Open Systems

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A Paper by Simon Forge
July 1990

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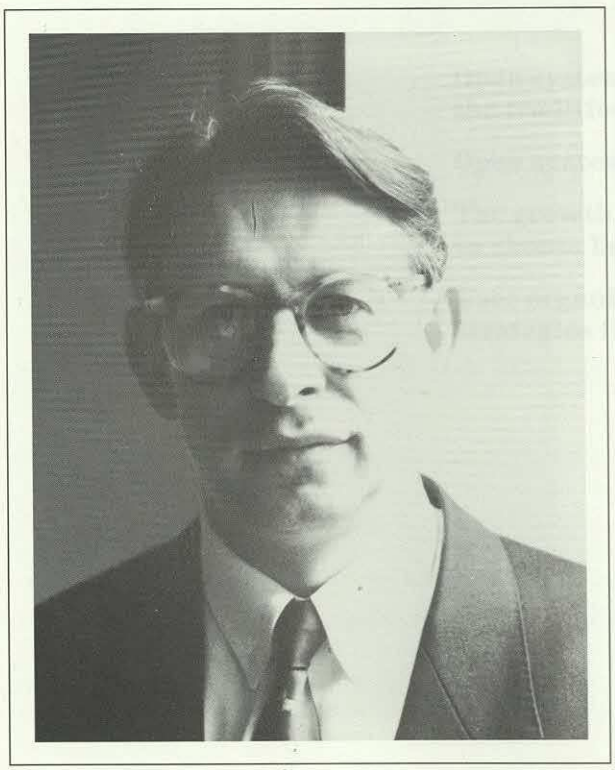
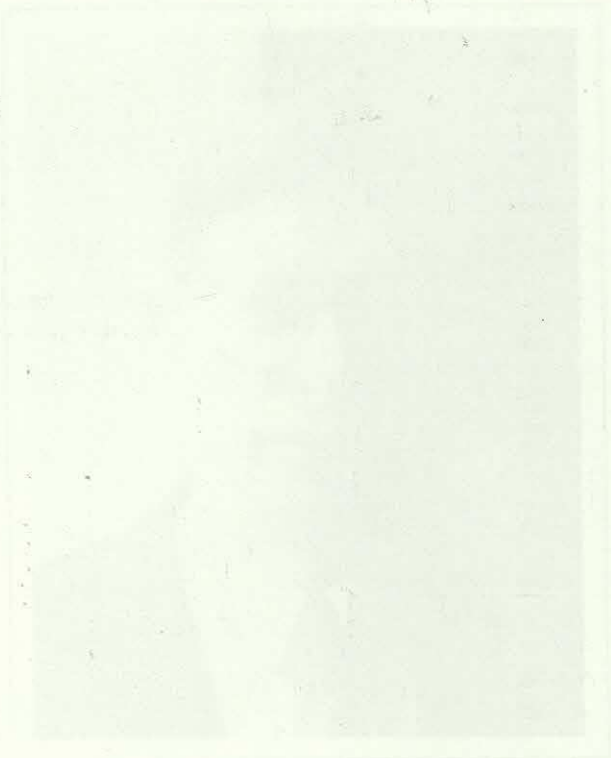


Simon Forge is a principal consultant with Butler Cox in Paris. In this capacity, he has consulted for a wide range of users and vendors on open systems and standards issues, in the areas of office systems, networking, and general computing. In particular, he has examined the concerns of potential users of open systems from the point of view of migration, and the concerns of vendors from the point of view of market positioning and perception. Prior to joining Butler Cox, he worked as an independent consultant and for several consultancy groups and software houses.

Rapid changes are occurring in the computer systems market, for both products and services. These changes, stemming from the strongly proprietary nature of computing up till now, will bring new choices and new freedom for users, and major challenges for the established vendors. In this paper, Simon Forge argues that a new form of IT market is emerging, with a different structure and different rules. Users' views of their vendors, and their relations with them, are likely to be slowly but radically changed for the first time in 30 years.



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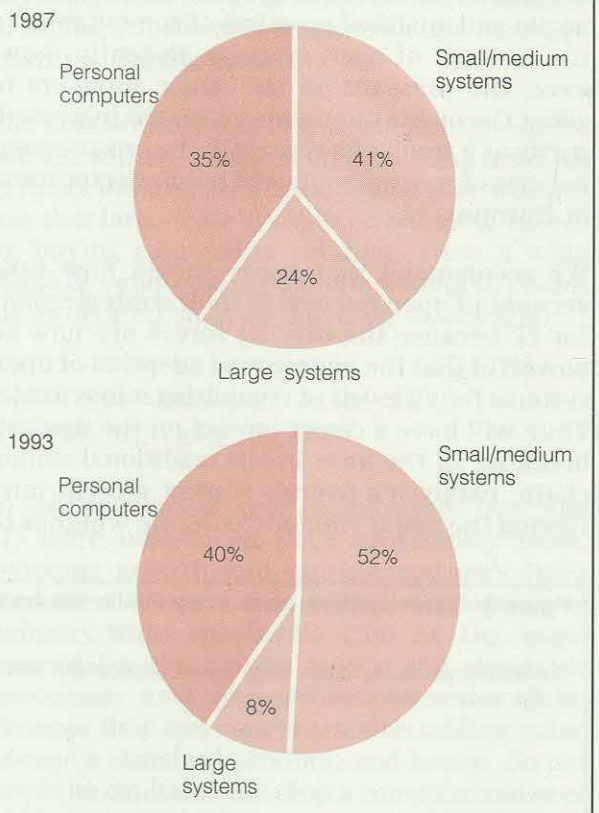
The early growth of the commercial computer market was dominated by a small number of large suppliers, each of whom designed systems to his own standards. The lack of compatibility between suppliers presented few problems for user organisations, because there was little need to connect computer systems, and rarely a requirement to modify software to run on another supplier's machine. Today, this is no longer the case. User organisations increasingly need to choose hardware and software from a mix of suppliers and be confident that they will work together. The response has been the development of open systems.

The concept of open systems applies to all levels of computing, from mainframes to personal computers, although the development of open systems is more advanced in the latter than the former. In this paper, the term implies the use of agreed standards (often software standards) that have come into common use. The standards are a pragmatic mix of public non-proprietary standards and industry-wide *de facto* standards, such as MS/DOS and Unix.

That there now exists a real discussion about open systems is due primarily to the emergence of the MS/DOS personal computer. As Figure 1 shows, personal computers (and more recently, workstations) account for a substantial and increasing proportion of the total systems market. Within five years of its formation, the PC market had adopted industry-wide standards — albeit on the basis of hardware suppliers being granted a licence to use MS/DOS, rather than on free access to standards. The motivation for this standardisation was that many of the entrepreneurial companies that entered the market simply could not afford to write their own applications software. By licensing the industry-wide standard operating systems (first CP/M and later MS/DOS), equipment manufacturers could gain access to a large range of software packages written by independent suppliers.

Figure 1 PCs account for a large and growing proportion of the value of the systems market



(Source: IDC, MIR, and The Financial Times)

The benefits of standardisation to the user are indisputable. To a large extent, PC users can now select the hardware that offers the best value or performance and the software packages that best suit their requirements, and

they may expect them to be compatible. If changing requirements dictate a change in hardware or software, the rest of the investment does not have to be discarded. Furthermore, it is relatively straightforward for a PC user to exchange software and data with users of other small systems.

Not surprisingly, users of minicomputers and mainframes are now starting to pressurise their suppliers into providing them with the same freedom of choice. This has resulted in much activity, but little substantive change. Major suppliers of all types of computer systems have formed groups or clubs, such as the Open Software Foundation or X/Open, and are making vague and qualified promises of commitment to the concept of open systems. Recently, however, the pressure on the major suppliers to adopt the open systems approach has increased, partly as a result of a change in the procurement policies of governments and public-sector users in Europe.

We recommend that users should now take account of open systems in their strategic plans for IT because the driving forces are now so powerful that the widespread adoption of open systems for all levels of computing is inevitable. They will have a direct impact on the market, breaking all the links in the traditional selling chain, catalysing overall market growth, and forcing the major vendors to decide whether to base their product strategy on open or proprietary systems, or both.

Open systems will break every link in the traditional selling chain

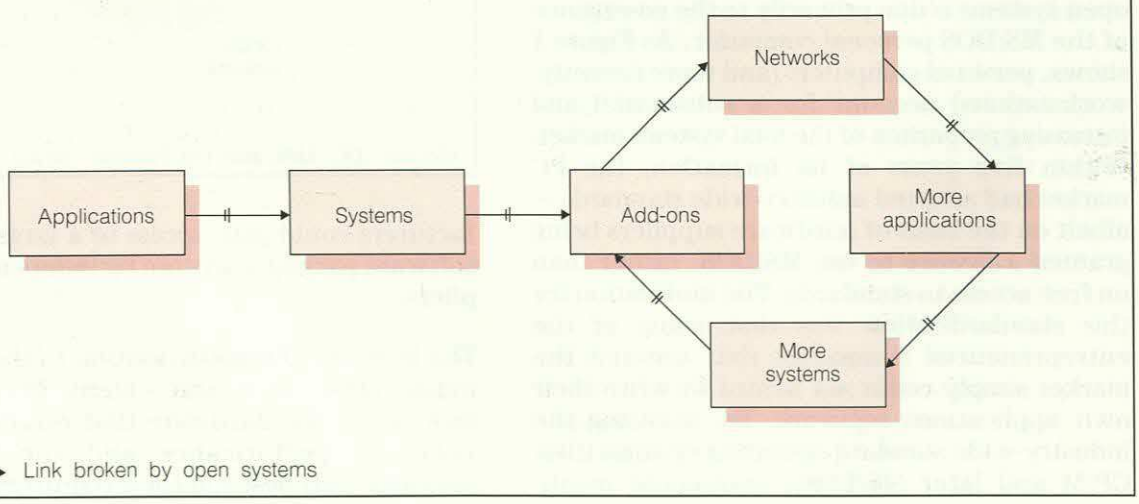
In selecting new systems, different users start from different points. Some start from the application and move on to the selection of systems software; others start by specifying particular computing and network architectures and move on to the selection of hardware. Irrespective of the starting point, however, all subsequent choices in the traditional market are severely constrained by issues of compatibility. Major vendors have exploited this selling 'chain' to the full.

Open systems will break every link in this traditional selling chain, as illustrated in Figure 2. By providing compatibility between different vendors' products of the same kind (for example, processors or databases), and between different elements in a system (for example, between network architectures and operating systems), choosing a particular supplier at one point in the chain will no longer constrain the choice of supplier at the next point.

The effect of this will be to break the market into relatively independent segments — hardware, systems software, networks, applications,

Figure 2 Open systems break every link in the traditional selling chain

The traditional selling chain begins with applications and leads to the user organisation's being locked in to the product of the supplier first chosen.



maintenance, training, and so forth. There are precedents for this type of market segmentation: in the early days of electric lighting, vertical integration was mandatory — each vendor had to generate electricity, provide and maintain a transmission network, install customer wiring, manufacture and distribute light bulbs. Only when agreement was reached on everything from transmission voltages to bulb holders could vendors specialise. The PC market became segmented at an early stage into two main segments — hardware suppliers and software suppliers. Although there is much exchange of information between the suppliers in each segment, neither type of supplier can be said to have control over the other.

Within each segment, the market will become increasingly 'commoditised' — that is, suppliers will produce and sell standard products in large quantities. This will increase competition and reduce prices to the user, and the changing economics of the market will favour the use of intermediaries (such as local computer dealers) in preference to direct selling.

In a commodity market, vendors must find new ways of differentiating their products. In theory, the vendor with the best price/performance ratio will win, but not surprisingly, many vendors are reluctant to compete on this basis. They have three main ways of differentiating their products:

- *Features:* Even within comprehensive standards, there is plenty of scope for adding extra features such as mini-knowledge-bases, 'biometric' security devices, advanced ergonomics, or environmental friendliness.

- *Service:* Providing comprehensive and high-quality service, and being perceived as a long-term player in the marketplace, will become increasingly important distinguishing factors. This explains how IBM managed to retain a significant share of the PC market despite its products being more expensive and technically less advanced than its competitors'. In the future, the main source of service will be local distributors. Vendors will be differentiated by the way in which they organise their distribution channels — the quality of service provided will be of paramount importance.

- *Industry specialisation:* Many smaller vendors, however, will choose to concentrate much of their effort on a single vertical market, as ICL has with retailing and Nixdorf has tried with banking. Vendors gain from this approach by developing intimate knowledge of the needs and requirements of the market. They are able to concentrate not only their sales efforts, but also their research and development, and in the long run, this benefits users.

Alternatively, existing vendors may seek new ways of generating revenue by offering new types of products and services. This may mean anything from running value-added networks, to selling information and knowledge bases, to facilities management.

The commoditisation and segmentation of the market will also result in an increasing need for systems integrators — companies that will put together large-scale systems on behalf of clients by buying commodity products from a wide range of vendors and combining them to create an integrated solution for their customers.

Open systems will catalyse overall market growth

In the past, most new technologies (not just IT) were introduced on a proprietary basis. Dynamic growth and market maturity have traditionally come only with the adoption of industry-wide standards. One of the main reasons for the growth is that the standards encourage new players to enter the field, because they can concentrate on adding value around a standard product, and hence, do not need the capital to develop a complete range of new products. In the systems market, this can be both good and bad news for users, however.

The good news comes in the form of innovation: entrepreneurial companies not only tend to have good ideas, but can develop and launch them in a very short time, whereas a major systems vendor can take anything from two to four years to introduce a new product. The bad news is lack of reliability, both in terms of the product and the vendor. Large vendors are able to spend more on product testing before launch — to some extent, they need to do so in order

to avoid risking their reputations. Moreover, large, established vendors are more likely to be supporting their product in five years' time than an entrepreneurial start-up. (It must be said, however, that the pressure of open systems on traditional vendors is causing even this conventional wisdom to be challenged.)

More players means more competition. This, in turn, means lower prices and a wider range of products. Both will fuel market growth, although for the next few years, the growth will be seen more in terms of volume than profits.

Japanese suppliers will become the main new players in the market, attracted by open systems. Although the argument that the Japanese are merely good copiers rather than innovators is seriously out of date, there is no denying that they thrive on commodity markets, especially commodity markets for electronic goods. Open systems will not only generate a unified market large enough to warrant Japanese attention, but they will solve, at a stroke, the problem that Japanese companies have traditionally had of developing quality software. The Japanese will not need to develop software for the open systems market. Instead, they can purchase it from the worldwide community of open systems software suppliers. The role of the Far Eastern suppliers in the developing open systems market in Europe is discussed further in Figure 3.

There is an interesting footnote to this argument. Several times in the past, Japanese multinational corporations have announced 'industry-wide standards' in the hope that this would encourage Western suppliers to make the software for them, but without success. Examples include various audio tape standards, and the MSX home computer standard. They have realised that this approach does not work. Now, they intend either to capitalise on the *de facto* standards already established in Western markets, or to attempt to create new *de facto* standards by forming strategic partnerships, such as Sony is doing with Microsoft and Philips, in the area of CD-ROMs.

In addition, Fujitsu, Hitachi, NEC, Toshiba, and other major Japanese systems manufacturers are forming their own open systems clubs, to which Western manufacturers are finding it difficult to gain membership. Moreover, behind every European vendor of large systems, there is a Japanese 'shadow' in the form of a trading partner or joint venture. ICL and Fujitsu, Bull and NEC, and Comparex and Hitachi are typical examples.

The overall market growth that open systems will catalyse can already be seen. Growth in the value of the worldwide market for open systems products (principally Unix systems at the moment) has been estimated at 25 per cent a year, compared with an industry average of 15 per cent a year (see Figure 4). A more recent survey (reported in the Financial Times on 5 April 1990) indicates that sales of Unix-based systems are now double those of proprietary systems.

The next few years will see the open systems concept encroaching on an increasing proportion of the total systems market, and we can expect to see higher growth rates in each new area as it develops. For many years, most of the talk concerned Open Systems Interconnection (OSI) — the International Standards Organisation's initiative that has resulted in a model for data communications based on public standards. The major vendors were very keen to promote this concept, but did not extend their enthusiasm to open standards for network management, operating systems, applications

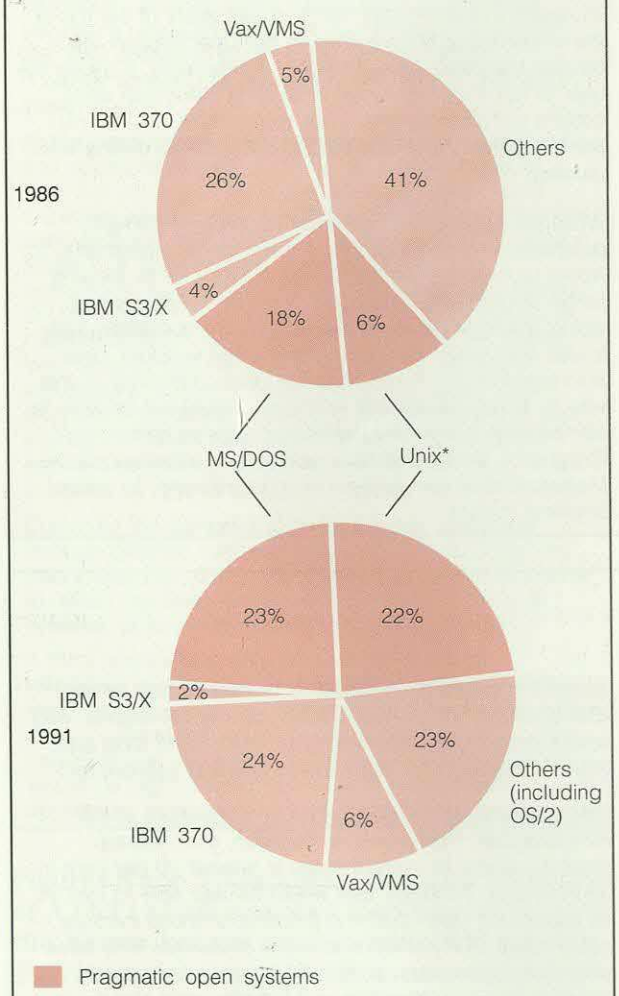
Figure 3 Far Eastern suppliers will see open systems as an opportunity to enter the European marketplace

Currently, Japanese involvement in the European market has been mostly at a component level: Fujitsu processors are to be found in ICL's top-of-the-range systems, and NEC processors are at the heart of the Bull 8000 and 9000 mainframes. Increasingly, however, Japanese companies will be seeking to supply complete systems for re-badging. In this context, open systems (and Unix in particular) represent an opportunity to expand their presence in Western marketplaces, particularly Europe.

As open systems drive the market increasingly towards plug-and-play units, the Japanese will be able to apply their considerable volume-manufacturing skills. Here, their advantage will show, not only in terms of price and quality, but in terms of technology features too.

The newly industrialised countries, such as Korea, will also see open systems as a chance to sell 'Unix boxes', especially 386- and 486-based Unix workstations. These will be commodity-like hardware designed to run standard software applications written by the growing Unix software industry.

Figure 4 The market for open systems is growing rapidly



* 50 per cent of public-sector users and 23 per cent of private-sector users are planning Unix applications, according to a Computer Weekly survey of 286 IT managers in September 1989.

(Source: IDC, 1988)

environments, user interfaces, and so on. Now, standards are being discussed and developed for each of these areas, and more. The excessive degree of choice inherent in the OSI standard is being eliminated by such moves as the Gosip (Government OSI profile) initiatives — the US and UK government standards for OSI procurement. Equivalent moves are expected to occur outside the government sector.

The growth of open systems will force major vendors to choose between 'leader' and 'follower' strategies

Until recently, it appeared that the major vendors would have the choice of embracing open systems or remaining fully proprietary. It was acknowledged that those who remained fully proprietary would lose market share, but would probably be able to defend certain sectors and niches almost indefinitely. That view has all but disappeared. Every major vendor has been forced into adopting the open systems approach at some level. Apple, for example, has traditionally had a strictly proprietary strategy. The announcement of its A/UX Unix system is, however, an unequivocal move towards open systems (see Figure 5, overleaf). Two quite distinct strategies can generally be discerned, and these may broadly be categorised as the 'leader' and 'follower' strategies.

The leader strategy implies whole-hearted support for open systems, but is by no means a recipe for success. It is a high-risk and high-reward strategy and is the one chosen by most of the new players, but also by some of the traditional players such as NCR and (to a certain extent) Unisys. After an initial spurt of growth in the market for open systems, there will be a major shakeout, as happened in the PC industry in the second half of the 1980s. The success, and indeed, survival of a company with a leader strategy will depend upon two things — product differentiation, and very solid financial management.

The conservative, or follower, strategy is the one chosen by more of the larger players. There are two variants: the semi-open strategy (arguably IBM's approach, described overleaf in Figure 6), and the twin-tower strategy, of which a prime example is Digital (see Figure 7 on page 7).

The semi-open strategy entails defining proprietary standards that embody all the principles of open standards, without being fully compatible with anybody else's. From the vendor's viewpoint, the prime benefit of the approach is that, in the short term, it appeases the demands of many users. In the longer term, users will learn the difference between a semi-open and a fully-open standard the hard way.

Figure 5 Apple's announcement of its A/UX version of Unix signals a move towards open systems

In the past, Apple has had a pragmatic attitude to open standards. Whenever it was advantageous to do so, it has followed the proprietary standards route — for example, by not licensing the Macintosh operating system and graphics-support software. On the other hand, where standards were required to help establish a new market, Apple in effect created industry-wide standards. For example, it made Postscript (the laser-printing control language) an industry standard through its previous association with Adobe, and so promoted the desktop publishing market.

However, Apple now recognises the advantages of a more open approach. Apple, for example, could benefit from a Macintosh 'clone', which would help to establish Macintosh technology in the corporate marketplace where the lack of a second source can be a disadvantage. A clone would also provide an impetus for the third-party software market to create even more Macintosh applications.

More specifically, Apple's recent announcement of its A/UX version of Unix is an unequivocal move towards open systems, and potentially one of the most interesting strategies in the industry. A/UX allows users of the top-of-the-range Apple Macintoshes to run Unix through the familiar Macintosh user interface. Furthermore, it allows the user to run the wide range of existing Macintosh applications concurrently with Unix applications, and to link them together via simple techniques such as cutting and pasting.

While the adoption of Unix may be seen as primarily defensive for many vendors, it could be an opportunity for Apple to increase the market significantly for its existing range of products. This could result from Apple's providing a bridge between the wide range of existing easy-to-use Macintosh applications and other vendors' Unix environments. By introducing the Unix community in this way to its advanced user interfaces, Apple will be able to demonstrate the benefits of its own style of computing. Experience shows that once users have experienced the Macintosh style of interface, they are reluctant to accept anything inferior.

Figure 6 IBM has adopted a semi-open strategy

Through its dominant market position in many areas, IBM has been able to set industry standards for others to follow. The PC is a case in point. However, IBM and its customers have suffered from an excess of alternative standards, so its latest standards initiative, Systems Application Architecture (SAA), can be seen as an attempt to put its own house in order. While there may be some truth in this view, the growing importance of open systems is forcing IBM to consider what external standards should be included under the SAA umbrella. The recent announcement of direct support for OSI network-management protocols illustrates the trend.

To date, IBM's stance on public standards included in the OSI framework has been to position them as a gateway into the IBM world of proprietary standards, rather than as the fundamental basis for IBM's mainstream products. We refer to this as a semi-open strategy for open systems. However, this attitude is now changing. For example, IBM is now providing Unix products. Its main hope must be that other suppliers will adopt its version, AIX. If this is successful, IBM will improve its market share in the areas where it is weakest. In the world of mainframes, where IBM accounts for perhaps 70 per cent of the market, and where proprietary standards were established long ago, IBM's enthusiasm for open systems is less pronounced.

IBM's main drive for open systems is therefore in the minicomputer, high-power workstation, and desktop markets, where its current share is around 20 per cent in each market. Although IBM would be less able to lock in its customers, open systems products in these markets could make IBM attractive to many customers who have previously been wary, so that SAA may progressively move to incorporate public and industry-wide standards.

The transition towards open systems will be particularly difficult for IBM, not only because of its investment in proprietary products, but because of its investment in people. Much of the organisation is based around product lines that are not very compatible. The success or failure of open systems within IBM is likely to depend as much on its ability to refocus and retrain its personnel as it does on technical or even marketing issues.

The twin-tower strategy involves developing every product in two forms — one compatible with the company's own proprietary systems, and the other with open systems. This is an effective strategy because the vendor can continue to support his existing user base while selling the new generation of open systems. Existing users, however, will at some future date have to migrate to open systems. There is also a major catch from the vendor's viewpoint — cost. The cost of developing, maintaining, and supporting two quite different versions is very high, as any vendor with multiple proprietary standards can testify. Moreover, it is increasingly difficult to pass on such overheads to users.

Figure 7 Digital has adopted a 'twin tower' strategy

Digital represents a clear example of the so-called 'twin tower' strategy towards open systems. Digital's proprietary product range has been built on internal standards represented by the Vax product range and the VMS operating system, and the company is currently stressing to users its continued commitment to these.

At the same time, it is supporting Unix across its current and expected ranges of hardware. Its own brand of Unix has proved more successful than many people expected when it was announced. Over 800 application packages are available to run on the workstation version alone — a small number compared with VMS equivalents, but large compared with alternative brands of Unix. Other moves towards open systems include its network architecture and network-management system, both of which will be OSI-based, and its document architecture, which is based around the public Open Document Architecture standard. Digital's windows user interface is based on a public standard (X-Windows), and is a key part of a specific multivendor thrust, which is based on tools to integrate multivendor environments.

Currently, the company markets the two standards through different business units, which in the long run, may prove very costly. Alternative approaches would be to retrain the sales and marketing teams to sell both systems, or to concentrate on one product range.

A third possibility is emerging, one that is both innovative and exciting. It is possible that Digital could make both its version of Unix and VMS compatible with Posix — the public standard for application calls to the operating system. Although the cost of this conversion would be high, it would encourage independent application developers to back Digital's technology.

Figure 8 AT&T is potentially in a very strong position in the open systems marketplace

AT&T's involvement with Unix may prove to be one of the ironies of the open systems movement. The telecommunications company's previous attempts to enter the computing marketplace have been disastrous — resulting in losses of $400 million to date. Yet, AT&T was responsible for the development of Unix, now one of the cornerstones of the open systems marketplace. With the benefit of hindsight, the original decision to place the early versions of Unix in the public domain was probably the prime cause of its growth in popularity. Now, AT&T controls Unix System V, a strong contender for the *de facto* standard version of Unix. Should that happen, AT&T would be in a very strong position to become a major player in the systems marketplace.

Figure 9 National vendors have been most affected by open systems

The greatest impact of open systems has been felt by the European national vendors. Proprietary vendors such as Nixdorf and Norsk Data have suffered the most, as has Wang in the United States. A switch towards open systems would have destroyed most of their asset base, yet they found themselves too small to maintain a proprietary position. Several of the smaller national vendors have been forced to merge with larger players in the last couple of years.

Other European vendors, of which ICL, Bull, and Siemens are the best examples, have fared much better. Each of them was relatively quick to adopt Unix, and found that, for the time being, this enabled them to maintain their strong position with national-government and public-sector customers. However, further change is coming. In the past, proprietary systems meant that customers of national vendors were locked in to them. The emergence of a European-wide open systems market will mean that this is no longer the case.

Figures 8 and 9 summarise the open strategies of AT&T (which invented Unix) and of some of the better known smaller national suppliers. There are no easy answers as to which of the various supplier strategies will win or lose. Ultimately, winning or losing will depend to a large extent on the calibre of the people implementing the strategy. Being able to identify the strategy of different vendors, and the implications of that strategy can, however, be enormously helpful when devising a user strategy.

User organisations need to develop their own strategy for open systems

From the user's perspective, the market for large and medium-sized systems will become more like the PC market. Elements of systems will become increasingly plug-compatible, choice will widen, and inevitably prices will fall, or rather, the performance available for a particular price will increase. Most user organisations will find themselves purchasing from local distributors and receiving local support, rather than dealing with the vendors direct.

Users will also see internal benefits and cost savings. Where, today, large user organisations need to maintain internal specialists for each of their system architectures, tomorrow, it will be easier to swap personnel between different systems based on open standards. This may also reduce recruitment costs.

However, users will not reap these benefits unless they actively adopt open systems. Many

organisations are currently faced with a massive dilemma. To switch, now, from existing systems to Unix would be very costly, and as some users have discovered, Unix systems may not yet be able to meet their total requirements. Yet, the longer that decision is postponed, the greater the cost of the change will be.

There is no simple answer as to when or if an organisation should make the transition. However, there are four guiding principles:

- Users should not be adopting open systems (whether for networking or operating systems) without having devised an 'enterprise architecture' — in essence, a blueprint for constructing computing and telecommunications applications and systems across the business. Being based primarily on business needs rather than on the products offered by a particular vendor, an enterprise architecture enables organisations to mix and match products, to ensure they have the right product for the job. To achieve this, the enterprise architecture should be implemented using selected open standards.
- Currently, there are almost as many options within 'open' standards as there are proprietary standards. Users need to decide which options are most appropriate to their needs and enforce their adoption across the organisation.
- It follows that to make this choice, systems managers should be actively tracking the development of all the major public standards (like OSI) and industry-wide standards. These include the two main versions of Unix — that promoted by the Open Software Foundation and that promoted by AT&T through Unix International, Office Document Architecture (ODA) — an ISO public standard that defines the format and structure of text and graphics for electronic documents, Posix — a public standard that defines the calls between an application and an operating system, and X-Windows — a public standard that defines a graphical, windows-based user interface.
- Adoption of open systems within an organisation needs to be accompanied by changes in the approach to systems selection and development. In particular, users of open systems should plan to make greater use of application packages and fourth-generation languages to take advantage of system portability. This theme is explored more fully in Foundation Report 74, *The Future of System Development Tools*.

Open systems offer users more freedom, but not absolute freedom of choice. To use a political analogy, proprietary systems can be thought of as a one-party state, which users must accept or leave. Open systems offer multiple parties. However, the 'party bosses', who decide what appears in the election manifesto, are the vendors, and users' needs will never be reflected precisely in the vendors' manifestos. Users will therefore vote (by purchasing) for the best compromise. As a consequence, even with open systems, users will, to a large degree, remain dependent on the vendors for what is offered and when it is available.

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The Butler Cox Foundation is a service for senior managers responsible for information management in major enterprises. It provides insight and guidance to help them to manage information systems and technology more effectively for the benefit of their organisations.

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Combined with the manager's own creativity and business knowledge, Foundation membership contributes to managerial success.

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