Improving Knowledge Work Processes

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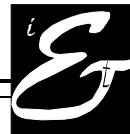
This working paper addresses the methods and approaches by which firms can successfully improve knowledge work processes. It is derived from a broader research project on "Managing and Improving Knowledge Work Processes," itself a component project of the "Mastering Information & Technology" sponsored research program at Ernst & Young's Center for Business Innovation. Other working papers address issues of viewing knowledge work as a process[1] and the content of changes in knowledge work processes.[2]

As these other working papers discuss, knowledge work has distinctive characteristics, and should not be treated the same as administrative or operational work for purposes of improvement. Even the notion of a business process must be modified in order to fit well with knowledge work. In this paper, the primary focus is the difference between knowledge work improvement methods and approaches used to improve or reengineer other types of work.

The approaches and methods for knowledge work processes described here come from the same data source as the working papers cited above, i.e., thirty firms that had undertaken efforts to improve how knowledge work was performed in their organizations. Because many of these firms had not yet completed their improvement programs (they can easily continue over several years), it is not possible to make systematic comparisons of methods with regard to success levels. Instead we can report the practices that seemed to be associated with short-term positive results and the thought processes of the managers who were attempting to make the efforts successful.

The methods for improving administrative or operational work have varied over time. Until about 1990, quality or continuous process improvement was the preferred approach to such processes. The hallmarks of quality include participation in work design and implementation, a focus on incremental change, an orientation to customers and other process stakeholders, and the use of statistical measures of process variation and control. Since 1990, however, many changes in business processes have taken place under the banner of "reengineering." This by-now-familiar phrase implies radical change in broad business processes, frequently employing information technology as an enabler. Though firms employ a wide variety of approaches under the reengineering label, the most frequent methods are top-down and involve little worker participation.

We initially described this project as "Reengineering Knowledge Work," but upon conducting several interviews with firms engaged in knowledge work activities, we quickly concluded that the term was somewhat inappropriate, for the following reasons:

- Several firms told us that they had a distaste for the application of the "reengineering" term to knowledge work; this may be related to a general

decline in the enthusiasm for reengineering, particularly in the U.S., as this research was being conducted;

- Some of the firms we researched clearly had only incremental improvement objectives for the knowledge work processes they were addressing;

- Most importantly for the context of this paper, the methods and approaches employed by most of these firms were not fully consistent with those advocated for reengineering.

The latter two issues—objectives and methods—are explored in greater detail below.

Knowledge Work Process Improvement Objectives

The objectives that firms choose for improvement programs are an important aspect of their overall approach to change. In reengineering, for example, it is believed that setting explicit, measurable, and highly ambitious objectives is critical to achieving breakthrough results.[3] We discovered in our research that the objectives for knowledge work improvement are less ambitious but broader than for most of the administrative or operational reengineering projects we have observed.

In reengineering projects, firms often strive for order-of-magnitude results— "10X" is a frequently-heard figure. Not only did we find few projects with that level of change objective, for most projects we found no specific change goals at all. When asked the objectives of the project in which they were engaged, managers frequently stated, "We want to reduce the time to edit and publish a book," or "We want to significantly reduce the cycle time to approve a capital project." In the latter example, the project manager explicitly rejected advice from his consultant that more explicit objectives would be more likely to produce change. Given the fact that many of the knowledge workers did not work for him and had typically autonomous jobs, he did not feel comfortable in creating an explicit target.

It is perhaps too early to tell what the implications are of the implicit nature of knowledge work process objectives. However, in other types of reengineering projects, we have observed that an absence of quantitative goals makes it less likely that major improvement will be achieved. A broad survey of reengineering initiatives also suggested that radical goals were more likely to be achieved with explicit objectives.[4]

Why would knowledge work improvement projects have less explicit goals than those for administrative or operational work? Knowledge workers have traditionally been concerned more with the quality of their outputs than with the process variables by which they were produced. Process variables, such as time and cost, are relatively easy to measure. The quality of knowledge work outputs, however, is usually difficult to measure. Managers of knowledge work improvement projects may have decided that a heavy emphasis on quantitative process measures would lead to unmeasurable results. Some managers we interviewed were simply not confident that explicitly-specified improvements could be achieved. Others felt that they did not know how much

improvement was possible. Finally, a few managers reported that specific goals would lead to focusing on the numeric measures, rather than improvement itself.

We did find projects whose goals were primarily cost or cycle time reduction. For example, two pharmaceutical firms were attempting to reduce their drug development cycle time. One of these firms was quite ambitious, striving for a cycle of 6 years instead of the existing time of 10-12 years. The other firm wanted only a reduction of three to six months in a nine or ten year cycle. Another firm wishing to reduce cycle time was a computer company focusing on the configuration subprocess within the broader context of order management. It wanted to move from a 5 day average cycle time to a virtually instantaneous configuration using a knowledge base. This effort was atypical among the projects we researched because it is a knowledge work activity within a generally administrative process.

We also found a few examples of organizations striving to reduce cycle time by segmenting a knowledge work process into its subcomponents. One product development organization, for example, was attempting to reduce the cycle time for its new product approval and signoff process. It realized that many of the people involved in the approval cycle did not need to approve the product design, but only to know about it. By separating information distribution from approval and clarifying the roles of each participant, the company reduced the number of required signatures by two thirds, and is well on its way to reducing the average cycle time for a product signoff by 70%.

Another segmentation-oriented objective that may be specific to knowledge work is the goal of "freeing" knowledge workers to do knowledge work by reducing their administrative tasks. In a pharmaceutical firm, for example, a goal in improving the research process was to free scientists from having to perform time-consuming, bureaucratic steps such as record-keeping and document production. In two human resource management processes we observed, the goal of an improvement initiative was to relieve human resource knowledge workers from the burden of answering routine employee questions about benefits, work life options, and job change issues. In one firm, the process change involved centralizing responses to such questions to gain economies of scale; in another, answers to typical questions were put into an easy-to-use textual database.

However, we found many other types of objectives for knowledge work improvement that did not involve cycle time or administrative time reduction, including the following:

- To make explicit and consistent an implicit knowledge process

- Add knowledge to a process to add value to the process customer

- Involve the customer in the process to improve the satisfaction with the result

- Share knowledge more effectively throughout the process

- Improve the execution of programs and initiatives.

The breadth of objectives for knowledge work initiatives may be a bellwether for other types of reengineering projects. Knowledge work process improvements often focus on increasing value. Reengineering efforts have been criticized for focusing too heavily on cost reduction, and not enough on adding value to products, services, and customers[5].

A Continuum of Methods and Approaches

We found that the methods used to improve knowledge work processes in the companies we examined fell on a continuum. One extreme of the continuum might be characterized as "reengineering." Although it may be perceived as an extreme view of reengineering, it is not unlike the views espoused in Hammer and Champy's *Reengineering the Corporation*. At the other extreme of the continuum we would place the traditional "laissez-faire" view of knowledge work, in which knowledge workers are viewed as fully responsible for designing and executing their own work, and any knowledge work process is viewed as a "black box."[6] These extremes of the continuum are summarized in Table 1, and described in some detail below.

TABLE 1

	Laissez faire	Reengineering
Strategy	hire good people and leave them alone	get people to do work differently
Focus	inputs/outcomes	activities
Detail	macro	micro
Evaluation	multi-yearly	hourly/daily
Level	individual	large group
Participation	broad	narrow
Commitment	persuasion	mandate
Analytic Emphasis	understanding existing environment	design new environment
Work Done By	insiders	outsiders
Primary Barrier	loyalty to discipline	fear of change

Two Approaches to Knowledge Work Improvement

The fundamentally different improvement strategies of the two polar approaches described in Table 1 are at the heart of how to address knowledge work. The laissez-faire approach might be characterized as involving finding good knowledge workers and leaving them to their own devices, and measuring only how quickly and how well outputs are produced. If work processes are examined, it is only at a very high or macro level. In these environments, knowledge workers may be left alone for several years while they are given a chance to prove themselves. The archetypal examples of this philosophy are the pharmaceutical scientist who can experiment with new compounds in

the lab for several years before identifying a specific drug or the university faculty member who is given several years to become a productive researcher before being evaluated for tenure and promotion. In both of these examples, the unit being evaluated is the individual, rather than any larger organizational unit.

In the reengineering approach, firms actively strive to change how knowledge workers do their work through the redesign of day-to-day activities. Work activities are decomposed into micro-level steps. Performance is assessed on a daily or even hourly basis. In this approach, evaluation may be at the level of the cross-functional process team; the individual's identity is subsumed within a larger group.

Because it is assumed in the laissez-faire approach that workers are autonomous and will not change without participating in the change process, this approach assumes a high level of participation from all levels in knowledge work improvement. It also assumes that individuals will adopt the new work designs not because they are compelled to do so, but because they have been persuaded intellectually of the benefits of a better way to do work. Because workers are viewed as intelligent, substantial attention is paid to understanding how they do their work today before recommending changes; "there must be a reason" why the process is as it is. The process design work itself should be carried out with a high percentage of "insider" participation, i.e., people who have worked in a similar process themselves at some point.

The reengineering approach to knowledge work is in contrast with these methods. Projects are managed from the top down, in fact, Hammer and Champy argue that "it is axiomatic that reengineering never, ever happens from the bottom up."[7] Workers comply with new work designs because they have mandates to do so. The "as is" process is de-emphasized, and most time spent on the "to be" work design. Since the existing process is not worth saving in this approach, and "out-of-box" thinking is highly desirable, it makes sense to employ mostly "outsiders"—either to the process or to the organization—to do the redesign. These outsiders may be internal or external consultants, or managers who have no experience in the process under study.

Finally, the greatest obstacle or barrier to change in the laissez faire view differs from that of the reengineering view. In the reengineering context it is common to speak of fear of change on the part of workers whose jobs will be "improved." In the laissez-faire context, such a fear may not be assumed; in fact, knowledge workers may be stimulated by change. Rather, the greatest barrier to process-oriented change may instead be loyalty to a particular profession or discipline. The knowledge worker may have been trained in the standards and values of a particular discipline, may have taken a job in an organization consistent with that background, and may participate actively in professional or discipline-based associations and meetings. Loyalty may not be to a business process nor even the organization that pays the knowledge worker's salary, but rather to the loyal order of chemists, insurance underwriters, or mechanical engineers.

In the next section we will examine this continuum of knowledge work improvement approaches in a different light. While any placement along the continuum for an improvement initiative is possible, we found definite patterns among our research sites. The points along the continuum where our research sites landed on the approach criteria just presented are described below.

Our Research Sites on the Continuum of Approaches

Most of the projects we studied were somewhere on the middle of the continuum defined above. On the one hand, several of the projects were defined as "reengineering," and they employed several methods and approaches that are consistent with that term. Most of the projects involved attempts to change micro-level activities, for example, and many also involved substantial use of "outsiders" in the process design. Several firms had not yet determined how they would do performance assessment for the knowledge work processes under examination, but there was a general desire to evaluate teams or process groups as well as individuals, and to evaluate performance on a more frequent basis.

However, most of these reengineering-oriented projects had not yet been fully implemented. It may be that over time these projects will face the common phenomenon in reengineering of "revolutionary design, evolutionary implementation" that has been identified in other research.[8]

Knowledge work improvement projects, we found, tended to be quite broad in terms of participation in the design of the work. We found several projects in which the design teams involved between 15 and 20 employees. This is roughly double the average size of design teams we have observed in administrative and operational reengineering projects.

Our respondents cited the need for participation from knowledge workers in order to secure their help in implementing a new process. Also, since knowledge work involves a high level of expertise that is frequently fragmented across multiple types of workers, in order to understand the process fully, more workers needed to participate in the team. For example, in the university fundraising project we studied, individuals in this process specialized in either individual, government, or foundation gifts. In order to design a better process, representatives of each type of fundraising needed to be included on the team. Of course, in business processes other than knowledge work there is also fragmentation of expertise. However, the firms we have observed for these process initiatives do not feel as compelled to represent all variations on the design team.

The focus of analysis for knowledge work projects is less oriented to activities and tasks, and more to process inputs and outputs. Projects addressed what kinds of documents are or should be produced by the process, when a particular output should be produced, how much it should cost to produce it, and so on. In three of the projects we studied, process improvement consisted largely of eliminating outputs that customers no longer deemed useful or worth their cost.

We believe that the reason for this output focus is that project owners and team members felt that knowledge workers would resist focusing heavily on activities within a decomposed work structure. Knowledge work outputs are the point in a process at
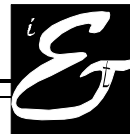
which the work becomes visible, and thus suitable for assessment and improvement efforts.

Similarly, many of the firms we studied viewed the commitment to implementation of new knowledge work designs as a matter of persuasion rather than mandate. The new designs were offered, marketed, or communicated through education rather than forced on those who perform the knowledge work. This may be viewed as a matter of either participatory management or power struggles; in knowledge work, power is more likely to be held by those who possess the critical knowledge, i.e. knowledge workers rather than managers.

At an international bank, for example, a new lending process was developed using a geographic region as the primary design site. After the design was completed and tested, the project team leaders produced documents, arranged one-on-one meetings, and held education sessions to try to persuade other regions to adopt aspects of the new design. Bank managers felt that a more heavy-handed approach would run counter to its culture of autonomous knowledge work. As a result, some design components are being adopted by other regions, others are taking a wait-and-see attitude, but none have rejected the design totally.

As noted above, most of the projects we studied involved heavy use of "outsiders." However, several of the knowledge work improvement efforts we analyzed eschewed traditional approaches to intervention involving consulting and rapid analysis by "objective" outsiders. However, the incidence of "ethnographic" methods was much higher for knowledge work processes than for more traditional projects. By this we mean intervention techniques involving joint participation by analysts in the knowledge work to be analyzed, usually over a longer period of time, and involving detailed description of the broad work environment and cultural and behavioral issues.[9] In short, rather than having a consultant come in for interviews over a one or two day period, ethnographic methods use the techniques of anthropologists in living and working with the knowledge workers under analysis for a period of several months. These methods involve systematic observation of work approaches, sometimes employing videocameras and detailed analysis of video footage to understand work activity.

The ethnographic approach was observed at two firms. One, a pharmaceutical company, used ethnographers to study how a new knowledge base was being used in the new drug development process. The goal was to learn how this intervention was actually working within a drug development team. The method showed promising results, but was discontinued before completion when its primary sponsor left the company.

The other firm employing ethnographic approaches, a high-technology manufacturer, used ethnographers to study the customer service process. The firm was attempting to shift many repair calls from field service personnel to telephone service workers. While

aspects of the telephone support were purely administrative, the workers did have a simple knowledge base at their disposal to diagnose problems reported by customers. The ethnographers realized that some telephone service personnel, if given enough opportunities to acquire knowledge of products and repair procedures, could often lead customers through a repair procedure over the phone, saving hundreds of dollars in costs for each service call.

While it is again premature to declare that ethnographic methods are more successful than those employed by traditional consultants, they seem to fit well with knowledge work. The analyst can get a good understanding of the many factors involved in why work is done in a particular fashion. The subjects of the study, i.e., the knowledge workers, are not insulted by the assumption that their work can be learned in a brief interview. Firms adopting ethnographic approaches, however, have to resist the desire of ethnographers not to generalize beyond their specific observations. A balance must be struck between paying sufficient attention to context on the one hand, and making recommendations and implementing improvements on the other.

We also found that fear seems to be less prevalent in the projects we studied as a barrier to process improvement. The greatest barrier we observed is rather strong loyalty to a particular profession or discipline. Such "professionalism" is often viewed positively, and is cultivated by educational institutions and professional associations. Yet we have found that professional or disciplinary loyalty often stands in the way of a cross-functional process orientation.

In product development processes, for example, the barriers arising from disciplinary loyalty to engineering or manufacturing professions are well-documented.[10] In pharmaceutical research, scientists insist on completing research to the professional standards of their discipline rather than sharing information about it throughout the process. To release findings prematurely, one scientist told us, would be "bad science"—even if it meant great savings for process steps further down the line. We have also heard this complaint for the knowledge work subprocesses of more administrative work. In the insurance industry, for example, when firms attempt to reengineer the new policy issue process, it is often the disciplinary loyalties of underwriters and actuaries that prevent more radical new process designs.

The solutions to this problem are far-reaching, since they involve much of the support infrastructure for knowledge work. As long as universities require doctoral students, for example, to narrowly specialize and avoid collaboration with other disciplines, corporations will have difficulty in changing the behaviors of their new hires. Some research-oriented firms we interviewed even amplify the problem by attempting to create university-like research departments in hopes of luring academically-minded scientists. Firms also frequently encourage their knowledge workers to be active in professional associations, even when the loyalties cultivated through such participation may hinder knowledge work process improvements. Managers in knowledge-oriented firms should consider whether their actions are creating disciplinary loyalties that will backfire on them.

In short, in our research we found elements of both the reengineering and the laissez faire approaches to improving knowledge work. While it is difficult to generalize across so many different factors and research sites, there is some evidence that firms were adopting more reengineering-oriented approaches at the design phase for knowledge work improvements, while resorting to more laissez-faire approaches during the implementation phase.

Placing a Project on the Approach Continuum

We did not see evidence among our research sites that firms were consciously adopting particular positions along this continuum (or any other similar classification of process change approaches). However, it is easy to envision a set of guidelines by which a firm might adopt a particular knowledge work change strategy. Such guidelines might focus on the different types of knowledge work, the culture of the organization, and the time and risk level that the project can bear.

For example, organizations that are attempting to make improvements in knowledge creation processes would probably be well-advised to steer toward the laissez-faire side of the approach continuum. This type of knowledge worker is perhaps the most autonomous of all, and perhaps the most resistant to micro-level activity design. These knowledge workers, by virtue of their education and creativity, may also be the best qualified to participate in the design of their own work.

At the other extreme, firms desiring to reduce or eliminate the amount of administrative activity in knowledge work processes might employ change approaches closer to the reengineering end of the spectrum. Many knowledge workers do not like such work anyway, and might be willing to participate in change programs designed to reduce it.

Most other knowledge work segments, e.g., those focusing on finding, packaging, applying, or reusing knowledge, would seem to be well-suited to approaches in the middle of the continuum. Of course, the specific methods and tactics used for such processes would need to be chosen carefully, and individual elements of a change program may approach either the reengineering or laissez faire extremes.

The culture of the organization may also dictate the position adopted for knowledge work process change. Organizations with long histories of leaving knowledge workers alone should not move to the other extreme without strong provocation. In those establishments where knowledge workers play significant roles in the governance of the organization (e.g., universities and hospitals), it may also be necessary to keep to the laissez-faire side of the spectrum. On the other hand, where an entire organization is undergoing reengineering-type change, it may be feasible to adopt that style of change approach for knowledge work processes. Indeed, to leave knowledge workers out of the reengineering movement would send damaging signals to the organization and to the knowledge workers themselves.

Finally, the approach adopted on this continuum of change approaches depends somewhat on the time and risk parameters for the project. Laissez faire approaches take longer to implement, but they involve lower risk of obvious failure—departures by several key knowledge workers, for example. Reengineering approaches are more visibly risky, but may conceivably be fully implemented within a year or two. There may also be a cost dimension to the choice of change approaches; we would guess that laissez-faire approaches would generally be less expensive because of their use of insiders and their need for lower levels of detailed process analysis.

The Segmentation of Knowledge Work

Those who attempt to bring about improvements in knowledge work processes should realize that they are not monolithic entities. That is, we found several instances in which different types of knowledge work processes were amenable to different types of change approaches. One key dimension of segmentation is the orientation to knowledge of a process, as described in another working paper.[11] Is the process intended to create, find, package, apply, or reuse knowledge? Methods appropriate for knowledge creation processes, for example, may not be well-suited for knowledge application processes. We found that firms were somewhat more reluctant to impose a strong process orientation on knowledge creation than on knowledge application processes.

Another source of segmentation may be the overall business strategy or mission of the organization in which the knowledge work takes place. An organization pursuing a strategy of product differentiation may adopt different process objectives and change approaches than one pursuing low-cost production. We observed, for example, more latitude for knowledge workers whose role involves generating revenue (specifically the system integration and university fundraising processes) as compared to workers whose process involves disbursing funds (the international lending and utility capital projects processes).

Even within individual knowledge work roles, there should be analysis of different types of activities, with different methods used to improve them. We found several firms in our study, for example, who were focusing on eliminating or reducing the administrative component of knowledge work—filling out forms, getting approval for activities, and writing correspondence. While not a knowledge work process, administrative work is performed by knowledge workers and should be viewed differently from more creative or knowledge-oriented activities.

It is even possible to segment among different performers of the same role; for example, relatively self-directed scientists might be given more autonomy to design specific work tasks for themselves, while others may require more explicit direction. A pharmaceutical firm in our research, for example, was pursuing the reduction of administrative work more aggressively for researchers than for other workers involved in drug development.

Summary

Firms attempting to make their knowledge work processes more efficient and effective face a choice. They may adopt "reengineering" methods and approaches that have been employed

for administrative and operational work. They may stick with more traditional approaches to knowledge work that involve more participation, less detail, and greater reliance on the capabilities of knowledge workers to design and evaluate their own work. In most cases, however, we believe that organizations will benefit by choosing an intermediate course between these two extremes. Using the categories in Table 1, they can select a set of methods and tactics that reflect the type of knowledge work they are addressing, their organizational culture, and the business requirements for the change project.

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[1]Sirkka Jarvenpaa, "Improving Knowledge Work Via a Process Approach: Challenges and Opportunities," Ernst & Young Center for Business Innovation Working Paper, July 1995.
[2]Michael Beers, Thomas H. Davenport, and Sirkka Jarvenpaa, "Design Changes in Knowledge Work Processes," Ernst & Young Center for Business Innovation Working Paper, July 1995.
[3]For example, I wrote that, "Process objectives must be quantified as specific targets for change." Another advocate of more traditional operational business change wrote, "it is essential that the breakthrough goal be bottom-line and measurable." Thomas H. Davenport, *Process Innovation: Reengineering Work through Information Technology* (Boston: Harvard Business School Press, 1993), p. 128; Robert H. Schaffer, *The Breakthrough Strategy* (New York: Harper Business, 1988), p. 70.
[4] "The State of Reengineering Report," Computer Science Corporation, 1994.
[5]Thomas H. Davenport, "Business Process Reengineering: Where It's Been, Where It's Going," in W. Kettinger and V. Grover, eds., *Business Process Change* (Harrisburg, PA: Idea Group Publishing, 1995); also Michael Hammer and Steven Stanton, The Reengineering Revolution: A Handbook (New York: Harper Business, 1995).
[6]A good example of this perspective is found in Gordon Davis et al, "A Conceptual Model for Research on Knowledge Work," University of Minnesota Management Information Systems Research Center Working Paper, 1991.

[7]Michael Hammer and James A. Champy, *Reengineering the Corporation* (New York: Harper Business, 1993), p. 207.

[8]Donna B. Stoddard and Sirkka L. Jarvenpaa, "Business Process Redesign: Tactics for Managing Radical Change," *Journal of Management Information Systems*, forthcoming.

[9] Michael Burawoy, "The Anthropology of Industrial Work," *Annual Review of Anthropology* (1979), pp. 231-266; see also J.C. Lave and Etienne Wegner, "Situated Learning: Legitimate Peripheral Participation," Institute for Research on Learning, Palo Alto, CA, 1990.

[10] Deborah Gladstein Ancona and David E. Caldwell, "Cross-Functional Teams: Blessing or Curse for New Product Development?" in Thomas A. Kochan and Michael Useem, eds., *Transforming Organizations* (New York: Oxford University Press, 1992):154-166; also Donna B. Stoddard, *Information Technology and Design/Manufacturing Integration*, doctoral dissertation, Harvard Business School, 1991.

[11]Sirkka Jarvenpaa, "Improving Knowledge Work Via a Process Approach: Challenges and Opportunities," Ernst & Young Center for Business Innovation Working Paper, July 1995.