MANAGING NEW OFFICE TECHNOLOGY

An Organizational Strategy

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To my parents,
Barbara and Paul,
for love and guidance. . . .

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Preface

A VAST ARRAY of new office equipment is now coming to market. Each task to which it is applied can be significantly enhanced. This technology will benefit offices most if the social subsystem of work—people and the organization of their tasks—complements the technical subsystem—tools and procedures. But joint emphasis on the social and technical aspects of work remains underdeveloped. On the one hand, the few available writings that concern social aspects of new office technology seem moralistic or vague. Often they sermonize, admonishing readers to remember that people still count, and proposing greater involvement of equipment users through surveys and discussions—yet these provide only a superficial form of participation. Although well intentioned, many of these efforts stop short, providing palliative adjustments instead of substantive change. On the other hand, the many available writings on the office of the future ignore its social aspects completely and instead emphasize technological wizardry, implying a naive faith that technology by itself will boost productivity. Yet deficient management and poor organization cannot be corrected magically by new gadgets.

To harvest full benefits from new office technology requires or-

ganizational learning and change; enterprises must develop new patterns of responsibility and work coordination. This reformation must affect those at every level of office work, including managers and staff professionals. The arrival of new office equipment is therefore an important event for many people in addition to technical specialists such as systems analysts and programmers. The influx of new tools can imply changes in the very character, mission, and structure of an enterprise. A vision and a method are required—a vision of distinctive principles that can generate new organizational alternatives, and a method of design that can successfully implement them as new technology is installed.

This book draws on sociotechnical design to provide such a vision and such a method. With a substantial record of accomplishments in factory settings, sociotechnical theory and method can be used, appropriately modified to the circumstances at hand, to produce high commitment, high performance office organizations. Proceeding beyond the vague admonitions that are usually set forth, sociotechnical design offers a specific method for reshaping the organization of office work. From this emerges the possibility of an organizational strategy to manage new office technology in which new tools are deployed for more than merely their own sake.

Managers and staff will find this material useful in efforts to capitalize on the opportunities afforded by new office technology for improved productivity. With such readers in mind, this study addresses issues of organization design neglected in the conventional literature. Thus it will be a useful handbook to specialists making purchase and installation decisions, and to the entire spectrum of people who will live with the consequences of new office systems. Furthermore, its explicit design methods and illustrative cases provide "how-to" information that goes beyond lofty declarations by providing real and feasible steps for change. No background in systems design or organizational theory is presumed. In addition, this book seeks to address a scholarly audience. The integration of organization design and information systems design grows more salient with the accelerating diffusion of new information technology; thus, faculty in both information systems and organization behavior may find this material useful in bridging their disciplines.

New office technology poses issues that are both micro and macro in scale. Already the individual enterprise must develop in-

ternally a stream of minute changes brought about by specific applications of new office tools. Cumulatively, these changes will aggregate and contribute to new social trends, and these trends in turn will trickle down to affect other specific sites that employ advanced office systems. Hence, management of new office technology must deal with both macro and micro levels; and accordingly the organization of this book is tailored to treat both these levels. The study first raises major organizational questions posed to management by new office equipment. Next it outlines specific methods of sorting out detailed change for specific internal operations. Finally it examines larger social issues that already are being advocated as an additional set of concerns for projects to deploy new office technology.

Chapter 1 identifies the major challenge to management posed by new office technology: How to foster organizational learning and change. This area is usually neglected by vendors and in-house technical staffs; nevertheless, management needs to acknowledge the challenge and to meet it well armed with workable ideas.

Chapter 2 reviews the principles of sociotechnical design, the conventional method of sociotechnical analysis, and the history of the approach. Chapter 3 reformulates conventional sociotechnical design to permit a wider range of office applications. A contingency approach is advocated, whereby different analytic methods are used for different kinds of office tasks. The contingency framework enhances sociotechnical design by making it more relevant to the multifarious activities of management and staff professionals. It also facilitates more usual applications to clerical staff.

Chapters 4, 5, and 6 describe cases of routine, nonroutine, and mixed routine–nonroutine office work, respectively, and their appropriate forms of analysis. These cases offer a detailed view of how sociotechnical intervention is done across the spectrum of office work.

Chapter 7 suggests likely changes in the office in the future. What offices eventually will be like depends on the extent to which organizations deliberately meet the challenges posed by technological advances and social trends. This choice must take the form of an incremental progression rather than some kind of grand plan; actually, the only alternative to a process of emergent design is a future shaped by uninformed default. By carrying out a posi-

tive plan, sociotechnical analysis can play a role in creating tomorrow's office.

Chapter 8 outlines the need for improved management of those external relations that will grow with the spread of new office technology. In the near future various stakeholder groups will arise, will become mobilized by the diffusion of advanced information systems, and will attempt to exert influence upon enterprises that deploy new office tools. In order that managers may engage these outside interests, a framework for external relations is proposed that extends sociotechnical design into the realm of institutional values and external affairs.

The Afterword by Eric Trist, originator of the sociotechnical approach, offers an interpretation of developments proposed by this book. It also highlights some relations between the new ideas formulated here and the heritage of sociotechnical design, the literature on organization behavior, and the changing context of our industrial society as we move into a postindustrial era.

Acknowledgments

THE PRINCIPAL IDEAS in this book have developed from a confluof academic and field based work. The scholarly foundations of these ideas lie in systems theory and social science; the field based experience is drawn from a variety of projects—all of them designed to improve organizational performance—that have involved me over the past six years. This intersection of lofty thoughts with hard reality has resulted, I hope, in a work of imaginative pragmatism. Certainly, no such endeavor is made in solitude. I have been fortunate to encounter people who have provided essential ideas, questions, provocations, and encouragement. Thus, although final responsibility for this work rests with the author, these individuals deserve grateful acknowledgment.

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C.H.P.P.

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CHAPTER 1

Advanced Office Technology: The Challenge to Management

THE "OFFICE OF THE FUTURE" is now the catch phrase of scholars, consultants, and entrepreneurs. Advertisements, periodicals, and seminars pronounce office equipment as the incarnation of tomorrow's efficiency today. Yet unfortunately, the prophets of new technology neglect issues that are crucial to the successful implementation of new office systems. Their enthusiasm for remarkable technology occludes any concern for the organizational learning and change needed to make new office tools most beneficial. Moreover, they do not yet realize that the responsibility to confront and resolve this challenge initially rests with management, and not just with experts in the technology. To bring about this realization is an important purpose of the present study.

This chapter embraces five topics. First, the revolution in office equipment is broadly sketched. Second, the need for organizational learning and change is defined. Third, this neglected area and the costs of such neglect are examined. Fourth, steps are suggested that managers can take to promote genuine organizational learning and change. Fifth, social trends are identified that complicate management's task of fostering organizational learning and change.

The Revolution in Office Equipment

The dramatic recent shift in the kind of tools used by office workers is in large part a result of the declining costs of integrated semiconductors, which are the basis of digital information processing. Many observers forecast a continued decline in microelectronics prices with a simultaneous increase in capabilities (Noyce, 1977; Shepard, 1977; Wise, Chan, & Yokely, 1980). The past few years have seen a proliferation of new devices for the office: smart typewriters and word processors, integrated voice/data switches, portable computers, and facsimile transmitters. The late 1980s should see even more remarkable developments: extensive networking, vocal input and output for command entry and information retrieval at desktop workstations, and software that is easier to use, more versatile, and equipped with partial discretionary capabilities (artificial intelligence) for a degree of automatic choice between alternatives. At the same time most nonoffice equipment will also use microelectronics to become more active, self-regulating, and interlinked (Pava, 1980; Skinner, 1979). Though the revolution in office technology is only one niche in this overall metamorphosis, it is particularly striking because of the immense opportunity taking shape. Office workers represent a growing segment of the labor force. The proportion of the U.S. labor force in white-collar jobs, 20 percent in 1978, will rise to 40 percent in 1988 (Uhlig, Farber, & Bair, 1979); the Bureau of Labor Statistics has projected 51.5 percent level in 1985 (Diebold Group, 1979). Some economists also have predicted the emergence of an information-based economy (Ginzberg, 1982; Porat, 1977). If they are correct, work that processes information rather than raw materials will be a vital component of overall productivity. Office equipment sales will skyrocket, growing at 15 percent on an annual basis, with U.S. shipments alone reaching $13 billion by 1985 (Weil, 1982).

Existing data are imprecise and specific figures can be misleading out of context, but most studies indicate that the rate of productivity increase has not grown much with the information sector's expansion. Throughout the 1960s and well into the 1970s rates of productivity growth for blue-collar work have been substantially greater than for white-collar work (Diebold Group, 1979; Purchase and Glover, 1976; Uhlig, Farber, & Bair, 1979). Moreover, the lastest estimates indicate a continuing rise in unit labor costs for office workers at an average rate

of 10 percent per annum through 1992 (Booz Allen & Hamilton, 1979). Room for significant improvement in office worker productivity clearly exists.

At the same time, office work has been characteristically supported with relatively low levels of capital investment. Purchase and Glover (1976) estimated that in 1976 the average capital investment per worker was $24,000 for blue-collar but only $2,000 for white-collar employees. This discrepancy does not imply that office productivity will rise automatically with greater capital investment, but it does indicate that investment in information processing may be justified as new equipment comes to market and the proportion of white-collar workers nears half the labor force.

Together, the office sector's static productivity and low capital investment level suggest that new office equipment may confer a very real competitive advantage in the long run. In the short term, initial capital investments are likely to cancel out savings in labor costs. Over time, however, high technology will quicken response, increase flexibility, and create new economies of scale and new learning-curve effects (Pava, 1982a; Skinner, 1979).

Different Kinds of Organizational Learning and Change

The purchase of exotic technology does not automatically result in its productive utilization (Ackoff, 1967). There is a vital distinction between equipment functionality and tangible user benefits. One device may offer more memory, faster processing speed, and better quality graphics than another, but these attributes belong to the machinery itself and the relative efficacy of techologies around which it is built. Technically enhanced functionality, however, is not the same as tangible benefits from a user's point of view. Concrete advantages to specific operations can be realized only if changes are made that take advantage of the equipment's capabilities. In most cases, the translation of enhanced technical functionality into substantive benefits requires both learning and changing on the part of the user organization, which must take into account the following elements:

1. *Operator skills.* New knowledge and skills are required to operate new equipment.

2. *Procedural enhancements.* Often the work of nonoperators must change to accommodate limitations of a particular device; the most common adaptation is change in administrative procedures.
3. *Structural factors.* Changes in a unit's organizational structure—distribution of responsibility, information flow, coordination of roles, incentives, and compensation—are necessary to the effective use of new equipment.
4. *Cultural fabric.* Tangible user benefits may be realizable only with profound changes in the premises that undergird a collective enterprise, such as status differentiation, human resource management philosophies, definition of a unit's mission, and key basis of competitive advantage.

Figure 1.1 illustrates the problem of translating technical functions into operational benefits.

The more sophisticated the equipment, the more learning and change will be required in order to realize benefits (Figure 1.2). Consider an architectural firm using advanced computer-aided design (CAD). The equipment brings with it more than a need to train operators and alter procedures; many structural and cultural factors must also change if the system is to be cost-effective. As work flow becomes quicker, the associates must coordinate their efforts more intensely; and as they begin to do their own drawings and filing, support staff roles must change as well. Standards of work and methods of supervision must reflect these shifts. Likewise, new sources of professional self-image and self-esteem need to evolve and gain recogni-

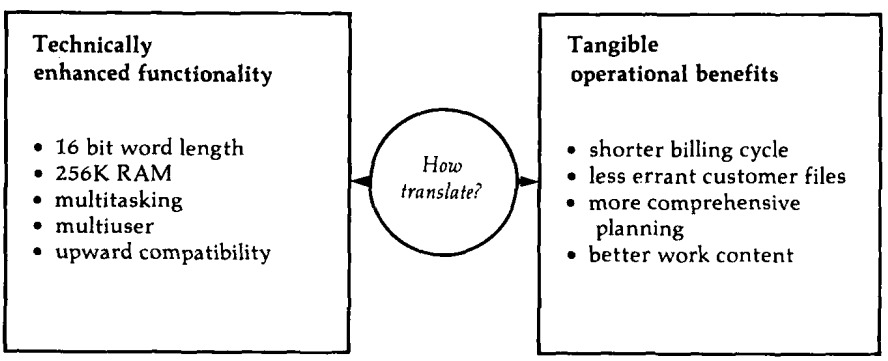

FIGURE 1.1 *Translating Technical Functionality into Tangible Advantages*

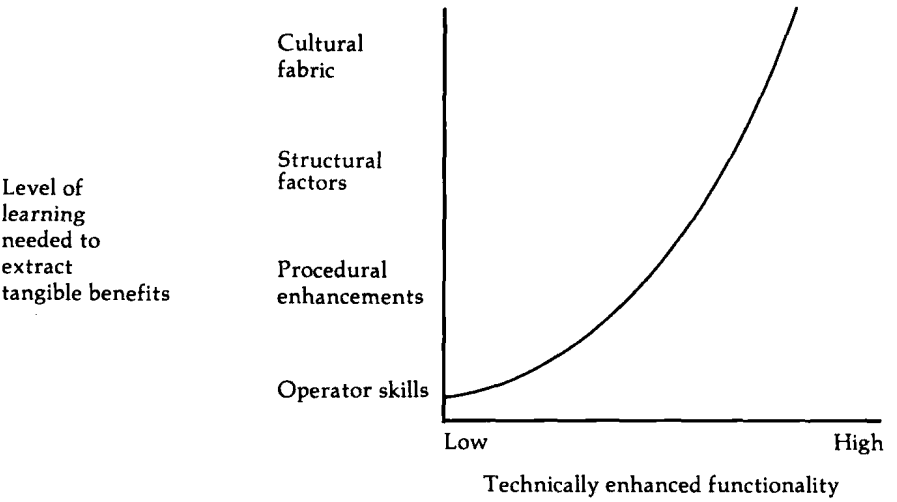

FIGURE 1.2 *Correlation Between Level of Technical Functionality and Type of Learning Required for Tangible Benefits*

tion. Even the scope of the firm's business may change as the system's great capacity allows new business lines to be pursued (selling excess capacity to other firms, planning projects beyond the traditional scope of architectural firms, and so on). This sweeping transformation rises from the enhanced technical functionality the CAD system delivers. CAD equipment is much more capable than prior graphics or word processors. Programs, data, and work stations are more highly integrated than for stand-alone systems. Opportunities created by these powers are secured only if the firm purchasing the CAD can make the requisite organizational and cultural changes. A transformation of this magnitude is far beyond mere operator training or procedural enhancements. It directly involves structural and cultural discontinuities that the firm must learn to capitalize on.

The challenge posed to management by advanced office technology requires both organizational learning and change that are sufficient to reap concrete benefits from enhanced functionality. Selection of equipment must go hand and hand with operator training, procedural enhancements, organizational restructuring, and cultural reappraisal. Vendors and in-house technical specialists are not in a position to effect such sweeping changes; accordingly, management must be directly involved in the adoption of new office technology.

The Failure to Address Broad Organizational Issues: Causes and Effects

Ordinarily, organizational restructuring and cultural change are not discussed explicitly in conjunction with new office technology. Yet too often, emphasis is restricted to the training of operators and the enhancement of procedures. Operator skill is undeniably necessary to the quick and accurate operation of complex equipment, and procedural enhancements are important to formatting data so that they can be run through a system. Indeed, the heavy emphasis on these levels of learning and change has given rise to a flourishing trade in user training, which includes programs with self-teaching modules and dial-up phone services for user support. To minimize the need for procedural learning there is renewed emphasis upon specialized software packages aimed at narrow markets, an idea that closes the gap between traditional work routines and learning the way new programs work. As we have seen, however, substantial learning and change must occur not only at these levels but throughout the organization, in order that the new capabilities of advanced office equipment may be translated into tangible benefits.

For vendors, on the other hand, selling complicated equipment is difficult enough without having also to peddle organizational metamorphosis. Sheer economy of effort leads them to focus their attention on equipment alone. The neglect of organizational learning and change among both vendors and customers is evident even in the office system literature. Most articles deal with equipment selection, operator skills, or procedural changes. For example, in a January 1982 issue of *The Office* devoted to the topic of managing office technology, just seven of the thirty-six articles concerned organizational questions such as management style or manpower planning; and of these, only one discussed organizational restructuring.

When occasionally vendors have suggested organizational changes to boost work volume to a level that would justify expensive installations, the results have been disappointing. In the late 1960s, for example, IBM encountered unanticipated demand for its magnetic tape Selectric typewriter from offices that did not have particularly heavy typing requirements. The machines cost $15,000 each, a price that could be offset only by very high equipment utilization. Therefore, IBM recommended the formation of document production centers staffed by "correspondence secretaries"; "administrative secretaries" would perform nondocument production tasks for "prin-