The “Fit” Between Reengineering & Quality Management

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Introduction

Note: I wrote this paper in 1993 when I was Chief of Staff for Operations at Educational Testing Service. With the exception of correcting a few typos and adding my current contact information, this is the original paper. Its analysis of Reengineering and Quality Management is still relevant.

My company has embarked upon what is initially envisioned as a five-year voyage of discovery and renewal. The objective is to rethink and, where needed, restructure the way we do business. As our CEO puts it, "Everything is on the table."

Within the Operations vice presidential area, two initiatives are just getting underway: Quality Management, and Reengineering. Naturally, questions arise. What is meant by "Quality" and by "Quality Management"? What is "Reengineering"? How do these two "fit" with one another?

My charge is Reengineering. A colleague is responsible for the Quality Management effort. That there is a relationship between the two seems beyond dispute. Further, getting clear about the connections and relationships between Quality Management and Reengineering appears to have value well beyond the boundaries of our company. This article, then, may prove of interest and value to others who have an interest in the "fit" between Reengineering and Quality Management.

Key Terms Defined

To begin, let's define the two terms of chief interest: Reengineering, and Quality. Then we'll move on to Quality Management.

Reengineering refers to the redesign and restructuring of an organization's work and work control systems. More on this later.

Quality has an internal and an external dimension.

- *Internal quality* refers to the extent to which a company's products and services meet specifications, that is, the extent to which they are free from defects.
- *External quality* refers to the extent to which a company's customers value its products and services. This is in turn traceable to the extent to which the company's product and service specifications reflect its customers' wants, needs, requirements, and constraints, which can usually be expressed in terms such as cost, suitability or "fit for use," reliability, accuracy, timeliness, speed, and so on.

Internal quality is of little value unless external quality is present also. By the same token, external quality cannot exist without internal quality. If the requirements of external quality are not satisfied, then to paraphrase Peter Drucker, the result is apt to be "beautifully engineered products that shouldn't have been built at all."

Quality, then, or what some seem to mean by "total quality," is not the simple arithmetic sum of internal and external quality but, rather, the more complicated integral of the two (see Figure 1).

$$Q_t = f(Q_i \,\&\, Q_e)$$

Figure1: The Quality Equation

Quality Management is the ongoing process of achieving and maintaining competitive levels of internal and external quality. This typically requires an ongoing, two-stage effort of *acquisition* and *maintenance*, of acquiring some new level of quality, internal or external, and then of maintaining it. Acquiring some new level of quality might occur on an incremental basis or on some larger scale, as a result of what Juran termed "breakthroughs."

Achieving internal quality is largely a matter of *engineering*, of building work and work control systems that perform to specification, of doing it right. Achieving external quality is largely a

matter of *communicating*, of ensuring that specifications are relevant and correct, of doing the right thing.

The Quality Management process transcends unit, functional, and other territorial boundaries within the company. Ensuring that a company's products and services meet or satisfy customer needs, for instance, has traditionally been the province of Marketing. Manufacturing has generally been responsible for ensuring that product meets specifications. If Quality Management is to run through instead of afoul of these power centers, then Quality Management must be a company-wide attitude, a mindset, a belief system, a set of values, a process, and not another element or echelon in the corporate bureaucracy. Above all else, it must not be another program, or management fad, or worst of all, an "event."

Reengineering also runs the risk of being seen as fad, at least in its current garb, embroidered as it is with glib promises of order-of-magnitude improvements in performance and equally sizable staff and cost reductions. Time will tell.

Origins & Roots

Neither Quality Management nor Reengineering are wholly new. Both have roots traceable to industrial engineering and, ultimately, to the "father of scientific management," Frederick Winslow Taylor. He and his colleagues were the first to study work seriously and the first to set about the task of making it more productive. Quality Management and Reengineering owe much along the way to other disciplines as well. Neither has much chance of succeeding unless backed by a carefully planned and orchestrated change management effort. Elements of organization development, work and methods simplification, work design and redesign, operations research, "systems thinking," and systems engineering can be found in both. Enabling tools and techniques range from simple little flowcharts through sophisticated measurement and feedback systems to state-of-the-art information technology.

Interestingly, Reengineering had its foundation poured in a 1962 book by one of the quality movement's leading gurus, Joseph M. Juran. Juran's book, *Managerial Breakthrough*, is a handbook for managers who view managing as an exercise in change management, more particularly, as a matter of systematically and periodically breaking through to new levels of performance.

The quality movement's taproot is William Shewhart's control chart. Moreover, whatever success the quality movement can be said to enjoy owes much to Shewhart's concept of statistical process control. W. Edwards Deming and Juran both acknowledge their debt to Shewhart.

Distinctions Between Reengineering & Quality Management

Reengineering and Quality Management are linked in two deceptively similar ways by two authorities on Reengineering: Mike Hammer and Thomas Davenport. Both rely on a "stair-step model" to depict the relationship they see between Reengineering and that aspect of Quality Management generally known as continuous improvement, or what the Japanese call *Kaizen* (see Figure 2 on the next page).

Mike Hammer, co-author of *Reengineering the Corporation: A Manifesto for Business Revolution,* is probably the best-known advocate of Reengineering. In his public seminars, Hammer uses the stair-step model to relate Reengineering to Quality Management as follows:

- Reengineering focuses on radical, dramatic improvements in a short period of time.

- Quality Management, which for Hammer apparently consists only of *kaizen* or continuous improvement, is concerned with gradual, incremental improvement over long periods of time.

For Hammer, when what is wanted are sudden, sizable improvements in performance, Reengineering is the only course of action. Indeed, Hammer asserts that if you don't realize such gains, you haven't really done Reengineering. Thomas Davenport, author of *Process Innovation: Reengineering Work through Information Technology*, makes essentially the same connection, using the same stair-step model. However, Davenport indicates that Reengineering and

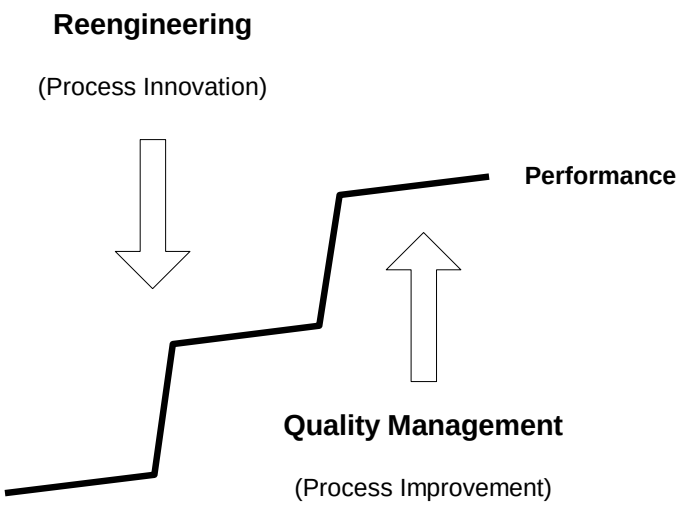

Figure 1 - The "Stair Step" Model

continuous improvement or *kaizen* are part of an overarching process, and that overarching process is Quality Management. Davenport's own terms for these two components of the Quality Management process are *process innovation* and *process improvement.* In his scheme of things, "reengineering" refers only to the redesign of the business process. Hammer claims differently.

Hammer and Davenport agree on some aspects of Reengineering and disagree on others. They agree, for example, that Reengineering seeks radical improvement, and that the starting point is a clean slate. Both view information technology as the chief enabler of radical improvement. They also agree that the approach is top-down, cross functional, and high-risk. Hammer and Champy offer in their book an admittedly "unscientific" estimate that pegs the failure rate of Reengineering efforts at 50-70 percent. Davenport offers no estimate of the failure rate, but does suggest that Reengineering is a long-term effort, easily lasting up to five years, whereas Hammer, in his public seminars, asserts that a Reengineering effort, start to finish, shouldn't take longer than a year. Perhaps the key difference lies in their use of the term itself. Davenport limits the definition of "reengineering" to the specific task of redesigning the business process. Hammer claims that "Reengineering" is much more than process redesign.

Hammer, Champy and Davenport all publicly acknowledge that they are not the inventors or creators of Reengineering, that they draw their material from the accomplishments of visionary and imaginative managers and executives. Davenport says it best when he writes at the end of the preface to his book, "Process innovation (or reengineering, redesign, and so forth) was invented not by consultants or academics, but by . . . bold and intelligent businesspeople. I simply jumped on their bandwagon at a relatively early stage."

It is worth mentioning that Davenport, now with the consulting firm of Ernst & Young at its Boston-based Center for Information Technology and Strategy, was formerly with the Cambridge-based consulting firm, CSC Index, where Hammer's co-author, James Champy, is chairman. Their views share a common heritage. Indeed, they seem to have appeared in print at approximately the same time. Hammer's widely cited 1990 *Harvard Business Review* article, "Reengineering Work: Don't Automate, Obliterate," appeared in the July-August issue of HBR. It was paralleled in the summer issue of *Sloan Management Review* that same year by Davenport's own article, "The New Industrial Engineering: Information Technology and Business Process Redesign" (co-authored with James E. Short). Both articles report on Ford Motor Company's dramatic staff reduction in its accounts payable process.

To some extent, differences between Reengineering as set forth by Hammer and by Davenport are minor ones, chiefly conceptual and philosophical in nature, of interest to academics and the scholarly, but of little practical import. However, some differences are more pragmatic and important, relating to the very difficult problem of making large-scale change in business organizations. And, although it is impossible to say by how much, any differences in the gospel of Reengineering according to Hammer and Champy, and the gospel according to Davenport, seem likely to stem from their respective business objectives, notably the requirement to differentiate one's products and services from those of one's competitors. They are, nevertheless, members of the same church, so to speak. In this writer's opinion, Hammer and

Champy's book does a better job of selling the reader on Reengineering, but it is Davenport's book that delivers the goods. Davenport's book abounds with references to the work of others, whereas the book by Hammer and Champy does not contain a single reference, except to Hammer's 1990 *Harvard Business Review* article. Davenport also traces out the origins of Reengineering in Appendix B of his book.

The chief point of agreement and the point of debarkation for the balance of this paper is that the proper targets of Reengineering or Process Innovation efforts are business processes. Reengineering and Quality Management are in perfect accordance with one another on this score. Both are process centered.

A *process*, or so the dictionary tells us, is "a systematic series of actions directed to some end." Hammer and Champy define a *business process* as "a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer (p.35)." Davenport defines process as "a structured, measured set of activities designed to produce a specified output for a particular customer or market (p.5)." Juran's definition of process in *Quality by Design* is quite consistent: "a systematic series of actions directed to the achievement of a goal (p.219)."

All four authors, Juran, Hammer and Champy, and Davenport, make use of the input-process-output paradigm. (Juran does so most clearly in his 1992 book, *Juran on Quality by Design*.) In this "systems thinking" context, speaking technically, the collection or set of activities to which the term "process" refers consists of the structured interactions between the inputs to a system and the system's processors. These structured interactions result in the transformation of inputs into outputs. Structuring interactions between inputs to a system and the system's processors so as to achieve a specified result is the essence of systems engineering. Structuring them so that they produce that result within certain control limits is the essence of statistical process control. The same general discipline, engineering, lies at the heart of Reengineering and Quality Management.

From the preceding, we can extract three more areas of linkage, or overlap in interests, between Reengineering and Quality Management: they are process-centered, customer-oriented, and permeated by "systems thinking."

Some perceived differences or distinctions between Reengineering and that aspect of Quality Management typically referred to as continuous improvement have been nicely summarized by Davenport (see Table 1). These are, however, perceptions, particularly Davenport's, and others may see things differently. These distinctions are discussed next.

Table 1: Davenport's Distinctions

	Process Improvement (Quality Management)	***Process Innovation*** (Reengineering)
Level of Change	Incremental	Radical
Starting Point	Existing process	Clean slate
Frequency of Change	One-time/Continuous	One-time
Time Required	Short	Long
Participation	Bottom-up	Top-down
Typical Scope	Narrow, within functions	Broad, cross-functional
Risk	Moderate	High
Primary Enabler	Statistical control	Information technology
Type of Change	Cultural	Cultural/structural

Level of Change

The first distinction Davenport draws, between radical and incremental change, is a clearly a matter of perspective. Pack enough incremental changes into a short enough period of time and the result is radical change. Stretch a radical change over a long period of time, in small enough "bites," and it appears incremental. The actual amount of change, however, is no different. The real distinction appears to be one of time compression, not the level or amount of change (see Figure 3).

Starting Points

One point of confusion is in the distinction between starting points. In Davenport's terms, Process Innovation or Reengineering starts with a clean slate and Process Improvement starts with the existing process. If this is true, why is Reengineering called "*Re*engineering"? Why isn't it called "Engineering"? In point of fact, a Reengineering project and a Process Improvement effort both start with the existing process. If there is a distinction, it is that the aim of Reengineering is to *replace* the existing process and the aim of Process Improvement is to *refine* it. Thus, a Reengineering effort begins by redefining the results sought, which might or might be the same as those the existing process is intended to achieve. The "clean slate" comes into play in designing a new and different process whereby these redefined results might be achieved.

Frequency of Change

Any given Reengineering effort might indeed be a one-time event but, unless it is intended to be the only such event, Reengineering will occur again and again, especially if Reengineering is seen against a larger backdrop of corporate or organizational renewal. Just as a practical matter, it seems unlikely that the new processing systems which result from Reengineering efforts are meant to last forever, especially in times of rapid change. What will Reengineering be called the second time it is applied: "Re-Reengineering"? It does seem reasonable to conclude that changes will occur more frequently as part of an ongoing effort to refine processes and less frequently in the form of periodic efforts to replace them. It is, therefore, the interval between changes that varies. For a program aimed at continuously improving business processes, this interval is short; for efforts aimed at replacing existing processes, this interval is likely to be much longer.

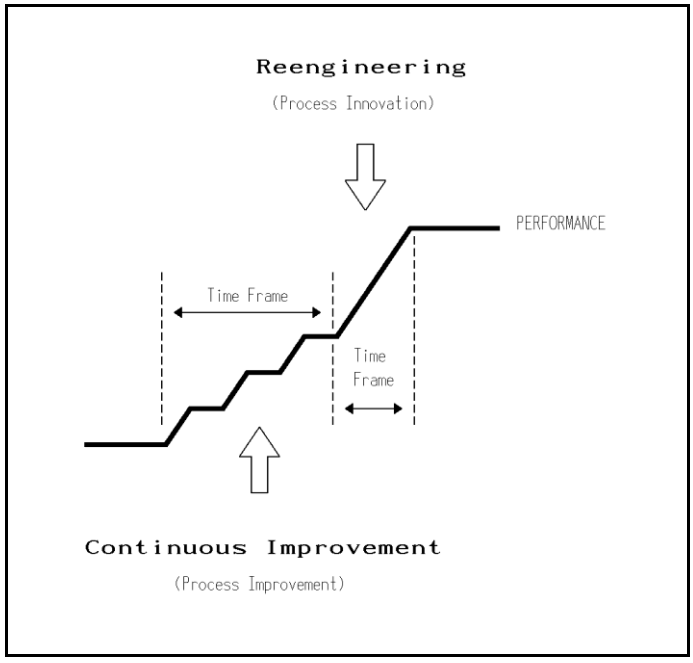

Figure 3: The "Stair-Step Model II"

Time Required

Davenport suggests that Quality Management or Process Innovation requires a short time frame whereas Reengineering or Process Innovation requires a long time frame. Hammer and Champy suggest the exact opposite. What is being confused here are the time frames required to implement a particular change and the time frames required to establish a program. While it seems true enough that the typical process change generated through a program of continuous improvement probably takes less time to implement than it does to carry out a full-blown Reengineering project, it also seems true that the time required to initially implement an effective, functional program of continuous improvement can easily take as long as the five years Davenport cites as necessary for a successful Reengineering effort.

Participation

Distinctions between Reengineering and Quality Management based on top-down versus bottom-up implementation strategies are baseless. Both require top-down support, involvement, and even protection in their early stages, and both require bottom-up participation and involvement in order to survive and flourish. Obviously, Reengineering and Quality Management are both of concern to top management. Moreover, CEO commitment must be high to both.

Scope

To acknowledge on the one hand that Reengineering and Quality Management are both process centered, and then suggest that only Reengineering takes a cross-functional view seems contradictory on the face of it. Quality Management, some would argue, is every bit as cross-functional in its outlook and its efforts as Reengineering. This is especially true if one views Quality Management as encompassing Reengineering and continuous improvement (or, to use Davenport's terms, "process innovation" and "process improvement"). In point of fact, it appears to be the case that Hammer and Champy, but not Davenport, argue, even if inadvertently, that Reengineering, as defined, applies *only* to cross-functional matters. This view imposes unnecessary limits on an approach that can in fact be profitably applied on a smaller scale.

Risk Level

The risk level differences between Reengineering and a program of continuous improvement do indeed appear significant. Hammer and Champy suggest a 50-70 per cent failure rate for Reengineering efforts. Again, however, it is really a matter of perspective. The risks of undertaking a Reengineering project are perhaps no greater than those of *not* undertaking a corporate-wide program of continuous improvement, especially in a larger context of renewal and Quality Management. The foundation of both efforts must include strong commitment, discipline, a process-centered approach, an orientation toward measurement, and a willingness to change. Davenport, at least, is very clear on these points.

Primary Enablers

Davenport's distinction based on "primary enablers" is yet again a matter of perspective. He proposes information technology as the primary enabler for Reengineering and statistical control as the primary enabler for continuous or Process Improvement. It seems reasonable to believe that some reengineered processes will employ statistical control. It seems just as reasonable to conclude that continuous improvement efforts will make use of information technology. This distinction, like the earlier one of starting points, seems more traceable to the aims of the efforts than to the technologies. For Reengineering, information technology makes possible the *replacement* of the existing process; for Continuous Improvement, information technology makes possible sophisticated measurement and feedback systems that facilitate process *refinement*. It is the uses to which the technologies are put, not the technologies themselves that distinguish the two.

Type of Change

The last of Davenport's distinctions, that Reengineering involves cultural and structural change whereas Process Improvement involves only cultural change is, as are all his other distinctions, a matter of perspective. Baseball, our national pastime comes immediately to mind. It is tempting to equate Reengineering with the long-ball hitter, and Process Innovation with a game of singles and doubles. The American business culture favors the "home run" of innovation instead of the singles of *kaizen* or continuous improvement. Therein, in some measure at least, lies the basic appeal of Reengineering. Yet, even Little League players will tell you that singles and doubles are as important to winning the game as the long ball. Besides, who can forget that George Herman "Babe" Ruth, the "Sultan of Swat" until Henry "Hank" Aaron deposed him, still holds the record for striking out? What really seems to be the case here is that Reengineering is consistent with the culture of far too many executive suites; namely, belief structures and behavior patterns that result in periodically tampering with the organization's structure, hoping for big results (or hoping to mask the absence of any results at all). Continuous improvement, the long-term commitment to systematically improving the organization's business processes, is totally inconsistent with such an outlook.

Rather than focus on distinctions or differences between Reengineering and Quality Management, it perhaps makes more sense to examine the two in terms of the many linkages or relationships they share in common (see Table 2 below).

Table 2: "Common Ground" for Reengineering & Quality Management

Reengineering: A Strategy of Process Replacement	***The Common Ground***	**Quality Management**: A Strategy of Process Refinement
Customer	***Orientation***	Customer
Business Processes	***Focal Point***	Business Processes
Replace Existing Business Processes	***Objective***	Refine Existing Business Processes
Periodic Reengineering (Process Redesign) *Projects*	***Means Used***	An Ongoing *Program* of Continuous Improvement
Order-of-Magnitude (10X)	***Magnitude of Improvement Sought from A Single Intervention***	Incremental (10%)
Work and Work Control Systems	***Change Targets***	Work and Work Control Systems
Top to Bottom	***Levels of Involvement & Participation***	Top to Bottom
High	***Requirement for CEO Commitment & Involvement***	High
High, *If* You Do It	***Degree of Business Risk***	High, If You *Don't* Do It
Two to Five Years	***Timeframe from Initiation to Completion***	Open Ended
Long	***Interval Between Discrete Changes***	Short
Information Technology	***The Source of Leverage***	Measurement & Feedback
Cross-Functional	***Boundaries***	Cross-Functional

Work and Work Control Systems

Two issues remain to be explored.

The first of these is *what* is it that actually gets reengineered? Is it the corporation, as the title of Hammer and Champy's book suggests? Or, as they go to great pains to point out in their book, are the proper targets for reengineering efforts the corporation's business processes? Is "business process" simply a fancy term for the work of the organization? Hammer's *Harvard Business Review* article clearly focused on the reengineering of *work*. Its title led off with "Reengineering Work." The first two words in the subtitle of Davenport's book indicate the same target: "Reengineering Work through Information Technology."

Work is a process and it has a result. Results, as Peter Drucker so sagely reminds us, are always outside the system that produces them. For this reason, any effort aimed at reengineering work must begin with the results to be achieved outside the system, and not with the work inside that is intended to achieve them. In terms of the definition of Quality presented earlier, one begins by examining the requirements for External Quality, not with those of Internal Quality. "To start out with the task rather than with the end product," as Drucker warns in his

1973 book, *Management*, "may result in beautiful engineering of work that should not be done at all (p.201)."

The work processes of organizations are carried out by work systems, some of which process information, some of which process materials, and some of which process both simultaneously. Some work systems are people-based, some are machine-based, and some are a complex mix of people and machines. These work systems are all controlled, if they are controlled at all, by work control systems. It is the organization's work and work control systems that actually get modified in the course of a Reengineering effort or a Continuous Improvement Program.

We come now to the final issue pertaining to Reengineering and Quality Management: Why? Why do either? Why do both? Why do them in a coordinated, integrated way?

The short answer is that Reengineering and Continuous Improvement, or to use Davenport's terms, "process innovation" and "process improvement," if undertaken in an integrated way, offer a partial solution to the control problem. The long answer follows.

The Control Problem

The industrialized world has been wrestling for a good many years with what I call "the control problem." This problem came about chiefly as a result of what Peter Drucker termed "the shift to knowledge work." Although the shift to knowledge work actually began in the late part of the last century, it was during the period 1920-1980 that paid work increasingly required people to work with knowledge and information instead of things. As more and more people engaged in this kind of work, the locus of control shifted more and more away from management and to the worker. The shift to knowledge work was essentially complete by the early 1980s.

In the world of manual work, which is the work of materials processing, the control problem had a straightforward solution: Management controlled the output by controlling the process. Typically, in the early days of the industrial revolution, and well into the last half of this century, the output was a product and the process to be controlled was human behavior. Even in today's highly mechanized factories, where workers are primarily operators instead of operatives, behavior is still the focus of control. In the minds of many, it is still supervision that links the mind of management with the muscles of the workers. The shift to knowledge work took working out of sight, into the mind where it couldn't be seen and, in so doing, snapped the chain of command. Hence, the control problem.

What Management has been struggling with ever since Peter Drucker announced the shift to knowledge work more than 30 years ago is how to manage the work itself, how to make it productive when the worker cannot be controlled through direct supervision. This breakdown in control accounts in large measure for the growth and decline of all manner of management fads, including the entire human relations movement, T-grouping and sensitivity training, organization development, process consultation, job enrichment, work simplification, methods analysis and improvement, work design and redesign, quality circles, self-directed teams, empowered employees, the quality movement, Total Quality Management, and now, Reengineering.

But there is a difference: Information Technology. The modern digital computer was just making its entrance in the 1950s. That decade also marks the approximate mid-point of the shift to knowledge work. More important, it was not until the very end of the 1950s, in his 1959 book, *Landmarks of Tomorrow,* that Peter Drucker advised us for the first time that such a shift was taking place. He has since chronicled it with remarkable diligence. In the meantime, the computer and other elements of information technology have been advancing, growing ever more powerful, ever less costly, and ever more useful. Our knowledge of the processes of innovation and of change management has also advanced. We know how to manage innovation and large-scale organizational change; not perfectly yet, but we succeed as often as we fail and that's a far cry from yesteryear.

The signal importance of modern information technology is that it enables machines to take on information processing tasks that were heretofore restricted to human beings. We are not talking here of simply "paving the cow paths," of automating the legions of accounting, bookkeeping, and clerical tasks; that has already been accomplished. In the new capability of information technology lays a second shift, a pendulum swing in the locus of control over information-based work, from the worker back to the management. Management once again finds itself coming into

control of the work process. Industrial engineering, decked out in modern garb, is experiencing a re-birth.

The table on the following page summarizes the nature of the control problem for three basic types of work and work control systems, all three of which exist in abundant supply throughout business and industry, at home and abroad. Please note that the categories in this table are categories of work and work control systems, they cannot be used to classify businesses, industries, economies, companies, cultures, or civilizations.

The Object

The object of Reengineering and Quality Management is, or ought to be, to build flexible, innovative work and work control systems, not simply replace the existing ones with up-to-date, but still inflexible systems. Hammer & Champy don't seem to be advocating anything much beyond replacing labor-intensive, information-based processes with technology-intensive processes. That these "reengineered" processes yield radical reductions in staff and costs comes as no surprise. That they will require regular maintenance and periodic re-reengineering should come as no surprise either. That the cost of capital, which is now less than the cost of labor, provides the economic incentives to do so should surprise no one who pays attention to such matters. Finally, that this new focus on business processes is restoring to management control over the work of the organization seems a certainty.

In this second shift, this shift of control back to management, lies a new and more perplexing problem: If we have the ability to allocate most materials-based work and much of the information-based work to machines, what role will people play? Who will buy what the machines make? Where and how will people obtain the money required to survive in an exchange-based economy if there are no jobs? One solution to the control problem is creating another, perhaps more severe problem.

When manual work was made more productive, the result was increased prosperity. Greater productivity meant more goods at a lower cost. Demand soared and new jobs were created. But that is a long-term benefit. Short-term, jobs are destroyed, workers are displaced, and lives are disrupted.

Ultimately, I think Peter Drucker has seen the answer: We, at least those of us who survive, will all be in the business of creating knowledge. That seems to be something human beings still do better than machines.

Table 3: Three Basic Kinds of Work and Work Control Systems

	Repetitive System	*Adaptive System*	*Innovative System*
Inputs	Low Variability	Moderate Variability	High Variability
Processes	Prefigured	Adjustable	Configured
Outputs	Fixed	Variable	Custom
Control Principle	Compliance	Coordination	Commitment
Locus of Control	The Supervisor	The System	The Worker
Focus of Controls	Processes	Outputs	Results
Basis of Authority	Position	Reciprocity	Performance
Management Style	Directive	Participative	Collaborative
The Worker's Role	Pawn	Player	Partner
Markets Served	Mass	Segmented	Niches
Nature of Demand	Concentrated	Clustered	Dispersed
Competitive Edge	Cost	Cost & Quality	Cost, Quality & Speed
Rate of Change	Low	Moderate	High
Regulatory Activity	High	Moderate	Low
Financial Leverage	Deploying Capital	Employing Technology	Creating Knowledge
Skill Levels	Low	Moderate	High
Need for Judgment	Low	Moderate	High
Risk Tolerance	Low	Moderate	High

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