Management Summary

BUTLER COX FOUNDATION

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The Future of the Personal Workstation

Management Summary

This document summarises the main management messages from Foundation Report 63, published in April 1988. The full report is available to members of the Butler Cox Foundation.

Today, most organisations provide computer support for many, if not all, of their office workers. This support usually comprises a computer terminal, or a personal computer, or a specialised technical workstation — all of which are referred to in the report as 'personal workstations'. The investment in workstations and personal computers, together with the costs of software, training, and user support, now represents a substantial proportion of most organisation's expenditure on information technology. Although workstation technology continues to develop rapidly, giving increased performance for less cost, there are still problems to be overcome if the technology is to be applied effectively. The equipment suppliers are trying to address some of the problems, but it will be several years before workstation products provide all the facilities required by office staff. We believe that the gap between what is available and what is needed calls for immediate action by systems departments, who should revise their overall IT policy to take account of the increasing importance of workstations, and should reorganise the way in which they provide support for workstation users.

The distinction between the different kinds of workstation is disappearing

To date, three kinds of workstation have been used to support office workers:

- 'Dumb' terminals linked to remote computers, typically used by clerks to support data capture, or to retrieve information from computer files.
- Standalone personal computers (PCs) or workstations, typically used by managers or planners for processing spreadsheet data, or by secretaries and typists for word processing.

A technical workstation

- Technical workstations, typically used by draughtsmen or engineers for design work.

The technical distinctions between these various kinds of workstation are beginning to disappear. Dumb terminals are being provided with their own processing power so that clerks can process data as well as retrieve and alter it. Standalone PCs are being provided with communications capabilities so they can pass information to and from each other and remote computers. And the performance of PCs is being enhanced by increased processing power and memory, and by higher-definition screens, which means that the more sophisticated PCs can now provide facilities similar to those available with technical workstations.

It is therefore necessary to examine the likely developments in computer terminals, PCs, and technical workstations as a whole. (However, the report does not attempt to consider the future of industry-specific workstations such as banking terminals or supermarket checkout terminals.)

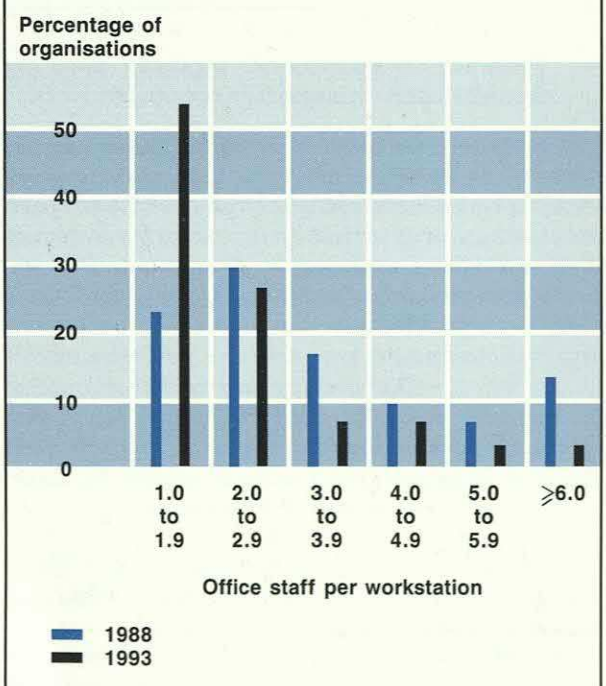
The widespread use of workstations has implications for the business and for the systems department

The widespread use of personal workstations has important implications both for the business and for the systems department. A representative sample of Foundation members now has an average of one workstation per three-and-a-half office workers, and the average penetration is expected to increase to one workstation per two workers in the next five years (see Figure 1). Twenty-three per cent of these organisations already have one workstation for all their office staff; a further 14 per cent expect to do so by 1993.

The high penetrations predicted for 1993 mean that there will be substantial investments in equipment and, more importantly, that there will be significant changes in the way the organisation operates and its staff work. In particular, there will be substantial increases in the time and effort required to train and support workstation users.

The higher penetrations of workstations, and the nature of their usage, will also have important implications for the systems department. Workstations will not be used just as personal systems by end-user computing enthusiasts. Instead, they will become the most usual means of accessing corporate systems and databases. As such, workstations will no longer be an adjunct to the mainstream systems, but will be an integral part of them.

Figure 1 Average penetration of workstations will increase from 1 per 3.5 office staff to 1 per 2 office staff between 1988 and 1993



(Source: Interviews with 38 Foundation members)

The most significant workstation problem is ease-of-use

Our research has shown that workstation users, in the main, have modest needs — but that they do want to be able to use their workstations to access data held anywhere in the organisation's computer systems.

To put it simply, workstation users wish to be able to use data held on any relevant system (internal or external), but especially mainframe systems, in as easy and as inexpensive a manner as possible. In particular, they want to be able to use the workstation in precisely the same manner, regardless of the type or make of computer (and its software) to which their workstation happens to be connected.

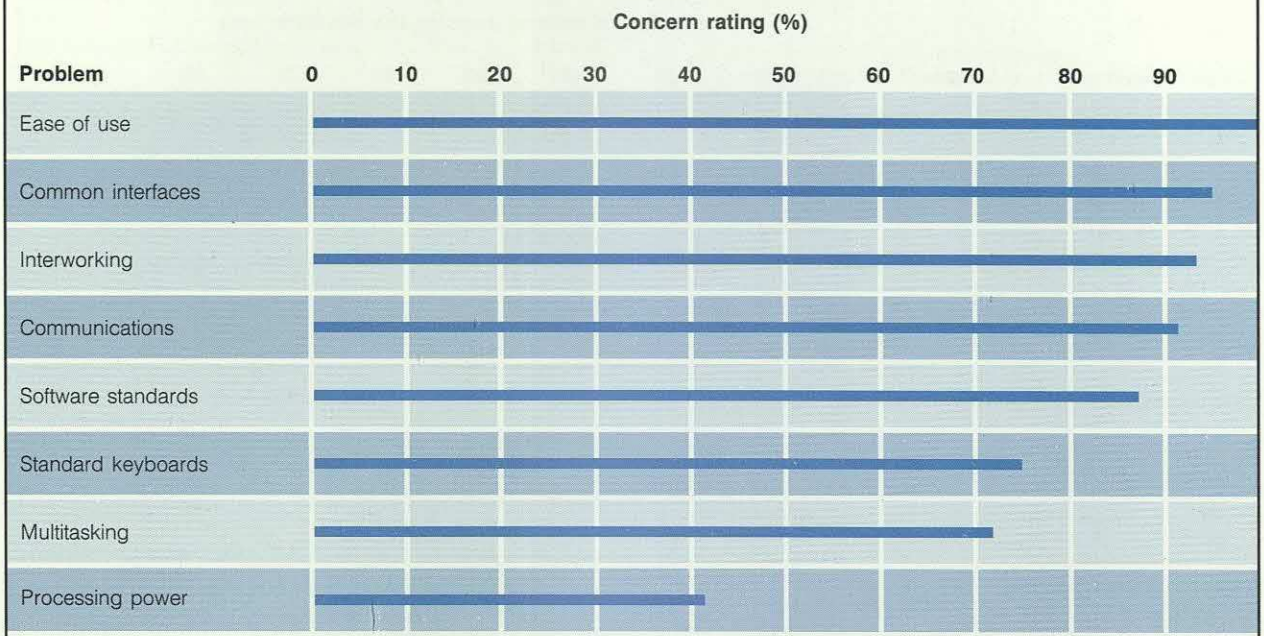
Today, workstation users are prevented from doing this by difficulties arising from a lack of standard interfaces, a lack of software and keyboard standards, *and* from problems with interworking and communications (see Figure 2). If these ease-of-use problems are considered in conjunction with our finding that, by 1993, there will be a major trend to using networked intelligent workstations, an alarming prospect emerges. Unless major progress is made on defining and using common standards, the resulting confusion of emulators, code convertors, and 'black-magic software' needed to overcome the lack of standards suggests that it is even less likely that workstation users' needs will be met.

Users are also concerned about the confusion of workstation products, the changes to operating systems and standards, and suppliers merging and going out of business. They are even more concerned about the lack of enthusiasm and support from their own systems departments. The signs are that the suppliers will make progress in solving the ease-of-use problems but that systems departments have not yet recognised the need for them to make some radical changes in their approaches and attitudes to supporting workstation users.

Most systems departments have paid insufficient attention to workstation users' needs

Unfortunately, workstation users' problems are aggravated because many systems departments

Figure 2 The most important user concern is ease of use. It is also the underlying cause of many of the other concerns



Interviewees were asked to rate their concern about each of the problems as high, medium, low, or no concern. A concern rating of 100% means that all of them rated their concern as high; a concern rating of 0% means that they all rated the problem as being of no concern.

have not paid sufficient attention to workstation users and their needs:

- Where technical policies exist, they tend to concentrate on products and suppliers — restricting the users' choice without considering the users' requirements or the underlying architecture or standards issues. (Figure 3 overleaf shows the content of typical technical policies for workstations.)
- Most technical policies do not cover workstation programming languages and backup and recovery procedures, partly because of a belief that workstations are personal tools, and that users should therefore be responsible for setting up their own procedures, and partly from a belief by systems staff that the new development tools used with workstations (particularly PCs) are not suitable for developing 'real' systems.
- Where a workstation support unit (sometimes called the information centre) exists, it tends to offer tactical (equipment selection) and operational (help-desk) support rather than strategic support. (Typical activities carried out by workstation support units are shown in Figure 4.)
- Most workstation support units are regarded by other systems staff as not being part of the systems department's mainstream activities. Such units deal with workstations and workstations only — using methods, techniques, and tools different from those used by other systems staff. The fact that a separate unit has been set up is often seen as an admission that traditional development and support approaches were inadequate.
- The typical workstation support unit is often staffed by technical 'mechanics' who are very capable in terms of installing equipment and in understanding the latest technical intricacies. They are, however, unlikely to be concerned about whether an application is actually suitable for a workstation.

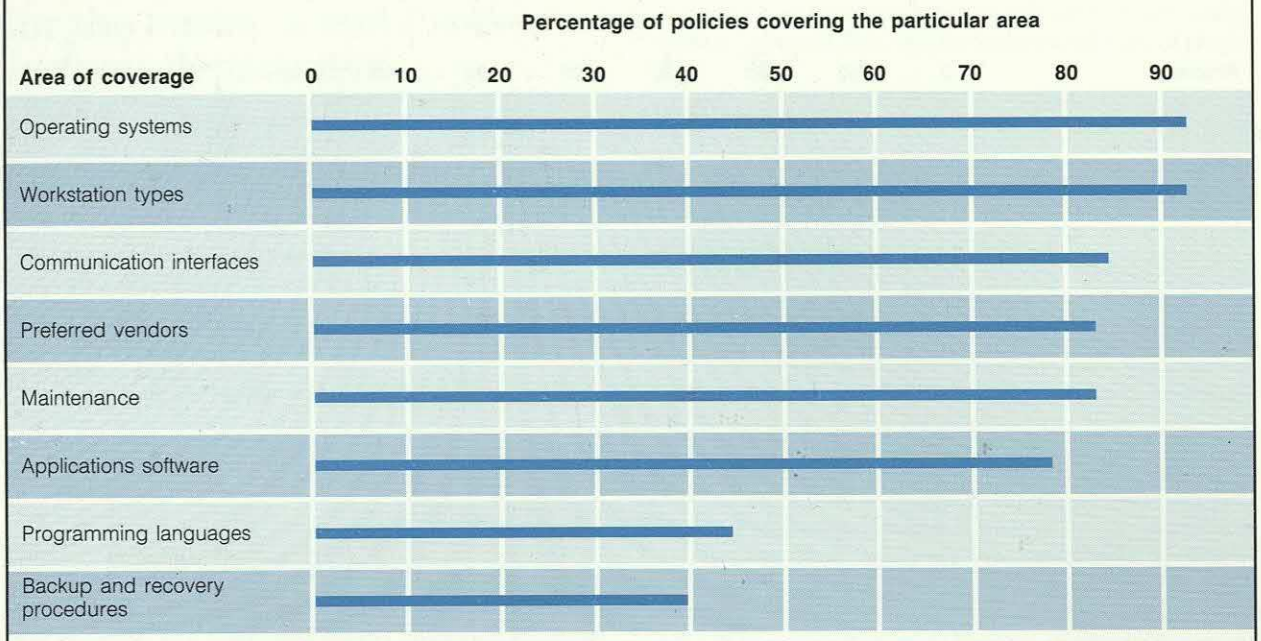
Thus, workstation support unit staff are not involved in formulating the organisation's overall information technology plans. The systems department has carefully isolated these staff (sometimes quite literally) from what it regards as the organisation's *real* computing interests.

So what is the task that will face the systems department over the next five years? How will personal workstations evolve and how will workstation suppliers respond to the ease-of-use problems?

By 1993, the majority of workstations will be intelligent and networked

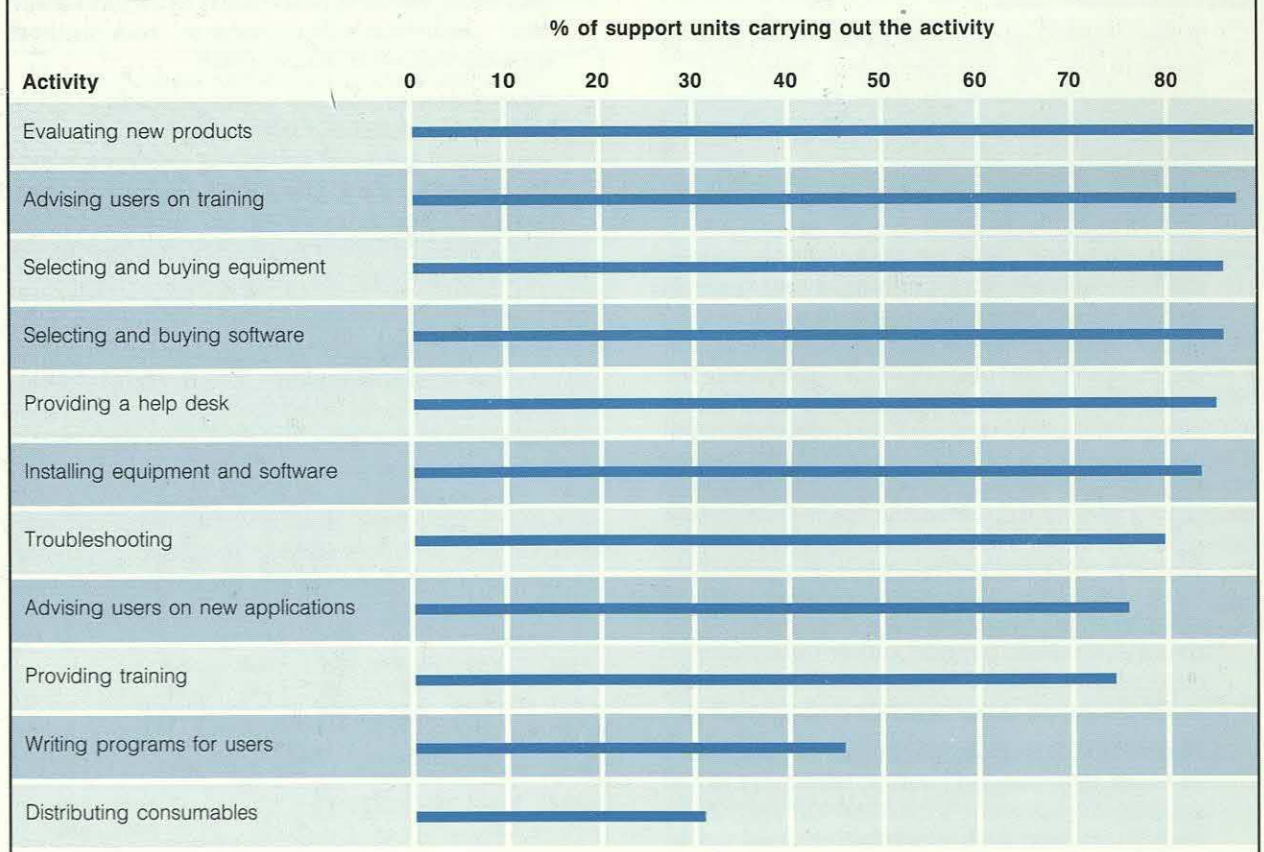
Figure 5 (on page 5) shows that, today, nearly 70 per cent of all personal workstations in the

Figure 3 Content of technical policies for workstations



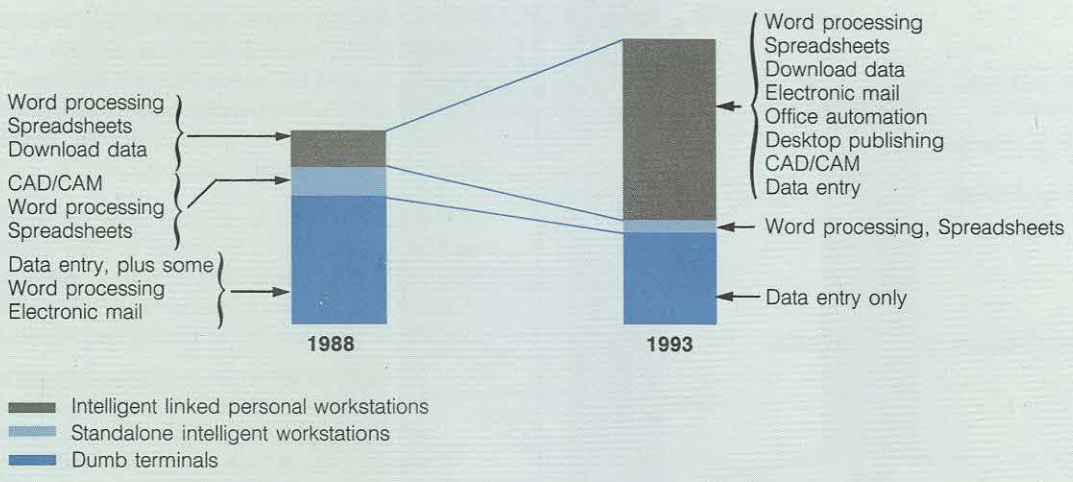
In our survey, 88 per cent of organisations had a technical policy for workstations

Figure 4 Activities carried out by workstation support units



In our survey, 90 per cent of the organisations had a workstation support unit

Figure 5 Linked intelligent personal workstations will become the multifunction device



(Source: Interviews with 38 Foundation members)

organisations we contacted during our research are dumb terminals used for data-entry purposes. However, the situation is changing rapidly, and by 1993 the vast majority of workstations will be intelligent and will be linked — either to other workstations or to the organisation's mainstream systems and databases, or a mixture of both. Dumb terminals will not disappear altogether — in data-entry departments, especially in banks and insurance companies, the dumb terminal will continue to be the most economic device.

Moreover, the number of applications for which individual office workers use their workstations is expected to increase. In five years' time, personal workstations will no longer be devoted to just one or two applications but will be used to support several of the tasks each office worker performs (see Figure 6 overleaf). Hence, the distinctions between the various kinds of workstation and between their applications are becoming less significant. By 1993, the majority of workstation users will expect to perform up to six different functions on each workstation. Word processing, spreadsheet calculation, and downloading data for local processing will predominate — but there will be significant growth in using existing workstations for additional applications such as electronic mail and other office automation tasks. A further additional function — desktop publishing — will become important, especially in conjunction with computer-aided design and manufacturing applications.

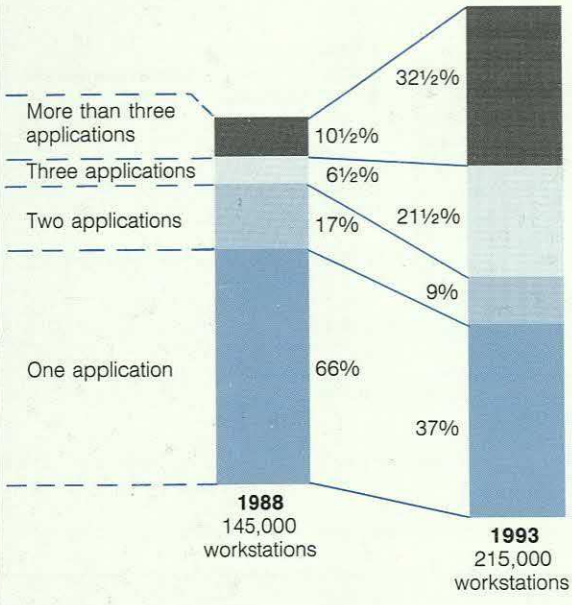
Ease-of-use problems will be resolved

Our discussions with the most influential suppliers suggest that they will address many of the ease-of-use concerns in time for the move to linked intelligent multifunctional devices. Perhaps the most significant announcement in 1987 was SAA — systems application architecture — which defines a wide range of standards going well beyond anything seen before. SAA was, of course, announced by IBM, but it will be available to all suppliers. We believe that SAA reflects the recognition by suppliers of the need to make workstations an integral part of corporate systems. One element of SAA concerns the user interface, and defines standards for presenting information on a display screen and for interfacing with it. (The SAA user-interface standards are similar to the display standards used on the Apple Macintosh.) Other elements are concerned with programming standards and communications standards. At present, however, SAA is little more than a concept, and it remains to be seen how far the implementation of SAA will go to achieving equipment and software independence. Nevertheless, SAA is important because, if nothing else, it has focused all suppliers' attention on ease-of-use issues, and we predict that there will be similar initiatives from other suppliers as a consequence.

Some of the SAA concepts are being implemented in Microsoft's OS/2 workstation operating system (which will be available to all suppliers) and in IBM's proprietary version — OS/2EE (extended edition). We believe that, eventually, OS/2 will become the dominant workstation operating system — but not until the mid 1990s. In the meantime, the leading independent software suppliers have announced their commitment to OS/2 and are preparing to write OS/2 applications.

Ease-of-use will also be improved because the basic workstation will contain many more built-in functions, removing much of the need to customise

Figure 6 Individual workstations will be used for an increasing number of applications



(Source: Butler Cox survey)

workstations with add-on boards, and simplifying their installation and support. Also, because workstations will operate in a networked environment, they will no longer need their own disc drives. Data will be stored and accessed via file servers. The basic workstation of the future will therefore be a much simpler device than today's, and could cost as little as $200 by 1993. When support costs and shared network-resource costs are taken into account, we predict that, in 1993, the total cost of a workstation will be about a third less in real terms than the total cost today. However, a higher proportion of the costs will be support-related.

By combining the users' requirements for easy-to-use multifunctional workstations with the likely developments in workstation technology and hardware, we can predict the characteristics of the personal workstation of the future.

The future workstation will be an integral component of corporate information-processing systems

By the beginning of 1993 we foresee the emergence of a two-tier computing environment (which is depicted in Figure 7), consisting just of mainframes and interlinked intelligent workstations. The workstations will be connected to a local area network and thence to file servers, print servers, and communication servers. Often, workstations will perform the functions carried out by today's departmental minicomputers. Most of an organisation's computer processing will be performed by such workstations, except for mainstream batch and transaction-processing applications and database maintenance functions, which will continue to require mainframe systems with dumb terminals. Furthermore, workstations and mainframes will be interlinked in a way that permits application-to-application communications.

However, the ability of personal workstations to act as the primary entry point to the organisation's information-processing systems depends on the quality of service and support provided both by the suppliers and by the systems department:

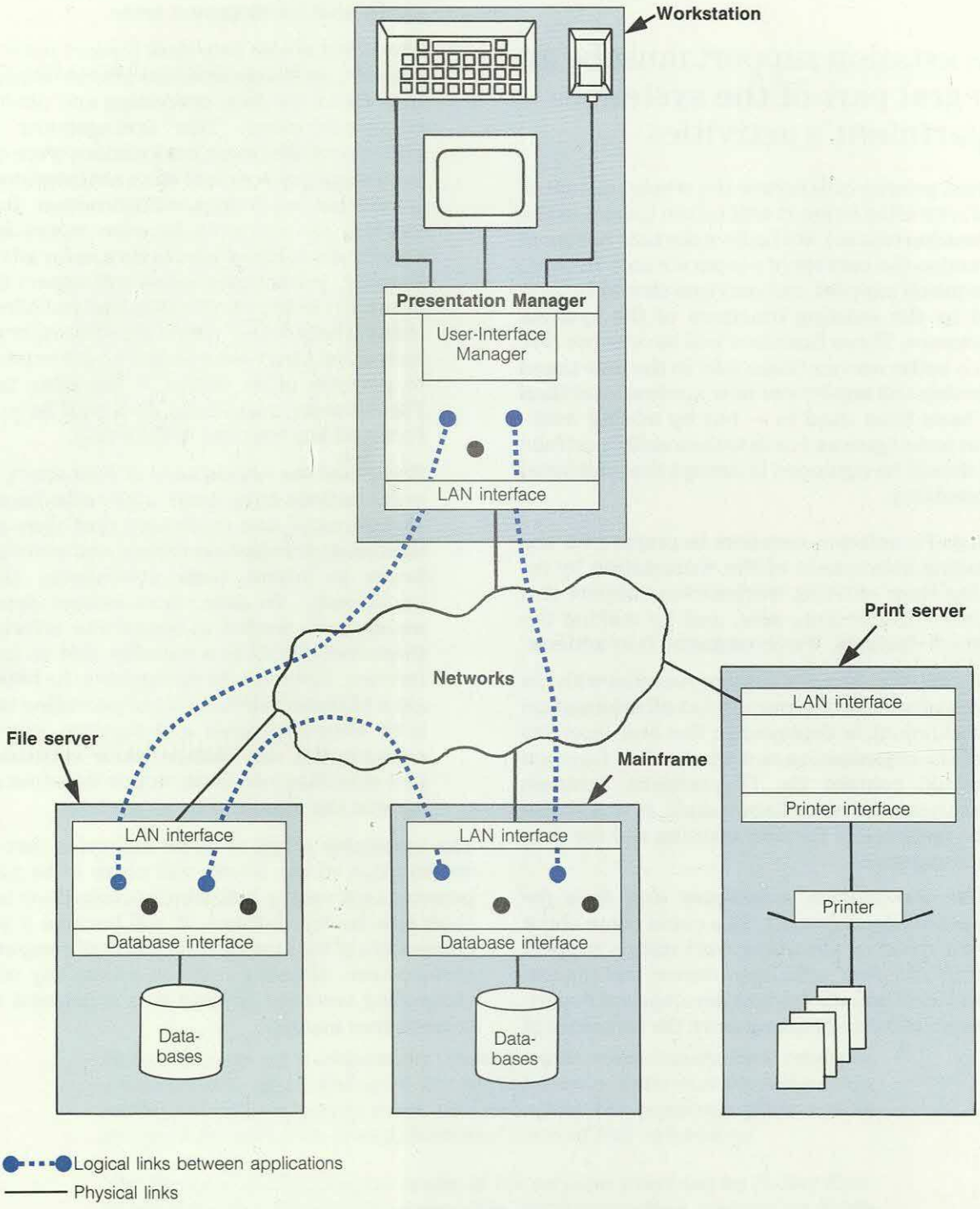
- The suppliers role is to provide products that allow transparent and simple access to all parts of the information-processing network. The extent to which suppliers fail to meet this responsibility will determine the level of user support required from the systems department.
- The systems department's role is to determine how best to incorporate personal workstations in the overall systems architecture, and to provide the appropriate policies and user support to ensure the chosen approach is successful.

Systems departments must recognise the importance of personal workstations and adopt plans for standards, policies, and training

Success will depend on the systems department's ability to recognise the importance of personal workstations, to take account of their implications in all its planning activities, and to make up for the suppliers' inevitable shortcomings. We believe that Foundation members need to plan now for:

- The adoption of industry-wide standards for the user interface, for system development (so that hardware-independent applications can be written and so that application-to-application interworking can be achieved), and for networking.
- A possible change in workstation operating-system policy, and preparation for the implications of the policy. In particular, a positive decision should be made about whether (and when) to move to the OS/2 workstation operating system.
- The development of internal standards for data management, security, and integrity purposes, and for the use of the network.

Figure 7 Future systems architecture



— The provision of professional support to underpin the planning and the standards, to resolve the problems that arise when departures from the standards occur, and to help users exploit fully the workstation facilities available to them.

— The development of a comprehensive training programme covering the many areas of change. Different training courses will be required for the user community and for systems staff.

The increased importance of the personal workstation means that the systems department will have a much greater responsibility for managing the way in which workstations are used throughout the organisation. Unfortunately, our research

suggests that most systems departments are ill-equipped to take on the expanded responsibility. In particular, they must rethink the way in which support for workstation users is provided.

Workstation support must be an integral part of the systems department's activities

The first priority is to review the whole concept of the workstation support unit (often known as the information centre). We believe the time has come to abandon the concept of a separate unit. Instead, workstation support and services should be provided by the existing functions of the systems department. These functions will have to provide a much better service (especially in the time taken to develop and implement new applications) than they have been used to — but by adding workstation techniques and tools to their skills' portfolio they should be equipped to accept the additional responsibility.

We urge Foundation members to prepare for the increasing importance of the workstation by reviewing their existing workstation support and services arrangements *now*, and by making the necessary changes. We recommend four actions:

- *Establish a business support function* with the responsibility of ensuring that *all* information technology is deployed in the best interests of the organisation as a whole. This function would contain the IT planners, business analysts, and user-liaison staff. It would also be responsible for user training and for data management.
- *Use workstation techniques and tools for systems development.* This could come about as a result of absorbing workstation support staff and their skills, experience, techniques, and tools into the systems development department, and thus breaking down the resistance of traditional development staff to using the advanced tools pioneered by workstation users. In this way, advanced system building tools will begin to have an impact on the traditional development areas.
- *Provide a single help-desk contact point.* At present, most organisations provide separate help desks for data processing and personal computer users. This arrangement was adequate whilst most workstations were used for a single purpose and were not interlinked. It will not work in a multifunction, interworked environment because workstation users will not know who to turn to for advice. Equally, workstation users will expect (and deserve) a better service than that provided by today's help desks, which are often operated by staff on a part-time basis who are expected to perform other duties at the same time. Furthermore, many help-desk staff have not received any training in their role.
- *Recognise the importance of lead users.* All organisations have some users who become so interested and motivated that they gain significant practical experience and eventually begin to advise their colleagues, albeit unofficially. To date, most system departments have tended to regard the efforts of these individuals as a nuisance and an interference. However, by recognising the importance of these individuals and providing them with encouragement and support, systems departments can channel their enthusiasm and expertise into constructive uses that will benefit the organisation as a whole.

The inevitable result of these actions is that the workstation of the future will cease to be just a personal tool used by individuals to help them to do their jobs better. Instead, it will become a vital component of the organisation's overall computing architecture, allowing users to access any other computing resource or data in a consistent and trouble-free manner.

Butler Cox is an independent management consultancy and research organisation, specialising in the application of information technology within commerce, government, and industry. The company offers a wide range of services both to suppliers and users of this technology.

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The Foundation publishes six Research Reports each year together with a series of special Position Papers. The programme of activities includes a wide range of meetings that provide Foundation members with a regular opportunity to exchange experiences and views with their counterparts in other large organisations.

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