The More Things Change ...

Nuts and Bolts of Technology Planning

by *Kenneth E. Marks*

The old adage, "the more things change, the more they stay the same," certainly applies to the relationship between technology and buildings. In spite of the emphasis on the rapid advance of technology, fundamental issues have remained unchanged for years.

There is no question that personal computers have become faster and more powerful as they have become less expensive. The cost of electronic storage has dropped in price per megabyte. Software applications have become more powerful. The Internet tidal wave has overwhelmed existing networks. These and other developments tend to focus a person's attention on the never-ending flow of newer and more fantastic electronic gadgetry. The key claim in this technological cornucopia is that our professional lives will become *much* more effective and efficient.

As in so many environments, the basics often become lost in the fascination with the newest technologies. If these fundamentals are not addressed, the technological superstructure that every organization wants to build can fall apart.

First among these fundamentals is the conduit to hold the network cabling. Unless the library is relatively new, it is likely that there will be little or no conduit in the walls and ceilings of the building. It is possible to install and operate a network without pulling the cabling through conduit, but if that is done, the data transmission could be affected by interference from such sources as fluorescent lights and elevators. Even if the cabling is shielded, it ought to be housed in conduit.

If library staff are planning new space or preparing for renovation, the installation of conduit can be an integral part of the construction that takes place. The common tendency to underestimate the amount and size of conduit that is needed must be guarded against during the planning process. Architects, electrical engineers, electricians, networking specialists, and others may not realize the extent to which many libraries are already dependent on networked resources. This dependency will not decline; it will grow. Trying to go back and install additional conduit can be terribly expensive. Review the dimensions of the proposed conduit and do not hesitate to double or triple its size. This is true even if you plan to install only fiber optic cable.

Also consider the raceways or cabletrays that carry cabling in bulk throughout the library. It is essential that the size of the cabletrays be large enough and easily accessible. Typically, they should be accessible from above or the side; otherwise these cable passageways might be located with plumbing and other piping, thus requiring a contortionist to get at them. Remember to make access easy for the workers who will have to deal with these installations in the future.

Once the conduit is installed, it is time to be concerned about the network cabling that will be pulled. While it might be a laudable goal, there is little immediate prospect for most libraries to install fiber optic cable to the desktop PC. There are a variety of reasons for this. First, it is probably more expensive than most libraries can afford or justify. Second,

bandwidth demands in most libraries are not yet sufficient to justify the installation. Third, it is probably unrealistic to expect local personnel to be able to work with or troubleshoot fiber optic cable installation.

A more reasonable, cost-effective cabling option is Category 5 shielded twisted pair which should provide adequate carrying capability for the near-term in most libraries. It is reasonable to expect that someone among the library staff can learn how to place the necessary ends on the cable so it can be connected to the network cards and hubs,
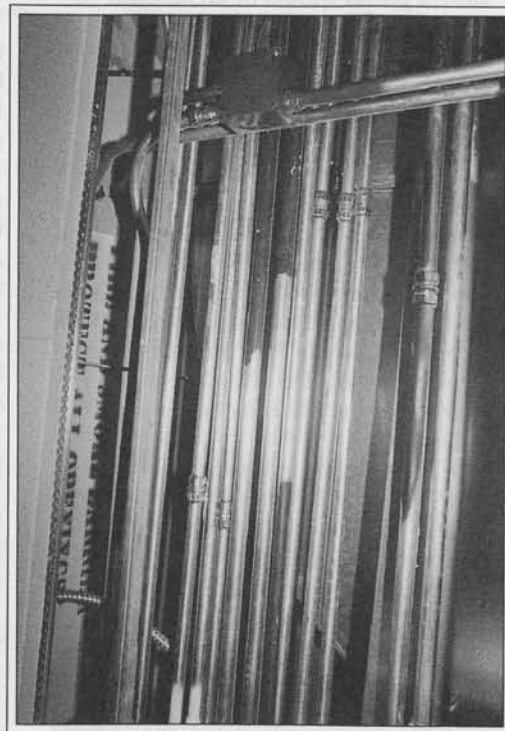
The amount and size of conduit should not be underestimated. (Photo: Joyner Library, East Carolina University.)

routers, and bridges. The equipment to do this is inexpensive.

A question might be raised at this point by many librarians in small libraries: since we are so small, will we ever have a reason to be networked? The answer is a resounding, Yes! Even the smallest library can benefit in two ways from networking its PCs. First, sharing applications, resources, and work can bring enormous benefits. Second, public access to electronic information resources from multiple workstations is extraordinarily important in every library, regardless of size.

The next fundamental crucial to library technology is the quality of the electrical power. Many libraries are dependent on power that appears to be generated by a pair of caged chipmunks. Power surges, power spikes, and brown-outs, among other events, are the bane of an electronic environment. Conditioned power is important if the investment in electronic equipment is to be protected and access preserved over an extended period. Typically, librarians will purchase surge protectors that plug into a wall outlet. These deliver band-aid solutions. The best solution is a power conditioner that controls all power entering the library. Retrofitting a library for this equipment may not be practical from a physical or cost viewpoint unless a major renovation is underway. In a new building, however, conditioned power should be an absolute requirement.

Today's electronic technologies are so robust that they no longer require the "glass house" with special environmental conditions in order to operate. Nonetheless some common-sense precautions are advised. Position PCs and servers so they cannot be kicked accidentally and network cables pulled loose. Loose network connections may be the single greatest cause of network problems. Raise PCs off the floor to avoid flooding. Do not place the equipment in a space that lacks adequate circulation.

If a library is renovating or building new space, it is wise to provide some type of server room to house a variety of electronic equipment. Servers, routers, bridges, hubs, and modems can be rack-mounted and placed in a relatively small space. The most significant payoff from this placement is security. No matter how secure librarians believe their facilities to be, there are individuals who will cause havoc with the network and its equipment if the opportunity is presented. Nearly all libraries have ex-

perienced petty mischief such as the theft of mice roller-balls and keys from keyboards. As a result, it is wise to secure the more critical pieces of a network.

Another facet of the security issue
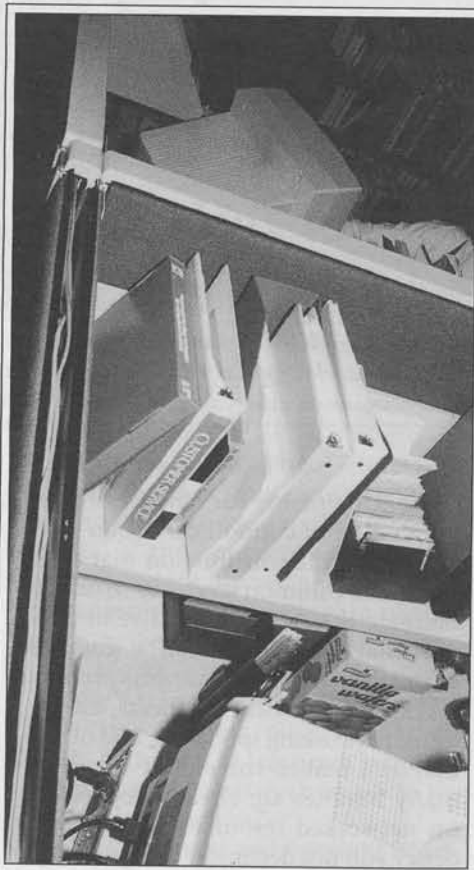
Modular furniture provides secure concealment for wiring. (Photo: Joyner Library, East Carolina University.)

involves the placement of PCs in a library. Plans for East Carolina University's Joyner Library expansion included dispersing PCs widely throughout the building. Clusters of two and three PCs were scattered throughout the second and third floors of the new space in August. Before the end of the fall semester, most of the PCs had fallen victim to intentional vandalism by library patrons who attempted to remove various operating parts of the equipment. The distributed PCs had to be relocated to establish clusters of approximately 12 PCs that could by supervised whenever the library was open. This new configuration required some rearrangement of the stack and furniture layouts.

Once the infrastructure for the network is in place, librarians need to turn to the use of technology in their libraries. Although many libraries still employ hardwired dumb terminals, they should develop a plan to migrate away from that technology. A library that is fortunate enough to have a new or

renovated facility should make certain that the equipment budget contains funds for PCs, printers, servers, hubs, etc. This may be the one time that a quantum leap in technology can be taken, so take full advantage of it.

Prices have fallen dramatically for PCs and related peripherals in the past year. Pentium-based PCs can be obtained without "breaking the bank." A most critical but often neglected consideration is the amount of RAM purchased with a PC. It is commonplace today to find PCs with 16 megabytes (MB) of RAM at very reasonable prices. Configurations with 24 and 32 MB RAM are becoming more common. Thoughtful consideration should be given to a minimum configuration of 32, and possibly, 48 MB RAM. Although this might be considered extravagant, it may be the best form of insurance to guarantee a longer useful life for the PCs that are purchased. Software applications such as those that run in a Windows 95 or NT environment are "hogs" when it comes to requirements for RAM. Few things are more frustrating than an under-powered PC trying to deliver the full functionality of the latest version of a standard application on which the library is dependent.

The other element in a PC's configuration that should be considered very carefully is hard disk storage space. Many of us can remember when a 10 MB hard disk was an unbelievable resource which no one could imagine filling. Now there are applications that require many times more storage space. It is common for PCs to come equipped with 1.2, 2.1, 3.2, GigaByte hard disks. This is one of those situations where more is better, even if there is a conviction that the space will never be filled. It will, and sooner than anyone can conceive.

Give serious consideration to moving beyond the 10 MB network cards typical of Ethernet networks, particularly since 100 MB network cards now are reasonably priced. As libraries move more and more images across their networks, it may be a wise investment to purchase the faster network card and the requisite upgraded hubs/routers.

If library staff are interested in taking the plunge, consider the alternative of a wireless network. There are certainly advantages to a wireless environment, such as avoiding the large scale installation of conduit and pulling of cable. Wireless network speeds, however, will not match those of the more traditional network environment. An additional potential problem could

arise if the space in which the wireless network is to be installed is filled with many columns or a large quantity of steel girders or supports. These could generate so much interference and dead areas that satisfactory data transmission could never be achieved. Nevertheless, every library ought to consider and evaluate wireless networks.

Plans for equipping a new or renovated library space should include a thoughtful configuration of the furniture, especially in terms of wire management. Too many library work areas and public spaces are cluttered by an unsightly mass of network cables, telephone lines, and peripheral cabling. Besides the obvious visual pollution that results from various types of cables spilling across the floor, tables, counters, and desk, it is only too likely that these cables will be pulled or jerked inadvertently, disrupting functions.

The solution to this disorder is furniture designed for wire management. A variety of methods is used to hide or disguise the cabling, and librarians should choose the one that is best for their environment. Select furniture that provides management capability for both network/computer cabling and telecommunications as well as electrical lines. Ideally, these will be managed in separate trays built into the furniture. Reject furniture that requires specialized technical people to pull cable in these management systems or to move the furniture.

Two developments in electronic display equipment, otherwise know as monitors, should be kept in mind. First, as more electronic resources contain images, an increased demand for 17- or 19-inch monitors is likely. These units are significantly larger than the standard 13- or 15-inch monitors and consequently affect the functionality of study carrels or worktables. It is possible that librarians will have to redefine the "standard"-sized workspace. Second, this year the first of the "thin" plasma displays have appeared in the marketplace. While they now are quite expensive, the consensus seems to be that they will be cost effective within another two years. Libraries will be able to purchase monitors that are 36 to 54 inches wide and 3 to 4 inches deep. These monitors can be hung on a wall instead of placed on a table or carrel, creating an entirely new set of challenges.

Three other technological developments will become important to library technology planning. Video conferencing and voice recognition may be viewed as irrelevant or unnecessary to-

day, but both features will be accepted quickly by both librarians and patrons. The third is the DVD, best known as the digital video disk or the digital virtual disk.

Most librarians have heard of CU-SEE-ME and have seen the advertising for the small, inexpensive video cameras that can be positioned beside or on top of a monitor. These small cameras will continue to improve in quality, decrease in size, and become even less expensive. It is only a matter of time until they are sold as an integral part of all PCs. The consequence for librarians is that planning has to begin now to resolve how to provide the necessary network connections. Equally critical is lighting in the areas where these PC/ video workstations will be located. Unless an appropriate level of lighting is available, complaints about the unsatisfactory nature of the equipment and the library's failure to provide satisfactory service will be constant.

Voice recognition software will make a significant appearance in the next twelve to eighteen months. The first voice recognition applications that work with continuous, rather than stilted speech have just been released. The cost of voice recognition software has dropped precipitously and, conceivably, could be one of the new features that is packaged with PCs in the next year or two. How will libraries integrate PCs that use voice recognition software? Should all public workstations be equipped with this capability? Should this capability be restricted to a limited number of workstations available only to the handicapped? Will the noise level in libraries increase beyond an acceptable level (whatever an acceptable level may be)? Does this mean that special precautions should be taken to install soundproofing in various parts of a library as it is renovated? There are no ready-made answers to these questions, but now is the time to begin considering them.

DVD is a technology that may begin to have an impact on libraries within the next eighteen months. As a
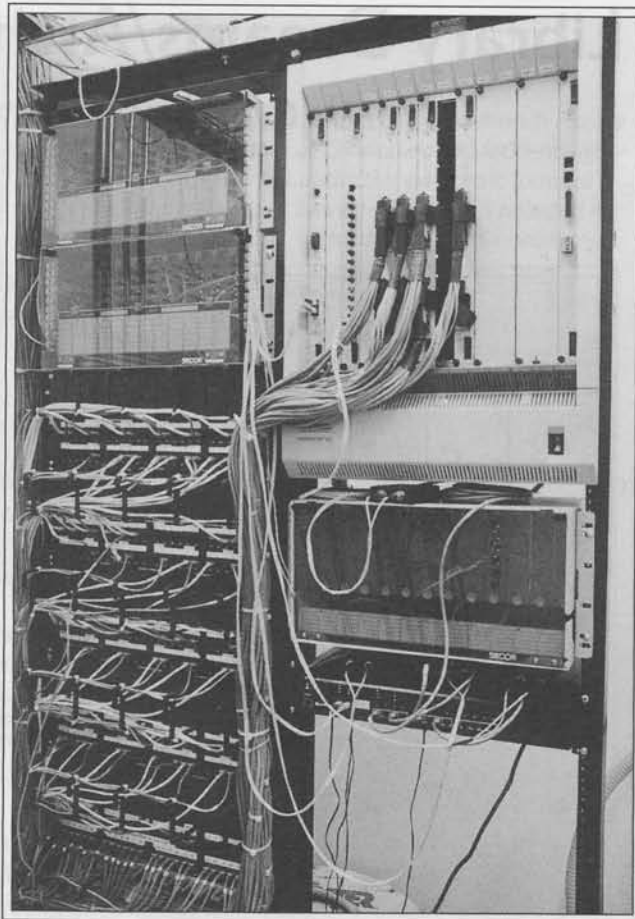
Wire management is accomplished in the renovated Joyner Library at East Carolina University with punch panels and hubs in eleven data equipment closets.

delivery medium for providing access to video-based materials, this technology has a number of distinct advantages over videotape. Not the least of these is the fact that wear and tear should be minimized. Also, it is likely that PC manufacturers will begin to sell their equipment with DVD players installed. When this happens, every PC in a library can become a video display unit, thus allowing VCRs to be phased out. PCs with DVD players installed should be available at reasonable pricing in about eighteen months.

It is apparent that there will be no decrease in the rate of technological development. It is apparent, too, that librarians need to consider the implications of these technological developments now and prepare to respond to the opportunities that will occur. Those librarians fortunate enough, or cursed enough, to be involved in planning a renovation of existing library space or a completely new space should become as informed as possible about the impact of technology on their facilities. Remember, however, that technology is a moving target that can never be brought completely within sight.

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