase or even maintain the shareholder earnings because of an acute need to invest back in the internal operations.

Companies that face a survival crisis may have little choice but to go broke or follow risky revolutionary tactics. But those companies that do not face a crisis may actually do themselves more harm than good by trying to embrace radical changes in a revolutionary fashion. By deploying evolutionary tactics, firms initially compromise their radical vision however they are able to get started; they are able to get on with the change programs, gain direct measurable benefits in the short term, and learn how to change (so as to continue to change). Over time, the firm moves toward the radical vision through incremental cumulative changes as long as measures and "organizational memory" are in place to keep score and keep the vision alive.

When starting a reengineering program, management needs to assess the appropriate tactics to implementation. If the organization faces a burning crisis, the organization may have to choose costly and organizationally taxing revolutionary tactics. If, however, the management has taken a proactive posture and anticipated the need to change, time should be available to implement the breakthrough change in an evolutionary fashion. A well-managed organization can accomplish a breakthrough result with evolutionary implementation tactics.

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