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# Library automation's affect [sic] on library interior design : a study of how technologies for public service have affected the interior design of California public libraries

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Library automation's effect on library interior design: A study
of how technologies for public service have affected the interior
design of California public libraries

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San Jose State University, 1992

LIBRARY AUTOMATION'S AFFECT ON LIBRARY INTERIOR DESIGN:

A STUDY OF HOW TECHNOLOGIES FOR PUBLIC SERVICE HAVE

AFFECTED THE INTERIOR DESIGN OF CALIFORNIA PUBLIC LIBRARIES

A Thesis

Presented to

The Faculty of the Division of Library and Information Science

San Jose State University

In Partial Fulfillment

of the Requirements for the Degree

Master of Library Science

by

E. Ruth Harder

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APPROVED FOR THE DIVISION OF LIBRARY AND INFORMATION SCIENCE

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# ABSTRACT

## LIBRARY AUTOMATION'S AFFECT ON LIBRARY INTERIOR DESIGN: A STUDY OF HOW TECHNOLOGIES FOR PUBLIC SERVICE HAVE AFFECTED THE INTERIOR DESIGN OF CALIFORNIA PUBLIC LIBRARIES

by E. Ruth Harder

This bibliographic study and library survey addresses ways in which technologies for public service have affected the assignable interior public service areas of public libraries in California. The focus is on function and aesthetics of the design, specifically in the areas of space utilization, furnishings, and lighting. Eleven California public libraries tell how they renovated interiors or built new facilities to accomodate library automation. The survey addresses design concerns such as access and flow; workstation size and ergonomics; veiling reflections and glaring on computer screens; and electrical wiring problems. New design elements such as "electronic islands" for the OPAC, and study rooms for public use computers are becoming as much a part of the new public libraries as the card catalog used to be. New interiors are becoming more focused on the library user. Librarians are becoming more knowledgeable and more actively involved in the planning stages of new facility building.

## DEDICATION AND ACKNOWLEDGEMENTS

Dedicated to my husband, Chuck Harder.

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# CHAPTER 1

## INTRODUCTION

This study will address ways in which technologies for public service have affected the assignable interior public service areas of public libraries in California. The study will focus on the function and aesthetics of library design, specifically in the areas of space utilization, furnishings, and lighting.

The best library interiors are those in which there is no obvious disparity between all the elements that create the whole. The basic Latin terms relating to architecture are *firmitas* or structural stability, *utilitas* or function, and *venustas* or aesthetic appearance (*Vitruvius' Latin Text*).[1] These terms are also relatable to interiors. Libraries are often the focal point of a community, campus or business complex and should be designed to last. The interior appointments and furnishings should be solid and able to withstand frequent usage. The basic component of library design is function. How well a library building functions is important. When a building interior is functional, it is probably arranged well, and lighted properly. A library becomes beautiful to both the staff and the users whenever it works efficiently. Lastly, the physical appearance, the ambience, may determine whether or not people find the library an inviting and comfortable place to research information. Aesthetic design does not necessarily bring function along with it, but when serious

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[1]*Encyclopaedia Britannica*, 15th ed., s. v. "The Art of Architecture."

thought and planning are inherent in the interior design, a functional design can be beautiful.

It is very important that libraries are designed for users in order to continue to attract people to use libraries.  While we are still far from being a paperless society as Lancaster (1982) and others predicted, the computer is revolutionizing services to the public.  Library users are being offered alternative information services beyond the walls of the local public library.  An extreme example of alternative services is that of the Catawba Waterbee Health Education Consortium in rural South Carolina that has established a "library without walls."[2]

Libraries have a different appearance because of the integration of automation into the design as a whole.  Many libraries -- Carnegies, 1960s large open room,  shopping center branches -- have installed technologies and forever altered the existing design.  Some are aesthetically appealing.  To illustrate, the April 1990 American Libraries shows Yale University's Sterling Memorial Library English Gothic design intermingled effectively with custom-designed tables and chairs for public access terminals.  Similarly, the historic Pasadena Public library restoration boasts a refinished oak circulation desk that is authentic on the outside, while being modular on the inside.  The visual display terminals work surprisingly well with the decor.[3]

Almost all library interiors are affected by the changes which technologies have brought to their facilities.  It is now commonplace to walk into any kind of library and find computer workstations.  The initial appearance of the

[2]Eric L. Morgan, "Implementing a Library Without Walls," Conference Proceedings of the Sixth Annual Computers in Libraries '91 Conference (Oakland, California, March 10-13, 1991), 125.

[3]American Libraries, "Interiors Showcase." (April 1990): 348.

library is sometimes similar to that of an automated office. Many special libraries rely heavily upon computer access to in-house reports, CD-ROM products, database access, online catalogs, desktop publishing, and facsimile or electronic mail service to patrons. These libraries, or "information centers," are sometimes small, and largely composed of CD-ROM and online terminals. A few bookcases and journal shelves give one the clue that it really is a library. Libraries on most college and university campuses in the United States have visual display terminals (VDT) for the online or CD-ROM catalogs. School libraries and public libraries add computers and automation equipment as soon as their budgets permit.

With technologies moving so rapidly there is a need for the technologies to be incorporated into the "fabric" of all new library interior design, and there is a need for guidelines for those who are renovating. The addition of technologies affects both library renovations and new library designs. Architectural considerations for lighting, wiring, telephone lines, furnishings, workstations, and space considerations are all affected by the addition, or the incorporation of automation into a library building. It is imperative that early planning take place if the automated services are to be integrated smoothly into an existing or new library facility design. Automation has an impact on design, and design of the facility has an impact on how usable the technologies for public service will be in any library.

From the general library space planning literature, one gets the picture that automation has not caused a significant change in the *total planning* process. Library design must begin with an understanding of the functional requirements of the facility. All planning, whether for a new building or renovation of an existing facility, is best when it is founded on the mission

statement and goals of the library organization. Planning for service is at the core of planning for technologies. Service is the most important ingredient in any library, and technologies are an enhancement to service. Computers give information seekers more access points to the literature than has ever been possible before with card catalogs and other indexes. Networks among libraries make the joint use of information resources possible. Online public access catalogs, circulation modules, network systems, dial-up catalogs, and CD-ROM products can greatly enhance public service.

While a networked system of information dissemination seems to be an alternative to paper, books will be the mainstay of the public library for some time to come. Therefore, planning for automation does not mean planning a smaller area, or planning for less growth.

Public libraries have perhaps been "caught up" in the wake of the technological wave more than any other library group. They are at the mercy of public funding as well as public demands for library services. Sometimes several years pass from the beginning architectural plans until ground is actually broken for construction to begin. Some public libraries that were in the architectural planning stages during the early phase of the availability of library automation now find that plans have to be revised again and again as even newer products are marketed. Still others, housed in historic buildings for which electricity and running water was the last major improvement, now find an even greater interior design challenge as technologies are incorporated into the facility.

This thesis investigates how libraries have integrated technologies for public service into the interior design of the public library. It will specifically address the affects of technologies on public libraries in California. A number

of questions regarding interiors and automation which the thesis addresses
are: (1) How have public libraries, constructed as recently as the late eighties,
planned ahead? (2) What lighting solutions, with regard to VDT screens, have
been utilized by public libraries; and how successful are these lighting
arrangements? (3) Have public libraries in California retained card catalogs in
tandem with online public access catalogs? (4) Do public libraries have patron
dial-up access to their catalogs? (5) Are all departments, including children's
introducing the online public access catalog at once? (6) How many patrons
can access the online catalog at once; and what criteria, if any, is being used to
determine how many terminals are installed? (7) Are people waiting in line to
use technologies? (8) Is electronic media beginning to replace books? (9) Are
libraries depending on premanufactured furniture for workstations or auto-
mation equipment, or are they having these furnishings custom made? (10)
When libraries choose online catalog workstation furniture, are they providing
wheelchair access?

All of the foregoing questions will reveal to some extent the library's
responsiveness to patron's needs as interiors change to accommodate
automation for public services. The way the lighting is handled in screen areas
could determine whether or not a patron accepts technologies for public
service. It could have a lot to do with staff acceptance and job satisfaction.
Whether or not a workstation is comfortable could be a deciding factor on
whether a patron wants to use the library at all. Convenient spacial arrange-
ments, an uncrowded atmosphere, and logical departmental "flow" are very
important to library user and staff satisfaction. From the general questions,
some specific survey questions which hope to answer some of the concerns
were formulated (see *Appendix C*).

The author found *no other studies of this particular kind.* This study hopes to find that the interior designs for public service areas of new or recently renovated public libraries are being driven by lighting, furnishing, and space planning considerations for automation. The research hopes to find that interiors are becoming more focused on the library user, and that librarians are actively involved in the planning stages of facility building or renovation. How California public libraries are handling space planning, furnishings, and lighting for the addition or incorporation of technologies for public service is the subject of the survey. The resulting successes or failures are detailed in the results of the survey.

What makes the study important is that findings could help answer facility planning problems for public librarians who are beginning to renovate for technologies, or planning a new building to incorporate technologies. Findings from this study may also help to solve or to avoid design problems encountered by others.

# CHAPTER 2

# LITERATURE REVIEW

Automation brings with it a set of interior design problems which can seriously affect whether or not the workstation and other areas are comfortable and efficient to use. Space planning, furnishings, and lighting related to technologies for public service are specifically detailed in this paper. Other issues which are an outgrowth of the study are ergonomics and electrical wiring. These issues are of primary importance for the increased usage of technologies for public service in public libraries in the "Information Age."[4]

"Historically, libraries were designed with a deep appreciation for achieving a balance between function and beauty," writes Sherer (1990).[5] Designs demonstrated a reverence for the past and respect for the future. Many libraries built in the 1960s demonstrated a lack of balance between aesthetics and function. Eric Rockwell (1989), in the "Seven Deadly Sins of Architects," writes that architects are more interested in creating a *look* or making a *statement* than they are in providing a functional library building. He recounts libraries with a number of architectural ills. Rockwell writes, "Too many libraries are built without adequate provision for computer networks and other signal distribution systems."[6] Cohen states that hidden light switches have been introduced by designers because they thought light switches

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[4]See *Definitions* in *Appendix A*.
[5] Jeffrey A. Sherer, "Function vs. Beauty," <u>American Libraries</u> 21 (April 1990): 312.
[6] Eric Rockwell, "Seven Deadly Sins of Architects," <u>American Libraries</u> 20 (April 1989): 341.

weren't attractive. Cohen also writes about architects who are more concerned with architectural highlighting than lighting.[7] From these articles one gets the message that in the past librarians may have not been involved in the architectural planning process, or may have allowed architects to tell them how the interiors should look.

In the special libraries literature one can find some detailed information on planning for technologies. Hodge and Lawrence in "Planning for the Electronic Library," have a special library, rather than public library in mind. The planning advice seems to fit the public library as well: "The first (step) is to develop a strong background knowledge of potentially useful technology and design resources." Second, one should set objectives for the library or information center based on user requirements, and third, one should define the facilities and services to meet these objectives. From user and plant surveys plans are formed for work and task flow. Details such as antistatic carpeting and "an abundance of electrical outlets," modular furniture, ergonomic factors for chairs and workstations, telephone outlets, emergency power backup, facsimile, and photocopy equipment are filled in from surveys taken at the subject plant or corporation. The best piece of advice seems to be, "Behave as if you are the construction project manager."[8]

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[7] Aaron Cohen and Elaine Cohen, Designing and Space Planning for Libraries. New York: Bowker, 1979): 5.

[8] Patricia Hodge and Barbara Lawrence. "Planning the Electronic Library." In Managing the Electronic Library: Papers of the 1982 Conference of the Library Management Div. of Special Libraries Assoc., ed. Michael Koenig. (NY: Special Libraries Association, 1983): 14, 16-18.

## Space Planning

The planning process for interior design for automation is perhaps the most important aspect, because it is, in effect, the foundation for all the details. Space consideration in particular is impacted in many ways by automation. Everything just seems to take up more room. The "Wheeler-Githens Formula" of .55 square feet per capita is no longer the accepted rule for determining the size of the library, but more likely .75 square feet or more than 1 square foot per capita.[9]  Simply because of increased book publishing (largely due to technologies and new knowledge), book collections are growing rapidly. Automated library systems have shifted work flow and require a more complex arrangement of the total library.

Authors in the literature discuss new library facility planning at length. While some authors such as Dahlgren (1985) touch on the subject of technology planning, even the newest editions of books on facility planning do not seem to have a lot of *detailed* information about planning for the incorporation of technologies into the public areas of the library.  Perhaps the reason could be, as Thompson states,"...changes are taking place at such a speed that anything that is written today is bound to be out of date by the time this book is printed."  He further states "drastic changes will come...the rate of change will depend less on the ability of thinkers than on the funding which will be approved."  To illustrate, some of the recent literature still refers to card catalogs within the scheme of things.  "The traditional card catalogue is still used world-wide (Thompson 1989)."[10]  Fraley and Anderson (1990), in Library

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[9]Raymond Holt, "Trends in Public Library Buildings," Library Trends (Fall 1987): 273.
[10]Godfrey Thompson, Planning and design of library buildings, 3rd ed.(London: Butterworth Architecture, 1989.):13-19.

Space Planning, write, "During the space assessment, measure all card catalog cabinets and complete a furniture record for each section."[11]  No mention was made in these writings about running card catalogs in tandem with the online public access catalog.

Measuring everything is important, so that final arrangements can work. Room for chairs and open space to move people around equipment areas is important.  Due to automated equipment for data searching, more room is required at the reference counter and circulation desk.  Of course, special patron areas for searching the online catalog must be carefully planned.

At least one writer (Holt 1987) is concerned about flexibility, or the ability to change the way things are arranged as it becomes necessary.  Flexibility is an important aspect of planning for space.  The trend is toward library buildings with enhanced electrical and communications capabilities, which includes planning for easy access to power sources.  According to Holt (1987), "... flexibility has taken on a new meaning as public libraries attempt to provide appropriate space for nonprint media and replace manual operations with automated systems."[12]

A planning document, Checklist of library building design considerations, is available from the American Library Association.  Section 3, "Interior," and Section 14, "Communication Equipment and Electrical," are both applicable and useful checklists.[13]  Location of service desks and PAC relationship to the service area is an important planning feature.  The first

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[11]Ruth A. Fraley and Carol L. Anderson, Library Space Planning. How-to-do-it Manuals for Libraries Number 5. Series editor: Bill Katz. (New York: Neal-Schuman, Inc. 1990.), 92.

[12]Raymond Holt, "Trends in Public Library Buildings," Library Trends (Fall 1987): 275.

[13]W. W. Sannwald, Checklist of Library Building Design Considerations, 2d. ed. (Chicago: Library Administration and Management Association, Div. of the American Library Association: 1991), 7-9, 41-46.

question on the checklist, "Interior," is an important design consideration. "Are all public service elements of the building easily located from the entrance?"[14] New users could become confused if confronted by corridors, machines, or anything other than some kind of service desk or guiding signage. To further highlight *Section 3*, the question, "Is the catalog easily accessible from all parts of the library and/or PAC's distributed throughout the collection?" is important to interior design regarding PAC implementation.[15] While access to the catalog is discussed here, these authors don't discuss how libraries establish the correct number of online public access terminals for a given library. All of these space planning questions relate to function. While some users only want a comfortable place to read, many of today's users want to quickly find a specific piece of information and then leave. Automation seems to promise the patron that can happen. To further illustrate, some questions from Section 14 are: "Are workstations or carrels used for electronic equipment staggered to enhance noise control and privacy?" and, "Are the areas where electronic equipment is used well ventilated and comfortable?" Both questions demand a "yes" answer if the library is to be all it can be for the user.[16]

Fraley and Anderson's, Library Space Planning, is another general reference source for library space planners.[17] The advice Fraley and Anderson offer is, "If planning is an ongoing process, the framework for implementing a space reconfiguration will be in place..."[18] Eleven pieces of information are essential to the planning process.

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[14]Ibid., 7.
[15]Ibid., 9.
[16]Ibid., 41.
[17] Fraley and Anderson, Library Space Planning.
[18]Ibid., 27.

1.  Institutional mission statement.
2.  Library mission statement
3.  Institutional and library budget information copies of justifications, etc. Energy uses and changes.
4.  Space utilization reports and studies done in past.
5.  Photographs of the past.
6.  Collection housing measures and notes.
7.  Equipment and furniture inventory.
8.  Building blueprints.
9.  Institutional space inventory.
10. Outline of present work flow.
11. Budget information, proposals, bids, specifications of earlier work. [19]

These eleven pieces of information relate to planning for automation as well as planning in general. (1, 2) The mission statements will define the function of the facility which will in turn clarify the need for automation, or expansion of existing technologies. (3, 11) Budget and energy uses are a consideration. These pieces of information will determine what the library can afford in terms of the whole renovation for technology, or plans for a new facility. (4, 5) Past studies on space utilization and photographs are good ways to determine what worked well and where improvements can be made in terms of space utilization. (6, 7) Collection, equipment and furniture inventories are essential to the smooth transition. Some pieces may work well in the new interior, and even find a new function, while some simply may no longer be usable. Some parts of the collection may do well to be weeded, moved, or even replaced with new media. (8) Building blueprints of the existing facility are essential for renovations to show where electrical wiring, telephones, load bearing walls, and the like are located. For new buildings, it helps to show how everything fit together in the older facility. (9) If the library is part of an institution, an institutional space inventory would be valuable to show where

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[19]Ibid., 28.

the library might expand, or be located more effectively. (10) An outline of the present work flow may provide a guide to work reassignments or other administrative concerns due to a new way of providing services once automated features are installed.[20]

**Planning: Access/Traffic**

Lushington states that "Planning a library building must start with an understanding of people's aesthetic needs and functional requirements of being able to quickly and easily gain access to an increasingly bewildering array of materials and services."[21] Each service area is unique in some way (such as children's reference services) yet has some relationship to other services. Rohlf has likened service desks to a series of spokes and hubs, each one touching each other. Staff work areas should be connected with service points, with machines in view of staff, and service points in view of patrons who enter the area.[22] Holt proposes a method of bubble diagrams which indicate relationships of areas as a useful way to begin planning the total library.[23]

Spaces should be designed so that people can move easily around and through various areas of the library. The impact of circulation space on square footage is that 15% of the area is allowed just to move people.[24] Aisle space for book shelving has been established at 36 inches, and that standard should also apply for movement through or around an equipment area. Whenever

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[20]Ibid., 28.

[21] Nolan Lushington and James M. Kusack, _The Design and Evaluation of Public Library Buildings_ , 24.

[22] Robert H. Rohlf, "Public Service Points," _American Libraries_ 20 (April 1989): 304-306.

[23] Holt, _Planning Library Buildings and Facilities,_ 48-52.

[24] Robert J. Hensley, "Designing Libraries for the 21st Century," Presented at the California Library Association Conference, Oakland, California, Nov. 16-19, 1991.

lines are anticipated around machine areas such as photocopy machines, extra space should be allowed for the anticipated typical number of people waiting in line. Lines can be directed to one side of the equipment or some other direction by means of roping, especially in areas such as the circulation desk during peak hours.


## Planning for Electricity

Electricity requirements are impacted considerably by technologies for public services. Wiring, location of outlets, switches, lighting configuration, telephones, and data lines are all important aspects of the plan for automation. Fraley and Anderson write about electrical requirements for technology. Location of equipment is important, particularly when some electrical equipment may require 220 wiring. The decision to locate or move equipment should be done with the power and grounding requirements thoroughly understood and noted on architectural drawings. Contractors will normally follow the National Electrical Code.[25] "The amount of power coming into the building, the amount available to the library, and the load on each line is of prime importance."[26]

Dahlgren, who devotes only six paragraphs to "computerization" in Planning the Small Public Library, writes, "Running conduit for electrical service and data cable to 10 projected terminal locations is expensive, more so if several of those locations are never used."[27] A particular concern with this

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[25]National Electrical Code. (Quincy,MA: National Fire Protection Association, 1989)
[26]Fraley and Anderson, Library Space Planning, 84.
[27]Anders Dahlgren, Planning the small public library. (Chicago: American Library Association 1985.),16.

advice is the expense of re-wiring, running conduit and cables to add terminals at a later date. Dix, on the other hand, states that planners can opt for flexibility and "plan to bring power and data wiring to every conceivable point in the building."[28]  Dowlin, who is involved in planning the large San Francisco Public Library says that wiring will be under the floor in a grid pattern every four feet.[29]

## Furniture

Furnishings are impacted by automation.  Circulation desks, as well as other public service desks must now be planned as automated workstations which provide for the associated wiring and computer equipment.  Patron terminals must be located on counters, carrels, workstations or desks which are appropriately designed and safely, aesthetically wired.  Since both library workers and patrons will sit at visual display terminals, sometimes for long periods of time, ergonomic[30] design has to be taken into consideration.

In The Design and Evaluation of Public Library Buildings, Lushington and Kusack devote a chapter to "Planning for the future."[31]  They state that, "Microfiche, CD-ROM, and other optical disc technology will access huge amounts of recently published ... materials in greatly reduced space, but with considerable additional machine work station space and electrical needs."

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[28]William S. Dix, "Space Planning for New Technology." American School and University 62 (February 1990): 64a,b.

[29]Kenneth Dowlin, "A Presentation of the Plans for the New Main Library in San Francisco," Presented at the California Library Association Conference, Oakland, California, Nov. 16-19, 1991.

[30]See Definitions in Appendix A.

[31]Nolan Lushington and James M. Kusack, The Design and Evaluation of Public Library Buildings (Hamden, Connecticut: Library Professional Publications, 1991), 12-16.

They refer to "stand-up access" because of the speed of searches. Predictions for 1990 are that public access computerized catalogs will replace card catalogs; there will be a proliferation of local area networks to access other local and regional libraries; and there will be public terminals to use CD-ROM databases, such as encyclopedias. The general trend, as they see it is a gradually decreasing need for book storage needs, and an increasing need for electronic workstations and cable transmission systems.

In the Lushington and Kusack chapter on, "Library functions related to library roles,"[32] there is a brief discussion of requirements for seating, desks, work surfaces, computer equipment and screens for staff, but not the patron areas. Andrea Michaels says that library furniture is replaced no more frequently than about every twenty years.[33] Her statement raises the question of how libraries are coping with the rapidly changing computer environments, and consequently the changing furniture needs.

**Furniture: Workstations**

Cohen and Cohen (1987) have researched and written about planning furniture for computer workstations. The potential location of each terminal should be indicated on the architectural drawing. An individual workstation area takes up about 35 square feet, a microform reader-printer takes up 30 square feet, and a freestanding computer workstation often requires 60 square feet.[34] A design which would be conducive to privacy for the online public access catalog searcher is featured in a picture of the William H. Hall Free

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[32]Ibid., 51.

[33]Andrea Michaels, "Design Today," Wilson Library Bulletin 62 (April 1988): 55.

[34] Elaine and Aaron Cohen, "Trends in Special Library Buildings," Library Trends 36 (Fall 1987): 310-311.

Library in the *American Libraries* "Interiors Showcase."[35] It is almost

completely enclosed in a cubicle with an entrance opening to one side, which

is not the screen side. The cubicle appears to take up approximately 5 x 7 feet,

which is a 35 square feet area as Cohen describes. One wonders whether or

not online public access catalogs which are not a part of groupings or

clustered arrangements require 35 square feet for each terminal.

New equipment and furniture, such as counters, carrels or workstations

to put it on should be carefully thought out and measured. Workstation furniture

should be sturdy, ergonomic, and should assure a patron's privacy. Public

libraries need durable furniture, and traditional library furniture manufacturers

have provided that kind of product for traditional furnishings for many years.

When the computer first became a regular piece of library equipment,

workstations were only available from office equipment manufacturers. The

kind of wear resistance needed by libraries was not inherent in those

workstations or systems furnishings. The alternative was to have counters or

workstations custom made, which many libraries did. Over the past couple of

years the library manufacturers have come up with a line of computer furniture

that seems to fill the need.[36]

There are a number of "rules of thumb" for determining the needed

number of OPAC terminals. Each of the following "rules" is from notes from

Library 240 at San Jose State University.

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[35] "Interiors Showcase," American Libraries 22 (April 1991): 346.
[36] Gaylord 1992 Library Supplies and Reference Catalog, (New York: Gaylord Bros. 1992): 225, 229, 231,233-40

1. One OPAC terminal for each 15,000 circulations.
2. One OPAC terminal for each 100 to 150 persons who enter the library on days of heaviest use.
3. Ten OPAC terminals for each OCLC terminal.
4. Four OPAC terminals for each circulation terminal.
5. An activity index can be created by adding together:
    A. Registration of patrons per year ( in thousands);
    B. Circulation per year (in thousands);
    C. Number of square feet in floor space (in thousands);
    D. Reference questions per year (in thousands);
    along with a constant 41.64 to provide a floor number for small branches. The formula 41.64 + A + B + C + D = the activity index. The activity index number divided by 100 gives the minimum number of online catalog terminals needed.
6. Another formula is: number of OPAC terminals = 1.23 multiplied by the number of people checking out books per hour + 11.53.[37]

## Furniture: Ergonomics

The ergonomics of computer workstations as a separate topic was not addressed extensively in the reviewed *library* literature. All of the many tasks applied to a workstation environment require a different set of ergonomic considerations. According to Veatch (1987), "If the element supports the task, it is ergonomic; if it inhibits the task it is poorly designed."[38] In a multimedia environment, the furniture should be ergonomically designed, with the human-machine interface in mind. Chairs, tables, carrels, counters, and workstations should provide comfort for large and small people. Child-sized units should be available in the children's section of the library, and the biggest man should be able to sit or stand at the terminal without getting a backache, neck strain, or eye strain. Keyboards should be at a comfortable height, that is, the arm bent

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[37] Linda Main, Library 240, <u>Advanced Microcomputer Applications in Libraries</u>. (San Jose State University, Fall 1989)

[38]Lamar Veatch, "Environmental design for library buildings," <u>Library Trends</u> 36 (Fall 1987), 372.

at a 70% angle when working to avoid wrist, elbow and hand strains. A person in a wheelchair should be able to use the public access catalog. Adjustable workstation units are recommended to accommodate the variable sizes of users.

One of the ways librarians can assure that the human-machine element is taken into consideration is to comply with the standard which specifies the correct measures for workstations (seated) with visual display terminals (VDTs). The *American National Standard for Human Factors Engineering of Visual Display Terminal Workstations, ANSI/HFS 100-1988* specifies standards for human factors engineering principles for the design of VDTs (based on CRT technology) and associated furniture. The VDT applications are described as "text processing, data entry, and data inquiry." This standard is intended for use by professionals who have technical responsibility for the design, installation, and setup of VDTs, the associated furniture, and the work environments. The standard is for seated users and does not apply to standing.[39]

**Lighting**

Lighting is one of the prime considerations for planning for automation. The quality of lighting from fenestration[40] and luminaires greatly affects whether a screen area is usable. Waters and Winters (1987) write that until recently, library lighting was planned by electrical engineers and designers who generally used a "quantitative" approach. The emphasis was placed on

[39] American National Standards Institute, <u>American National Standard for Human Factors Engineering of Visual Display Terminal Workstations</u>, ANSI/HSF Standard No. 100-1988, (Santa Monica, California: Human Factors Society, Inc, 1988), 5.
[40] See *Definitions* in *Appendix A*.

general quantities of illumination, with little consideration for an individual

user's comfort, color rendition of the source, aesthetics, or energy

conservation. Typical public institution layouts consisted of fluorescent

luminaires equally spaced across the ceiling. Lighting for the library should

place an emphasis on the "qualitative" approach in order to emphasize the

quality of the light being provided, provide a pleasing atmosphere and result in

an energy efficient system design.[41]

Lighting in screen areas, with reference to concern for glaring and light

that is too bright or too dim is discussed very briefly by Lushington and Kusack

(1991). While lighting in general is covered, nothing is said about lighting

screen areas for patrons. In the summary of lighting considerations they state,

"Select lenses or louvers that diffuse light and prevent glare."[42] While

Thompson (1989) devotes a chapter to "lighting" in his work, he does not go

into any detail about lighting for online public access catalogs in the public

areas.[43]

The problem for libraries is that both reading tasks and screens are

usually under the same lighting system. One lighting strategy is to provide

uniform fluorescent lighting throughout the library, and task lighting for areas

where more illumination is needed. Cohen states that one wants to achieve a

visual comfort probability (VCP)[44] index of 70 or better.[45] That means that 70

out of 100 people are comfortable in light from a particular fixture. Illumination

[41] Bradley A. Waters and Willis C. Winters, "On the Verge of a Revolution: Current Trends in Library Lighting," Library Trends 36 (Fall 1987): 327.

[42] Nolan Lushington and James M. Kusack. The design and evaluation of public library buildings. (Hamden, Connecticut: Library Professional Publications1991)

[43] Godfrey Thompson, Planning and design of library buildings, 3rd ed.(London: Butterworth Architecture, 1989.) 63-71,116-126.

[44] See Definitions in Appendix A.

[45] Aaron Cohen and Elaine Cohen, Designing and Space Planning for Libraries. New York: Bowker, 1979): 5

over a visual display terminal should not be more than 50 footcandles

according to consultant Sy Silver.[46]   Ramsey and Sleeper (1989) write that the

Illumination Engineering Society (IES) recommends 70 footcandles for general

writing and reading.[47]  In Guide for Educational Facilities Lighting, the IES

recommends that the general reading range should be from 50 to 100

footcandles, but the screen area range should be from 5 to 10 footcandles.

The footnote to the table where the information for screens is found reads,

"Especially subject to veiling reflections. It may be necessary to shield the task

or reorient it."[48]

Kaser writes that there are three pressures that "muddle what should be

a simple issue." These pressures result from aesthetics, economics, and from

market forces. Market forces can result in the over lighting of library spaces.

Task lighting, while aesthetic and seemingly economical can be costly in terms

of bulb replacement, or even entire fixture replacement due to vandalism or

theft.[49] As for aesthetics, some designers look at uniform lighting as uninspired

or even ugly and institutional. Designers see illumination as a vital part of the

aesthetic composition of the interior design. Contrasts in light and shadow are

utilized for effect. What is overlooked in this "effect" is that heavy contrasts of

light and dark can produce a poor reading environment, and can even cause

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[46]Sy Silver, telephone interview by author, Notes, Livermore, California, 8 October 1991.

[47] Charles G. Ramsey and Harold R. Sleeper, Ramsey/Sleeper Architectural Graphic Standards, Robert T. Packard, 7th edition editor --Student edition abridged from the 7th ed., Stephen A. Kliment, ed. (New York: Wiley, 1989): 52.

[48]IES RP-3-1988, 10-11.

[49] David Kaser, "The Role of the Building in the Delivery of Library Service," In Access to Scholarly Information Issues and Strategies. (Ann Arbor, MI: Pierian Press, 1985): 13-24.

disorientation. It can also produce undesirable glaring, which can be temporarily blinding to anyone, but is especially hazardous to older patrons.[50]

Cohen writes that as the human eye ages, lenses begin to thicken and discolor, making it more difficult to focus on reading materials. The eye's ability to deal with light intensity, glare, and contrasts is affected as well. Greater light intensities are needed in order for people to see. Bifocals and trifocals are worn by many library patrons. Since libraries as yet have not come up with a "seeing standard," it is important to take these sight problems into consideration when planning for lighting libraries.[51]

Waters (1987) says that some task lighting systems produce undesirable glaring from ceiling and/or wall reflections.[52] Luminaires should be chosen which are glare free. One should not be able to see the light source from the normal working position, or passing area. Task lighting in visual display terminal (VDT)[53] screen areas should be positioned in a way that no veiling reflections[54] are present on the screens, nor glaring in the user's eyes.

In reading areas a desk lamp should not light the printed page more than three times the level of the adjacent desk top, or five times the level of the room, writes Cohen.[55]

> Direct glare is produced by excessive luminances in the visual field that affect the visual systems as the individual looks around the environment. It is usually associated with the luminaire zone from 45 to 90 degree zone.[56]

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[50] Aaron Cohen and Elaine Cohen, Designing and Space Planning for Libraries. New York: Bowker, 1979): 5.

[51] Ibid., 127.

[52]Richard L. Waters, "The Library Building Tomorrow," Library Trends 36 (Fall 1987): 329.

[53]See Definitions in Appendix A.

[54]See Definitions in Appendix A.

[55] Cohen, 1979,132.

[56] Ramsey and Sleeper, Architectural Graphics Standards, 52.

Daylight is thought to be free, which is why it is so often chosen as part of a lighting system for public services. In a comprehensive energy analysis, heat losses and gains through glass and air infiltration around window frames generate some energy costs that may begin to offset the savings of using natural light to augment artificial light.[57] "Daylight produces less interior heat per unit of illumination, however, than do most forms of electric light."[58] Sharma (1970) discusses natural lighting for general library lighting. He writes that in the evolutionary process, the human eye has developed and adjusted itself to natural light, making it the best light. Defects listed for natural light are uneven distribution, glaring, temperature control, wall space consumption, and the expense of installation and maintenance.[59] Daylight is not as controllable as artificial lighting sources. Blinds and shades are necessary to perform as barriers and filters to prevent glaring.

Lighting for visual display terminals is discussed in the library literature by Cohen and Cohen, Kaser, and others, as well as in lighting standards relating to lighting for screen areas. While new theoretical knowledge in the area of library lighting is not in question, the practical application and implications for function and aesthetics for interior design lend themselves to additional study.

The important variables which the literature addresses are: library space planning; planning for access/traffic; electricity; furniture; workstations; ergonomics; and lighting. The literature partially answers some of the questions from Chapter 1 regarding interiors and automation. What lighting

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[57] Norman D. Kurz, 1986. "Energy's Future." Progressive Architecture, (April 1986): 124-27.
[58] Ramsey and Sleeper, Architectural Graphics Standards, 53.
[59] Sharma, H. D. Library Building and Furniture. (Jullundur: Indian Bibliographic Centre): 1970, 67-69.

solutions with regard to VDT screens have been utilized by public libraries? Is daylight a part of the lighting solution? According to the literature, lighting for screen areas is important, because the screen location in relationship to light sources has an impact on screen usage. Glaring and veiling reflections can result from poor choice of location. Lighting, both daylight and electrical, is frequently used by architects as a design element. The literature indicates that windows and glass may be planned more as an artistic or aesthetic part of the architectural creation, than a source of light for library activities. Further study is indicated to determine what is happening in actual library design.

In the question, "How have public libraries constructed in the 1980s planned ahead for automation?" the keyword is "planned." According to the planning literature one needs to go through the planning process for space, electricity, lighting, and furniture before any automated system can successfully be installed either in an existing or a planned facility. Space relationships and work flow are important design considerations inherent in this question. When design elements for automation are not taken into account during the planning phase of a new building, the results could be less than desirable.

Are libraries using premanufactured or custom made workstations and other furniture for automation? There seems to be a fairly reasonable selection of premanufactured furniture for automation. The problem is whether or not the particular furniture system meets a particular need. Each automated system has its own set of specifications for size, and they are not always interchangeable from one brand to another. One library may need space for printers in a workstation, while another library has no need for a printer stand next to every computer. The importance of this subject is a matter of "fitting" a system to some particular style of furniture, or vice versa.

Is electronic media beginning to replace books? Predictions have been made (Lushington 1991) that raise the question. Given the availability of encyclopedias and other books on CD-ROM media, public libraries could very well retrieve valuable shelving space. On the other hand, CD-ROM products could be an added service, rather than replacement of bound copies. Some factors involved in the decision to retain both formats could be the availability of space, the kinds of services patrons expect, or even administrative or staff preference. The implication for public libraries could be the flexibility to go either way.

How many patrons can access the online catalog at one time, and what criteria, if any, is used to determine how many are installed? The literature answers the question in part (see notes on "rules of thumb," page 18). The ratio of patrons to OPAC or CD-ROM terminals is a critical question when one is looking at the degree of acceptance and satisfaction of users with an online system. More study on this subject is indicated. If some libraries have found a good method for determining the ideal number of terminals to install for the OPAC, then that information will benefit other libraries as well.

Some questions were not answered by the literature. Are people waiting in line to use technologies? This question is directly related to the previous one regarding number of terminals. When lines must form for any reason, library traffic patterns are impacted. Some areas which can be affected are terminals for CD-ROM products which index journals, copy machines, automated circulation desks, and public access catalog terminals. Where do public service areas need to expand to remain current with the increased demands placed on the system due to automation?

Have public libraries in California retained card catalogs in tandem with the public access catalog? Nothing in the literature addresses this question, so further study is indicated. The literature does not answer whether or not public libraries have patron dial-up access to their catalogs? When the answer is, "yes," one design implication for some communities could be that less terminals are needed at the library site itself. Perhaps the biggest implication for this question is whether or not public libraries are financially able to take advantage of some technologies that are available.

Are all departments, including children's introducing the public access catalog at the same time? The literature does not address the question. The design implication here is the location and size requirements for workstations as well as staff locations in relationship to online public access terminals. When workstations are located conveniently in particular departments rather than having one large central bank of terminals, the wiring and furniture requirements will be different. Child-sized units would be indicted in the children's department as well as one or more convenient adult-sized units for parents and staff.

Are libraries providing wheelchair access to terminals? This question is of prime concern because of the new handicapped laws.[60] Are libraries aware of their responsibilities to these patrons; and are they finding ways to accommodate them?

Since the literature raised some questions, and does not answer others, further study is indicated. A survey of public libraries is covered in the next chapters. Responses to space planning questions hope to reveal what public

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[60]The *Americans with Disabilities Act*, which was signed into law July 26, 1990, brings the access requirements into effect January 26, 1992.

libraries have been doing to plan for automation in general. The benefit should be to learn from the experience of others what worked well, as well as what did not work at all. Survey answers are important for both functional and aesthetic design reasons, and hope to find that the specialized needs of automated public service areas are addressed in actual library design.

# CHAPTER 3

# METHODOLOGY

## Development of Survey Instrument

In order to further study how technologies for public service have impacted the interior design of public libraries, a questionnaire was developed to survey subject libraries on the way they have handled interior design problems related to automation. The survey instrument was developed from some of the questions which were raised in the literature review (Chapter 2). Questions specifically about lighting, space planning, and furniture decisions were formulated, as well as general questions regarding the size of the library and the population served. The author wanted to see, hear, and write down the experiences of the selected libraries, so that others might learn useful interior design information for their libraries. It should be helpful to hear success stories as well as those which were not so successful.

These survey questions were first tested on two local libraries, Livermore and Pleasanton public, and then revised so that the questions and answers would be more clear in future interviews. The specific questions which were changed in order to achieve more specific answers were those pertaining to lighting.

## Selection of Survey Subjects

For the purpose of this study on how technologies for public service
have affected the interior design of public libraries in California, eleven
California libraries were selected, ranging in original date of building con-
struction from 1959 to future completion in 1995. The author had hoped to get
a listing of recent construction projects from the California State Library facility
consultant. According to the facility consultant, that kind of listing was unavail-
able. The author was advised to consult the December, annual architectural
issue of Library Journal.[61] The California public libraries were chosen as
research subjects, based upon their appearance in Library Journal's annual
architectural issue, or based upon the author's knowledge of local libraries.
Local libraries were selected as much as possible so more libraries could be
observed by the author.

The reason for selecting both new and renovating libraries as a
representative sample of California public libraries was twofold. (1) The author
wanted to see the contrast, if any, between the interior design problems
encountered because of automation being added, and that of being able to
plan them into the facility before it was built. (2) Since the existence of new
construction is limited, including the renovated libraries provided the
opportunity to observe more libraries. Only California libraries were chosen
because the author found no study of these public libraries on this specific
subject. Since most of these libraries have similar public service require-
ments, mild year round climate, and the availability of sunshine for lighting
purposes, the assumption was made that these libraries would have similar

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[61]Library Journal 115 (Dec. 1990): 62-65; vol. 114 (Dec 1989): 54.; vol. 113 (Dec.
1988):60.

design needs and solutions. Names and addresses of the surveyed libraries are in Appendix D.

Libraries constructed within the last three years, or libraries planning construction completion within the next three to four years were selected to give the study a sense of how public libraries are now incorporating technologies for public service into interior design. Newer libraries, or libraries under construction: Fremont, Oxnard, Pleasanton, Sacramento, San Francisco and a composite of Los Angeles branches[62] were chosen based on the recent date of construction or projected date of completion. Older libraries which have incorporated technologies for public service were chosen in order to get a more balanced view of how libraries in general are handling interior design solutions for automation. Existing libraries: Concord, Cupertino, Dublin, Livermore, and San Ramon were interviewed, because they had similar demographics, and were near enough for the author's personal observation of how renovation for technologies had been accomplished.

Demographics and the general economic climate of the community could make a difference on the kinds of library services supported by the community. The eleven libraries which were selected for the survey represent communities with a population spread of from 23,229 to more than 400,000. Library sizes range from 12,640 square feet to a projected 361,960 square feet. Two larger cities: San Francisco and Sacramento are represented in the new library group. Sacramento's main public library is being completed in 1992, and San Francisco's main public library is planned for 1995. In the older libraries, the fast growing communities of Concord and Dublin are included.

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[62]Some Los Angeles branches are renovations.

## Interviews and Observations

A contact was made with the facility planner of the library, or failing that, the head librarian. Personal, or telephone contact was made with all participants. Personal interviews were conducted whenever it was possible to do so, because the author wanted to observe the subject library. In one instance, additional information was obtained from a telephone interview with a facility consultant. Since some facilities were not yet open, some data, such as how well lighting solutions were working for visual display terminals was not yet available.

All libraries in the survey were asked the same questions, but the responses were slanted to their particular application (See Appendix C for survey questions). Older libraries answered, based upon how they renovated and retrofitted interiors for technologies. Newer libraries and those in the planning stages answered the same survey questions based on how technologies for public service were built into the total library interior design plan. The author merely presented questions, and did not try to influence answers in any way. In at least one instance the survey was sent by facsimile to the surveyed library, and was received in kind. In each case, the answers were recorded on the questionnaire. (See the paraphrased individual library responses in Appendix E.)

Observations of the subject libraries by the author substantiated the answers on the questionnaires for Concord, Cupertino, Dublin, Livermore, Pleasanton, Fremont, and San Ramon. Sacramento, Oxnard, San Francisco, and the Los Angeles branches were not yet open to the public at the time of the survey.

# CHAPTER 4

## SURVEY RESULTS

The results of the survey can be reduced to three major variables: *space planning, furniture* and *lighting.* Within space planning, the areas of planning for *access/flow,* and planning for *electricity* are included; and within furnishings, the areas of *workstations* and *ergonomics* are included.

The data collected in this survey is reported in five tables. Renovated library survey results for space planning and furniture, except the Los Angeles branches, are in Table 1. Space planning and furniture results for all new libraries in the survey except major cities, San Francisco and Sacramento are in Table 2. Los Angeles branches composite answers, Sacramento and San Francisco are compared in Table 3. Lighting results are compiled in Table 4 for renovated libraries, and Table 5 for new libraries.

## Space Planning

General planning for technologies by the surveyed public libraries is good considering all of the variables involved in the process. Concord, Cupertino, Dublin, and Livermore all have added technologies. All of these libraries have renovated except one. New libraries, except one, in this survey have all planned for technologies during the architectural planning phase. When technologies are not included in a new library's architectural plan, but added after the fact, the result is that the library almost needs renovation before

it can install an automated system. The major difference between the four libraries in Table 2 is that technologies were added in San Ramon without the benefit of being integrated into the original architectural plan. Even though this is a new building, there aren't enough outlets and wiring for all of the equipment. Technologies were not included in the architectural plans of this library, and the resulting design is difficult for librarians as well as patrons. Both Pleasanton and Fremont planned for technologies as the facility was being planned. Oxnard and Sacramento couldn't be compared as they were not yet open at the time of the survey. Both have planned technologies into the architectural construction plans.

Planning for the space that hardware for automation and its associated furniture will occupy seems to be an inexact science. Libraries in the survey generally do not know the percentage of assignable space which is devoted to automation. Estimates of from 1% to 20% are given by a few, who admit it is only a guess. Hardware involved in the technologies for public service for renovated libraries takes the same amount of space as had been anticipated for two libraries, and "more" space than anticipated for two libraries. Part of the problem is unfamiliarity with what is available, or getting a different, newer product by the time the requisition is finally filled. For example, Fremont, a newer library, had furniture which would not fit the equipment when it finally arrived. They had to remove the side partitions from the workstation carrels in order to accommodate printers. Pleasanton, in contrast, built for growth in this area. Most new libraries have planned for and measured to allow the necessary room for equipment, hardware and associated furniture.

One of the planning differences among the studied libraries is the ratio of online public access catalog workstations to the number of users. Among

the surveyed libraries, the number of PAC or OPAC terminals varied, and there does not seem to be a formula that fits so far as number of terminals per square foot of library space, or number of terminals based upon population. No true analysis can be done on the size of the library versus the population due to the fact that some communities also have branch libraries. Cupertino has one catalog terminal for every 1000 people in the community; Concord 1 per 13,000; Dublin 1 per 3000; Fremont 1 per 5000; Livermore 1 per 5000; Oxnard 1 per 4700; Pleasanton 1 per 3000; Sacramento 1 per 1200; San Ramon 1 per 3000. The average is 1 terminal for each 4237 population in these cities. The trend average is 1 per 3000. The rationale for using population versus cardholders is that everyone in the community is a potential library user, whether or not they have a library card.

Newer libraries, regardless of size, are planning more online public access catalog terminals than renovated libraries are planning. The number of catalogs ranges from 11 to 35, with an average of 24 terminals. Twenty online catalogs will be placed adjacent to the First Stop Reference Desk on the first floor of the San Francisco Main Library. All public service departments throughout the building will contain additional smaller groupings of online catalogs (the total number is yet to be determined). Compare Pleasanton (population of 50,553), a new library, with 16 terminals, to Livermore (population of 56,741), an older library, with 8 public and 2 staff terminals. The renovated *main library* in a similar sized community with similar demographics has half the amount of terminals of a new main library. It is almost impossible to include more terminals in an older facility without a considerable amount of expensive rewiring.

The libraries that have a more adequate number of PAC terminals per potential user experience better patron traffic flow. Generally speaking, those libraries having only 8 to 10 public access catalogs find patrons waiting to use the catalogs during peak hours. In Table 1, the answers to the number of PAC terminals (line 5) to population (line 1), and size (line 2) have some relationship to flow problems (line 17). Concord, with a population of 111,348 and 12,640 sq. ft. floor space with 8 terminals experiences formation of lines and obstructed aisles. Dublin, with a smaller population, 23,229, and 15,000 sq. ft. library facility also has 8 terminals, and experiences line formation, not so much at the OPAC, but the CD-ROM product terminals. (Dublin plans to have about 50 terminals when they renovate.) In contrast, Cupertino with a population of 40,263 and 24,000 sq. ft. library facility has a projected 40 terminals (now microfilm) and does not normally experience line formation for catalog usage. Livermore (population 56,741), with 10 OPAC terminals and dial-up access *does not report line formation* for the OPAC terminals. For the renovated libraries surveyed, the number of online public access catalogs (OPAC) or CD-ROM based public access catalog (PAC) terminals ranges from 8 to a projected 50 terminals. Space constraints and budget constraints are limiting factors for the renovated libraries.

The renovation date in relationship to the addition of technologies, along with the number of OPAC terminals to population ratio, seems to have an affect on line formation. Concord (lines form) has added technologies without the benefit of facility renovation, while Cupertino (lines generally do not form unless the equipment has broken down) has renovated prior to the addition of an automated system. While Cupertino had not yet installed OPAC terminals at the time of the survey, the 40 available microfilm workstations could be

equated to OPAC workstations. Concord has experienced some inconvenience as a result of having added technologies without the benefit of renovation. A renovation is planned. Little or no space planning was done for the implementation of the public access catalog and other technologies. The library went through a progression from card catalog to book catalog, to microfilm catalog, to CD-ROM catalog. Concord replaced the microfilm stations one-on-one with the CD-ROM catalog.

CD-ROM products and associated hardware are making an impact on the interior design of public libraries, particularly in the journal areas. All new libraries, except one, and all older libraries, except one, have chosen InfoTrac CD-ROM index for journals and its associated microfilm subscription. An area must be devoted just for this product, because it usually consists of one or more CD-ROM workstations and one or more microfilm reader-printers. Parts of the collection in one library had to be shifted to accommodate the change. In one library, a counter in the reference section was sacrificed to house the InfoTrac system. The CD-ROM is centrally located at mid-building and can be seen from both reference and circulation desks. It is important for two reasons: security, and assisting patrons with the equipment, or teaching patrons how to use it. Since bound journals are no longer needed with this system, some libraries such as Pleasanton and one of the Los Angeles branches report a space savings there.

The public access catalog is introduced in all departments at once in all of the libraries in this survey. The children's area catalog is a complete catalog, and not restricted to children's literature. In most of the surveyed libraries there is at least one child-sized workstation as well as a regular sized unit for the librarian or adults who accompany children. This arrangement

seems to work well. The children's area has not really been greatly changed by the advent of the computer. It generally looks bright and cheerful as always, with child-sized furniture, block, or cushion type arrangements for story time.

## Planning: Access/Flow/Traffic

Patron traffic flow problems exist in the renovated libraries to varying degrees. When the same terminal is used for both check-outs and returns, libraries experience a bottleneck at the circulation desk. Concord and Livermore both report congestion at the circulation desk during peak hours. Pleasanton, in contrast, has more terminals and has little or no waiting during a peak period.

Line formation affects the aisle space and spaces around equipment which were planned in the original architectural design. The affect is both on the functional aspect of being able to move people through areas, and the negative aesthetic affect of a crowded appearance. During this study, a line of patrons waiting for a photocopy machine was measured. The test was only performed once, and is not meant to be scientific, but to give an idea of the space requirement many designers seem to have overlooked. The total standing area taken up by the average individual was approximately 20 inches wide by 18 inches deep, with a range of 10 to 20 inch space between people. Others who wanted to use the machine saw the line of people and moved on to other areas of the library until the line had diminished, because the line already impacted the flow to another area of the library.

While the copy machine lines and "peak time" circulation lines in some libraries are a problem, a somewhat smaller problem occurs when equipment

or products are placed wherever they seemed to fit. Some stand-up use catalogs are placed at the ends of bookcase sections. When two people are standing at the terminal, one using and one waiting, no other person is able get past the area without going around.

All surveyed libraries are aware of the need for access to the OPAC for the handicapped person. San Francisco Public Library has handicapped access planned for the entire five story building. Whether renovated, or in the newly completed or planning stages, all libraries surveyed report that they have "wheelchair access" to at least one public access catalog terminal. Some libraries are counting on using an existing terminal by removing the regular chair. An observation by the author is that if one moved a regular chair away from a workstation, a wheelchair patron could get to the keyboard, but not necessarily comfortably. Some chair wheels would bump against the structure of the workstation and impede the wheelchair from sitting comfortably beneath the work surface.

The San Francisco Main Public Library is planning to maximize access and flow. This will be an "intelligent building" which will measure the flow of people within it. The First Stop Reference Desk staff will assist patrons with the catalogs on the first floor and direct them to the department holding the library materials they want. The interlibrary loan department is placed in a logical spatial relationship, adjacent to the First Stop Reference Desk. Relationships between the nature of each space and its adjoining space are taken into consideration, so that users can function in a comfortable manner in an environment that encourages study. User traffic areas and cross aisles between the stacks and seating are planned to minimize distraction caused by those moving through the book stacks. The library and furnishings layout are

planned to provide considerable visual control of the several building spaces and areas with minimal staff. Special attention is given to the visual control of entrances, exits, public rest rooms, meeting rooms, the spaces for children and the small study and meeting rooms. A public address system with cassette tape program source and speakers throughout the building is planned.

## Furniture

It was originally thought by some that the computer terminals would take up less space or about the same area as the card catalog. While the days of providing a special air-conditioned computer room for a huge main-frame is virtually becoming a thing of the past, computers still require special attention and take up more space than card catalogs. One librarian reports that before they actually had computers, they were told that computers could be put almost anywhere as long as one had an electrical outlet and a desk to put them on. AIA architect Bob Callori[63] of Hornberger Worstell reports that he had done only slight remodeling for computer installation in some offices, usually placing computers on existing work surfaces.

Computer furniture has forever altered the appearance of public library interior design. The area required for computer terminal installations largely depends on the number of terminals, choice of arrangement, and style of the workstations. The most economic use of space seems to be the side-by-side and back-to-back arrangement of up to eight computers which is being referred to by librarians in this survey as an "electronic island." Every public access catalog terminal, including a small printer and standard chair, takes up

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[63]Bob Callori, telephone interview by author, Notes, Livermore, Ca., 8 October 1991.

approximately a four by five foot area. In the "island" arrangement, printers are sometimes shared, and sometimes stools (Pleasanton is one example) are used instead of chairs.

Electronic "islands" have emerged as a way of dealing with the public access catalog and keeping it largely contained in viewing distance of the information or reference desk, and readily available as well as recognizable to library patrons entering the library. Newer libraries, Sacramento, Pleasanton, Fremont, and San Francisco all have, or have planned, groupings of OPAC terminals. San Ramon's OPAC area consists of eight study carrels attached to each other, and placed in the back of the library near the reference area. Some of the renovated libraries manage smaller groupings of terminals.

CD-ROM products for some items such as encyclopedias, or indexes are beginning to be utilized, but there does not seem to be a significant change in shelving requirements as a result of CD-ROM technologies. No library surveyed has gotten rid of the bound text equivalent, or bought the CD-ROM product in place of bound texts such as encyclopedias. Bound journals are not kept in most libraries surveyed, and fewer magazine racks are needed as a result of a CD-ROM and microfilm magazine and journal product usage. InfoTrac (a CD-ROM index with microfilmed journal subscription) is used by seven of the nine libraries (Los Angeles and San Francisco are excluded).

Furniture in all libraries (Tables 1, 2, 3; line 14) is a combination of custom made and pre-manufactured pieces. Not all automated systems will fit all workstation furniture. Some libraries have custom made furniture for the online public access catalogs, because there was no suitable computer furniture available from library manufacturers at the time they began looking for

it. Many kinds of workstation arrangements are now available from the major library furniture manufacturers.

## Furniture/Ergonomics

Ergonomics is a separate subject which was not undertaken as part of this survey. One library reports that their patron chairs are high-backed, "spoked" chairs. These chairs are not ergonomic. However, their staff chairs are reported to be ergonomic. The ergonomic relationship of keyboard to arm, and eyes to VDT, as well as seating for library computer workstations requires further study (See Appendix B).

## Furniture/Equipment

Facsimiles, and local area networks have made little impact on the public libraries surveyed. While some libraries have a network for their personal computers for staff, and Livermore has a port for community dial-up catalog access, most libraries surveyed do not yet have community network access. Some anticipate a network in their cooperative, or locally, in the future. Pleasanton reports that a request for procurement of a local network for community dial-up access has been placed. Facsimile machines, while available for staff in some libraries, are not yet available for the public like photocopy machines.

The change that personal computers for patron usage has made on the interior design is that in some libraries, study rooms are set aside for computers. These arrangements were never needed in pre-computer days. Six of nine libraries have personal computers available for the public to use

(refer to Tables 1, 2 , 3; line 13).  The number of computers that are available ranges from one to five.

## Electricity

The results of the survey seems to say that planning for the electrical aspect of automation is of major importance and all of the requirements should be assessed and carefully spelled out before equipment is ordered and installed.  Electrical wiring for automation is more of a problem for older libraries than newer libraries.  Librarians in this survey have learned that they cannot merely run another extension cord and plug things in.  One library reports that it cannot run two particular pieces of equipment at the same time, because that will overload the electrical system.  A new library, Sacramento, had to be rewired during the final construction phase because it had been done incorrectly.  Of the new libraries, three out of four (Table 5) report that the wiring is adequate for automation.  Of the renovated libraries, three out of the four (Table 4) report that electrical wiring and outlets are inadequate. San Francisco plans to run conduit every four feet beneath all floors so that electrical lines can be accessed almost anywhere in the building.

One library is switching from a microfilm-based catalog which has been in place since 1964 to an online system.  The advantage is that the electrical conduit for workstations is already in place, so that the workstations can be replaced almost one-on-one.

Table 1. Renovated Library Space Planning and Furniture Survey Results

| | | Concord 1959 | Cupertino 1971 | Dublin 1979 | Livermore 1966 |
|---|---|---|---|---|---|
| 1 | Population | 111348 | 40263 | 23229 | 56741 |
| 2 | Library Size Square Feet | 12640 | 24000 | 15000 | NR |
| 3 | Renovation Date | Future | 1988 | 1992 | 1989 |
| 4 | Technologies added | Yes | Yes | Yes | Yes |
| 5 | PAC Terminals | 8 | 40 projected | 8 | 10 |
| 6 | Wheelchair access to PAC | Yes | Yes | Yes | Yes |
| 7 | Children's Dept. | 1 | 3 | 2 | 1 |
| 8 | Depts. Introduced | All | All | All | All |
| 9 | Did hardware take up more, less or same area anticipated | Same | Same | More | More |
| 10 | CD-ROM Products | No | InfoTrac, Grolier, Guinness | InfoTrac, Worldbook | InfoTrac |
| 11 | Network | No | No | No | Dial-up access |
| 12 | Public Fax | No | No | Staff use | Staff use |
| 13 | Public Computers | No | 3 | 1 | 2 |
| 14 | Furniture: C. Custom P.Premanufactured. | NR | P, C | P, C | P, C |
| 15 | Does any CD or online product replace paper | No | Not yet | No | No |
| 16 | Commercial Databases such as BRS, Dialog | No | No | No | RLIN, staff use |
| 17 | Flow problems? | Lines form; obstruct aisles. | Yes, some, but not usually | Aisles obstructed by CD-ROM, etc. | Circulation desk during peak hours. |

For the sake of brevity in all tables, abbreviations have been used:

NA = Not applicable; NR = No response.

Table 2. New Library Space Planning and Furniture Survey Results.

| | | Fremont | Oxnard | Pleasanton | San Ramon |
|---|---|---|---|---|---|
| 1 | Population | 180000 | 142216 | 50553 | 35303 |
| 2 | Library Sq. Ft. | 60000 | 72000 | 30000 | 18238 |
| 3 | Completion Date | 1988 | 1992 | 1988 | 1989 |
| 4 | Technologies in plan | Yes | Yes | Yes | No, added |
| 5 | PAC Terminals | 35 | 30 | 16 | 11 |
| 6 | Wheelchair access to PAC | Yes | Yes | Yes, some | NR |
| 7 | Children's Dept. PAC | 6 | Yes | 5 | 1 |
| 8 | Depts. PAC Introduced | All | All | All | All |
| 9 | Did hardware take up more, less or same area anticipated | More | Same | Less, built space for growth | Same |
| 10 | CD-ROM/ Products | InfoTrac, Worldbook, Kurzweil Reader | Ebsco,B.I.P | InfoTrac, Graingers | InfoTrac |
| 11 | Network | No | No | No (RFP) | PC LAN staff |
| 12 | Public Fax | No | Staff | Staff | Not yet |
| 13 | Public Computers | 5 | No | 2 | No |
| 14 | Furniture: Custom(C) Premanufactured(P) | Tech. all on custom | C, P | C, P | C, P |
| 15 | Does any CD or online product replace paper | No | NR | Graingers | InfoTrac, Old Journals |
| 16 | Commercial Databases such as BRS, Dialog | No | NCLS,OCLC | No | No |
| 17 | Flow problems? | No | None anticipated | No | Yes, lines at peak time |

Table 3. Los Angeles Branches, San Francisco Main, and Sacramento Main
Library Space Planning and Furniture Survey Results

|    |                                                    | Los Angeles | San Francisco | Sacramento        |
|----|----------------------------------------------------|-------------|---------------|-------------------|
| 1  | Cardholders                                        | NA          | 405,000       | 369365            |
| 2  | Library Gross Sq. Ft.                              | NA          | 361,960       | NR                |
| 3  | Completion Date                                    | NA          | 1995          | 1992              |
| 4  | Technologies in plan                               | Yes         | Yes           | Yes               |
| 5  | PAC Terminals                                       | 6 - 1 2     |               | 3 0               |
| 6  | Wheelchair access to PAC                           | Yes         | Yes           | NR                |
| 7  | Children's Dept. PAC                               | Yes         | Yes           | Yes               |
| 8  | Depts. PAC Introduced                             | All         | All           | All               |
| 9  | Did hardware take up more, less or same area anticipated | Same | Same          | Same              |
| 10 | CD-ROM/ Products                                  | Yes         | Yes           | Yes               |
| 11 | Network                                           | NR          | Planned       | No                |
| 12 | Public Fax                                        | Planned     | Planned       | Yes               |
| 13 | Public Computers                                  | 1 - 2       | NR            | 3 or 4            |
| 14 | Furniture: Custom(C) Premanufactured(P)           | C, P        | C, P          | C, P              |
| 15 | Does any CD or online product replace paper       | No          | NR            | NR                |
| 16 | Commercial Databases such as BRS, Dialog          | 1           | Planned Ref.  | Dialog, staff use |
| 17 | Flow problems?                                    | NA          | NA            | Don't know yet    |

## Lighting

The survey answers seem to say that besides choice of lighting sources, an important interior design element should be screen placement relative to light sources and light spill. In this study of eleven libraries in California, all of the libraries surveyed use a combination of fenestration and luminaires to light the general public service areas of the library. The most frequent lighting-related complaints of the surveyed libraries are veiling reflections and glaring on screens. Optimum placement of the VDT in relationship to the light source in existing buildings is often hindered by constraints such as wiring, or other fixed furnishings.

Lighting solutions which are chosen for visual display terminals (VDTs) in public access catalog (PAC) areas play a significant part in whether or not glaring and/or veiling reflections are a problem. Screen areas in renovated libraries generally experience some glaring and veiling reflections. New libraries report "some" to "very little" glaring in VDT areas. Lighting solutions for the screen areas for renovated libraries (Table 5) are combinations of natural and fluorescent; diffused, fluorescent and natural; and just fluorescent. Libraries with a natural and fluorescent combination lighting solution report that it is inadequate (or unsatisfactory) due to placement of screens relative to natural (window) light. The other three renovated libraries report satisfaction with screen areas, one of which also has a natural and fluorescent combination. New libraries utilize combinations of diffused, natural, and fluorescent; natural and fluorescent (3 libraries); and diffused-fluorescent (2 libraries) for their VDT areas. Two of the new libraries report a "little" problem with glaring or veiling reflections on screens (Table 5).

Circulation desk lighting solutions which are utilized by all libraries in the survey are combinations rather than single lighting solutions, and are self-rated by the survey participants from satisfactory to excellent. Renovated libraries (Table 4) rate their circulation desk areas as satisfactory to excellent. Combinations rated as excellent are "diffused, fluorescent and natural," in Concord, and "diffused-incandescent, fluorescent and natural" in Livermore. Satisfactory combinations are "diffused, fluorescent" in Cupertino and "diffused, fluorescent, and natural" in Dublin. When Livermore renovated to move its circulation desk, more lighting had to be installed in order for the barcode readers to function.

New libraries (Table 5) report lighting solutions for the circulation desk which are: natural and fluorescent (4 libraries); incandescent and fluorescent; and natural, incandescent and fluorescent. New libraries (which are open) report satisfactory results with these lighting combinations. Variables in these combinations such as placement of fenestrations and luminaires in relationship to the workstation or desk, bulb wattage and light spill are not apparent in this report.

Libraries are finding various solutions to the problems of the veiling reflections and glaring on VDT screens. Use of remote control shades on clerestory windows in the Fremont Public Library is one solution for daylight variations. Screen guards are another way to handle the problem of veiling reflections. Screens that tilt and rotate can be moved to avoid a reflection or glare. Tinted or treated glass is used for windows in the newer constructions to screen out damaging ultraviolet rays. Some older libraries report that poor lighting conditions are a result of inadequate planning for the installation of automation.

The colors of ceiling, wall, flooring, and furnishings are taken into consideration for the purpose of lighting by most of the surveyed libraries. Antistatic carpeting, in muted tones to prevent floor glare, is a common choice for newer libraries. Wall treatment (Tables 4 and 5) varies, but generally the ceilings and walls are pastels or white, with wood trim. Only the Los Angeles composite report of several branch libraries indicates that some libraries in the group are historical buildings with darker interior walls, which they are not allowed to change. Some of these historical branches are planning to add task lighting.

Abbreviations are used in the tables for the sake of brevity.

NA = Not applicable; NR = No response.


Lighting Key:

1. Diffused

2. Natural

3. Incandescent

4. Fluorescent

E. Excellent

S. Satisfactory

In. Inadequate


Table 4. Renovated Library Lighting and Wiring Results

| | Circulation Area | VDT/PAC Area | Glare Problems | Ceiling/ Wall Colors | Wiring |
|---|---|---|---|---|---|
| Concord | 1, 2, 4 /E | 2, 4 / S to In | Yes | Light | Inadequate |
| Cupertino | 1, 4 /S | 4 / S | Yes, Little | Light Gray | Adequate |
| Dublin | 1, 2, 4 /S | 2, 4 / In | Yes | White & Wood | Inadequate |
| Livermore | 1, 2, 3, 4 / E | 1, 2, 4 / S | Very little | Light | Inadequate |
| Los Angeles Branches | 2, 4 / NR | 2, 4 / NR | NR | Light colors mostly | Various Solutions |

Table 5. New Library Lighting and Wiring Results

| | Circulation Area | VDT/PAC Area | Glare Problems. | Ceiling/ Wall Colors | Wiring |
|---|---|---|---|---|---|
| Fremont | 2, 4 / S | 1, 2, 4 / S | Little | White | Inadequate |
| Oxnard | 3, 4 / NR | 2, 4 /NR | NR | Light; Dk.trim | Adequate |
| Pleasanton | 2, 3, 4 / S | 2, 4 / S | Little | Light | Adequate |
| San Ramon | 2, 4 / S | 2, 4 / S | NR | Light | Inadequate |
| Sacramento | 2, 4 / NR | 1, 4 /NR | NR | Light | Adequate after rewire |
| San Francisco | 2, 4 /NR | 1, 4/ NR | NR | Light | Adequate/ Planning |

# CHAPTER 5

# CONCLUSION

Technologies for public service have made an impact on the interior design of public libraries. This study finds that the interior designs for public service areas of new and recently renovated public libraries in California are being heavily influenced by lighting, furnishing, and space planning considerations for automation. In the area of space planning the biggest impact is on areas which are now planned for workstations for staff as well as the online public access catalogs (OPAC). The specialized furniture and electrical wiring required for the "electronic island" is another impact of automation. Lighting solutions now take computer screens into consideration.

Library facility planners read the literature which is available to become more aware of the many aspects involved in planning for automation. Library literature is one resource. Industry standards and codes are an important aspect of the literature review. Consider the Illumination Engineering Society standards[64] on lighting; American National Standards Institute standards[65] on ergonomics for workstations and office chairs; and the National Electrical Code for wiring.[66]

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[64]Illuminating Engineering Society of North America, American National Standard Guide for Educational Facilities, IES RP3-1988 (NY: Illuminating Engineering Society,1988)

[65]American National Standards Institute, American National Standard for Human Factors Engineering of Visual Display Terminal Workstations, ANSI/HSF Standard No. 100-1988, (Santa Monica, California: Human Factors Society, Inc, 1988)

[66]National Electrical Code. (Quincy,MA: National Fire Protection Association, 1989)

Perhaps the one of the largest impacts of the "Information Age" on public libraries is on how the library itself is perceived by both librarians and patrons. Interiors are becoming more focused on the library user. The library is no longer only a place to check out books, or review journals and references. A diverse range of services is often accommodated. Someone who needs a personal computer to type a term paper may find one available for use in the public library. The public library is the place for all kinds of people whether senior citizens or youngsters looking for audio tapes, videos or compact disks, or business people reviewing journal article citations from an online database search. New American citizens looking for ethnic materials or a place to learn English may satisfy their information needs at their local library. Hearing impaired may find a telecommunications device for the deaf (TDD); or sight impaired patrons might turn to the public library for braille publications and talking books. The public library is often the place where exhibits influence and educate, where local history is archived, and so much more. This paper does not suggest that these services are an outgrowth of technologies, rather that embracing technologies has been a direct result of the same *user* focus that inspires these and many other services.

The typical California public library in this survey is both functional and aesthetic, and it is definitely the place to go for the information seeking community. The public library utilizes technologies for public service in order to provide information to their communities in the most expedient manner. Some libraries in this study have information desks in clear sight as a patron enters the library. At the same time, there is a feeling of spaciousness and orderliness. High clerestory windows stream natural light onto the reading areas, and signage gives clear directions to the business area, children's area,

and the like. The online catalog "electronic island" is in view, with users perched on stools, busily searching for information. The facilities which are built or renovated are there to serve the library users. The books, journals, reports, videos, etc., in the public library are the most available source of most kinds of information for the masses.

Space planning is probably the single most important aspect of facility planning, whether one is planning a new facility, or renovating an older library building to accommodate automation. Space planning involves the entire facility and how everything, including automation, works together to present a viable resource for the community. Flexibility within the spaces allocated for all the areas that make up a library is necessary, because the information industry, automation and its associated equipment is like a living organism, growing and changing even as this paper is written.

According to the survey in the preceding chapter, libraries built prior to the sixties and even into the eighties were ill prepared for automation. The struggle with inflexible facilities is an ongoing battle for some. Some identified problems with renovation of public libraries are: slab flooring which causes problems for running electrical wiring; asbestos removal; not enough terminals so that people wait in line, causing traffic flow problems and congestion; line of sight problems due to terminals being placed where they can be hooked up rather than the ideal spot; poor ergonomics for workstation or computer users; and printer noise control.

The design of a new building project or a renovation project best begins with the mission statement. Consideration of the goals of the library as a whole and also the goals and plans of the various areas of the library follows its mission. How the various areas tie in with each other and what services are to

be performed in the various areas are to be determined before any layout can be drawn. Here follows an example of the mission statement for San Francisco Public Library.

> The mission of the San Francisco Public Library is to be the focal institution for public supported access to information and knowledge in San Francisco. Special emphasis should be placed upon meeting the needs of San Francisco's economically and culturally diverse, and multilingual community, utilizing the most up-to-date technologies available. [67]

Ken Dowlin, of San Francisco Public Library, speaks of the library as a "cultural anchor in the electronic age."[68] He sees the library as a community information and communication center. The planned library ideally shall serve as a central computerized database for access by constituents' home computers, and disseminate information to the public through cable programs, meetings, and electronic mail. In comparing the present library, which was built in 1916 to the building plan for 1995, the major difference is that of the old building being "building focused" while the newer building will be "user focused." The old building, like so many other older libraries, is inflexible, crowded, confusing, with a lack of flow, lack of program space, impossible security, and only fifty percent of the building assignable. The newer plan is for a facility that is flexible, and allows for ease of access, handicapped access, and a controlled environment. An integral graphics design for flow will make moving from one area to another a natural course and will maximize technology. Focused centers will include: art and music, center for the book,

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[67] From the "Strategic Plan of the San Francisco Public Library, 1990," in A Building Program Prepared for the San Francisco Public Library by H. B. W. Associates (Dallas: HBW Associates, 1990), 1.

[68]Kenneth Dowlin, "A Presentation of the Plans for the New Main Library in San Francisco," Presented at the California Library Association Conference, Oakland, California, Nov. 16-19, 1991.

business and technology center, government center, San Francisco history archives, service to the visually impaired, and service to the hearing impaired. The plan has a complete telecommunications system, and an infrastructure with the capacity to expand. Seventy-five percent of the building will be assignable.[69]

A work flow scheme as well as establishment of patron traffic flow patterns is essential groundwork for planning. For each area, questions to ask are: what will be the major function or service performed; who will be the typical person performing this function; how many people will be at this place at the same time; what specifically will they be doing; does this person have specialized needs such wheel chair access, hearing impairment or sight impairment; how much time will the person spend at one sitting in this place; where will patrons and/or staff be standing or sitting as they perform this research task, and what amount of space shall be allocated? Answers to these questions can help formulate a task-oriented sketch of each area.

While space planning must take flow, logical sequence of library operations, and patron traffic into consideration for the general plan, the final drawing of the area cannot be accomplished without a measurement of equipment, shelving and furniture that will occupy any given area. An equipment and furniture inventory, with an indication of the condition of the items and continuing usefulness, as well as careful measurement of each piece is an important beginning. Equipment and its associated peripherals such as number of computer terminals, screens, printers may be hypothetically drawn into place during the rough sketch phase. Placement and requirements for lighting, wiring and cabling, electrical outlets, telephone outlets for data

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[69] Ibid.

communications, acoustics, and furniture space requirements are best determined even in the earliest stages of a plan.

Electrical outlets, data communications, phone outlets, and wiring for computerized services is an integral part of the space planning, regarding location of workstations, electronic islands of OPACs, and circulation desks. One can't have enough telecommunications access planned for the future. Plans for future expansion of services should also be anticipated and worked into the total concept. While most libraries do not usually electrically wire the whole book stacks, reference areas and reader areas should have more electrical flexibility built in. A single CD-ROM jukebox may serve several workstations, serviced from a single desk. This means there could be cabling all over the place. Designers have to allow for that kind of maximum flexibility, so as to be able to move things around later on without major re-wiring, which can be fairly costly.

Electricity for the various hardware components which are needed today may not be necessary tomorrow, because of advances in microwave and fiber optics. Possibly, the electricity needs for the future could be even greater, if we use history as our guide. A number of wiring solutions are available: cellular floors with built-in channels for wiring, so one could merely punch a hole in the floor to access the wires to equipment at any future time. (San Francisco Public Library is planning that type of wiring solution.) Another wiring solution is flat wire. Flat wire is of somewhat limited value and can be costly to move around. It almost requires carpet tiles, can be easily abraded, and is difficult to splice. Initially it is less expensive than a cellular floor, but is less flexible in terms of access. Power poles can be made reasonably attractive and are another option for retrofits. "Colorful" cable drops from the ceiling can work aesthetically

and may be least expensive, with the only drawback being some loss of open ambience.[70]

One of the most important findings in this survey regarding lighting for public libraries is that there should be a standard for lighting the VDT areas of the *library*. Placement of VDT screens in relationship to light sources should be an exact art, not something left to chance as it now appears to be. Librarians are interested in glare-free lighting, but don't always know how to achieve it. Whereas an office worker often has the ability to change or adjust lighting for a VDT, the patron areas of the library are not usually that flexible. Librarians did not seem to know how many footcandles were generally needed in the library for reading purposes.

Quality of lighting seems to be more important than quantity. Illumination Engineering Society (1988) standards drastically changed the amount of lighting recommended for reading. Where they used to specify 100 footcandles, now 50 footcandles is more often specified, with 75 footcandles specified in some areas of more intense work.

Lighting solutions are varied in the California Public Libraries. Use of energy conserving fluorescent lighting and clerestory windows seems to be an emerging trend for new California libraries (Refer to Table 5 in the previous chapter). According to consultant Sy Silver the most common electrical lighting for new public buildings is dropped ceiling recessed, parabolic, diffused fluorescent.[71] In the stacks, the ideal place for lighting is parallel over the aisle center. None of the public libraries in the survey had used lights attached to stacks. Another style emerging is high intensity lamps on top of

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[70] Sy Silver, telephone interview by author, Notes, Livermore, California, 8 October 1991.

[71] Ibid.

stacks to bounce light off of the ceiling. In older construction, lights were placed in strips perpendicular to stacks, so they didn't have to be changed if stacks were. Sometimes, fixtures are suspended over the stack aisles if the ceiling is too high.

*California Administrative Code, Title 24, of the State Building Code* states that the minimum handicap aisle is 36 inches. This factor was not present 10 years ago. The federal government is now adopting laws concerning the physically disabled which affect library facilities. The *Americans with Disabilities Act*, which was signed into law July 26, 1990, brings the access requirements into effect January 26, 1992. These laws make the strip fluorescent over the dead center aisle a sound construction practice, because the likelihood of stacks being moved or changed once in place is minimal, to not at all.

There is some movement toward task lighting, with wiring and light controls at each seat in some reading areas. The general lighting is softer, diffused to prevent glaring on screens and areas of high contrast. Table lamps or carrel lamps are sometimes integrated into plans to bring light to the work surface. The trade-off for using a table lamp is that the table has less work surface. Some libraries use technology plug strips at reader tables for lap-top computer use, or individual portable reading lamps.

Furniture for automation for public libraries is a problem which the library furniture manufacturers have only recently begun to address. (When the author needed to furnish a special library in 1984, neither Gaylord nor Brodart had computer furniture.) Meanwhile, several libraries in the survey had service desks and OPAC units custom made. There are now a number of manufacturers of computer furniture which accommodate library automated system arrangements.

One of the most important aspects concerning library furniture for automation is that *the furniture must be coordinated to fit the equipment.* In one library which the author visited, there was a computer on a *regular desk* in the staff area. It definitely appeared to be an ergonomic problem. A difficulty was encountered by another library when the computer furniture was ordered without taking into consideration their specific automated system. Needless to say, the furniture had to be altered to accommodate the equipment.

The "electronic island" seems to work well in public libraries for a number of reasons. The group of OPACs are usually situated in view of a reference or other staff area for the purpose of patron assistance and equipment security. This arrangement is a more efficient use of staff than that of terminals scattered throughout an area. Electrical wiring and cabling is less expensive to install, particularly in a renovated library, because it is centralized. The disadvantages of the electronic island are lack of privacy for patrons, noise, sometimes a lack of adequate wheelchair access, and sometimes the distance from actual references. So far as privacy is concerned, anyone can come around and watch another person's screen. Patrons strike up conversations at the OPAC. The accelerated conversational noise, combined with printer noise is something that public libraries did not have to deal with before automation.

This study suggests that a more conscious effort to insure a patron's privacy needs to be made on the part of those planning public access catalog terminals. More needs to be done in order to insure the privacy of those searching for titles on the public access catalog. In all the libraries observed,[72] none seem to have addressed that issue. No screening is available to prevent

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[72]Not part of questionnaire. Observed: Concord, Cupertino, Dublin, Livermore, Pleasanton, San Ramon.

someone looking over another's shoulder while they search on the VDT

screen for information. One library has side-screening in individual carrels, but

someone might still view the screen from behind.

The interior designs for public service areas of new public libraries in

California are being influenced by lighting, furnishing, and space planning

considerations for automation. New interiors are becoming more focused on

the library user, and librarians must become more knowledgeable and more

actively involved in the planning stages of new facility building. How public

libraries are handling space planning, furnishings, and lighting for the addition

or incorporation of technologies for public service are answered in part by the

study. While the results of the interior design strategies of public libraries is

the subject of this survey, the underlying emphasis in the responses of all the

librarians is not so much *technology*, but *public service* .

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# APPENDIX A

## DEFINITIONS

**Ambient lighting.** Ambient lighting is lighting throughout an area that produces general illumination.

**Assignable.** The assignable square footage is the remainder of the sum of the total square footage of a floor plan minus the sum of the total square footage required for bathrooms, elevators, hallways, stairwells, furnace rooms, and space for other utilities.

**Clerestory.** The clerestory is that part of a building rising clear of the roofs or other parts and whose walls contain windows for lighting the interior (ANSI/IES RP-16. p. 42).

**Direct glare.** Direct glare is produced by excessive luminance in the visual field that affect the visual systems as the individual looks around the environment. It is usually associated with the luminaire zone from 45 to 90 degrees. To minimize direct glare, the luminous intensity should be kept out to the 45 to 90 degree zone (ANSI/IES RP-16. p. 21).

**Equivalent sphere of illumination (ESI).** The level of sphere illumination which would produce task visibility equivalent to that produced by a specific lighting environment (ANSI/IES RP3-1988 p. 44).

**Ergonomic.** Equipment, furnishings, or a working environment that takes into account the physical and psychological needs of humans is said to be ergonomic. *Ergonomics* is the study of human capability and psychology in relation to equipment and work area.

**Fenestration.** Fenestration is any opening or arrangement of openings for the admission of daylight. The window design of a building is referred to as fenestration.

**Footcandle.** The unit of illuminance when the foot is taken as the unit of length. It is the illuminance on a surface one square foot in area on which there is a uniformly distributed flux of one lumen (ANSI/IES RP-3-1988, p 44).

**Glare.** Glare is the sensation produced by luminance within the visual field that is sufficiently greater than the luminance to which the eyes are adapted (ANSI/IES RP-16. p. 21).

**Information Age:** The electronic processing of information is causing an information revolution wherein the world labor force is moving from industrial processing to information processing (F. W. Lancaster, 1982).

**Luminaire:** A complete lighting unit consisting of a lamp or lamps together with the parts designed to distribute the light, to position and protect the lamps and to connect the lamps to power supply (ANSI/IES RP 16. p 41).

**Task lighting.** Task lighting is lighting directed to a specific surface or area that provides illumination for visual tasks.

**Veiling reflections.** Regular reflections that are superimposed upon diffuse reflections from an object that partially or totally obscure the details to be seen by reducing the contrast (ANSI/IES RP-16 p. 22).

**Visual comfort probability.** The rating of a lighting system expressed as a percent of people who, when viewing from a specified location and in a specified direction will be expected to find it acceptable in terms of discomfort glare. Luminaires are given a VCP rating (ANSI/IES RP-16 p. 22).

# APPENDIX B

# ERGONOMICS

Seating, as well as adjustment ability of the seat, influences user comfort at a workstation. Stability and support of the back is the primary objective of an ergonomic chair. Posture, effort to maintain posture, back strain experienced, circulation, and freedom of movement are all affected by the design of a chair or seat. Chair components should allow for flexibility, adjustability and safety. Whenever armrests are provided, they should not interfere with the ability to maintain posture. The seat depth should be between 15 and 17 inches and the width shall be at least 18.2 inches to accommodate average sized people. To avoid excessive pressure just behind the chair occupant's knee and lower thigh area, the front edge of the chair should ideally have a contoured relief design (ANSI X5.1-1985).

The seat height should allow the user to place their feet on the floor or on a support surface. Seat height adjustment range is ideally 16 to 20.5 inches (40.6 to 52.0 cm), and a foot support should be provided as an alternative for less than average height individuals. The range of seat height is based on the 5th percentile female height and the 95th percentile male height. Shoe heel height should be factored into the total measurement. The foot rest may be a part of the chair, the workstation, or a separate item
(ANSI X5.1-1985).

In Section 8 of the ANSI/HSF-100 standard the minimum parameters needed to accommodate postures of most users when seated and performing tasks at a VDT is addressed. The fifth percentile female dimensions through the ninety-fifth percent male dimensions are the minimum parameters.

The minimum leg clearance under the worksurface at the level of the knee should be the buttock-to-knee length minus the torso depth. Diffrient, Tilley and Bardagjy (1974) indicate torso depth for the 95th percentile male to be approximately 40 percent of the buttock-to-knee length.  Therefore, the minimum leg clearance under the worksurface at the level of the knee should be approximately 60 percent of the buttock-to-knee length (ANSI /HSF Std. No. 100-1988).

Care should be taken to place keyboards at a comfortable level for library tasks. Keyboards are raised about two inches above desk top. Keyboards should be about 24-26 inches from the floor.  Placing computer terminals on a standard desk top can produce ergonomic problems. Visual display terminals should be positioned at the operator's eye level, and the operator's elbows should be flexed at a 70 degree angle to the keyboard.

In upright posture chairs for conventional CRT-based VDT workstations, the maximum floor-to-seat height is determined by the seated 5th percentile female operating a keyboard at a fixed-height worksurface.  Under the most extreme circumstances, a seat height greater than 52 cm (20.5 inches) may be necessary for the small female to achieve an acceptable keyboard-to-forearm relationship (ANSI/HSF Std. No. 100-1988: 52-53).

Minimum viewing distance of the screen is equal to or greater than 30 cm (12 inches). Greater viewing distances are allowed, and some people may require additional corrective or multisegmented lenses to view text.  The typical eye-to-keyboard distance when the VDT user is seated in the upright position has been estimated to be about 45 to 50 cm (17.7 to 19.7 inches).

## APPENDIX C

## SURVEY QUESTIONS

Library:                         Year built/year renovated:

Population:

Facility contact; phone number:

1.    In general, how do you think technologies for public service have affected the interior design of libraries?

2.    Size of library: Overall assignable space.

3.    Do you think that the age of building is a hindrance when retrofitting for technologies?

4.    Does the interior design of the new library facility accommodate, or have you changed the interior of an older library to handle electronic technologies which are available to the public such as:

| | | |
|---|---|---|
| online public access catalogs ( ) | Number | ( ) |
| computers( ) | " | ( ) |
| CD-ROMs( ) | " | ( ) |
| facsimiles( ) | " | ( ) |
| telecommunications( ) | " | ( ) |
| commercial online databases( ) | " | ( ) |
| or other technologies( ) | " | ( ) |

Yes_____    No_____ No, but in the planning stages. _____

5. Approximately what percentage of total library (square footage) area is devoted to technologies for public service?

6. Did the hardware for the system take up
   more ( ) less ( )
   about the same amount of space anticipated ( )

7. If the new technologies take up more area than anticipated, what has been given up to accommodate it? (i.e. card catalog, reading tables, etc.)

8. In what department was the technology introduced? Check all, or note all that apply. Give the number of units (OPAC, etc.) installed for each area?
   All ( )

   | | | |
   |---|---|---|
   | Reference ( ) | Number | ( ) |
   | Circulation ( ) | " | ( ) |
   | Children's ( ) | " | ( ) |
   | Any others, please list. | " | ( ) |

9. When the library was renovated, what specific changes, if any, took place in the public areas? Why did these changes take place?

10. What codes, laws, or standards were referenced?

11. Traffic patterns in the library. Does the new technology affect the flow? Anticipated? Unanticipated?

12. What kind of lighting is utilized?
    (1.) Parabolic or diffused
    (2.) Natural
    (3.) Incandescent
    (4.) Fluorescent
    Why?

What kind of lighting is used in the reading area? (1) (2) (3) (4)

(A) At the circulation desk? (1) (2) (3) (4)

(B) In the stacks? (1) (2) (3) (4)

(C) Any task lighting under shelves? (1) (2) (3) (4)

(D) Where CRTs or Terminals are located? (1) (2) (3) (4)

For each, is the lighting inadequate? satisfactory? excellent?

| | | | |
|---|---|---|---|
| (A) | ( ) | ( ) | ( ) |
| (B) | ( ) | ( ) | ( ) |
| (C) | ( ) | ( ) | ( ) |
| (D) | ( ) | ( ) | ( ) |

How many footcandles, if known, are normal for each area?

(A)          (B)          (C)          (D)

13.  Are windows taken into consideration for any lighting reason? Describe.

Are wall or ceiling colors taken into consideration for the purpose of lighting?

No ( )          Yes ( )          If yes, please explain.

Were CRT screens taken into consideration when lights were placed?

Discuss electrical wiring and outlets if applicable.

14.  Briefly describe the furniture in the public areas.
Custom made ( )or pre-manufactured furnishings ( ) combination ( )

15. Does the technology in any way affect the type or amount of shelving in the library? Was shelving removed or omitted to make room for computers or other technologies?

Approximate linear footage removed _____.

What took its place?

Was it circulating or reference shelving?

16. If CD-ROM and online databases were added, were larger paper volumes of the same information discarded, or retained?

If discarded was it for space consideration?      ( )
If discarded was it for outdated material?        ( )
Didn't replace paper.                              ( )

17. If you had a chance to do it over, what would you change?
What worked well?
What could have worked better?

# APPENDIX D

# NAMES AND ADDRESSES OF SURVEYED LIBRARIES

Concord Public
2900 Salvio
Concord, California
Year built: 1959
Total square feet: 12,640
Contact: Joyce Marlin 415-646-5455

Cupertino Public
10400 Torre Ave.
Cupertino, CA
Year: 1971; OPAC installation, April, 1992
Total square feet: 24,000
Contact: Mary Ann Wallace 408-446-1677

Dublin Public
7606 Amador Valley Blvd.
Dublin, CA
Year: 1979; renovation planned for 1992
Total square feet: 15,000
Contact: Rayme Meyer 510-828-1315

Fremont Main
2400 Stevenson Blvd.
Fremont, CA
Year: 1987
Total square feet: 40,000
Contact: Sandra Pantages 415-745-1400

Livermore Public
1000 South Livermore Ave.
Livermore, CA
Year: 1966; OPAC installed 1989
Total square feet: NR
Contact: Julie Casamajor 510-373-5500

Los Angeles Public
433 S. Spring
Los Angeles, CA
A composite of eighteen branch library plans.
Year: 1993
Total square feet: NA
Contact: Leslie Nordby 213-612-0503

Oxnard
251 South A Street
Oxnard, CA
Year: 1992
Total square feet: 72,000
Contact: Doug McLaughlin 805-385-7500

Pleasanton
400 Old Bernard Ave.
Pleasanton, CA
Year: 1988
Size: 30,000 sq. ft.
Cardholders:
Contact: Don Nunes 510-462-3535

Sacramento Central Library
828 I Street
Sacramento, CA
Year: July 1992
Total square feet: NR
Contact: Judy Renzema 916-440-7800

San Ramon
100 Montgomery St.
San Ramon, CA
Year: 1989
Size: 18,238 sq. ft.
Contact: Joyce Gunn-Bradley 510-866-8467

San Francisco Main
Civic Center at Larkin & McAllister
San Francisco, CA
Year: 1995
Projected size: 361,960 gross square feet (75% assignable)
Contact: Kathy Page and Ken Dowlin 415-557-4400

# APPENDIX E

# SURVEY NARRATIVE SUMMARIES

## Concord Public

Year: 1959 (renovation planned)

Number of PACs: 8 total

Little or no space planning was done for the implementation of the public access catalog and other technologies. The library went through a progression from card catalog to book catalog, to microfilm catalog, to CD-ROM catalog. They replaced the microfilm stations one-on-one. And the CD-ROM catalog resides on the same custom built counters that the microfilm format did. At times, lines form around terminals, and especially at the circulation desk, obstructing aisles. The same terminal is used for both check-outs and returns, which causes a bottleneck at the circulation desk.

Lighting is rated as excellent at the circulation desk, satisfactory, but not ideal in the PAC and other VDT screen areas, but inadequate in the book stacks. Natural and fluorescent lighting is used throughout the library. No changes were made when technologies for public service were added. The sunlight causes glaring on screens at certain times of the year, but window coverings which have been installed virtually eliminate the problem. Incandescent lighting is used for the vestibule exhibit area and bookstall area. Lighter wall and ceiling colors seem to have been taken into consideration for

the purpose of reflected light. The reading room has one glass wall which provides natural light.

## Cupertino Public

Year: 1971; OPAC installation, April, 1992

Number of PACs: 40 - 57 public

The thrust of the Cupertino Public Library is to make things compact when possible, and have a flexible plan which is open to new technology. PAC terminals will be located on the same custom built counters that held the microfilm catalogs. Wiring was done in the previous renovation to anticipate change, so the wiring is almost already in place. Counters for the PAC are located in visible traffic areas for optimum accessibility. In the mezzanine, popular area, the location of a standing terminal seemed to create a traffic flow problem if two people were standing next to it. Pre-manufactured shelving is utilized for compact disk records, video cassettes, and audio cassettes. Macintosh computers for public usage are in isolated study rooms for the purpose of noise control and security monitoring. CD-ROM products such as *Guinness Book of World Records* and *Grolier Encyclopedia*, are located next to the reference desk. Currently only two terminals have InfoTrac, and lines now form at busy times, creating traffic problems. A solution to this problem, that of making InfoTrac a menu choice on the new system, is being planned.

One of the biggest impacts on this library will probably be in how the staff functions once the new system is implemented. A lot of the duties now performed locally will be moved to the headquarters of the South Bay Coop System. Some terminals now used for staff may be re-assigned for public usage.

Lighting is accomplished with a combination of diffused, fluorescent, decorative pillar lights (expensive bulbs) and natural lighting from windows. The entry lobby is exceptionally dark in the afternoon. Reading areas have fluorescent lighting; the circulation desk has diffused and fluorescent; stacks are lighted with fluorescent fixtures. While there are windows, the library does not especially rely on them for lighting. Lights were placed with future, counter height as well as a few "standing" computer screen areas in mind. Veiling reflections may still be present on some screens when they are actually installed. Currently, glare guards are being placed on some circulation terminals, and catalogs. Screen angle adjustment shall be implemented to deal with the problem.

**Dublin Public**

Year: 1979; renovation planned for 1992

Number of PACs: 8; approximately 50 when renovate.

The library was originally designed with a lot of open space for flexibility. It is very noisy, especially with the addition of machines. Lines form and cause traffic flow problems. Everything will be in a different place when they remodel. As it is, new technologies were not especially planned; they just happened. Computers were not supposed to take up a whole lot of space; just put them on a table or counter. "Aisles used to be aisles that now only sometimes are," says Rayme Meyer, "everywhere there used to be an aisle we have stuck a product." Video racks and CD racks are at the ends of aisles. One should really have a three foot clearance around each of these racks. People waiting for copy machines form lines which interferes with the newspaper area. Presently, wires are strung in areas that could create a tripping hazard, and

outlets for the technologies are inadequate. Four printers are available for six catalogs. Furnishings are all pre-manufactured except for pits and cushions in the children's area.

Natural daylight from windows, and fluorescent ceiling lamps light the circulation desk and reading areas of the library. There are spot lights at various places in the library, and a couple of carrels have usable fluorescent lights. Where there aren't windows, the wall has wood paneling, and the ceiling is off-white. Carpeting is dark, light absorbing. Glare and veiling reflection problems are present on VDT screens.

## Fremont

Year: 1987

Number of PACs: 35

Even though the library doubled the original space allocated for public use computers and PACs, the space was inadequate by the time the library was finished and equipment was being installed. They did not know the exact configuration ahead except in a general way. Details had to be worked out, as new products were introduced even as they built. While the wiring for technologies is insufficient for the information and circulation desk areas, the index counters work well. Conduit behind the walls and the ability to pull cables makes for a flexible system.

The card catalog was replaced, and areas rearranged to accommodate the technologies. There are fewer magazine shelves due to the InfoTrac system. The custom built area had dividers built into the PAC counters; which had to be ripped out when they added printers. Some space efficiency was achieved by stacking equipment pieces. A counter surface is used for

equipment which was not originally planned for that use. In the children's area, *Magazine Index* on film has taken up one reader table.

The first floor has a large window, which allows natural daylight to add to the ambient light. All library areas except the fiction area are lighted with fluorescent luminaires. The incandescent lighting was originally inadequate, and has now been upgraded. Two skylights allow natural lighting to aid the electrical lighting. Incandescent lighting over the information desk casts some shadows. Architectural highlighting is accomplished with some up-lighting spots. Window shades are operated with a remote control. The window glass has an ultraviolet screening tint. Technologies for public service, and VDT screens were not taken into consideration when the lighting system was planned and placed. The result is veiling reflection and glare on a few screens. Tilting screens help alleviate the reflection or glare problem in some areas. One especially bad glare problem results from the clerestory window for about one-half hour part of the year. It is generally enough to cause people to simply wait. The architect selected the luminaires and planned the fenestration for daylight.

**Livermore**

Year: 1966; OPAC installed 1989

Number of PACs: 10

The library interior is both functional and behavioral, but not especially aesthetic. Counters and workstations for computers were not purchased from the traditional library furniture manufacturers. The state prison system pre-manufactured counters, etc. Secretarial chairs were purchased for the machine areas. None of the CD stations were originally intended for

technology, but they work. Lack of wiring and outlets, which is the problem in most older buildings is one of the biggest planning problems encountered.

People stay longer at the OPAC than they did at the card catalog; some to learn, and some to browse. The system has been networked to the homes of people who have modems, but there is only one port. Another phenomenon is the line of people waiting at the circulation counter, especially during the summer reading program. Waiting in line for the InfoTrac system sometimes causes traffic flow problems during peak hours.

The Livermore Public Library uses diffused fluorescent, fluorescent, incandescent, and some daylight to illuminate the library. The major areas: reading, circulation, and stacks all have diffused fluorescent lighting. Carrels have individual desk lamps. When renovation was done to move the circulation desk, new lighting had to be installed as an afterthought because the barcode readers wouldn't read in the dimly lit area. Visual display terminals were not in existence when the lights were placed in this building, so when the computers arrived they had to be placed as best they could to avoid veiling reflections and glare. Only one screen at the circulation desk is momentarily blinding when the sun is at a particular place, if the shade on the window has not been drawn. Lighting in the machine areas is generally satisfactory.

**Los Angeles Public**

A composite of eighteen branch library plans.

Year: 1993

The greatest impact, at least in the design phase, is in the creation of "electronic islands" or centers where electronic equipment will be located. This space was not required before. Patron seating sustains the greatest impact from this change, either in the form of rearrangement or reduction. In a couple of branches both the patron table seating and some shelving has been reduced slightly. Regional branches contain more CD-ROM and other technologies for public service than do the community branches.

In the patron circulation area there is more equipment with semi-fixed locations. There must be aisles around the equipment that are sufficient to allow normal patron flow without congestion. The reference areas and reference desk must be larger than in the past to accommodate equipment. A bank of online public access catalogs (OPAC) are placed near the reference desk, since some patrons will need assistance in their use. The electronic island more or less defines an area that is fixed, not flexible. CD-ROM stations, associated with research and periodical literature, are to be located near the reference desk and microfilm reader-printers. Equipment should also be located near those who assist with machine problems and printers.

They report that they have not yet found safe and usable equipment tables or carrels. Circulation desks and reference desks are custom built-ins. Some of the equipment counters are built-in as a part of the construction contract. All other furniture is pre-manufactured. Sixty linear feet of circulating book shelving is to be removed in one library renovation to make room for equipment counters.

Most lighting will be fluorescent and natural. Older buildings have skylights which are being restored. The relative positions of the skylights are being taken into consideration in locating islands of visual display terminals (VDT). Reading areas, circulation desk, stacks and VDT areas will have a combination of natural and fluorescent lighting. In older buildings, the electronic islands are placed in such a way as to minimize glaring and veiling reflections on the screens. Wall and ceiling colors are taken into consideration for the purpose of reflected light, with the exception of historic buildings which must retain their original colors, regardless of the color. In historic library buildings, special lighting problems are being evaluated. Task lighting is often utilized under the shelves to provide adequate light in historic buildings.

**Oxnard**

Year: 1992

Number of OPACs: 60

PAC location: all departments.

Both aesthetics and function are considered in the design of the library facility. Carpeting was chosen, not only for its subdued mixture of purple, gray, pink, to cut down on glaring, but also for its sound absorbing and anti-static qualities, particularly in the machine areas. The children's area floor is tiled. Round tables which seat four people comfortably were chosen for the reading area. Chairs for the patron and patron machine areas are high-backed spoked chairs; ergonomic chairs were chosen for the staff work areas. The location of machines with proximity to staff is for the purpose of training new users and servicing equipment. Eight study rooms, which are wired for computers, each hold a maximum of four people.

Lighting is accomplished by use of indirect lighting, halogen spotlights, diffused fluorescent lighting and some window lighting. No skylights are installed. In the stacks, the fluorescent lights are right on top of the shelves, except in the children's area where they are ceiling fixtures. The halogen spotlights are used for task lighting over the circulation desks and work areas. Wall, ceiling and furniture colors were taken into consideration for the purpose of reflecting light. Furniture is light ash wood and walls are white and pink in the children's area. There has been no experience with the lighting as it relates to technology as the library (at this time) is not yet open. A "considerable amount of effort" has been put into placing screen areas where one would not experience glaring or veiling reflections.

**Pleasanton**

Year: 1988

Number of OPACs: 16

There is a feeling of openness and friendly service when one enters the library. The reference and circulation desk are right there as one enters. One can see the PAC "island" from the reference and circulation/information areas. InfoTrac terminals, including the microfilm and readers, are also in this central location. The location is such that there is plenty of room to move to either side or completely around the area, so it almost never impedes the flow of traffic. To the left of the PAC area is the young adult fiction and paperback, and audio visual area. Wall decor and displays of popular tee-shirts, etc., make this an inviting area for teens. In the children's area there is a "Storytime Mountain" of colorful stacked cubes. Carrels throughout the library are wired for future computer use and expansion. There are electrical outlets in the stack areas as

well. Six study rooms and two small conference rooms are wired for computers, but not all of them have computers. No shelving was omitted to make room for technology, nor was any gained due to acquisition of CD-ROM products such as encyclopedias. (Old encyclopedias circulate, and more than one person at a time can use them.) Another point is that there is probably less shelf space devoted to back issues of journals.

Lighting chosen for Pleasanton Public Library is a combination of mercury vapor diffused (up-down), natural lighting from windows and high clerestory windows, and general diffused fluorescent lighting. The main OPAC screen area is located under a ceiling and not under the clerestory window area, however for a few minutes in the day, sunlight reflects off of the screens in the machine area. Otherwise the lighting seems to have been installed with VDT screens in mind and is rated as satisfactory to excellent. Sunlight from the clerestory windows also glares on a table in the fiction area at noon. Blinds on windows help control light spill and make the rest of the window lighting a great addition to the library's ambiance. In spite of all the studies done to plan for the lighting, there are dark areas in some parts of the library in the evening. The wall treatment is off-white, light greens, aqua, and natural wood, which are light reflecting, and the carpeting is gray-green to absorb reflections, and avoid floor glare from high clerestory windows.

**Sacramento**

Year: July 1992

Number of OPACs: 30

As one walks off the elevator the PAC, California Library Catalog (CL CAT), will be banked to either side in each area, and will act as an information source as well, helping patrons see how to use the library. Staff and machinery are arranged to be in view of each other, and the CL CAT banks form a hallway to the service desk. The CD-ROM products are also next to a service desk. Furnishings are light maple for study carrels, PAC counters, atlas stands, and display shelving. Three years ago, when the library construction plans began, "not one library furniture maker had equipment to put computers on." Consequently, much of the furniture is custom made.

Indirect, incandescent, fluorescent luminaires, and natural lighting from windows comprises the lighting scheme of Sacramento Public Library, due to open in 1992. East and west windows are tinted, and west windows also have blinds on them; north windows are clear. The circulation desk has both natural and fluorescent lighting; the stacks have baffled fluorescent tube luminaires between the stacks; and the reading area has natural and fluorescent lighting. According to the librarian, Judy Renzema, the VDT screen location is not taken into consideration for the placement of lighting; it is unknown how it will all work out. The lighting is rated as standard for libraries. The building is being re-wired during the construction phase in order to accommodate computer technologies.

**San Ramon**

Year: 1989

Number of OPACs: 7 CD-ROM Alameda Co.; 4 on-line Contra Costa Co.

In order to put the PAC into this library eight study carrels were attached to each other, and placed in the back of the library near the reference area. Parts of the collection had to be shifted to accommodate the change. One counter in the reference section was sacrificed to house the InfoTrac system. Traffic flow problems exist, and they were anticipated. People wait in line at the copy machine, and wait for the PAC or InfoTrac at times. Parts of the collection were shifted to accommodate technologies. The CD-ROM is centrally located at mid-building and can be seen from both reference and circulation desks. It is important for two reasons: security and helping with the equipment or teaching patrons how to use it. There are not enough outlets or wiring for all of the equipment, even though this is a new building. Both custom made and pre-manufactured furnishings are utilized.

Clerestory windows provide a lot of natural lighting during the day, and fluorescent ceiling luminaires provide the balance of the lighting. Halide bulbs near the children's area and over the files area have burned out and are expensive to replace. The ambient light seems to be okay without them. Computers were added to this facility as an afterthought, but the computers were placed in areas where they would have minimal veiling reflection and glaring. There is fluorescent lighting over the circulation desk, stacks and reading areas. Walls are painted a light gray; it is not known whether they were painted with light reflection in mind. Some reading carrels have fluorescent lighting.

**San Francisco Public**

Year: 1995

Number of OPACs: 225 public projected; 600 total.

The San Francisco Public Library serves a diverse population, 405,000 cardholders, with many information needs. The library's open design will create people spaces and easy surveillance. An early interior plan is being implemented to make sure that the exterior will work. Gross square footage will be 361,960 square feet in seven floors; and the net assignable space 271,470 square feet. The space required to house books from the many collections will consume more than 50 percent of the net assignable square footage. On the second, third, fourth, and fifth floors, where there are to be large concentrations of conventional book stacks, reader seating will be arranged in between blocks of stacks to break up density. Readers will be provided a variety of choices for seating, including window or exterior wall locations.

Twenty online catalogs will be placed adjacent to the First Stop Reference Desk on the first floor. All public service departments throughout the building will contain additional smaller groupings of on-line terminals. The First Stop Reference Desk staff will assist patrons with the catalogs on the first floor and direct them to the department holding the library materials they want. Interlibrary loan department is placed in a logical spatial relationship, adjacent to the First Stop Reference Desk.

"The ultimate plan must accommodate site, traffic and use patterns."[73] Relationships between the nature of each space and its adjoining space are

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[73] A Building Program Prepared for the San Francisco Public Library by H. B. W. Associates (Dallas: HBW Associates, 1990), 11.

taken into consideration, so that users can function in a comfortable manner in an environment that encourages study. User traffic areas and cross aisles between the stacks and seating should be planned to minimize distraction caused by those moving through the book stacks.

The library and furnishings layout must be planned to provide considerable visual control of the several building spaces and areas with minimal staff. Special attention shall be given to the visual control of entrances, exits, public rest rooms, meeting rooms, the spaces for children and the small study and meeting rooms. A public address system with cassette tape program source and speakers throughout the building is planned. This will be an "intelligent building" which will measure the flow of people within it.

There are still questions to be addressed concerning whether to place like formats together, such as all the video cassettes, or gather all formats with one subject together. OPACs will be arranged in islands or banks of counters, probably custom made. Low sound level equipment is specified.

The telecommunications system, including the placement of all telephone instruments and the number of incoming/outgoing lines that will be required will be planned in conference with the city librarian and staff. A dedicated telephone line shall be provided for each CRT terminal. [74]

Stacking chairs specified for group areas will have adjacent storage space. Book stacks are conventional steel and compact (mechanical assist type) shelving, limited to six or seven three foot sections in order that users can find library materials without frequent changes in direction of the stacks. Seating shall provide readers a variety of choices in location.

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[74] Ibid,. 89.

Upon entering the new San Francisco Public Library, scheduled for completion in 1995, one will immediately see natural light and books. High clerestory windows will provide natural light and create light wells. All window glass will specify ultraviolet filtering. Reading rooms will have lots of natural light. Technologies for public service have been incorporated into the design, so that there will be adequate lighting for reading and writing tasks, yet minimal problems from glaring or veiling reflections.

General lighting in the new building will be indirect up-lighting. Baffled or diffused fluorescent lighting will be installed in the stack and reading areas, with task lighting employed on reader tables. Clerestory windows will add natural lighting to the ambient light in most areas. An exception will be that there will be no natural lighting in the rare book sections. In the compact, closed-stack areas there will be fluorescent lighting with no special ultraviolet protection. Each area will have its own separate lighting controls, as well as controls for window shades.