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The Information Technology Enabled Organization: A Major Social Transformation in the U.S.A.

by

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Abstract - This paper is focused on a transformation that is well underway in the United States. This transformation, which some have argued is as dramatic as the industrial revolution, is changing the way we work and live in our society. Sometimes generically called the information revolution, it is driven by the integration of organizational processes through enabling information technologies and systems. The outcome of the transformation is unknown, but researchers and policy analysts have cast the problem in familiar terms. On one side we have those who question the societal benefits of technology and wish to limit its use, and on the other, we have those who equate technology with progress and promote its adoption in all areas. We provide two views from opposite ends of the spectrum to frame our analysis. Even though we support technology advancement, we don’t enter this argument. Our focus is on the drivers within organizations that are enabling the change that is displacing workers and managers. Our research indicates that we are experiencing the natural process of firms trying to gain competitive advantage by using new tools and technologies, and those firms that don’t pursue this route are unlikely to survive. We show in some detail how firms are integrating processes with new information technologies and systems, and discuss the resulting implications for workers and managers. We also consider competing views of the societal impacts of the information revolution. Finally, we suggest some policy implications and avenues for further research.

1.0 INTRODUCTION

The primary thesis of this paper is centered on the following assertions:

1. We are in the midst of a transformation that may be as significant as the industrial revolution.
2. Some of the drivers of the transformation are economic, but Enterprise Integration, using enabling information technologies and systems, is the primary driver.
3. The transformation is having an adverse impact on many workers and managers, especially those who check the work of others and those who transfer information or data without adding customer value.
4. Some workers are moving to new and perhaps more interesting jobs within their existing organizations while others are being displaced.
This paper is focused on the drivers of the transformation, the new work environment, and the effects on displaced workers\(^1\). Our objective is to present views about this transformation within the context of our research and consulting work with public and private sector organizations in the United States. This presents a bias that will cause some international researchers to discount our ideas, but our modest international work leads us to believe that the trend is not localized. Since the transformation is enabled by the new evolving information technologies, we risk revisiting old arguments about controlling technology, but that is not our intent. We can’t easily control these technologies: *The genie is out of the bottle.* Our focus is on the underlying forces that are driving this change within organizations.

Our position is that it is difficult to contain technology, and as the technology diffusion process unfolds, there may be undesirable consequences; e.g., employment dislocation, downsizing, or other significant organizational transformations. However, we are optimists; we believe that technology creates opportunities for positive social transformation that exceed the undesirable consequences; e.g., environmental improvements, remote health diagnosis and care, distance learning, etc.

This paper is organized as follows. First we present a popular view of how technology has enabled social change, focusing on the traditional paradigm of agriculture, industry, and information. This historical perspective provides the context for our ideas. Much has been written on the history of technology. We are aware of the historical origins of our arguments, and even if we don’t enter the debate about controlling technology, this argument provides the social framework for placing our ideas in context. As noted by Rybczynski (1983), this is a polarized debate. “On the one hand are the *Boosters*, for whom all technological change represents progress, and who see any attempt to control the future as a loss of nerve. On the other hand are the *Obstructionists*, for whom any technical innovation is a threat, and for whom controlling technology means gradually reducing, or at least doing so whenever possible.” To place our analysis in context, we present the ideas of a modern-day *Booster* and a modern-day *Obstructionist*:


As noted by White (1978) the origins of this debate can be traced to medieval times, but the two above authors represent the modern information technology-enabled reincarnation of the debate.

After the presentation of the two opposing views, we move directly to the primary contribution of the paper. We show how *Enterprise Integration* is transforming organizations by examining three distinct phases of development:

- The era of stand-alone and vertically oriented management and information systems,
- The era of process reengineering, and
- The era of Enterprise Integration.

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\(^1\) Enterprise Integration will be defined and explained in detail in a later section. However, for context we note that Enterprise Integration is distinctly different from the Japanese management models that penetrated the U.S. in the 1980s. These methods, as described by Robinson (1990), are focused on continually improving a fixed process. Enterprise Integration, as presented in this paper, is a much broader concept.
Following the discussion of Enterprise Integration, we explore the resulting impacts on managers and workers. Finally, we end with some ideas about how organizations of the future might be configured and managed, and the corresponding implications for government and society in general.

2.0 THE TRANSITION AND TWO OPPOSING VIEWS

Almost everyone agrees that our society is experiencing a period of rapid change. It is difficult to understand the magnitude and rapidity of this change because our reference point is one of relative stability. That is, the last 50 years represent an outlier period in U.S. history, a period of unusual stability. We are now moving into a period of relative instability. Regardless of one’s opinion, it is a fact that the 40 years immediately following World War II represented a period of stable organizational relationships in the United States. The U.S. emerged from World War II as a dominant industrial power with almost monopolistic control on many world markets.

As the world rebuilt from the destruction of World War II, the market dominance of the U.S. was challenged. In addition, many U.S. organizations were characterized by outdated and bloated bureaucracies. In short, U.S. dominance had fueled complacency. Hence, much has been written about the reactions of U.S. organizations to the reality of changing market forces. The macroeconomic response to the changing business environment is one driver of organizational change. While some organizations have reacted through “slash and burn” downsizing, others have dealt with competitive pressures by using enabling information technologies and systems. Even though some would argue the point, we don’t see technology as the driver. The transition that we discuss is driven by market forces; the enabling technologies provide organizations with a wider range of alternatives with which to react and respond to the fundamental market forces.

It is this reaction that has led some authors to hypothesize that we are entering a new age. For example, Dertouzos (1991) states: “The agricultural age was based on plows and animals that pulled them; the industrial age, on engines and the fuels that fed them. The information age we are now creating will be based on computers and the networks that interconnect them.” The implication is that we are experiencing a new information revolution, one that is as dramatic as the agricultural and industrial revolutions. Furthermore, the effects of this revolution have been uneven, having a dramatic impact in some countries and relatively little in others.

Revolution or not, everyone agrees that organizations are in transition. In the U.S., “Downsizing” and “Reengineering” are household words, yet there is little understanding of what is causing the unsettling change in organizations. Who is responsible for the resulting social pain of unemployment and the transition to other (and perhaps lower paying) employment? Is it cruel cost cutting senior management? Our research and applied work indicates that the change organizations are experiencing is inevitable, and in most cases senior management is only reacting to the inevitable. The drivers of information technology-enabled organizational change will be discussed in section three. To place these drivers in context, we first present the polarizing frameworks which are used to frame the debate. We could have selected from any number of authors to provide this perspective, but we selected two authors who represent opposite ends of the spectrum.
2.1 The Modern *Booster* - Arno Penzias

Penzias (1995) hypothesizes that we are poised on the verge of a second information revolution. Despite enormous progress, modern technology still falls short of fulfilling human needs. The threefold task of harmonizing technology with people, with nature, and with itself offers a challenging goal.

Penzias uses three phases of development to represent his ideas:

- The era of quantity,
- The era of quality, and
- The era of harmony.

The era of quantity is associated the mass production paradigm of the industrial revolution. The quality era in the U.S. is associated with a relatively short period of history, approximately the last twenty-five or thirty years. The period is characterized by a focus on product quality in order to achieve competitive advantage. In the U.S., the focus on quality was a reaction to international competition, primarily from Asia. While the chronological boundaries are blurred, Penzias suggests that we have already transitioned from the quantity to the quality era, and we are currently in transition from the quality to the harmony era.

The transition to Penzias’s era of harmony will shift the locus of value from individual products to integrated service, with each customer becoming a partner in value creation by participating in “design” at the point of sale. The transition to harmony will bring greater coherence to the value-creation process, with technology becoming more aligned with its users and with the surrounding environment. Businesses and their employees will shift their focus from internal matters to their customers.

Others have made similar arguments, but the differences between the quantity and quality eras as elucidated by Penzias are summarized in Table 1.

The comparison in Table 1 requires little discussion. The problems with U.S. competitiveness and product quality were discussed extensively by academicians and public policy analysts. Several significant works are Cohen and Zysman (1987), Dertouzos, et al. (1989), and Magaziner and Patinkin (1989). Thousands of popular management books on quality control, TQM and Japanese management techniques attest to the fact that this transition has occurred. While it may not have been clear at the time, the *Industrial Renaissance* that was projected by Abernathy, et al. (1983), has taken place. Companies have rethought the ways that they manage operations, R&D, and marketing, and a new emphasis on customer, cost, and quality has emerged.
Quantity Versus Quality

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<th>Era of Quantity</th>
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<td>Advance planning emphasis</td>
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<td>Hierarchical organizations</td>
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Table 1. Comparison of the Quantity and Quality Eras

While interesting from an analytical perspective, the era of quality is not our focus. We proceed under the assumption that this transition, while uneven, has occurred in the U.S. It is the transition to harmony that is more instructive for this paper. A comparison of the eras of quality and harmony is presented in Table 2.

Penzias views the future as one in which organizations work together with their suppliers and customers to add value to their products. Organizational teams are extended to include suppliers and customers, forming what are known as architectural organizations. Quality is no longer a goal; it is expected, and the focus is now on convenience. Customer feedback, a key ingredient of the quality era, is replaced by personalization; i.e., mass customization, producing to customer order with possible lot sizes of one. This type of coordination among customers, suppliers, and organizations is enabled by integrated processes supported by direct and integrated information access. Environmental concern is enhanced at the level where organizational processes contribute on an ongoing basis to environmental renewal. In short, information technologies and systems are used in previously unimagined ways to add customer value.
Quality Versus Harmony

\[ \text{Table 2. Comparison of the Quality and Harmony Eras} \]

Penzias argues that integration is the enabler of the transition from the era of quality to the era of harmony. Integration and direct information access, two components of the harmony era, will greatly reduce paperwork, which provides an indirect benefit to the customer, and will consequently reduce the positions that were centered around it. We have no predictions about the era of harmony, but we believe that “integration” is one driver of the current transformation that is occurring within organizations, even though we are in the very early stages of this transformation. Penzias presents integration in very general terms. The contribution of this paper is that we present integration in very specific terms (section three), demonstrating why it is unlikely that the transformation can be controlled.

Penzias provides little insight into the problem of worker displacement and re-assignment that will inevitably occur as we make the transition to harmony. Penzias notes, correctly we believe, that many new opportunities will be developed for those who have the skills to make technology more accessible and user-intuitive. His discussion leads one to believe that new opportunities will be available to other worker classifications, but details are not provided.

2.2 The Modern Obstructionist - Jeremy Rifkin

Rifkin (1995) views the current information transformation as the final Marxian struggle between labor and capital; i.e., the devaluation of labor that is induced by capital substitution. He quotes the following passage from Marx. Each technological breakthrough transforms the worker’s operations more and more into mechanical operations, so that at a certain point the mechanism can step into his place. Thus we can see directly how a particular from of labor is transferred from the worker to capital in the form of the machine and his own labor power devalued as a result of this transposition. Hence we have the struggle of the worker against machinery. What used to be the activity of the worker’s labor becomes that of the machine.
This statement forms the analytical framework for Rifkin's study of the information revolution.

Rifkin approaches the information revolution in the same way that a subset of economists/sociologists/politicians have approached economic adjustments due to technological progress. This is the heart of Rifkin's argument:

In the debate over how best to divide up the benefits of productivity advances, every country must ultimately grapple with an elementary question of economic justice. Put simply, does every member of society, even the poorest among us, have a right to participate in the benefit from increases in productivity brought on by the information and communication technology revolutions? If the answer is yes, then some form of compensation will have to be made to the increasing number of unemployed whose labor is no longer needed in the new high-tech automated world of the twenty-first century. Since the advances in technology are going to mean fewer and fewer jobs in the market economy, the only effective way to ensure those permanently displaced by machinery the benefits of increased productivity is to provide some kind of government guaranteed income. Tying the income to service in the community would aid the growth and the development of the social economy and facilitate the long-term transition into a community-centered, service-oriented culture.

At first, Rifkin’s proposal seems unique. He argues that there are an insufficient number of private sector jobs to absorb those displaced workers who don’t have market-valued skills. He also argues that since the government sector, in its diminished role, cannot absorb these workers, a Third Sector should absorb these workers. The third sector is comprised of non-profit community-based organizations that are focused on volunteerism and community service. This is distinctly different from government funded work programs that are often described as “the Third Sector.” According to Rifkin, the workers would be employees of the “non-profit” sector, a rapidly growing segment of the U.S. economy¹. The types of organizations could vary tremendously; e.g., charitable, hospitals, manufacturing technology transfer centers, etc. However, as indicated below, they may not be fully compensated by the non-profit organization.

A closer examination shows that there is little new in Rifkin’s proposal. Rifkin’s community-based sector is funded by the government. Volunteers are paid “shadow wages” in the form of government tax credits. Other non-employable people are given a government-funded “social wage,” a form of the “guaranteed minimum income hypothesis” that was espoused by economists earlier in this century. The funding for such initiatives would come through a variety of new tax programs, including a U. S. version of the value-added tax.

We think that Rifkin’s approach is flawed for several reasons. The information revolution can’t be cast in traditional Liberal/Conservative terms; i.e., equity versus efficiency or more government versus less government. Rifkin recognizes that the information revolution is having a dramatic impact on the private sector, but he apparently does not realize that the public sector will be equally affected. In fact, Rifkin’s Third Sector will be transformed as well.

The information revolution will affect paper-based transaction processing in the same way that computer integrated manufacturing has transformed the processing of production units on the factory floor. If government and Third Sector offices process information (which is a fact), they will be affected by the transformation. In our opinion, Rifkin’s approach would not survive in the long-run; it is a 1960s idea applied to a 1990s scenario.

— – ¹Rifkin’s concept maybe unique to the U.S. We don’t fully understand the evolution of the non-profit sectors of other developed economies, but this segment of the U.S. economy is significant.
3.0 THE NEW MANAGEMENT AND WORK ENVIRONMENTS

We move to the heart of the paper by providing a detailed explanation of how and why organizations are changing. Earlier and similar observations were presented by Morton (1990) and Dertouzos (1991). We reiterate some of these general observations, but we extend this work by focusing on the details of how information technologies are changing organizations. The above authors were correct in noting that information technologies would radically change organizations, but the extent and the rapidity of this change were not completely understood.

3.1 Enterprise Integration

We believe that Penzias is correct in noting that Enterprise Integration is the key. He presents the concepts of integration in general terms; however, Enterprise Integration is an elusive concept that has little meaning to most people. We will use a simple example to present our ideas on the meaning of the concept. Our definition of Enterprise Integration is comprehensive. Enterprise Integration is the integration of processes across organizational and functional boundaries to provide competitive advantage. The process of achieving Enterprise Integration includes all managerial and technological factors that enable cross-functional process integration. The end result is a customer-oriented management structure with information systems that are formally linked to processes and the integration of processes needed to establish/retain customer satisfaction.

We will present the concept using simple examples that relate to the phases of enterprise transition that are presented in Figure 1.

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3 We use the term “information technologies” to encompass a wide range of information systems, technologies, networks, computers, etc. that are enabling organizational transformation. This choice of terms is for convenience; i.e., the relevant set of hardware and software technologies are presented as a generic verbal package.
3.2 The Period of Isolated Stand-Alone Systems

Prior to the 1990s, the information needs of an organization were met by vertically aligned information systems that supported specific organizational domains. Consider the simple example that is presented in Figure 2. This picture describes three organizational domains: Sales, Production, and Shipping. In former times it was common to have a separate information system supporting each domain; i.e., “stovepipe” systems for sales, production and shipping. It was also common for there to be limited interoperability among the systems, and seldom any integration. In fact, people (or organizations) often existed only for purposes of transferring information from one system to the next.

For the customer placing the order, this implies that full information about the order and its delivery is not available at the point-of-sale. For example, someone in Sales would be unable to tell the customer exactly when the order would be shipped. Also, the inability to integrate information adds time to the customer order fulfillment process. This old information systems paradigm is associated with the first phase described in Figure 1, the age of stove-piped vertically aligned information systems.
The transition to the second phase, as indicated in Figure 1, was driven by the realization that process management could greatly reduce the time required to respond to a given business need; e.g., fulfilling a customer order. Hence, in order to reduce cycle-time in delivering the product to the customer, organizations stifled their focus to managing by process as opposed to vertical “stovepipe” domains. In our simple example, we focus on the customer order process. This situation is depicted in Figure 3.

In figure 3, the customer order process does not contain all functions within each domain, even though the management solution spans all three domains. Some would argue that this concept is a reincarnation of the industrial engineering methodologies of the 1950s, but never-the-less the concept motivated a managerial revolution in the U.S. during the first half of the 1990s. This period was associated with the radical improvement (i.e., reengineering) of business processes within organizations.

The purpose of Business Process Reengineering (BPR) is to change business processes and cultures radically by identifying and implementing new business practices. The focus is on redesigning processes with information technology playing a supporting role. BPR was touted as a key to corporate survival, providing the capability to respond to rapidly changing customer expectations. The reality is that many organizations used BPR to achieve cost efficiencies in their business processes, with a secondary focus on increasing effectiveness. In most organizations the targets of BPR were outdated and bloated processes and organizational structures as well as archaic and often arrogant corporate cultures. The advent of reengineering is often associated with the seminal work of Hammer (1990), but in fact the

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See, for example, Davenport and Short (1990).
ideas were being independently applied in various forms within many U.S. organizations. The strategy followed by U. S. firms in implementing BPR alternatives is presented in Figure 4.

![Horizontally Integrated Process Diagram](image)

**Figure 3. Process Management by Core Process**

The concept of a core process is essential for understanding Figure 4. Core Processes “are those central to business functioning, which relate directly to external customers” [Earl, (1994)]. The reengineering strategy was to focus organizational resources on the core processes while continually reducing overhead and underhead\(^1\). The private sector objectives were simple:

- Optimally allocate resources to “winning” products,
- Create an environment for continual change,
- Stay ahead of demand and the competition, and
- Shift resources from other corporate claimants to the core processes.

\(^1\)Underhead is non-value-added middle management.
With hindsight, we can see that many organizations did not reap the anticipated benefits of BPR, but the data must be evaluated with care. The popular press reported BPR failure rates in the U.S. as high as 70-80%. The reasons for these failures have been discussed extensively in the literature, hence they are not repeated here. Many firms implemented “slash and bum” downsizing and called it reengineering. There is mounting evidence that these firms obtained short run cost savings, and perhaps a quick uptick in stock prices, but no long term competitive advantage.

This paper is not about downsizing, a temporary phenomenon in our opinion. We are focused on fundamental technology-enabled organizational change. Workers may be displaced, and cost savings may result, but the real focus is increased competitive advantage through cycle time reduction. However, whether it be reengineering or downsizing, the impacts on displaced workers and corporate loyalty were real and painful. These impacts will be discussed in another section, but first we complete the story by focusing on the third phase described in Figure 1, the period of Enterprise Integration.

3.4 The Period of Enterprise Integration

A key precursor for understanding our concept of Enterprise Integration is to first understand that Business Process Reengineering is a management strategy. Its successful implementation is enabled by information technology. Information technologists don’t always communicate

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6 The preconditions for successful BPR implementation are discussed by Bashein, et al. (1994).
7 The problem became so severe in the U.S. that a new term, corporate anorexia, was added to the business vocabulary. Corporate anorexia is a noun, describing a company’s loss of effectiveness due to excessive shrinkage through various cost-cutting measures [Soukhanov (1996)].
8 Because of bad press, there is already evidence that word is disappearing from our lexicon. See the news report by Sands (1996).
well with business managers because they lack a common language. Figure 5 provides insight into the conceptual barrier that often exists between managers and technologists.

Figure 5 is divided into two parts: A perspective that relates to senior managers (the top half) and a perspective that relates to technologists (the bottom half). Managers are very comfortable conversing about certain views of the organization such as planning, management structure, core processes, etc. Technologists are comfortable with other views of the organization; i.e., information architectures, data models, activity models, etc. A conceptual barrier exists because managers and technologists don’t communicate effectively across the views. In simple terms, they don’t often talk, and when they have the opportunity to talk, they often don’t speak the same language. In many organizations the Information Systems department is perceived as just another necessary cost center.

Successful implementation of Business Process Reengineering alternatives requires that the conceptual barrier be bridged so that the managerial and technological views of the organization are integrated. Activities are embedded in processes, data flows through the processes, the organizational units (or people) are embedded in the processes; etc. Successful implementation requires that all views be integrated with managers defining the process and organization views, while technologists define the data, activity, and other technology views⁹. Furthermore, there must be protection in the following sense. If managers alter organizational processes, which is the essence of Business Process Reengineering, then discipline must be forced on the technologists so that information systems can be eventually aligned with the reengineered processes.

If the customer order process in Figure 3 is reengineered and the three legacy information systems are realigned so that they support the process as opposed to the individual domains, then there is potential for large reductions in cycle-time. This improves customer satisfaction, adds value to the customer, and reduces cost. This point deserves more attention since it is the key to understanding why it has been asserted that many BPR efforts failed. It is also the key to understanding why Enterprise Integration is more likely to succeed. Consider Figure 6, which is Figure 3 with a single modification.

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⁹A technical presentation of these concepts is provided by Scheer (1992, 1994).
Recall that Figure 2. indicated three separate legacy information systems, each supporting a single domain. In Figure 3, the domain focus was changed to a core process focus. We suggested that each process should be reengineered to maximum attainable efficiency, but we did not consider further changes to the information systems. In fact, this was the strategy that was followed by many U.S. firms. They reorganized on core processes, reengineered their processes, but did not change their information systems.

This was one of the reasons that so many U.S. reengineering efforts were classified as failures. Managers were attempting to manage by process, but their systems were still providing information by organizational domain. In this simple example, it would still be impossible to provide timely order information at the point of sale, even with the managerial focus on process.
Figure 6. Process Management by Core Process with Supporting IS

Figure 6. indicates that the problem has been solved by implementing an information system that supports the process, as opposed to the separate domains. This is the essence of Enterprise Integration. If the information system supports the process, then there is no requirement for people to transfer and check data at the domain boundaries. This is the transition that we face: As we achieve Enterprise Integration we are going to eliminate paper-based transaction processing in all of our organizations. Every person who checks, re-enters, or transfers data is potential non-value-added activity. They will be moved to other jobs or completely removed from organizational payrolls as we enter the 21st century!

The point was dramatically made by Bell (1993):

> The litany of jobs to be cut, announced by the leading high-technology companies around the world in the past year and a half, is tolling the knell of an era: IBM Corporation, headquartered in the United States, 90,000; General Motors in the United States, 74,000; British Telecom in the United Kingdom, 65,000; Daimler-Benz in Germany, 40,000; and Nippon Telegraph & Telephone in Japan, 33,000. . . . . . . . . . . . the current huge layoffs are not just the belt-tightening responses of many companies to cyclical hard times. On the contrary, the layoffs are the most visible and painful symptom of fundamental and permanent structural (non-cyclical) changes in the way high-tech companies will conduct business in the 21st century. Thus, many of the former employees, including engineers, may never get their jobs back even once recovery is fully underway, because those jobs will no longer exist.

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*In our interviews with Eastman Chemical Company, we encountered precisely this problem. After reorganizing the corporation with a focus on process and extensive process reengineering, the company realized that it could not reap the full benefits of the change without implementing a new system that supports the reengineered processes. After a two year effort the integrating system was implemented. This was confirmed in conversations with Mr. Robert Savell of Eastman Chemical in May, 1996. Since the popular press has identified several hundred of these large-scale implementations that are currently underway in the U.S., we don’t believe that the Eastman experience is that unusual.*
Enterprise Integration is driving this dramatic change within organizations. The resulting social implications are difficult to envision. Of course, the underlying and troubling question is: Where will all of the people go? Will they make technology more useful and friendly as suggested by Penzias, or will they go on the public payroll as suggested by Rifkin?

4.0 IMPLICATIONS FOR WORKERS AND MANAGERS

The implications for workers and managers are difficult issues to address since so little data is available, and much of the data that is available is suspect. However, there is an emerging picture.

4.1 Worker and Manager Displacement

First, almost everyone agrees that there will be winners and losers. Those with skills and knowledge that are valued by the market are doing quite well, and there is consensus that this trend will continue. Those who are poorly educated and have few skills (including communications skills) are going to continue to suffer.

Employment displacement is not isolated to the factory. According to Pearlstein (1994), an American Management Association (AMA) survey indicates that “middle managers, supervisors, and even professional employees are taking the brunt of downsizing. Although salaried workers in general represent 40 percent of all workers, they accounted for 63 percent of the reductions reported in the survey.” The survey indicated that 47 percent of the AMA’s 7000 member firms experienced reductions in their work force. Pearlstein notes that 66 percent of the firms in the survey were simultaneously downsizing and hiring during the sample period. “The survey is the latest piece of evidence that the economy is continuing to be roiled by major structural change and dislocation even as the level of sales, profits, and employment continue to rise.” It is suggested that downsizing is no longer an event, but a way of business life. This trend continued into 1995. According to Challenger, Gray, and Christmas, Inc. (a Chicago based outplacement firm), more than 300,000 jobs were lost in the first nine months of 1995 [Grimsley (1995)].

The group that will most likely be hurt the most are those workers who currently “check” data and “pass” data at process interfaces. If processes are integrated, we no longer need the “data handlers and checkers” who gain their power by monitoring the interfaces. Workers who do not add value to the customer will disappear. In the Enterprise Integration literature, these people are known as non-value-added check stations. These jobs have traditionally been clerical and mid-level management positions. Grimsley (1995) reports that “salaried workers, particularly middle managers, have been hardest hit, at a rate more than double their percentage in the work force.”

The implications for public sector workers are astounding. The number of non-value-added check stations in government is staggering, in both the defense and non-defense sectors. These are the workers who manually process forms and claims within government agencies. If the organization is integrated, and the information system is aligned with processes, data should only be entered once. If it is entered correctly, there is no need for checkers. We are in the early stages of this transformation in the U.S. as witnessed by the strong push to electronic commerce within the U.S. government. With Electronic Data Interchange (EDI) and

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1 Electronic Data Interchange is the computer-to-computer exchange of routine business information in a standard format between companies.
Internet/Intranet technologies, many manually processed operations can be eliminated while simultaneously reducing cycle-time and error rates. Penzias is probably correct - We are going to transform the office in the same way that we transformed the factory.

For those people who are displaced, unemployment has a number of negative consequences. These are detailed by Moore (1996). First, there maybe a significant amount of earnings loss, both from not working and from taking a lower paying job. Many workers have skills that are finely tuned to their current employer and of little or no value to other organizations. Consequently, they have difficulty finding new employment at the same compensation rate. Prolonged unemployment also has social-psychological effects such as feelings of inferiority which effect the mental and emotional well-being of the unemployed.

We should point out that there are dissenting opinions concerning the current employment opportunities. Jasinowski (1996) notes that “while Americans have been busy berating our capitalist system with unbridled enthusiasm, the U.S. economy has become the envy of the industrialized world.” There has been tremendous growth in the U.S. economy, and those workers with the right skills and in the right fields are reaping the benefits of this growth. Jasinowski argues that “there are too many workers with inadequate skills struggling to fit themselves into an economy that increasingly demands higher levels of education.” Hence many jobs are difficult to fill. “Some manufacturing firms are so desperate for skilled assembly-line workers that they have taken to hiring professional recruiting firms to help them find qualified applicants.”

In addition, demographics are not working in favor of the U.S. worker. As Jasinowski points out, “the baby-boom generation, combined with the influx of women into the workplace and high levels of immigration, has brought the largest increase in the supply of labor in American history. Since 1968, the number of Americans seeking jobs has shot up by 52 million workers, a factor which has had the inevitable effect of slowing wage growth since so many more people were out in the market competing for jobs.”

Finally, there are some scholars who believe that there is little unusual about the employment uncertainty that many workers are currently experiencing. The years following World War II have been characterized by exceptional stability and job security, relative to earlier periods of U.S. history. It maybe that we are returning to a period of “normalcy”.

The point of this discussion is that our transition to the period of Enterprise Integration is encapsulated in a complex macroeconomic and demographic web. Even though the politicians in this election year are making many claims and promises, the person who claims to have the easy solution is misleading the public. Political “spin” in an election year makes it difficult to get a credible understanding of even the most basic concepts. The press interpretation of the Stiglitz report is a good example. Are average wages for newly created jobs above the median? The answer is no, but after reading the Stiglitz report, the New York Times reported that “Pay is higher for New Jobs” created during the Clinton administration.

12 The authors acknowledge Prof. Henry Alberts for his discussions on this point.
13 One only has to listen to the inflammatory rhetoric from both sides of the political spectrum; e.g., presidential candidate Pat Buchanan and Labor Secretary Robert Reich. Those who propose simple solutions target callous business executives as the sole source of displacement are not promoting an understanding of the transition that we are currently experiencing.
14 Mr. Joseph Stiglitz is the Chairman of the President’s Council of Economic Advisers for the Clinton administration.
15 See Kuttner (1996).
An understanding of the transformation will not be obtained from the politicians. The transformation is being driven by more basic economic, demographic, and technological enablers. Even though the demographics are gradually shifting in favor of the worker, this transition is far from over, and for the worker who is displaced to a lower paying job or permanent unemployment, the consequences are very real.

4.2 The People Who Remain

For those who remain (i.e., are not displaced), their view of the organization is forever changed. The question of corporate loyalty, or the decline thereof, has been discussed extensively in the academic literature, and such stories are rampant in the popular press [see, for example, Allen (1996) or the Economist (1993)]. The problem is not restricted to the private sector. Barr (1996) reports that diminished loyalty is also a problem in the public sector.

The picture isn’t completely grim. According to Penzias (1995), the growing use of car phones, beepers, faxes and laptops are changing how we work. The worker who sits behind a desk from 9 a.m. to 5 p.m. is disappearing. Workers are increasingly mobile as new technologies allow them to travel directly to the customer while still maintaining a connection to the office and relevant up-to-date information. In fact, Penzias claims that getting workers out of the office decreases the amount of time they direct to internal demands and correspondingly increases the time focused on the customer.

5.0 SUMMARY OF COMPETING VIEWS

In this section, we will summarize competing views of the societal impacts of the information revolution that is being enabled by Enterprise Integration. Although there may be other alternative scenarios that merit attention, we will concentrate on the following three possibilities:

. Current trends will continue. Those with market-valued skills and knowledge will do quite well in the new technology-enabled business environment. Those who have limited skills will move to jobs that are less fulfilling and probably lower paying.

. The second possibility involves some modification of the first trend. Those with market-valued skills and knowledge will do well, but something will alter the trend for those with skills that the market assigns less value. That is, some unanticipated factor or combination of factors will open new opportunities that lead to fulfilling and higher paying jobs for these workers, perhaps using the information technologies that are made more accessible and user-intuitive by others.

. The third possibility is another modification of the first. The workers with market-valued skills and knowledge will do well, but work does not become available for those with skills that are not valued by the market. The resulting dislocation would require massive government intervention, creating work programs similar to Rifkin’s (1995) third sector.

5.1 Confounding Factors

Jasinowski (1996) has delineated many of the factors that make this analysis so difficult. Demographic trends are one of the major confounding factors. For example, the large influx of
females into the work force has essentially been realized. The same is true of the large numbers of minorities that have entered the economy since the passage of the Civil Rights Act. Immigration is difficult to predict, because it is very dependent on events that occur outside U.S. boundaries. For example, consider the large number of immigrants from Vietnam and El Salvador. These immigrants were war refuges, and their arrival could not be predicted in advance. The admission policies with respect to other classes of immigrants are political and difficult to predict. However, we agree with Jasinowski that, in general, the demographic trends tend to support a “tighter” U.S. labor market, which would suggest a higher real wage.

The business cycle is another element that complicates the analysis. Even though business cycles are difficult to predict, it is unlikely that a down-cycle would have long-run impact on the transition that is occurring within organizations. A depression-like collapse would have major implications, but the current integration trend will continue, even if some decisions are postponed because of economic considerations. Economic downturns confound the data, i.e., it is difficult to identify those workers who are let go during downsizing efforts to reduce costs, as opposed to those who are displaced by Enterprise Integration. However, the long-term trend will not be altered. As long as organizations can gain competitive advantage by integrating their processes with enabling information technologies, economic theory suggests that the integration process will continue.

5.2 Analysis of Possibilities

The third scenario, in our opinion, is the least likely alternative for the U.S. There is little historical evidence to support Rifkin's views. Even if new technologies created a massive underclass, the un-affordability of Rifkin’s solution would be a major barrier to implementation. Rifkin's assessment of the problem and his proposed solution is controversial (by U.S. standards), and we think that it is unlikely that implementation would be politically acceptable.

We turn our attention to the other two scenarios. Moore (1996) points out that as companies restructure around core activities, they tend to outsource more. The companies that take care of these outsourced tasks provide lots of “dead-end” jobs. This would seem to support a trend as discussed in the first scenario with workers being released from well compensated jobs only to move to jobs that are less fulfilling and pay less. However, alternative one, the status quo, is difficult to accept for two reasons. The first reason is weak, in our opinion, but it merits stating. The history of technology development and implementation tend to support the assertion that the new technologies will generate additional job opportunities in other areas.

The second reason, there is much evidence that new user-friendly products are emerging in the marketplace that are making new technologies more accessible to wider classes of people. New graphical interfaces, especially in the entertainment areas, are going to change the way that the average citizen views computing systems and technologies. The Internet is one example of a technology that has become easily accessible and widely used across most sectors of society. Initially a tool for sophisticated defense-related research organizations, the Internet is now used by large corporations, small companies, schools, libraries, individuals at home, and others due to the development of easy to use products in this area. While far from being overwhelming, there is mounting evidence that the new information technologies are going to become increasingly accessible and available for most citizens to use in work and recreational endeavors.
Perhaps our optimism is excessive, but we believe that Penzias is correct, and the second alternative will prevail. However, we are not naive - there will be losers. For those who are unskilled and have poor communications skills, meaningful employment will probably not be available. Even factory jobs require market-valued skills and knowledge in the current work environment, and the situation is unlikely to change in the future. We must find better ways to educate this classification of workers so that they are able to develop the necessary skills to obtain meaningful employment.

6.0 CONCLUSIONS

During the 1980s, a dramatic transformation occurred within U.S. manufacturing organizations. The number of “blue collar” jobs has steadily declined as a result of this transition. Penzias (1995) suggests that we are going to see a transformation that is just as dramatic in the “white collar” occupations. That is, organizational transformation through Enterprise Integration is going to forever change organizational relationships. Those workers who check the work of others, or pass data or information at process interfaces, will be displaced from their current jobs.

If one accepts this premise, the social implications are obvious. What are the consequences for the displaced workers, and will Enterprise Integration widen the gap between the rich and the poor? We have argued in this paper that the search for competitive advantage makes Enterprise Integration inevitable. The precise implementation is not predictable, but there is ample evidence that the transformation is underway.

The implications for displaced workers and managers are not well-understood. The analysis and political arguments are bounded by views of extreme optimism and pessimism. The views of Penzias (1995) represent the optimistic end of the spectrum, while the views of Rifkin (1995) characterize the other extreme.

Our research and experiences from working within organizations tend to support the position of Penzias. The analysis is complicated by confounding factors, such as normal responses to business-cycles and other competitive pressures. In particular, in the U.S. the technology-enabled transition to the period of Enterprise Integration has been occurring during a period of significant downsizing. We make a distinct difference between downsizing and organizational transformation through Enterprise Integration. Both usually result in fewer employees, but Enterprise Integration leads to increased effectiveness and sustainable competitive advantage. Downsizing is a cost cutting response to competitive pressures, often resulting in short-run gains in profitability, but little in the way of long-run competitive advantage.

This distinction is extremely important for a proper understanding of our major points. Downsizing is the elimination of people to reduce costs. Enterprise Integration is a transformation of the organization to achieve competitive advantage. Downsizing always leads to fewer employees; Enterprise Integration may or may not. If the organization is growing, employment could increase as processes are integrated with enabling information technologies; e.g., Eastman Chemical Company. However, our research indicates that decreases are more likely, especially if the work is primarily paper-based transactions processing.

There is evidence that many displaced workers will use the new enabling information technologies in other employment. Our argument is based on the observation that these technologies are becoming more-and-more accessible to non-technologists. Just as the graphical user interface has made computing more user-friendly, there is evidence that we are
moving to a level that could be called: user-intuitive. As noted by Penzias, “disemployed
workers generally find work closer to the customer interfaces, either in the same corporation,
in other corporations, or as individual consultants.”

We already see a transition to more exciting and meaningful work for many displaced workers. However, there are winners and losers. Those with skills that are not market-valued are not benefiting from the transition. To date, the negative effects of the transition appear to be localized on those with relatively less education; i.e., secondary school degree or less. These people, in general, were dependent on the manufacturing sector for employment. While there are many new and high paying manufacturing jobs, the absolute number of manufacturing jobs has been declining. Also, many of the new manufacturing jobs require skills that were not previously required.

Even though we accept an optimistic view, we agree that the prospects for those workers who are unskilled are not promising. Many of the new jobs require enhanced analytical and communications skills. While the alternatives may change, it is currently unreasonable to assume that people who can’t read and write can be retrained for these jobs. This is not a new problem. These people had difficulty in securing employment during the quality era, and this situation is unlikely to improve in the future. This is a societal problem that requires new solutions; the old solution of sustained underemployment through government transfer payments creates a safety net, but solutions are needed that result in long-term and meaningful employment. These solutions are not obvious, and those proposed to date in the U.S. have been politically controversial.

We end as we began. The genie is out of the bottle. Enterprise Integration will transform organizations throughout society. As noted by Dertouzos (1991), “closing the door to technological discovery so as to avoid the societal pitfalls is unacceptable to the probing nature of the human spirit .“

7.0 REFERENCES


