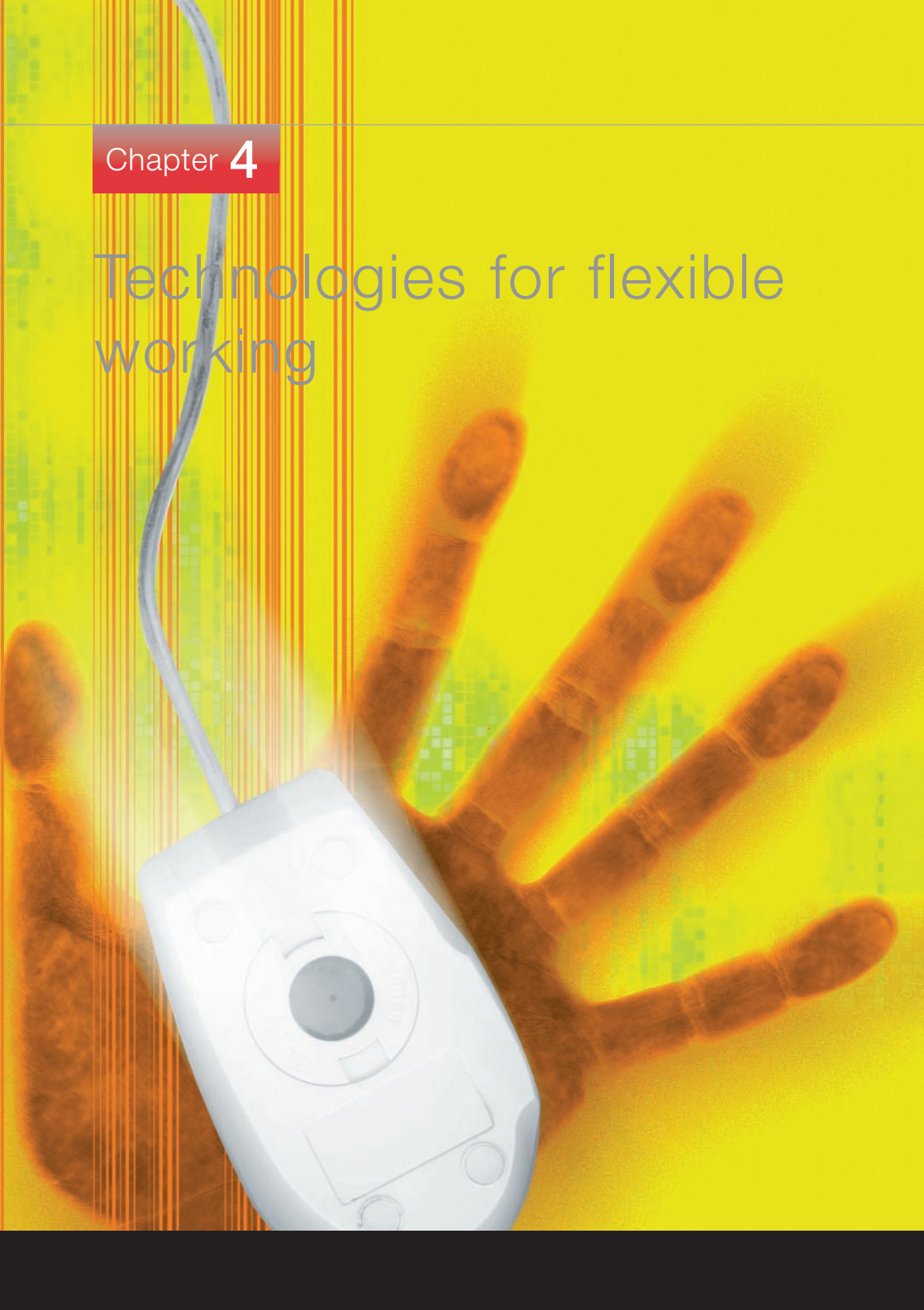


## Chapter 4

# Technologies for flexible working



This chapter examines the key technological issues related to enabling and supporting flexible working, and reviews what can be gained. It will be most relevant to IT, telecomms and other managers responsible for technology infrastructure, applications and business processes.

As already stressed in chapter 1, technology solutions should be specified and developed as part of an integrated programme, which also addresses facilities, organisation and people issues. As a result, it is important for all managers involved in implementing flexible working to get to grips with the technology basics. Accordingly, we have presented the issues in a language that is intelligible to the non-specialist.

Volumes could be written on the subject of technologies for flexible working. Hundreds of hardware devices and software applications have been developed and new solutions are appearing weekly.

However, we focus on a basic understanding of what needs to be achieved. We outline the options likely to be available, how to decide on the optimum strategy and how to ensure that business processes are capable of distributed and remote operations.

We analyse the underlying voice and data infrastructure of corporate systems, and show how they can be adapted for new business

processes and flexible working solutions. Finally we cast an eye to the future.

An important theme is that, in many organisations, the investments already made in technology are not yet delivering the expected business benefits. Introducing flexible working goes hand in hand with maximising the return on IT investment, and learning to use the full capacity of business applications.

### **Information and communications: setting the scene**

In order to work effectively, flexible employees must be fully engaged with the information and communication systems of the organisation. Clearly, any flexible working scheme has to be based on a commitment to the principle of ubiquitous access to information. Otherwise, flexible employees risk becoming “second-class” employees, with one foot on each side of a corporate “digital divide”.

### **At the core of the organisation**

Information has always been the lifeblood of organisations. It is even more critical today. The traditional armies of clerks, supervisors and managers, who were the keepers of information, are being replaced or enhanced by the more powerful, affordable and accessible infrastructure of information and communications

technologies.

Corporate information includes documents, messages, conversations, structured data and so on. It is stored in computer systems, voice-mailboxes, filing cabinets, briefcases, books and people's heads, and communicated by telephone, IT network, messenger and face-to-face contact.

Conventionally, communication of information has been highly structured and hierarchical, often on a "need-to-know" basis. However, with the advent of the electronic infrastructure, there has been an explosion in the volume of accessible information in organisations. And not only is this information more readily available, it is in principle also instantly available.

The new forms of flexible working are made possible by information and communications technologies. One of the roles of the technology manager is to ensure that people are fully networked into the corporate systems from wherever they may work, so systems must be specified and designed to support location-independent working.

### **Digital convergence**

We no longer think of the ability to speak to anyone, anywhere, as a phenomenon. Similarly, we consider sending the contents of a piece of paper over the telephone as being commonplace.

Today, we are beginning to regard the ability to store, process and exchange huge quantities of information in the same way, and we expect people in organisations to have all that information at their fingertips.

Currently, most organisations have two largely separate networks that support this free exchange of information – the telephone network and the IT network. Everyone is expected to be “telephone literate”, and it is increasingly assumed that people will be “IT literate”, at least at a basic level.

The trend over the next few years will be for the telephone and IT networks and applications to converge, most likely using the technologies of the Internet. This digital convergence will help remove any remaining technical barriers to fully flexible working.

### **Underlying technology infrastructure**

Although much of the information in this section will be well known to technology managers, we believe it is important to reinforce and explain it, as technology infrastructure provides the platform on which user tools, applications, processes and ultimately business benefits are built.

We have considered IT and voice infrastructure separately, as that is how they are currently managed in most organisations.

### IT infrastructure overview

Most large and medium-sized organisations have adopted a standard approach to their IT infrastructure:

- Desktop PCs running a version of Microsoft Windows, Microsoft Office, a web browser (from Netscape or Microsoft) and a "groupware" application: e-mail, calendar, contacts, file sharing, etc, (Novell Groupwise, Lotus Notes or Microsoft Outlook)
- Servers that provide applications, file, database, groupware, web, printer and communications services. "Legacy" (i.e. old mainframe) applications are often reconfigured to appear as network servers
- Structured cabling that can be used for either voice or data
- Local area networks that use the structured cabling to connect PCs, servers and printers, etc, and are themselves connected together with hubs, bridges and routers.
- Wide area networks that connect sites together and connect to the Internet, using digital leased lines or digital dial-up lines (ISDN)
- Notebook PCs, which may spend some time connected directly to a local area network, some time connected by analogue or digital dial-up and the rest of the time disconnected from corporate systems

For IT managers, it is seemingly a never-ending task to maintain the entire organisation to the

same technology standard. In practice, it is common to find a mixture of hardware types and software versions as refresh and upgrade programmes are implemented.



### Voice infrastructure overview

Although less glamorous than IT, there has also been a progressive upgrading of corporate telephone systems, again assisted by the Millennium threat. Whilst there are quite a few variations, a typical system now offers:

- Standard or "smart" telephones, the latter facilitating access to special system features
- Direct dialling from and to individual extensions, with "virtual numbers" that can follow users wherever they go – both within and away from the network
- Call transfer, conference calls, dealer calls, call distribution (as required in call-centres), group pick-up and a host of other advanced call handling options

- Voice-mail, that can be accessed remotely using a security code
- Distributed networks that allow an internal system to span a number of sites
- Connection to one or more public network operator (e.g. BT), with software to select least-cost routes

Most commonly, telephone systems are implemented using a PBX (Private Branch Exchange) on each site. Many telephone companies offer "centrex" services, whereby the PBX functions are provided by the local exchange.

In the main, telephone systems tend to be managed separately from IT systems. Other than in call-centres, and for call-logging and service set-up purposes, the systems are not connected. However, it is likely that this situation will need to change as the technologies and services converge.

### **Wireless technologies**

Twenty years ago, radio engineers struggled to find employment. Today, digital radio technology has revolutionised telephony and broadcasting, and is poised to do the same for computer networking.

There are now over 34 million subscribers to mobile telephone services in the UK, with high growth expected to continue as prices fall and

new services come on stream. Mobile phones are widely used in business, though they are not generally integrated with the corporate fixed networks. In addition to voice, they can also be used for mobile PC remote access, though speeds are low and costs are high. There are associated data standards, including SMS (Small Messaging Service) and WAP (Wireless Application Protocol), though these are more oriented towards transactional applications than computer connectivity.



Within the office and home environments, digital radio systems are also being used, though usage is not yet widespread:

- The European Digital Cordless Telephone standard (DECT) supports wireless PBXs as well as individual phones. This enables users in buildings, such as maintenance staff, to remain in contact wherever they may be
- Wireless local area networking allows, for example, portable computers to be used anywhere within a building, without the user needing to find an access point. Accordingly, it reduces and simplifies cabling requirements
- Although not a radio technology, infrared is used in a number of proprietary products such as cordless keyboards and mice, and laptop connections to other PCs and printers, etc.

The recently launched "Bluetooth™" standard has been designed specifically for short-range cable replacement. Ultimately, its very low cost will encourage deployment in a vast range of office and consumer equipment.

The most significant development of wireless technology for location-independent working is the launch of third generation (3G) mobile networks. Licences for these were the subject of highly lucrative auctions for the government during 1999, and services will be launched from 2002 onwards. These 3G systems promise high

bandwidth "always on" Internet access, as well as a host of new voice, video and other services. Prices remain to be determined.

## IP

The IP (Internet Protocol) has become hugely important over the last decade. It is the universal protocol for any computer, anywhere in the world, communicating with any other. IP makes possible the worldwide web, e-mail, file transfer, secure tunnelling, "voice-over IP" and other applications.

Whilst IP can be used simply as a connection protocol, allowing, for example, a remote computer to connect to a corporate local area network, it is at its most powerful when the corporate applications have been "Internet-enabled".

Intranets have conventionally been viewed as "internal webs", presenting information on demand to users within a secure network. Increasingly, a wide range of business applications, such as accounts, management information systems and database applications, are being redeveloped with browser front-ends so they can be accessed using normal web browsers rather than special applications.

Intranets can be extended securely via the public Internet to include remote offices and location-independent staff. In the same way,

"Extranets" can extend a corporate system to include other organisations, such as partners and suppliers. In the future, most corporate IT applications will be Internet-enabled, thereby allowing them to be used by approved individuals with access to the Intranet or Extranet.

The other significant IP development is telephony and other forms of real-time communications. Already, it is possible for people connected to the Internet to communicate by voice and video, though reliability and quality have so far been inadequate for corporate use.

As with other Internet-related developments, change is happening fast. Leading telephony organisations are launching serious IP telephony applications, and so-called convergence is happening. Collaboration and conferencing tools, which provide voice, video, document transfer and applications sharing, are set for rapid development and growth.

All this is excellent news for the future of flexible working, further reducing costs, improving performance and simplifying set-up and support.

### **Security**

Security is a complex subject, and here it is only possible to skim the surface of issues in the

context of location-independent working.

The starting point is an understanding of the risks:

- Unwanted visitors may gain access to company information
- Communications with remote users may be intercepted
- Information stored on remote PCs may be compromised
- Unauthorised users may be able to use remote PCs
- Unsupervised employees may take less care of confidential information.
- Equipment may be lost or stolen
- Data protection legal requirements may be inadvertently breached

A variety of security technologies are available, including passwords for log-in, encryption of data transfer, biometric user validation and use of auxiliary equipment such as rolling pass-code generators and proximity detectors.

IT and voice security are important issues and deserve to be taken seriously. Interestingly, most breaches occur as a result of careless implementation or human indifference. It is not unknown for notebook PCs to be fitted with labels carrying ID and password information for all to see!

Security is not solely a technology issue. It is also about good management and appropriate policies, taking account of the different types and sensitivity of information, roles and rights of access.

### Technology infrastructure for remote working

For most people undertaking work at home, either full-time or part-time, the ideal solution is to "stretch" the corporate desktop in its entirety to the remote location. In theory, this means:

- The telephone operates without compromise as a fully functioning extension on the corporate telephone network
- The computer also operates without compromise as if it were connected directly to the corporate wide area data network

Currently, in practice, compromise is almost always necessary, as the costs of providing fully functional, high bandwidth voice and data connectivity are still prohibitive.

#### Solution 1: Full voice and data routing

This solution currently comes closest to the ideal, though with data bandwidth restrictions and cost implications:

- ISDN is installed at the remote location, together with special routing equipment
- All corporate telephone network services and features are extended to the remote location

over one ISDN channel

- The corporate local area network is fully routed to the remote location, using data compression to increase the effective available bandwidth

The strengths of this solution are seamless operation. The phone and PC at the remote location operate identically to the office. Also, online user and technology support services can remain unchanged.

The weaknesses are modest data speed (even with compression), long-distance phone calls and relatively high capital expense.

#### Solution 2: Voice divert, data dial-up

Currently, this is probably the most popular solution, largely because it is cheap to implement:

- Inbound voice calls are diverted to the remote location by the corporate PBX or public network; outbound calls are dialled directly or via the PBX
- Modem or ISDN dial-up (with or without compression) provides data access to a remote access server or, for web browsing, to an Internet service provider

The strengths of this approach are that its costs are low and that it is easy to configure.

The weaknesses are low data speed, non-seamless operation, long distance phone calls and the need for special support arrangements.

### **Solution 3: Voice divert, data via ISP**

In this option, an Internet Service Provider (ISP) is used to provide data access:

- Voice is handled as in the previous section
- Data connection is achieved using Internet "tunnelling". This effectively allows the Internet, rather than the telephone network, to provide the secure link into the corporate systems. The new high bandwidth Internet access services such as ADSL, cable modems and fixed radio can be exploited to good effect

Strengths are low equipment and usage costs (unmetered Internet access services can be used) and relatively easy configuration.

Weaknesses are possible security concerns, Internet bottlenecks, low data speed using modem or ISDN Internet access and difficulties in remote management.

### **Solution 4: IP only**

Making greater use of the Internet will probably be the preferred solution of the future:

- Telephony is delivered via the PC using "voice-over-IP"
- Data connection is as in the previous section

The strengths are full location-independence, no long distance calls and low equipment costs. As the Internet improves, high speed unmetered access becomes available and wireless services

are launched, this approach can only get better!

Weaknesses are that it is still relatively unproven, voice quality and grade of telephony service may be variable and Internet bottlenecks may further degrade service.

Nevertheless, this is a "fully converged" solution and will also support the widespread use of online meeting and collaboration tools. The inventor of the Internet, Vinton Cerf, proudly wears a T-shirt proclaiming, "IP under everything"!

In due course, it is likely that corporate communications will be built on IP.

### **The location-independent PC**

Many large organisations have chosen to configure all their PCs identically to simplify management and support. Customisation is performed at log-in, at which time the specific configuration is downloaded from a server. This can include desktop "look and feel", e-mail and groupware personal data, history files and applications access rights.

An incidental benefit of a common operating environment throughout the organisation, is that mobile staff can log-in to any PC, or plug their notebook PCs into any network access point. Some large organisations even take this idea internationally, so travelling executives are able to keep in touch and continue working, wherever they may be in the company.

Extending this concept away from the organisation's network is technically straightforward, using the techniques outlined above. It is, however, sometimes impractical, as the time taken to synchronise and customise over low bandwidth connections may be prohibitive. For laptop and home PC users, most of the customisation can be pre-installed, reducing log-in/downloads mainly to e-mail, calendar and other data. When using shared



PCs, for example in cyber cafés, staff might be limited to accessing (with appropriate security) the corporate Intranet and other web-enabled applications.

Small portable PCs, sometimes called palmtops, personal digital assistants or pocket PCs, can offer diary, contacts management, e-mail and other applications. Increasingly, these can be synchronised with corporate networks, adding another option for mobile workers.

### **The location-independent phone**

Many people give out their mobile phone numbers to their contacts, knowing that calls will reach them wherever they are. There are, however, several problems with this approach:

- Grade of service is often poor due to coverage, drop-outs and call quality, etc.
- Costs to the caller are high
- Mobile phones are rarely integrated with corporate systems, so call transfer, conferencing and other facilities are not generally available

Other operators also offer location-independent numbers using the fixed network. The user controls where he or she wants the call delivered. However, these normally use premium rate tariffs and are difficult to integrate with corporate systems.

At the moment, the preferred approach is to enable so-called "virtual numbering" and "follow-me" services on the corporate network. The user's direct dial number can be redirected by the user to any other number: internal, external fixed network, external mobile network, voice-mail, etc. However, each redirected call beyond the internal network incurs a charge to the organisation, and the value of this type of service comes at a cost which some organisations may not wish to carry.

### The anywhere/anytime office

In this section, we list the various locations that can now function as part of the distributed office, and outline their main technology characteristics and issues.

#### Main offices

**The standards in the main office provide the benchmark for other locations.** The main servers and PBX will be located here, with PCs directly connected on a high-speed local area network. Where there is more than one main office, high capacity and high-speed private networks ensure all perform equally well.

#### Branch offices

Even with only a handful of workstations, small offices benefit from a local area network connected to the main office using either a leased line, automated ISDN dial-up or IP via an Internet service provider. For cost reasons, speed is normally compromised. However, careful design, including a local server, should minimise the impact of this.

A similar approach applies to telephony. Most PBX vendors offer branch office solutions that connect seamlessly with the main system, though normally using the public network to route calls, rather than a leased line.

#### Third party offices

A generic third party office, for example at a business centre, will typically provide PCs running standard office software and Internet access. Sometimes, modems or ISDN connections are also supplied.

Provided bandwidth is adequate, Internet-enabled IT applications can usually be run without difficulty. Remote access via modem or ISDN requires some temporary configuration to be carried out to network and dial-up settings.

Security can be a problem at third party offices. A common issue is that Internet history files, memory caches and dial-up settings are left behind for the next user to study.

If the third party office provides direct inward dialling, the main office follow-me facilities can be used to divert calls to employees when they are based there.

#### Home offices

Staff who spend more than, say, one or two days a week working at home will normally wish to set up a permanently configured office, with a dedicated PC and telephone. The most straightforward solution is ISDN dial-up for remote IT system access and call-forwarding. IP solutions are becoming more attractive with



the launch of unmetered services and higher bandwidth, and these are likely to offer better performance and lower costs.

Occasional home workers may use either mobile PCs (see the next section) or a multi-purpose home PC. In the latter case, similar considerations to more regular home workers apply, with the added complication that security issues need to be carefully addressed.

In its simplest forms homeworking can involve the use of a PC with a modem to allow connection to an office network via a dial-up connection. Toshiba notebook PCs are well suited to this application as they all have a built-in modem as standard to support dial-up connections. In certain cases, where more functionality and flexibility are required, a solution based on a PC or notebook PC and

higher bandwidth connection may be the better way to go for heavier network users. Many computers, for example from Toshiba's extensive range, come tailor made with the right level of equipment for the job.

### **Mobile offices**

Corporate users of mobile PCs currently operate in four ways:

1. The computer is never connected to the corporate network
2. The computer is connected to the corporate network when the user is in the office (main or branch office)
3. The computer is also connected to the corporate network by dial-up from home or other locations (e.g. client office, third party centre, hotel, etc)
4. The computer also, or only, has a wireless connection to the corporate network

The trend is towards the third and fourth of these, with "always-on" wireless connection likely to become increasingly important following the launch of 3G services.

Mobile phones are already a well-established feature of the mobile office. Apart from cost and performance, they provide effective integration with corporate systems.

### **Virtual offices**

By definition, the virtual office does not have a physical manifestation. The concept is to dispense entirely with main and branch offices and work from third-party, home and mobile locations.

Clearly this is only possible in a largely paper-free working environment.

Although the most radical approach, it is now becoming a realistic option through:

- Web-enabling and locating all corporate IT applications on a dedicated, secure server at a business Internet service provider
- Ensuring all users have reliable and fast Internet access from wherever they are working
- A centrex-based implementation of telephony

As with other implementations, the trend is towards data and voice convergence; the "server on the Internet" will, in future, host voice and multimedia services as well as information systems.

### **Adapting processes for location-independent working**

Most information systems departments will have to undertake a considerable amount of groundwork before fully location-independent

working becomes a reality. A further consideration is the logistics and cost of technically supporting a distributed workforce.

### **Paper-free processes**

The use of paper as a primary medium for information communications and storage is one of the greatest inhibitors to more effective and efficient working. Compared to electronic systems, paper-based systems are slow, expensive, inflexible, labour-intensive and demanding of space. Furthermore, staff are forced to base their working practices around filing and administrative systems, sometimes making visits to the office simply to pick up information.

Breaking free from the constraints of paper is far from easy. Whilst technology is no longer a serious barrier, the biggest problems stem from deeply entrenched attitudes, lack of awareness and fear of change, especially amongst administrative staff. There is also an unwillingness of organisations to take a strategic approach to paper reduction.

Mentioning the words "paper-free" often generates amusement and ironic comments. In most people's experience, computers generate paper rather than reduce it. However, the scope for reduction is real, and "paper-free" needs to become a real aspiration. Just because it is difficult, is no reason not to do it!

Until recently, electronically stored records were inadmissible in court cases. This is beginning to change. Legitimacy of the media as legal proof will forward the case for electronic (paper-free) archiving of critical data. However, it has taken many years to reach this point, and may take just as many again to gain full acceptance and more crucially, user/customer trust.

A whole guide could be written on this subject alone, but the following checklist should help the IT manager in co-operation with facilities and human resources colleagues, understand and begin to address the issues:

- Reorganise existing paper filing:
  - Eliminate personal storage of files, eliminate duplication of paper and file current material at a team or department level
  - Archive off-site and implement strict processes for archiving non-current files
- Eliminate the use of paper for internal communications such as memos and forms, etc. Also discourage (or ban!) printing of e-mails, web pages and document drafts, etc
- Move all static information, such as manuals, procedures and guidelines, to the corporate Intranet
- Ration printers and photocopiers. (See chapter 3)
- Insist on electronic communications with

business partners. Where this is not possible, scan incoming documents

- Exploit to the full, groupware, intranet, knowledge management, integrated messaging and other technologies

### **Groupware**

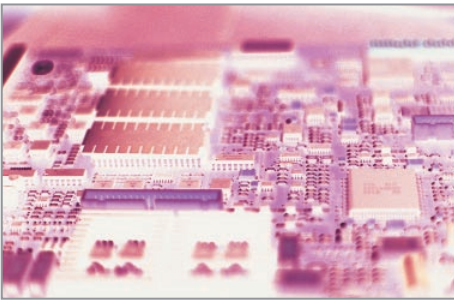
Many organisations have been using e-mail internally since the mid 1980s, and external connections have been widely used since the early 1990s.

The early e-mail programs are largely being replaced by so-called groupware applications, such as Microsoft Exchange/Outlook, Novell Groupwise and Lotus Notes. These offer additional services and facilities, for example:

- Diaries that not only allow personal schedules to be stored, but enable meetings to be scheduled
- Personal, departmental and company-wide contact lists that can also be accessed through word processing and other applications
- Personal, departmental and company-wide filing and retrieval of messages, and documents, etc
- Synchronisation of information kept on mobile PCs and home computers with office systems
- Web-enabled capabilities, including secure remote access and direct web-publishing of stored information

- Launch of online conferencing and collaboration tools. (See below)

When they are introduced strategically, and staff are properly trained, groupware applications can play an important role in enabling paper-free and location-independent working. However, our experience is that this rarely happens and the benefits are consequently lost.



### **Intranets and web-enabled applications**

Intranets are closed user-group web sites, exploiting the technologies of web browsers, servers and applications over a secure internal network.

A modern web browser allows information to be viewed and used interactively by the user. The BBC is a good example of an organisation that is using its intranet effectively on a remote basis. A diverse number of BBC personnel frequently dial-up to access the intranet from their home, or plug in via touchdown points.

Virtually any IT application can, in theory, be

configured to operate through a browser. Web servers feed the browsers, receive information back from users and connect to databases and other applications, either on the server or elsewhere.

Some corporations have embarked on projects to fully web-enable their information systems. In practice, this means that users interact with their systems using only a web browser interface. This, in turn, simplifies technical and user support and enables all applications to be used remotely.

Practical applications of intranets, relevant to location-independent working, include:

- Publishing of relatively static material, including directories, etc
- Access to documents, presentations and other material
- Replacement of forms: vacation requests, sickness reporting, timesheets and expenses submission, etc
- Group discussion forums
- Front-line staff support
- Access to databases and other corporate applications
- An electronic filing and collaboration alternative to network drives or groupware folders
- A portal for Internet access to preferred or recommended sites

Part of the power of intranets is that they can be extended securely beyond the physical boundaries of the organisation, not only to staff working remotely, but also to customers and suppliers.

### **Knowledge management**

This is another area that could be the subject of a guide in its own right. Whilst there are various rigorous definitions of what is and what is not knowledge management, a pragmatic approach is that it is concerned with collecting, organising, protecting, analysing and making available an organisation's collective knowledge, to the benefit of the business.

A common problem is that valuable information is stored in a variety of locations, such as financial, personnel, supplier and customer chain, production and workflow systems, as well as individual PCs, departmental systems, ad hoc databases, and so on. Knowledge management techniques can add value to this information through effective collation, classification, correlation, analysis and interpretation.

Most approaches to knowledge management are themselves web-enabled, and make extensive use of automatic indexing, search engines, metadata and so on.

As with groupware and intranets, knowledge management systems further enable and support location-independent working.

### **Integrated messaging**

The ability for any member of staff to send and receive messages is vital in many organisations. Messages may be delivered face-to-face, by paper memorandum, by e-mail, by telephone and possibly by multimedia messaging or a custom business application. The essence of a message is that it is asynchronous – it does not require the sender and receiver to be connected simultaneously.

The two most popular forms of message delivery are e-mail and voice-mail. Conventionally, these are handled by totally separate systems. Also, few people set out to deliver a voice-mail – instead, it is usually a consequence of the phone being engaged or not answered.

Integrated messaging seeks to establish a single messaging environment, where any message can be originated or collected by telephone or PC. There are, of course, limitations – non-text attachments to e-mails cannot be converted to voice, and speech recognition may not always be accurate. Nevertheless, the contribution to operational efficiency can often outweigh the difficulties.

### **Multimedia collaboration**

Video conferencing has a mixed history in business. For most people, the experience revolves around needing to visit a special and expensive conferencing suite, having to use special telephones, encountering poor quality, or working with images that are the size of postage stamps. Either way, video has not really caught on in business, other than as a training tool.

This situation is now changing with the arrival of high-speed IP networks, powerful PCs and low-cost video cameras. Products such as Microsoft NetMeeting, supplied as part of Office 2000, allow users connected to the Internet to:

- Communicate by voice, video and text "chat"
- Pass files to each other
- Draw on a common "whiteboard"
- Share applications running on each others' computers
- Take control of each others' computers

When it comes to keeping in touch across a distributed workforce, the advent of unmetered high speed Internet access should herald an upsurge of interest in these products.

### **Supporting a distributed workforce**

User support consumes a large proportion of the costs associated with technology in most organisations. These costs include hardware

and software maintenance, user help, troubleshooting and training. The capital costs of PCs represent only a small fraction of total operating costs.

Many IT managers are reluctant to encourage take-up of remote working as the costs of supporting remote users could be even higher than those in the office. Some get around this by insisting that equipment is returned to the office in the event of a problem. However, this shifts even higher costs onto the users. Further complications and cost implications arise as a result of remote users tending to require support outside the normal working week.

This is an issue that requires a careful and structured response in terms of the specification, design and implementation of hardware platforms. It also impacts configuration, applications and support, including remote diagnostics.

Third party services, which take over all aspects of home and mobile worker support, are being launched. These include technology, telecommunications, health and safety, insurance and other aspects. The important thing to remember is that whilst the direct costs of supporting a remote user may be higher than in the office, this is more than offset by savings in office space and productivity gains.

## Future developments

Technology is not standing still. Managers need to specify solutions that are, as far as possible, future-proof and capable of benefiting from new technologies and innovations as they occur.

Probably, the three main areas of development that are most relevant to flexible working are:

- Continued streamlining of business processes through paper elimination and the introduction of advanced knowledge management techniques
- Increased penetration of IP as the universal networking protocol for data, voice and multimedia information, coupled with better and faster access
- The launch of new wide area and in-building wireless services

Finally, as is the case with facilities managers, technology managers must keep their eyes on the bigger picture, and avoid becoming too narrowly focused on technology solutions. Most large organisations have already invested in good technology infrastructure, and from a business perspective, making more effective use of current systems may often be preferable to investing in new technology.