Micros in the workplace—the 1990s

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INTRODUCTION

To find a setting where mainframe computers are used which has not felt the impact of the development and use of mini and microcomputers is rare if not impossible. And while the growing array of developments in the microcomputer field can generate much excitement and enthusiasm for personal computer “buffs,” serious problems can confront the data processing professional who attempts to actively implement strategies to accommodate mainframe-minicomputer-microcomputer links. This presentation will provide an overview and explanation of the events, concepts, and issues related to microcomputer applications which may provide some guidance in making the correct decisions related to the implementation and integration of these technologies.

THE FIRST TEN YEARS

In the mid-1970’s, as the microprocessor on a chip became a reality, a handful of individuals dreamed of offering computers as kits. Few persons could ever have predicted the potential of such a range of relatively inexpensive microchip-based products as we understand them today. Some of the significant events to be briefly reviewed in the timeline are:

1. The development of early microprocessor chips: the 8080, the Z80, and the 6502
2. The heyday of single-tasking software
3. The Silicon Valley phenomenon
4. The emergence of significant concepts of computer design and implementation
5. The impact of the shake-out of the computer industry in the early ‘80s.

WHAT ARE THE CURRENT ISSUES?

As the pressure builds within organizations to attempt the forging of productive links among the various levels of mainframe, minicomputer, and microcomputer applications, a wide range of reactions and approaches result. In many cases, the outcomes mirror the tensions commonly found when cultures clash: there is much suspicion between and among advocacy and non-advocacy groups, and resistance to change becomes a major impediment to objective discussion and concrete action. More specifically, some of the user-related issues are:

Misrepresentation of Software and Hardware

The results of a recent poll are typical of those which provide fuel for the arguments of those who resent the intrusion of desktop computers and continue to resist their use in the workplace. The poll of 526 businesses indicated that, in 70 percent of the cases, the software did not work as envisioned. It was claimed by many respondents that appropriate software was either unavailable or hard to find. Many charged that advertisers and vendors misrepresented the software in order to close a sale.

As for hardware: horror stories related to incompatibilities, inadequate warranties and service policies, and poor and negligent installations are countless.

Inappropriate Policies, Planning, and Training Strategies

The initial involvement with stand-alone microcomputer systems with simple applications of word processing, spreadsheets, data bases, and other tools often appears to bring quick gains in productivity. The effect may be deceptive and often leads to the possession of a shallow perspective on productive implementations of the technology. This detracts from serious long-range planning, appropriate policy making, and the establishment of effective training programs. Compared to the effort required to bring about the truly productive implementation of a constantly evolving access to resources and electronic tool-set, the initial commitment to spend money to purchase the technology is usually trivial.

The Data Base Dilemma

Data base management systems (DBMSes) have long been a major part of the mainframe and minicomputer landscape. First came the simple hierarchical models, then made more accessible by networking capabilities. But concurrent with the introduction of the IBM-PC, a marketing strategy regarded as
unthinkable by some mainframe-using traditionalists, came—with IBM's DB2—the introduction of relational data bases. And then, in the opinion of many MIS managers, far too little time had elapsed before the introduction of distributed data base management systems (DDBMSes). The on-going debate is punctuated with concerns for user-access, data integrity and security, management policies, and implementation strategies.

The data base dilemma is further complicated, for some users and managers, by the continuing proliferation of on-line data bases, resources which contrast with the increasingly available laser-read optical storage media (now with 3 standards of CD-ROM) with the potential for a combination of text, audio, graphics, and animation. Any significant impact of artificial intelligence applications has yet to be measured but rumors of new developments, along with some ridiculous claims, abound.

All this, with the greatest advantages of fibreoptics and satellite transmission yet to come! One thing seems certain: the concept of information as a utility has been well-accepted.

The Push for Connectivity and Expandability

Microcomputers have gained their popularity because of low initial cost, portability, and ease of use. But many users soon find that standalone PCs are inadequate for the kind and number of tasks at hand. The dissatisfaction is often fueled by an awareness of the power of file and data sharing, and electronic communication.

With the appetite for the access to more data and increased computing power whetted, many users seek, but find impossible, the use of mainframes and minicomputers: lease or purchase, set-up, management and maintenance costs, are too expensive.

For those who turn to local area networks (LANs), questions of security and access arise. Many find the complexity of networking, especially when troubleshooting, overwhelming. And when a multitude of vendors supply a diversity of components, the excuses offered for non-performance of the network can take the form of endless loops.

So multiuser microcomputers, typically with up to 10 users on a small system, become an alternative. With a multi-processing supermicro, a standard configuration usually includes a "birdcage" for expansion boards, a hard drive, a tape backup, all supervised by a special processor. A strong advantage in acquiring such a system is the confidence in the integrity of the design as a complete operational system.

Many of the PC enhancements—new chipsets, expansion boards and cards will permit the upgrading of existing models. Such add-on and add-in devices allow PC users to preserve the value of their investment of money and time. The brisk sales of laptop computers and the shift to 3½ inch drives seems to indicate that the next generation of PCs will, in spite of being packed with more features, have a smaller "footprint."

SIGNS OF A MATURING INDUSTRY

On the developer/vendor side of the story, much effort is being expended to create products, operating-environments, and vendor/client relationships considerably more professional, reliable, flexible, and cost-effective than those characteristic of the pre-1985 era. The following are current efforts representative of a new level of maturity and commitment in today's computing industry:

The Concern for Compatibility

Considerable activity is currently being devoted to defining more-or-less precise specifications for hardware and software standards across the mainframe-mini-micro range. Some examples:

On the global level

Map (Manufacturing Automation Protocol) is a result of a 1980 General Motors task force recommendation to standardize communications specifications for factory floor operations. Such an action was prompted by GM's need, as an end-user to improve communication among various pieces of factory equipment such as programmable controllers and robots. GM's principal goal was to bring about a standardization of communication protocols among different vendors of equipment thus creating new levels of computer-integrated manufacturing. The original push has now evolved into the establishment of a world-wide user's group comprised of several hundred users and vendors.

TOP (Technical and Office Protocol), from Boeing Computer Services, offers a parallel and compatible set of standards applicable within office environments. Again, there is world-wide interest with participation in a users group by more than 100 companies with major data-processing departments. The goal of the group is to establish and maintain standard protocols related to office automation and resource sharing.

MAP and TOP conform to subsets of specifications contained within OSI (open systems interconnection) standards, a seven layer structure of protocols being defined by the International Standards Organization (ISO). It appears that this comprehensive set of protocols will gain high levels of acceptance thus leading to a guarantee of compatibility for manufacturing and office automation tasks throughout the world.

At the individual corporation level

In the late 1970's, Digital Equipment Corporation (DEC) made the decision (starting at that time) to build a new line of computers that could readily be linked together. The acceptance of the resulting VAX computer architecture has added to DEC's popularity in science and engineering fields and brought—during the mid-80's sales slump—new customers in other fields, including Europe, formerly served by IBM installations. IBM, with its proliferation of aging computer architectures, has been slow to follow DEC's example.

At the operating system level

Since the entry of IBM into the microcomputer market in 1981 with Micro-Soft's MS-DOS at the heart of its IBM-PC,
microcomputers have largely been called “personal computers” and MS-DOS has become the de facto industry standard for 16-bit computers.

UNIX, an operating system originally developed for minicomputers by Bell Laboratories, has been rewritten for use with microcomputers. To this date, Unix cannot be regarded as a major commercial operation system. But considerable effort is being made to provide software which bridges the two operating systems—MS-DOS and Unix. Some experts insist that Unix will become the standard operating system for the 32-bit machines.

Towards Friendlier User Interfaces

In response to criticisms that training costs are too high, operating commands are too cryptic, operating systems are too difficult for the would-be average user to interpret, and, as a result, the transfer of skills from one software application or operating system to another is limited, a considerable amount of effort is being directed toward improving the human interface. The following are some of the devices and features that are now available, at relatively lost cost, for use with many makes of microcomputers:

1. The mouse pointing device for cursor positioning
2. Icons as pictographic representations of important objects and commands
3. Multiple windows that simultaneously display different programs
4. High-resolution graphics with the use of sound and color as a means of motivating the user and providing for clarity of presentation
5. Applications permitting touch screen input, voice recognition and optical character recognition.

HUMAN RESOURCES—THE REAL CHALLENGE

To this point, we have been primarily concerned with technical considerations. But the answers to increased productivity through correct implementation policies and strategies will only come with a parallel consideration of issues related to “people problems”.

Not much experience in a computer-intensive environment is required to bring out the realization that the most challenging problems may not be with the technology itself, but with attempting to change the ways people attempt to use it. Effective computer applications usually require changes in the “pre-computer” approaches to accomplishing specific objectives or tasks. A period of experimentation with the objective application of the technology must be matched by a period of “play” by the individual members of the human resource group who must overcome their anxiety in finding the best approach to making the application work.

A second level of increasing concern is based on some critical issues that have arisen as the implementation of computer technology in the workplace approaches the scale of a mass movement in society. Here is a cross-section:

The Design of Physical Plant Structures

The planning, designing, and construction of “intelligent” buildings and environments to accommodate computer-based technologies will increasingly demand a knowledge of ergonomics, information, communication, security, climate control, and energy systems monitored and controlled by advanced computer systems already in existence. Worldwide, there is a shortage of personnel, from architects to managers, capable of providing services and performing the necessary tasks.

The Location of Computer-intensive Businesses

The shift of the nation’s economy to a service and knowledge base is a major factor in the rapid growth of urban villages—the locating of office space and related amenities in suburban communities. Computerized functions—especially those based upon the telecommunication of data and information—are essential to the operation of such services and yet do not require physical proximity to traditional city cores. Issues related to such rapid demographic change include shortages of qualified clerical, light-assembly, and service personnel, the lack of locally-available appropriate high-density housing, day-care, and transportation services for low-paid workers.

The Redefinition of Social Institutions and Professions

The impact of computerization is touching virtually every profession and occupation in society. Some of the more obvious changes:

Health care

A revolution in healthcare and delivery methods is strongly affecting hospital operation and the deployment of medical personnel. Due to competition for the provision of services there is an increasing need to contain costs while meeting the health-care related needs of a greying population. Fully integrated health-care information networks are under development which eventually will link the patient’s home with doctors’ offices, clinical personnel, hospitals, and sources of medical information and education.

Education

In the face of increasing enrollments and demands for higher educational and professional standards, the education field is confronted with shortages of teachers. An increase in the number of applications of computer-based and computer-assisted instructional delivery systems and a greater use of teacher productivity applications is taking place.

Libraries

The use of on-line data bases and optical storage media, microcomputer-based methods of cataloging, and patron
access to information sources is changing the service and research missions of many libraries.

FINDING PATHWAYS THROUGH THE MAZE

The futurists and trend spotters continue to present arguments and provide evidence that the 1990's will be a time of rapid change and mounting uncertainty in the workplace. What are some key elements in learning to effectively implement and integrate microcomputers within these workplaces of the 1990s? Some vital strategies include:

1. Improving the flow of information throughout an organization. The main operational goals should emphasize achieving an acceptable level of productivity, strong communication within the work group, and the sharing of appropriate information throughout the organization. Effective computer implementation can elevate individual and group productivity, but only if appropriate attention is paid to establishing the most appropriate “people” links between and among each level of operations.

2. Representative participants from every level of operations and personnel clusters should be involved in assessing needs, determining objectives, and establishing procedures and policies. A considerable effort also needs to be made to implement effective assessment and evaluation standards and procedures.

3. The actual short and long-range goals of the computer-using organization must be determined and logically charted out as part of an organizational infrastructure. In most cases, these goals remain relatively constant. In the volatile world of information technology the physical configurations appropriate to achieving those goals often do not. With goals clearly defined, the comparison of ways to achieve them with computer-based technology is much easier.

4. Special attention must be paid to the strengths and weaknesses of individuals within work groups or personnel clusters. Each personnel cluster will have a unique mix of technical, application, and problem-solving skills. Attempting to mandate uniform operational strategies for each group may rob an organization of some of its richest resources: individual and group creativity, team spirit, and constructive competitiveness.

5. The available technologies to be applied to the achievement of specific objectives may also indicate the need to create new work clusters. Adopting the “islands of automation” approach may provide the best building blocks or “springboards” for eventually creating a totally integrated operation. There are some tough decisions to be made here in regard to predictability of performance vs. flexibility of performance.

CONCLUSION

The easy availability of microcomputers has brought the most important technological advance since Gutenberg’s printing press to almost anyone who wishes to use it. Because of the rapidity and vast scope of development of hardware and software, the resulting potential for productive applications is enormous. The challenges of the 1990’s will be to harness this potential for the benefit of organizations while effectively addressing high levels of anxiety and insecurity for personnel because of rapid change in the workplace, and society in general. To be successful will require establishing working environments that place a premium on human capital by encouraging the growth of individual responsibility and productivity and, in embracing computer technology appropriately, provide a sense of individual and group fulfilment and empowerment.