Planning for Technology in Libraries

▬▬▬ *by Kenneth E. Marks*

The integration of technology in libraries is not a new phenomenon. Libraries have utilized "high" or "new" technology for at least three decades and, in some cases, for more than half a century. Often the bulk of the equipment that was associated with these technologies was located outside the library so the planning that occurred was the responsibility of another organization. The symbols of these technologies that were located in libraries often were placed in convenient niches without consideration for the implications of their placement. They were add-ons to the principal tools used to perform library work and little, if any, thought was given to their integration into the library's work environment.

While technology was on the periphery of library activities, not extensively embedded in the full range of activities, it could be an add-on to the library environment. As long as technology was used in a limited manner by library patrons and staff, it could remain an appendage to the library building. During the 1980s the use of technology became pervasive in providing many library services and is now indispensable to what is considered to be the effective function of a library.

The role of technology in the workplace changed fundamentally in the decade of the 1980s as technology came to be equated with electronics and automation. Technology today is viewed as an indispensable factor in any organization's efforts to remain competitive in its part of society. This is true of libraries as well. There are a growing number of alternatives that offer library patrons timely access to information and entertainment. Technology offers libraries the prospect of being able to remain competitive by extending an alternative to the public seeking information and entertainment.

Many organizations, libraries among them, have struggled with the manner in which technology can be integrated in the workplace. This quandary regarding technological integration has been compounded in those environments where service to the public is important.

Technology, during the 1990s, must be seamlessly integrated into the full range of work and service found in libraries. The development of various levels of networking, improvements in telecommunications, and the continuing decline in the cost of computing combined with increasing storage capacities has removed many of the perceived impediments to utilizing technology more broadly in the library environment. Library patrons in the 1990s should be able to sit at a public access library workstation and have uncomplicated access to a wide variety of resources, some residing locally and many more located at a distance. Local area networking should become commonplace in libraries, permitting them to establish workstations that can provide access to a variety of local databases, indexes, and abstract services. The situation in which a patron has to move from one terminal to another to access different resources is no longer justified by technology. Neither will it be acceptable to have to master a variety of computer languages in order to access these resources.

Similarly, the development of multimedia computing offers the possibility that a single workstation will not only offer access to the typical data and text resources but also will allow access to a variety of sound and image resources, including video. The obstacle to installing these workstations will not be the technology, but the fact that libraries, generally, have tended to separate these resources. For the most part, they have not been accessible from one location. Local area networking will permit workstations to be distributed throughout a library rather than concentrated in a few locations.

If local area networking can be beneficial, so can metropolitan (MAN) and wide area networking (WAN), which offer the opportunity to connect to resources located at a distance. Access to other public access catalogs, text resources, and numeric databases located in other libraries is practical now using WANs. The challenge is how to design, construct or renovate, and arrange new or existing library facilities to allow technology to be used more effectively. This is a challenge that must be answered in the near term rather than be delayed until the next century. If libraries do not meet the challenge, other organizations will. Telephone companies and cable TV companies are two of the more obvious contenders for the opportunity to deliver information to the public.

Yet, how can a library be planned for technology? It can be suggested that technologies are evolving so quickly that it makes little sense to spend the time planning for something that will be quickly replaced. While it may be true that the particular technologies may change, the building infrastructure needed to support the technologies may remain adequate if

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it has been properly planned. Experience seems to indicate a number of basic considerations to focus upon in planning for technologies in libraries.

While automation has received the majority of the attention as libraries consider electronic technologies, there is a great variety of equipment that can be covered by this umbrella. Mainframe computers, minicomputers, the ubiqui-

tous microcomputers, telefacsimile equipment, modems, scanners, image setters, bridges, routers, brouters, printers, videotape recorders and players, video cameras, audio cassette equipment, videodisc equipment, and telephones are only a few of the items that are "electronic." Additionally, there is the more established microform technology. This technology is often lost in the shuffle of library planning. The result is a continued "bum rap" for a technology that has a definite place in most libraries. Reprographic technology (xerography) has become such an integral part of libraries that it is hard to imagine not having the equipment, but it, too, continues to evolve and requires planning. Finally, there is the library's print collection, which certainly represents a long-accepted technology. The need to accommodate print collections more effectively can hardly be disputed.

Still, the question remains whether it is possible to plan for technologies in libraries when the technology manifests itself in an expanding diversity of complex equipment. The answer is, of course. The key to effective planning for technologies in libraries is to avoid being captivated by the glamour of a technology, especially the electronic technologies, and to focus on the infrastructure of the building. As long as the basics are the focus of the planning process, librarians can plan successfully for both existing and new technologies.

*I*f you have never been involved in the planning process for a new library or the renovation of an existing facility, the experience will be a "learning experience." In preparation for any type of project, learn how to read a blueprint. Do not place yourself or your library in the position of being completely dependent upon an outside agent for understanding what is being presented.

Before the planning begins for a renovation project, obtain a set of the blueprints or floor plans for the existing facility. What may be available is a set of blueprints for the original facility. Most buildings, libraries included, undergo a number of renovations and alterations over time. Unless there are major changes, new blueprints will not have been prepared. Thus, the blueprints of the original building will have little relation to the actual facility. If that is the case, have a set printed that can be marked to document the present facility, including the pertinent information about power, lighting, and HVAC (heating, ventilating, air conditioning).

Regardless of whether it is a new facility or a renovation that is being planned, an inventory of equipment that will be in the building on opening day is a necessity.

The inventory must include the location of each item and whether it will be on a desk, a counter, or the floor. This is critical for several reasons. First, unless there is some fairly precise inventory of powered equipment, there will be little opportunity to calculate accurately the electrical load of the building. Second, if there is no indication where the equipment will be placed, the outlets may be located in a generic way that makes plugging in equipment next to impossible.

*I*t makes no difference whether the planning is for a completely new or a renovated library. The concerns remain the same. Focus on the basics: Provide the infrastructure in the library's physical plant that will accommodate existing technologies, new technologies, and unplanned or unanticipated technologies. If a library can be provided with an effective infrastructure, then technologies can be adopted as it becomes appropriate without a substantial reworking of the library's physical plant.

The basics that comprise the library's infrastructure include electrical power, lighting, HVAC, cable (wire) management, office landscaping, and equipment ergonomics. Indispensable to these aspects of any building is compliance with existing state and local building codes. Most librarians never have a need to work with building codes. However, if a librarian is going to be involved in any sizable construction project, it is probably wise to become familiar with the applicable building codes.

Electrical Power:

If one aspect of planning for technology in libraries is more critical than others, it is providing for an adequate electrical supply. Many librarians have experienced the frustration of finding that all the available electrical capacity in the library has been consumed and that gaining additional capacity will require a major, expensive utility project to bring the needed electricity to the building. If a new library is being planned, calculate the electrical power needs and then consider increasing that requirement by 50 percent to 100 percent depending upon the forecasts that can be made regarding the future use and integration of equipment in the library's activities. An underlying principle that should be kept in mind throughout the planning of a new facility or a renovated site is that *it will never be any less expensive to install the infrastructure than it is while construction and renovation are occurring.* Do

it correctly — or as correctly as can be projected — the first time!

The mere fact that a library has sufficient electrical power is not enough. The quality of that power must also be considered. Quality of power refers to the amount and frequency of variance in the electrical current that is passing over the utility lines. How many times does the library experience brown-outs during the high heating and cooling portions of the year as the community's demand for electricity consumes all the local electrical utility's ability to provide power? How often are there power surges and spikes in the electricity? Variations in the flow of electicity may cause more long term damage to equipment in a library than any other single factor. Spikes and surges cause wear on the chips and soldered connections that are found in electronic equipment. The damage is insidious because, typically, there is no immediate equipment failure; instead, there is a slow degrading of the effectiveness of the equipment.

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Most organizations are forced to address quality of power in an after-the-fact-manner by installing surge protectors on various pieces of equipment or in equipment rooms. If a new building is being planned, provisions should be made for the electrical power to be conditioned before it enters the building, thus smoothing out the variances in the current. The extent of a renovation project may dictate what can be done to improve the quality of power that is available to the library.

An aspect of many libraries that is overlooked in the planning is the number, type, and arrangement of electrical outlets. How many library offices and work areas are overrun by extension cords in direct violation of safety and building codes? How often is the final location of publicly accessible pieces of equipment determined by the availability of electrical outlets? Consider outlets on every wall in an office and specify that the outlet be fourplex rather than duplex. In work areas and the open public areas, electrical outlets should be located on each facing of every column. As a minimum, electrical outlets should be spaced every six feet, possibly closer, along all walls. Again con-

sider the fourplex rather duplex outlet. If it is determined there should be outlets in the floor, every effort should be focused on ensuring that the outlets are flush with or recessed in the floor. Raised electrical outlets guarantee a legacy of problems when furniture and equipment are inevitably moved in response to changing needs.

Conduit:

One aspect of construction or renovation that must be resolved early in the planning process is the matter of conduit. Conduit is required to house electrical wire and, in most jurisdictions, any type of electronic cable as well. All too often, conduit for computer cable or wiring is sacrificed as the costs of a construction or renovation project mount. This is extremely short-sighted and should be avoided if at all possible. The cost of installing the conduit at a later date will be exorbitant and extremely disruptive to the work of the library. Often if the conduit is not eliminated, there is an attempt to reduce the diameter of the conduit. Again, if one-inch conduit is projected as sufficient, one- and-one-half-inch or two-inch conduit should be installed. Nothing is more frustrating than finding that the conduit is filled and that there is no room for additional cable to be pulled. Typically, one-inch conduit is likely to be designed for most spaces. There will be a tendency to design the conduit layout for coaxial cable which is fine if there will never be any reason to put fiber optic cable into place. It is likely, though, that fiber optic cable will be the cabling media of choice in the next few years as its cost drops and the need for bandwidth for fast transmission of signals increases. Conduit for fiber optic cable requires a different bend radius from coaxial cable and probably should be the standard used for installation as insurance for future needs.

Lighting:

The effectiveness of the lighting plan in a library may be one of the most critical aspects of the building's long-term success. There has been a recognition that lighting has an impact on the usability of a library and the deterioration of the library's collections. The ongoing debate centers around the efficacy of task lighting for patron tables and carrels. When task lighting is used, space can be rearranged more easily without worrying about whether there will be adequate lighting. To be effective, task lighting requires a more extensive wiring grid to permit the efficient relocation of tables and carrels. Without an adequate wiring grid, additional electrical wire may have to be pulled each time you need to rearrange the furniture or equipment in an area. It will also require a greater monitoring effort to make certain bulbs are replaced regularly.

Another area of growing concern relates to the effect of ultraviolet light on paper and the resulting accelerating deterioration. There are filters and sleeves that can be installed on existing lights, and special lights that eliminate the ultraviolet spectrum from the lights, but each of these has an associated cost. While minimizing the effect of ultraviolet light may be important to a library, it may be dismissed out-of-hand by the library's parent organization because it would mean stocking another type of light bulb and would require additional time to replace the bulbs.

Heating/Ventilating/Air Conditioning:

While climate control is already a major concern in many libraries, its importance will increase as the quantity of electronic equipment increases. Electronic or electrical equipment generates heat. A single piece of equipment does not create much concern; but if there are several dozen pieces of electrical equipment operating most of the hours the library is open, they will generate a noticeable amount of heat.

"However, as the heat output of a terminal can vary between 50-100 W, comparable to the rating of a single fluorescent tube, problems may arise where banks of terminals or personal computer are available, e.g., online catalogues. Consultation with

architects or heating engineers will be necessary to determine the effect of this on the heating and ventilation requirement of the building."[1]

This is another reason to have the inventory of equipment, including locations, that was mentioned earlier.

Furniture:

The emphasis that is placed on preparing facilities for electronic equipment can cause problems in planning the rest of a library. In the rush to accommodate the symbols of "high technology," the users of that equipment, both library staff and patrons, are given short shrift in the planning process. Furniture and the space in which the furniture and various technologies is placed often receive very little thought.

There is a tendency to accept the standard of twenty-five square feet for a reader station as the standard for the wired electronic patron work station as well. However, a personal (micro) computer, including the keyboard and a printer, and some surface for working with books or journals

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will not fit comfortably in the space traditionally dedicated to a patron carrel. This need for expanded work space is accentuated when staff work space requirements are considered. It is clear that in most libraries traditional office equipment such as typewriters will still be needed in addition to the electronic office equipment. Confining a library staff member to 50, 75, or even 125 square feet may create an intolerable work environment.

Influencing the square footage needed for an adequate work space will be the set of factors that are encompassed by the term "ergonomic." Ergonomics is defined as "the study of people in relationship to their working environment. It is concerned with the design of man-machine interfaces to improve factors affecting health, efficiency, comfort, and safety."[2]

Libraries are not unique in having traditionally ignored these factors that make the work environment more conducive to a productive staff. A work space should be large enough to accomodate a workstation that has the computer screen positioned so that the user looks down at an angle of fifteen to twenty degrees. The

eye-to-screen distance for the user should be twenty to thitry-five inches. If the individual is working with copy, it should be held at the same height as the screen. The work surface on which the workstation is located should be adjustable so that the keyboard is about thirty inches from the floor. This will allow the person's upper arms to hang vertically and the forearms to angle downward slightly. This presumes there is a chair with five casters and an adjustable seat height of fifteen to twenty-one inches above the floor, with an adjustable backrest to support the small of the back. All furniture should be certified as nonstatic and chairs or tables with casters should be lubricated with graphite. A cramped work space will not allow an ergonomically effective arrangement of the equipment to be achieved.

Indispensable to the effective use of space for technologies is the ability to rearrange or redefine that space from time to time. Permanent load-bearing walls should be minimized to permit the greatest amount of long-term flexibility in the use of space. One option that has been used in some libraries is modular walls that are hung in place and can be relocated. A drawback to this approach is the fact that it may still require a specially trained crew of workers to rearrange an area.

A more effective approach is the use of office landscaping. There are a variety of companies that can provide a broad range of furniture designs that are assembled in a manner that permits their ready rearrangement. One of the most critical considerations in office landscaping is the way in which wiring and cabling is managed. The best office landscaping will provide channels that allow the cabling to be hidden from sight while it is readily accessible when changes or additions need to be made.

P lanning for new or renovated library space is not a solo act. Depending upon the library's parent organization, a building committee with a diverse membership including representatives from a variety of other agencies may be mandated or politically wise. There may be architects, interior designers, and engineers (electrical, acoustical, lighting, mechanical, etc.) who will bring needed expertise to the planning process. As important as these participants in the process are, the full involvement of the library staff, both professional and nonprofessional, is crucial. Library staff will have to live with the good and bad results of the planning, so they should have substantial input. This is

particularly important as furniture and equipment are placed in the various work areas. Library staff are the only ones who can visualize whether a particular design will function effectively within the context of the work to be done in the building.

The reaction of library staff to the prospects of planning a new library or renovating existing space may range from an enthusiastic desire to be involved to an effort to distance themselves from the project. Regardless of the initial reaction, an effective first step is to have the staff meet with the architects, consultants, and any other participants to become acquainted with the members of the team and to learn "first hand" the process that will be followed and the likely timetable. Once the "get-acquainted" meeting is concluded, the project team should meet with the staff of each unit to learn directly their space concerns and needs. The staff can also participate in preparing the inventory of existing equipment. This is a good time for the topic of temporary relocation of work groups to be discussed. If staff understand that library administration is genuinely interested in garnering their opinions and reactions, staff involvement should not be a problem. What may become a problem is the many iterations of the building program that will be required and the need for exhaustive discussion of the minutiae of the project. This process can be considered successful if staff think of the building and the program as theirs.

Technology can be planned for in libraries even if our crystal ball is often clouded. It is not important to comprehend the specific technology as long as an adequate infrastructure is designed for the library. The crucial element is to plan for today, tomorrow, and next century. If there seems to be one consistent characteristic to planning library infrastructures, it is the tendency to underestimate the demands for electrical power, the need for appropriate levels of heating, cooling, and humidity control, and adequate space for patron and staff interaction with the new technologies. Careful attention to detail on the part of library administration and extensive participation by library staff can minimize the likelihood that future technologies will surprise us.

References

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[2]Dennis Longley and Michael Shain, *Van Nostrand Reinhold Dictionary of Information Technology*, 3d ed., (New York: Van Nostrand Reinhold, 1989), 196.