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Canadian Workplace Automation Research Centre

COMPUTERIZATION:

THE BEGINNING OF A NEW ERA

IN THE WORKPLACE

by

Jacques Lyrette

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Introduction

The impact of office automation in the workplace is as dependent on human resources as it is on the technological innovations themselves. Will the introduction be worthwhile for the organization? If it is profitable, will machines replace people who used to work in these organizations or will the skills of these people be employed elsewhere in the organization? This paper focusses on the human side of office automation, discussing the potential impacts of technological innovation in the workplace and stressing the need for strategic planning if the overall result is to be positive, both for the organization and the workers within it.

Chapter 1 — Where we have been: the historical background

Between World War I and World War II, the industrial world was witness to an unexpected sociocultural metamorphosis catalysed by advances in the field of electronic technology.

The transition from an industrial society to an information society began around 1930 with the parallel developments of computer technology and communications technology. It was only after these technologies had existed separately for almost 25 years that scientists began to create interfaces between them. The pace of development in computer/communications technology has accelerated rapidly. Since 1965, we have seen the birth of the 4th generation computer (integrated circuits), video cassettes, briefcase computers and laser communications.

In 1945, it cost about $1,000 and took at least a month to perform a million operations on a keyboard. By 1960, the same volume of work cost $0.75 to perform and could be accomplished within a second. Today, the cost of a million operations has dropped to one tenth of a cent and takes only one tenth of a second to complete. Between now and the year 2000, computer costs will have been further decreased, perhaps by as much as a factor of 100.

Chapter II - Where we are: organizational adaptation

The rapid rate of development and the low cost of computer and information technology have led industrialized nations such as Canada to a new era, sometimes referred to as "The Information Society" or "The Computerized Society". How are our organizations -- private and public, small and large -- coping with this transition?

The answer to this is -- with difficulty. In a study of large Canadian organizations recently conducted by the Canadian Workplace Automation Research Centre (CWARC), significant problems with the management of workplace technology were found. These problems are concentrated in three main areas: planning, implementation and justification.

In the planning area, it seems that organizations are having difficulty tailoring projects to user needs -- for example giving electronic mail to people who do not need to talk to each other. There is a marked lack of long-term planning for the changes in employee skill requirements and labour force composition which may result from automation, especially in sectors where a large proportion of workers occupy clerical jobs. And, most seriously, these organizations often fail to make connections between their plans for technology and their business plans. In other words, the use of technology is, in many cases, not tied to central organizational goals and

philosophies. Organizations either do not plan the integration of technological change with their business goals or are unaware of what magnitude of change to expect with the advent of integrated office systems.

This study also showed that Canadian organizations have not avoided many of the workplace automation problems reported in American literature. Taking a step back from these problems, we can see that they are indirect results of slow, evolutionary changes in organizational structure which seem to be coming about, whether as a result of automation or other societal changes.

What are these problems? Tensions between the former nabobs of data processing in centralized departments and the new centres of computing power in user departments are common, as are problems in managing the constant bewildering changes associated with technological transformation within departments. These organizations also have difficulty training and maintaining the skill levels of their staff because they fail to pinpoint human resources, in particular knowledge workers, as of crucial importance in the process of technological implementation and, as a result, they are often unable to truly profit from all the capital investment. In the secondary sector plan, automation means the use of Computer Aided Design/Computer Aided Manufacture (CAD/CAM) and/or robotics and often does mean a decrease in the number of workers, but in the tertiary, or information, sector it can and should mean an investment in the skills of actual employees and an upgrading of the work force rather than a decrease in the number of employees. And,

departmental managers frequently get caught in a kind of organizational Catch-22 -- they are told they must innovate with the technology to reap the instant productivity gains promised by vendors, but that some central agency will retain total control over what exact pieces of hardware and software they can use to innovate with.

The final set of problems uncovered by this study have to do with how workplace automation is justified -- how the organization decides whether workplace automation is a worthwhile investment. There is a very strong tendency for organizations to greatly underestimate the resources needed for proper implementation and training, so often automation projects end up costing far more than anticipated, or worse, being doomed to failure because of inadequate resources given to implementation and training. And, although most organizations expect to see some sort of difference in some kind of bottom line after automation, the measures they use for the bottom line are usually inappropriate yardsticks for the kind of impacts that we can really expect from automation. Finally, the real effects of automation alone are very rarely subjected to systematic evaluation.

A study of small Canadian businesses conducted for the CWARC had surprisingly similar findings. The objectives of this recent study were to see how office automation was introduced, used and evaluated in small and medium-sized businesses (50-500 employees).

The three main goals of the managers interviewed when implementing technology were: faster access to information, better control and better information. On a scale measuring satisfaction with office technology, the managers were extremely satisfied -- 4.2 out of 5. But despite this high level of satisfaction, it was also discovered during the study that 80 percent of the organizations had no corporate information systems plan and had done no cost-benefit analysis. What is worse, in organizations without a plan, the actual cost of office automation was 200 percent more than the expected cost. The firms without plans also had fewer of their expectations fulfilled.

This leads us to conclude that the planning phase is crucial for all organizations, small or large. There is a general underestimation of the cost involved with automation and a recognized lack of training at all levels. Despite the problems, managers of small and medium-sized organizations see office automation as improving, mainly qualitatively, organizational performance.

Chapter III -- Where we are going: new technology and future work patterns

To make our economy competitive with that of other industrialized nations, Canada should become a leader in the large-scale adoption of information technologies. In order to make this transition

successful, we will have to rethink our world of work, re-examine our job training systems and re-examine our educational system from the primary to the university levels.

By the year 2000, the nature of work for the individual worker will be considerably altered. Scientists express ambivalence as to whether the changes in technology will result in the loss or the creation of jobs. In my opinion, new technology will displace workers rather than cut their jobs. One has only to examine past experience to find evidence that advances in technology have always created jobs and generated wealth. If you reflect on the effects of such inventions as the telephone, airplane or television, you will observe that technological conversion only creates short-term difficulty. Nevertheless, it is also evident that people in certain categories of work are likely to experience unemployment, particularly those in low-skilled positions. It is already the case, in our society, that low-skilled and less-educated workers are disproportionately represented among the unemployed.

To reduce the short-term problem of technological conversion, we, as a society, should be planning the transition of the workplace. We should assist management to adopt technological implementation strategies appropriate to the nature of their organizations. In the case of knowledge workers, who are essentially information processors, this means training, and the result of this training is a more valuable resource. Manufacturers, equipment vendors and consulting firms must also adopt this new "user" focus.

Other possible devices for minimizing the stress of conversion include: improved mobility in the workplace, greater flexibility in work schedules, the facilitation of early retirement, and provisions for the retraining of workers who must acquire new skills as the nature of their position changes.

Chapter IV -- Planning the future: the changing nature of work

The effect of the introduction of office automation on job specialization does not constitute a break with Taylorism, but a continuation of it. Task division and job specialization are still present. In banking, for example, work is so specialized that some tellers only do withdrawals, deposits or fund transfers at their terminals. In some sectors, however, we are beginning to see a move away from assembly-line-type production towards a teamwork approach where all tasks are accomplished within the context of a small group.

Scientists also express ambivalence as to whether tasks will be upgraded or downgraded. Many researchers, however, agree that information technology will have the effect of spreading the gap between high-qualification and low-qualification jobs, a phenomenon known as job bipolarization.

Computerization has made it possible to reduce work hours or improve work schedules. A survey conducted by the Centre de Recherche et de Statistiques sur le Marché du Travail (CRSMT) (1984) shows that a flexible-hour system is more commonly used in work-pool units, which are more likely to be computerized (46 percent) than in individual positions (23 percent) due to the ease of personnel rotation in pool units.

If you are observant in daily life, you will notice that consumers are doing tasks previously performed by workers a few years ago. The extensive use of automated teller machines by bank customers is a perfect example of a task taken away from a teller. Do you remember when you had to contact the operator in order to make a long-distance telephone call?

To avoid the creation of "electronic sweatshops," where employees are closely controlled by computers in their day-to-day work, the new technology will force management to restructure work procedures.

"There are at least two distinct phases to the so-called office automation 'revolution', the implications of which vary considerably. Up to this time, the main impact of the new technology has been to facilitate current office operations. For example, the word processor replaces the typewriter and the microcomputer replaces the filing cabinet. While significant, these innovations simply increase the efficiency of work as it is done now." (Long 1984)

"However, a second phase of application is now beginning which portends revolutionary changes to the organization. This stage involves the outright elimination of many intermediary functions, and has been brought about by the convergence of the three technologies of electronic data processing, telecommunications, and office machines." (Tapscott 1982)

To illustrate phase one, an inspector from the Department of Revenue who used to have to work several days in his office to complete an audit could now greatly improve the efficiency and quality of his work through the use of the word processor and the microcomputer. In phase two, he would make use of a portable terminal, thus eliminating the use of clerical staff, reducing travel time and adding the dynamic of flexible work-hours and work location.

In order to enhance and extend the human abilities and skills required to realize the potential benefits of new technological developments, progressive management policies will be necessary. The human issues must be considered in all phases of implementation. Employees should be consulted and should participate actively to limit the burden of the transition. The "socio-technical" approach (used at Rand Corporation in the United States) stresses that as much care should be given to planning employee participation in job redesign as to planning the implementation of the technical aspects themselves.

Chapter V -- Planning the future: towards a new generation of managers

Who are the managers of the future; what are their skills; how do they spend their time?

Management can provide the key to realizing the full potential of automation in the workplace but it will require different skills and attitudes. Management will have to be highly adaptable, capable of accommodating change. According to Joseph A. Fernandez, a Vice-President of Citibank, "the biggest obstacle you have when you're introducing technology is with your more senior employees who have been trained to operate in a certain way" (September 1985 interview with L. Garceau).

Obviously, managers will have to be comfortable and competent with new technology, able to use the available tools which will increase their productivity. Tapscott cites several studies indicating that managerial staff spends between 40 and 80 percent of their time in communication activities such as mail processing, telephone calls and business travel. Office automation can vastly reduce the time spent on such activities by making quality information accessible to the manager or knowledge worker in a more timely way, through such devices as electronic mail, teleconferencing, computer conferencing, intelligent phones, etc. (Tapscott 1982).

The change in the manager profile goes much deeper than the individual capacity to utilize the available technology. Fernandez of Citibank describes a hierarchical flattening of his organization, where managers have fewer people reporting to them but where these people are knowledge workers paid to think and make decisions. These people have to be treated as intelligent and responsible (September 1985 interview with L. Garceau).

M. Gannon, a Vice-President of the Royal Bank of Canada, sums up the changed nature of the supervision function. "It will involve more co-ordination and more collegiality rather than command and control . . . It will be more influence and less power . . . I will be able to do what I do because I'm competent as a manager to help people get it done, rather [than] as a person who really understands the details". (October 1985 interview with L. Garceau)

Instead of a conclusion -- a challenge!

One of the characteristics of the ongoing reflection on integrated office systems and their impacts on the work force is that, like change itself, the reflection is never over and you are never led to a definitive conclusion, but merely to a pause in the ongoing process. Rather than just adapting to this constant process of change, organizations will have to turn this contingency of existence into a corporate advantage. In other words, the greater the degree of improvement in internal processes and the greater the commitment to the skill upgrading of human resources,

the greater the benefits to the organization in terms of cost- efficiency, work performance and competitiveness.

We cannot afford to put on rose-tinted glasses. The process of change may involve clashes, conflicts, unresolved problems and tensions. In some economic sectors, change has occurred so rapidly, as a result of the combined factors of economic necessity and availability of suitable technology, that workers have been laid off with the arrival of machines rather than retrained for new jobs within the organization. We find examples of this phenomenon in the manufacturing industry and in the banking sector. For some time, change may result in stress and poor adaptation to new tools, new job profiles and new management styles; and this stress will be experienced at every level of the organization. The displacement of managers, professional knowledge workers, and secretaries may occur and these workers may find themselves temporarily or even permanently maladjusted to that change.

The powerful new integrated tools may lead to higher levels of performance but only if the users have complete mastery over their use. For this to happen, we need to learn a great deal about how to forecast the impacts prior to implementation, how to undertake strategic planning, how best to train and retrain people. We must also learn how to accurately evaluate the gains of automation in terms of the quality of output and total factor productivity rather than by current standards which are related to staff-reduction capacity. We need to learn more about information

processing as this is the work of 60 percent of the population and, if the trend continues, it will be the work of more people in the future. What are the best tools and the best work processes for effectively and efficiently generating, storing, retrieving, processing, and disseminating information? These questions are more than philosophical, as our answers will determine the level of success we attain in the Canadian workplace.

Instead of a conclusion, I would like to leave you with a challenge: to master the situation in the spirit of co-operation on the part of all parties concerned, be they manufacturers, vendors, consultants, service firms, businesses, academics or union representatives. Our success will depend on the sharing of ideas and the recognition of common goals. With a national commitment to obtaining technical goals through cooperation and dynamic tension, we can meet this challenge of technological innovation.

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