

INTELLIGENT LIBRARY BUILDINGS

Proceedings of the tenth seminar
of the IFLA Section on Library Buildings
and Equipment

The City Library of The Hague (Netherlands),
Sunday 24 August 1997 to Friday 29 August 1997

edited by Marie-Françoise Bisbrouck and Marc Chauveinc

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PROGRAM

- Sunday August 24, 1997**
17.00 Registration delegates
- Monday August 25, 1997**
9.30 Opening session
Welcome by Marc Chauveinc, Chairman, IFLA Section on Library buildings and equipment, Anke van Kampen, alderman for Education, Social services, Employment project, Integration and Emancipation of the municipality of The Hague and Wim Renes, director of the City Library, The Hague
- 10.30 Chairperson: Piet Schoots
Building with intelligence, by Harry Faulkner-Brown, architect/consultants, Anick, Hexham, United Kingdom
- 14.00 The City Library of The Hague, by Wim Renes, director City Library of The Hague
Intelligent buildings, by Jacques Mol, Valstar Simonis consulting engineers, Rijswijk, Netherlands
Is an intelligent building automatically a functional library by Hanke Roos, manager Central Library of The Hague
Guided tour of the City Library of The Hague
- 15.00
- Tuesday August 26, 1997 :**
9.00 Chairperson: Rick Ashton
Niedersächsische Staats- und Universitätsbibliothek, Göttingen, by Reimer Eck, Head librarian, Niedersächsische Staats- und Universitätsbibliothek, Göttingen, Germany
- 11.30 Die Deutsche Bibliothek at Frankfurt-am-Main, by Ingo Kolasa, building expert/coordinator, Die Deutsche Bibliothek, Frankfurt-am-main, Germany
- 13.00 TThe new headquarters of the Venezuelan National Library, by Elvira Muñoz Gimenez, architect and director of the Design project, Caracas, Venezuela
- Wednesday August 27, 1997**
9.30 The University Library of the future today (Video), Towards the digital library by Hans Geleijnse, librarian Katholieke Universiteit Bibliotheek Brabant, Tilburg, the Netherlands
- 11.00 New information services for academic staff and students, by Solke Veling, director Rekencentrum KUB
- 12.00 Guided tour of the Katholieke Universiteit Bibliotheek Brabant, Tilburg
- 14.00 Departure for Rotterdam City Library
- 15.00 Transforming the library into a public information center, by Franz Meijer, director City Library, Rotterdam
Guided tour of the library

Thursday August**28, 1997**

9.00

Chairperson: Piet Schoots

San Francisco Public Library (SFPL), New Main Library: a case study, by Kenneth E. Dowlin, distinguished visiting professor, School of Library and Information Science, San Jose State University, USA

11.00

A beautiful, useful machine for service: the Denver Public Library, by Rick Ashton, City Librarian Denver Public Library, USA

14.00

The New York Public Library's Science, Industry and Business Library (SIBL) as a smart building, by Paul LeClerc, president of the New York Public Library, USA

The NYPL's SIBL, slide presentation, by David Walker, Director Research Libraries, New York Public Library

16.00

The Adsetts Learning Center, Sheffield Hallam University, by Graham Bulpitt, director Learning Center, Sheffield Hallam University, UK

Friday August 29,**1997**

9.30

Chairperson: Marc Chauveinc

A new library with a new building, a new network and a new computer system, by Jean-Marc Czaplinski, Head Division Études et Développement, Direction des systèmes informatiques, Bibliothèque nationale de France, Paris, France

11.30

Closing session by Marc Chauveinc and by Wim Renes

INTRODUCTION TO THE SEMINAR

by Marc Chauveinc
Chairman of the Section on Library Buildings and Equipment

First of all, I would like to welcome you to this IFLA 10th pre-seminar on « Intelligent library buildings ». The large number of participants gathered in this room, far beyond our expectations, shows that the chosen theme is of great interest to you and will contribute to the success of this seminar.

My name is Marc Chauveinc, and, until next week, I am the chairman of the IFLA Section on Library Buildings and Equipment.

IFLA is the International Federation of Library Associations and Institutions which groups together librarians from all over the world. Its Headquarters are in The Hague, close to this place.

The annual meeting of IFLA will take place next week in Copenhagen.

The Section on Library Buildings and Equipment holds its 10th seminar on « Intelligent library Buildings » here in The Hague from today to Friday, allowing you to fly to Copenhagen for the IFLA Conference.

This means that this seminar is not isolated but, with other pre-seminars held in different places before or after the main IFLA Conference, is organized in conjunction with it and as part of it.

It is one of the activities of the section, with study tours of several libraries in one country and annual meetings during the IFLA Conference.

Most of the time, these meetings present new library buildings in the country where the conference is located. Last year, we listened to Chinese speakers describing new library buildings in China. This year, we will have four speakers presenting new national libraries in Finland, Denmark, Sweden and Norway.

These explanations are given just to show you that this seminar is not a one time activity but is part of a continuing work on library buildings, carried out by the section. It is the continuation of several seminars held in conjunction with annual IFLA meetings.

I am not going to start on « Intelligent library buildings » now. I just want to say that this theme was chosen by the Section in conjunction with the tremendous progress made by new technologies in the world of libraries and with the impact of these technologies on our work and on the building of our

libraries.

We will learn from our speakers how library buildings can be adapted to computer technology and to new communications means. I am sure you will enjoy their presentations and learn a lot from them.

Before starting, I would like to thank those who have made this seminar possible.

First of all, the Mayor of the City of The Hague who has accepted to sponsor the seminar, so it can take place in the beautiful surroundings of the city hall and in the library. We will benefit from this modern environment. He will tell us some words of welcome.

Mrs. Marie-Françoise Bisbrouck, secretary of the section, who has, in addition to her normal work, taken the responsibility and the charge of sending the invitations and collecting your registration forms. It was not easy to connect the registration forms to the bank transfers which often had no names. Even when we had names, it was not always obvious to know if they were for a man or a woman! She also has contacted most of the speakers, explaining them what we expected and discussing the topic with them. Marie-Françoise has done a marvellous job.

Mr. Wim Renes, past chairman of the section, has accepted to hold the seminar in his library which we will visit this afternoon. This implies a lot of tedious but important activities, such as finding sponsors, places to stay, places to eat, hotel reservations and bus renting for a visit to Tilburg and Rotterdam. We thank him for organizing everything so smoothly.

I want also to thank every one of you for attending this seminar. Some of you have come a long way and travelled long distances from your countries very far from the Netherlands, like China, Namibia, Singapore, Thailand, Malaysia or Peru. It is a wonderful surprise to see participants from so many countries represented at this seminar. We are 74 participants coming from more than 30 countries.

I am very grateful to the speakers, chosen among the most prominent librarians in their countries and responsible for new and innovative buildings, who have accepted to spend one week with us to discuss our theme. I am sure that they will share their experiences and give us good advice on how to build an « Intelligent library building ».

As you know, nothing can be done without money. This seminar would not have been possible without the generous support of some sponsors. Of course, IFLA is one of them, but the others are coming from the private sector, business companies interested in libraries: Schulz Bibliothekstechnik GmbH from Germany, Automated Library System from Great Britain, Nederlandse Bibliotheek Dienst from the Netherlands. They should be thanked for their co-operation and support.

I hope you will have a good and stimulating seminar.

I now give the floor to the Aldermam for education and social services

of the city hall of The Hague.

WELCOME

by Anke van Kampen

Alderman for Education, Social Services, Employment Project, Integration and Emancipation of the Municipality of The Hague.

Dear ladies and gentlemen, librarians, architects and library-furnishers.

I am pleased to welcome you on behalf of the municipality of The Hague on this tenth seminar of the IFLA Section on Library Buildings and Equipment in The Hague, which goes by the title of "Intelligent library Buildings".

During this seminar you will be informed on this subject by several speakers.

For many of you this will be your first visit to The Hague.

Therefore I will confine myself to a short impression on the city of The Hague.

The Hague has 450.000 inhabitants, it is a multicultural city where people of different cultures live, work and relax.

It is the Queen's residence, the centre of government and the green city by the sea, but it is also the library city par excellence. Here you will not only find the municipal library and the city archives, but also the Royal Library and the National Archives and many specialized libraries, like for instance that of the International Peace Palace.

Berlin is often called the building site of Europe, but The Hague also counts! The Hague is building a new city centre, you will be able to see and hear that this week. This creation of a new city centre really started after the completion of this city hall/library complex.

When in 1975 the city hall Council developed plans for a concentration of cultural and recreational provisions in the city centre, the public library of The Hague made sure to be in the forefront of things. The building that housed the library at that time was far too small and not suited to present the materials in an orderly way to the public. The building of the central library did not comply with the standards set to a city library and could not be remedied to do so.

In 1988 the decision to build the city hall/library complex was made.

It has taken twenty years before a good solution for the lack of space of the central library was realized. In 1995 at last there was the new central

library on the Spui.

The library is a very attractive institution in the city centre, which should be a meeting place par excellence.

If only because the library is an institution that attracts visitors at all times of the day (61 hours a week) and on average sees approximately 3.500 visitors a day.

Also from another point the library is a focus.

Nearly 5 million books and other materials are lent every year.

Not only to readers belonging to one specific group, or of a specific level of learning, or of one specific religion, but to people from all layers of society. Can you imagine any other place where young and old, this and that, right and left, high and low, meet one another like they do in the library?

Starting point for the municipality of The Hague was to create a central library that would act as an information centre for all and would become a place for relaxation and meeting for all inhabitants of The Hague and now we can say we succeeded.

It has become a place where people come in as a matter of course and find themselves suddenly surrounded by books, open and inviting, not sterile but, on the contrary, full of life. A pulsing heart in the royal residence, pulsing rhythmically with the rhythm of the city itself.

Therefore I am pleased to invite you for a visit to this « intelligent library building »: to the central library, the city archives and the city hall.

I wish you an informative and especially a fruitful seminar and hope that your first visit to The Hague will lead you to another visit to us, if only to look at the new city centre of The Hague.

INTRODUCTION

*by Wim Renes
Director of the Central Library, The Hague*

Confusion over what makes a building intelligent is that probably the main reason for you to join this 10th IFLA seminar on the topic: intelligent library building ?

At least nearly 80 participants from 30 different countries all over the globe and from all the different continents made up their mind and booked for this seminar in The Hague, Netherlands.

The city as well as the library are very pleased that so many colleagues, librarians, architects, consultants and library suppliers take the opportunity to discuss the item on intelligent library buildings. I welcome you once again to The Hague, to this seminar.

For all types of libraries, national libraries as well as university and public libraries, the building has to be well designed and fully prepared to cope with the definition of the intelligent building: « as a building that maximizes the efficiency of its occupants while, at the same time, allowing effective management of resources with minimum lifetime costs ».

Let me give you another definition of intelligent buildings, which I came across reading a thriller:

« Ladies and gentleman, I have to tell you that the modern architectural scene presents us with the greatest adventure of all: architecture that uses the advanced technology of space exploration and the computer age. The building as a machine in which invisible micro- and nano-technology have replaced industrial mechanical systems. A building that is more like a robot than a shelter. A structure with its own electronic nervous system that is every bit as responsive as the muscles flexing of the body of an Olympic athlete.

No doubt there are some of you present here today who will have already heard of so-called smart or intelligent buildings. The concept of the intelligent building has been around for a while and yet there remains little consensus of what makes a building intelligent. » (Philip Kerr, *Gridiron*, London, 1995, page 7-8.)

There are many definitions to present.

The best solution however is to listen to and follow the various presentations of intelligent library buildings from all over the world.

Colleagues with recent finished projects are very pleased to guide us this week with their presentation and including our discussions into the world of intelligent library buildings. With far better results than in Philip

Kerr's thriller.

Projects of national libraries, university libraries and public libraries are scheduled this week. A greater variety is hardly possible.

I am sure that at the end of this 10th IFLA seminar there will be less confusion about what makes a library building intelligent.

I wish you all a week well spent: for your professional work in the field of libraries and personally here in The Hague.

SOME THOUGHTS ON THE DESIGN OF MAJOR LIBRARY BUILDINGS

by Harry Faulkner-Brown
Chartered Architect and library Planning Consultant

ABSTRACT

Library buildings of all sizes but, particularly large ones, should have the following purposes: - protection of books and collections; - housing of books and other collections; - housing of the various catalogues; - accommodation of readers; - provision for staff; - quarters for ancillary functions; - quarters for library administration; - study, research and writing quarters; - space to publicize resources; - structure to serve as a memorial.

These can be studied, agreed and communicated by means of both an initial and final brief. In it qualitative factors are of singular importance. Ten are suggested together with some British space standards. Ecological library buildings and architectural options are outlined.

INTRODUCTION

I was somewhat at loss when asked to stand in for the first speaker at this conference at a few days notice. Since I recently prepared a chapter for a publication dealing with the subject of my title, I am presenting you with substantial extracts from « Design criteria for large library buildings », chapter 19 in UNESCO World information report, 1997/1998.

This paper considers planning and design aspects of new library buildings, and extensions and major reconstruction of existing buildings.

So many factors influence these buildings that a rationalization of common features is presented, since there are many similarities in the functions of large buildings designed to meet the needs of academic and research institutions, historical societies, state and national libraries. The many similarities are balanced by differences caused by the unique nature of governmental, educational, cultural, geographical and urban philosophy and practice, and by the community they serve.

Some results are well illustrated in a recent publication (Melot, 1996). Several authors describe and illustrate many of the features of fifteen recent major library buildings. The variety is staggering; some are quite inspirational and cover regions as dispersed as the west and east coasts of the United States, Europe and Scandinavia, the Middle and Far East and parts of Africa. This is an important book of reference which can be of value to decision makers in any country contemplating a project for a major library

building.

FUNCTIONS

Keyes Metcalf, the doyen of library consultants, wrote his important book « *Planning Academic and Research library Buildings* » in 1965, the great guide on this particular subject. The revised edition (1986) contains the following statements of purposes:

- *protection of books and collections* of other records from the elements, poor environment and mishandling;
- *housing of books and other collections* in a variety of accommodations for ease of access;
- *housing of the various catalogues* and related bibliographic tools which enable the reader to find relevant materials in the local collections and supplementary holdings in other institutions;
- *accommodation of readers* and other clientele who need immediate or frequent access to collections and services;
- *provision for staff* who select, acquire, organize, care for and service the collections, and who aid readers in their informational needs;
- *quarters for ancillary functions* such as photocopy services, bibliographic instruction, audio-visual materials preparation, computer support facilities, etc.;
- *quarters for library administration and business offices*, such functions as personnel, finance, fund-raising, publications, graphics or signage, building operations, security, supplies, mail and delivery service, etc.;
- *study, research and writing quarters* for students, faculty and visiting scholars;
- *space to publicize* resources or services through exhibits, lectures, publications, etc.;
- *structure to serve* as a memorial to an individual and symbolism of institution's academic life in pursuit of scholarly achievement.

These physical provisions are designed to meet the present needs of the library building but at the same time must be arranged in such a way that it remains possible to adapt to inevitable changes in government or institutional policy, educational variations, social patterns and technological advances and which are difficult or impossible to predict.

BRIEF (PROGRAM)

It is important that the needs of a new, extended or reconstructed building should be clearly and unambiguously stated. This is one of the most important activities in the life of any building. It is formulated for

clarity of communication. It is important here to define what is generally accepted as the brief or program. The final brief is a comprehensive list of all the requirements necessary to inform the design team adequately, and is gradually developed over an extended period of consultation. (This sometimes undertaken at the outset by brief-writing specialists). It is based on the initial brief given by a client to an architect, usually when the building is first commissioned, and can form the conditions and rules of a competition. It can be defined as a short, concise statement of the problem, its objectives, organization, operation, technical requirements and schedule of accommodation, and sets out factors affecting the design standards and qualities required; it should be comprehensible to lay committees and be used for subsequent design evaluation. Prejudices and suggested design solutions should be avoided. Examples are given in Faulkner-Brown (1993).

FIXED-FUNCTION

For all practical purposes, before 1940, library buildings were fixed-function buildings. Each part was designed to do a specific, known and predictable function. This type of building was successful only while the function remained constant. By 1945, the function of academic libraries and others, including very large libraries with a legal deposit role, stopped being constant. Three principal items revolutionized library planning, resulting in massive changes to the building: the changing role of and expansion in education; new forms of communication and access to information; the massive development of all forms of relevant technology. However, in larger buildings requiring storage of considerable amounts of both book and non-book material, generally in closed access, bookstacks and specialist stores in fixed function accommodation form a large part of the whole. The rest of the building provides space which can be adapted, enlarged and changed to rearrange functions and activities easily, without undue disruption.

MODULAR

The flexible modular building is now a mature building type and is the result of several decades of development and refinement. Some buildings have not managed to cope with the changes which have taken place in activities and access to information, although many have - but will they and new unborn schemes continue to cope in the future when needs and activities are changing so rapidly and in such a unforeseen ways? It is difficult, or virtually impossible, to predict how library buildings will change in the future except that the only certainty is that they will change.

QUALITATIVE FACTORS

In examining what exists at the moment, an enormous range of solutions to the problem presents itself. To attempt to analyze or even comment on aspects of resolution and either to review or criticize building design solutions would require a volume on its own. Major buildings,

especially national libraries, are unique and some are so unusual that they should not be studied as role models. It is therefore more appropriate to try to establish common ground so that in making projections for the future a clear picture can emerge of what the library building of today and tomorrow should be like.

To attempt to illustrate an ideal library would ignore the many and varied basic factors affecting the buildings, such as national culture and education, user needs, patterns of use, the influence and constraints of the site, the financial climate and national pride. There is, therefore, justification for an examination of desirable qualities rather than theoretical details.

Although internal arrangements and user services vary from place to place, and from one type of library building to another, recent buildings of all sizes have several common factors, which have been crystallized into the following desirable qualities, or as some colleagues call them - « Faulkner-Brown's ten commandments ».

A library building should be:

1. **flexible**, with a layout, structure and services which are easy to adapt;
2. **compact**, for ease of movement of readers, staff and books;
3. **accessible**, from the exterior into the building and from the entrance to all parts of the building, with an easy comprehensible plan needing minimum supplementary directions;
4. **extendible**, to permit future growth with minimum disruption;
5. **varied**, in its provision of book accommodation and of reader services to give wide freedom of choice;
6. **organized**, to impose appropriate confrontation between books and readers;
7. **comfortable** to promote efficiency of use;
8. **constant in environment** for the preservation of library materials;
9. **secure** to control user behaviour and loss of books;
10. **economic** to be built and maintained with minimum resources both in finance and staff.

These are the broad outlines of ten important qualities. Irrespective of size, these qualities can be applied in varying degrees. It is worth examining them in more details. Several library buildings have adopted these qualities: National and University Library, Reykjavik (Iceland); Bibliotheca Alexandrina , (Egypt); Juma Al-Majid Centre for Culture and Heritage (Dubai).

FLEXIBLE

Flexibility of course does not mean that the structure is flexible and

will bend or move under stress. A flexible library building is one which permits flexibility in the layout of its planning arrangements, with structure, heating, ventilation and lighting arranged to facilitate adaptability. By arranging columns with regular spacing, or reducing the number of columns with long span beams, and by designing the floors to carry a superimposed live load of 7.2 kN/m^2 (150 lbs /ft^2) for bookshelf loading, it is easy to move departments, issue and service desks, bookshelves, reader places or other library functions to any part of the building.

Better flexibility is achieved when floors are level, without steps, and when the heating, ventilation and lighting are uniform and allow rearrangement without the need for any alterations and yet maintain an adequate environment. The planning arrangements are much more flexible if the number of internal walls are concentrated in certain areas to form « cores », containing immovable features such as stairs, lifts, toilets and ducts. Other walls, where security and privacy are absolutely essential, are not structural, and are designed to be demounted and erected elsewhere. The building and its components are designed to facilitate this. All other areas can be left open and, through applying the well-tried experience of offices designed on « *Bürolandschaft* » principles, visual and aural privacy are achieved very simply, with the bonus of much improved communications and supervision.

The necessary visual privacy is achieved by varied furniture arrangements with bookshelves providing indigenous screening, and movable indoor planting additionally providing colour, a variety of forms and life to the interior.

Aural privacy is achieved by acoustic material on both the floors and ceiling, plus the introduction of an even level of ambient noise in the ventilation system. These factors ensure that noise levels of normal library functions and conversations are absorbed in a satisfactory manner, and are not distinguishable at distances of beyond about four meters from sources.

In an open-planned building designed flexibility to cater for adaptations, the relocation of departments and activities are achieved without having to resort to expensive contractual alterations, and the librarian is not inhibited from making changes or instituting experiments - they are achieved merely by moving furniture and bookshelves. If, however, the furniture is fixed or built-in, or built of brick, steel or reinforced concrete, then it does present a more difficult problem. The furniture is immovable for all time, which assumes that needs will not change.

Furthermore it can be demonstrated that the open-plan flexible library can be economical in staff resources, since overseeing and informal control are facilitated by the openness rather than by dividing up the building into rooms or halls, thereby requiring fewer staff.

It can be seen therefore that the open plan has many advantages, that enclosed rooms disappear, or are drastically reduced in number, and that the departments are in loosely defined areas, informally arranged in relationship

to each other.

COMPACT

A compact building will assist the librarian in many ways. Theoretically, travel distances will be reduced to a minimum if the building is a cube and on entry users are brought to the centre of gravity. Books, staff and readers will need to move shorter distances in a cubic building than in a linear building or one extended by moving away from a deep plan. There is also a bonus in economy of consumption of fuel and energy.

ACCESSIBLE

The quality of « ease of access » to the building and to the books is one to which much attention needs to be paid. An easy and inviting route to the entrance should also be unambiguously defined. Once inside, the user should be aware of the location of the principal elements of the building - inquiries, the main desk, reference, catalogue and stairs - and the routes should be strongly stated without an overproliferation of signs and directions.

EXTENDIBLE

Until recently all librarians and some architects have maintained that library buildings especially academic libraries, are not finite. They should be capable of extension and land should be reserved for future expansion.

A significant development in British academic libraries was the report of a working party on Capital provision for university libraries - the Atkinson report. Among other things it recommended the adoption of a « self renewing library of limited growth », and established new norms. This meant that academic library buildings were to be finite with no provision for extension.

It is a commonly held view that every library building should be capable of extension, that the construction of the building will facilitate extension, and that, at each stage of development, the building should appear to be a complete entity. Naturally, the choice of exterior materials and construction will be heavily influenced by this latter factor. The exterior wall of a library building can consist of a series of simple repetitive units which can be removed from the facade and re-used in an extended building. If the library is not extended, it can stand in its present state as a finite, and apparently complete building. If the needs of the library change, the building can be changed reasonably easily. Some of the ten commandments can be bent, some diluted, but this one should not be abandoned.

VARIED

The variety of book and of user accommodation in a library adds interest to the interior but also provides for the many needs and preferences of the users. This will vary considerably depending on size, function and location.

ORGANIZED

Since it has been said that « the library is the principal means whereby the record of man's thoughts and ideals, and the expression of his creative imagination, are made freely available to all », then a principal quality in a library building is that the display of its library materials can be organized so that they are accessible and easily available. Simplicity in layout, arranged in an easily understood and inviting way, is vital in both small and large libraries.

COMFORTABLE

Before beginning the design of a library, the librarian and the architect together should visit a large number of libraries of all types. It is important to observe how libraries are actually used. Photographs and notes should diligently record this, and will probably include many cherished photographs of sleeping users. Almost without exception, they will have occurred in large libraries with antiquated and inadequate ventilation without air-conditioning. A fresh, constant temperature and humidity not only promote efficiency of use, they encourage use. In some climates, discomfort is caused if windows in a large library are opened - heat, cold, dirt and noise are offered « open-access » from the external environment.

In other climates, to achieve the desirable comfort conditions, it is important and economic to use the free facility nature offers from the external environment and induce it into the building with controls to regulate it according to need. Generally speaking, this applies to large library buildings, especially those with a deep plan, and to those where study conditions can be offered with a secure aural environment.

In all libraries, a good standard of lighting is necessary - there is a lot to be said for an evenly maintained level of minimum of 400 lux at the working plane throughout the public areas. This will be adequate for most needs, including the illumination of the book title on the lowest shelf.

CONSTANT IN ENVIRONMENT

Research into the preservation of library materials indicates that a constant environment is necessary, and when this requirement is linked to the former - comfort of the user - an unvarying level of illumination, heating, cooling, ventilation and acoustics will give the type of environment needed in a library. The external wall should be considered to be an environmental

filter or regulator. It should reduce heat loss in winter and solar gain in summer. It should keep out intrusive external noises yet provide windows for prospect.

Temperature and relative humidity (RH) standards, which are generally acceptable in a library, are:

- 18.5 ° C to 21 ° C;
- 50 % - 60 % RH (never to exceed 65 % RH).

SECURE

Security of the collections has always been of prime importance in libraries. The reduction of public access and egress to a single point well controlled by electronic book detection systems or other means, and the openness of planning to assist automatic overseeing of most areas, goes some way to reduce the loss of books and to control the behaviour of users in many instances, so that vandalism is reduced.

ECONOMIC

The energy crisis has hit all of us. Libraries can be expensive buildings to build and they can be expensive to run; in fact, running costs have become a major financial consideration to librarians. In large libraries, the deep compact plan requires long hours of artificial illumination and air conditioning to create an even and constant environment. Every acceptable method must be examined to minimize cost without impairing service.

In first instance, when designing a building, economy in running costs can be affected by reducing the surface of the exterior skin of the building (walls and roof) as much as possible, so that the ratio of wall area to floor area is low. A building form with a cube shape is ideal, but may not suit the library planning needs. However, it is important that the building shape is as close to a cube as possible.

Secondly, windows allow heat to pass out of the building in winter and to pass into the building in summer from solar penetration. Window openings should be as small as possible and as a guide the recommended total area of window should not exceed 25 % of the total wall area. Shaping the exterior of the building to provide shading for the windows can keep out solar penetration at the hottest part of the year, thereby reducing the cooling load in summer. There is no need to stress the importance of wall and roof thermal insulation.

Contrary to widely held belief, the great consumer of energy in a deep plan building in temperate climates is not the heating requirement in cold weather. Well insulated walls of minimum area are the only substantial source of heat loss. The centre part of the deep plan is not losing heat, since it is surrounded by a cocoon of warm air in the perimeter bay. In addition to the lighting, the major consumers of energy are the fans to circulate air

through the building and the refrigeration equipment to reduce the temperature in warm weather. The period when maximum energy is required is in hot weather with a full library, when the air conditioning plant has to deal with outside temperature, and with permanent artificial lighting to a high even standard.

SPACE REQUIREMENTS

The Standing conference of national and university library (SCONUL) co-ordinates the results of investigations and experiences in British academic libraries. In one of its recent papers (McDonald, 1996) attention is drawn to the inadequacy of the need British norms for the size of libraries and to the need for increasing the allowance.

According to what have become known as the Atkinson Norms, the appropriate net size of a university's central library should be assessed by the following formula:

- 1.25 m²/student numbers FTE (full time equivalent);
- 0.2 m²/student numbers FTE in ten years' time;
- + assessed provision for special collections;
- + adjustment for special circumstances.

The gross size of the library can be derived by adding the balance area (for toilets and staircases, etc.) to this net figure. Depending on the shape of the building, this balance area is commonly about 25 %. The figure of 1.25 m² was based on 0.40 m² for seating and 0.62 m² for bookstacks, with an additional 20 % allowed for administration (library staff). It is also suggested that there should be one reader place for every six students (FTE) on average, and the space required for each reader place was 2.93 m². It was recognized that different provision was appropriate for different academic disciplines; for example, one place for every two law students was recommended. These norms have been widely adopted not only in the United Kingdom but also around the world, and have been used by many universities in planning their libraries and bidding for the necessary resources. On the other hand, some universities have never achieved the level of funding necessary even to approach these minimum standards.

The existing space norm was based on a reader's module with a table measuring 900 mm x 600 mm. It has become increasingly clear that this was an absolute minimum even in print based libraries; but as the use of equipment, especially computing equipment, has grown, this table size has become grossly inadequate. In order to provide space for books, computers and reader's papers, a table size of 1200 mm x 800 mm is necessary. As a result of increasing information technology provision, the old space norm of 2.93 m² per reader space has therefore been found insufficient, and in recent projects universities have found it necessary to make a more generous space allowance of between 2.5 m² and 4 m² per reader space.

SPECIAL TECHNICAL REQUIREMENTS

In large library buildings, storage accommodation for either books, pamphlets, maps, sheet music, slides, records, compact discs, audio and video tapes should be available as appropriate on open access. But a large part of the collections inevitably will be housed in closed access stacks. There is merit in considering furnishing the stores with static shelving initially, with the physical provision to convert to compact mobile shelving when necessary.

As a guide, the parameters given in the brief for the Bibliotheca Alexandrina for special technical requirements were summarized as follows:

Reading rooms and offices:

- sound reduction factor 43 - 45 dB; - natural lighting as far as possible; - artificial lighting about 500 lux at table level; - finishing designed to avoid glare; - temperature 21 - 24° C; - relative humidity 55 - 65 %; - air change 2 V/h.

Lecture rooms, classrooms in the International school of information science (ISIS):

- sound reduction factor 45-55 dB; - finishings designed for acoustic absorption; - natural lighting for classrooms; - artificial lighting about 500 lux at table level; - temperature 21-24° C; - air change 10V/hr.

Closed access book storerooms:

- artificial lighting about 300 lux; - temperature 18 - 20° C; - relative humidity 45 - 55 %; - floor load 13 kg/m². Laboratories and workshops; - designs ensuring acoustic absorption; - variable artificial lighting about 500 lux; - temperature 18 - 21° C; - air change 2 V/h; - own air extraction system; - de-ionized water supply; - uninterrupted power supply for computer; - standby power source.

MAJOR RECONSTRUCTIONS OF EXISTING BUILDINGS

The great difficulty encountered in conversions or alterations to buildings to make them suitable for use as up to date libraries buildings usually lies with the existing structure and services. If the structure has a floor loading capacity of 13 kN/m², from a structural point of view it should be reasonably flexible since it can carry static bookstacks. A floor loading

capacity of 13.5 kN/m² will permit the use of compact mobile bookstacks. If the building is a historic or architectural national monument, then problems of interference with parts of the building fabric might be overwhelming.

A major cause of interference can be ductwork for a ventilation system. There is a wide experience in this problem in most parts of the world. The new problems which are showing themselves are generally concerned with the proliferation of communications and information technology. So much cabling needed in public parts of a library building are difficult to conceal. However, new techniques could be helpful. Digital cordless communication technology is developing. This eliminates the need for horizontal wiring, has minimal space requirements, causes little disturbance to the fabric of an existing building and is quick to install. Generally it is in its infancy - it will be most interesting to see how it develops.

ECOLOGICAL LIBRARY BUILDINGS

Library buildings protect the contents and occupants from the external environment and phenomena such as rain, wind, temperature and humidity. Indigenous and intelligent design make use of naturally occurring materials and works with the environment. Examples of man-made materials for building which work with the environment, in addition of those occurring naturally, are concrete, brick and tile. Those which do not are glass, steel and plastics.

In the 1960's, the style of building was in conflict with ecology. Glass boxes and lightweight structures made huge demands on energy supply (and therefore costs) and, among other disadvantages, contributed to the « sick building syndrome ». Fortunately, there is a steady move towards reducing wasteful expenditure on energy by maximizing the use of ambient, renewable sources of energy in place of generated energy by:

- providing a thermally massive structure (which to a large extent is needed for floors substantial enough to support bookshelves) and gaining free night-time cooling;
- achieving an effective balance between the use of advanced automatic controls on building plant and the opportunity for users to exercise direct control of their environment;
- improving natural ventilation;
- maximizing the use of daylight and sunlight with the possible introduction of an atrium, provided it does not impair the acoustic environment.

The above suggestions when applied in differing climates will produce quite different solutions. It is a complicated technology but can produce a simple energy and cost saving solution.

ARCHITECTURAL OPTIONS

For several decades, the design of large library buildings generally followed the pattern of this building type in the USA which evolved as a deep plan squarish building, with open access bookstacks in the centre and reading spaces on the perimeter. In some instances, sometimes for good visual reasons, large windows occupied substantial areas of the facade.

Technically the buildings were similar in a variety of climates since they were sealed, without opening windows. Heat gains due to solar effects on both the structure and in many cases unshaded windows, caused problems which could only be relieved by artificial cooling. In addition the centre bookstacks, because of their remoteness from the perimeter daylighting, needed to be artificially illuminated during opening hours.

Damage to the biosphere has become an increasing concern of all those involved in construction. The energy crisis of the 1970's has made us recognize the critical effect on human and economic costs. There is an increasing realization that many of the problems can be avoided by designing for natural light and ventilation.

Human response to daylight indicates that most people value the variety of daylight, enjoy its presence and at least want a view of the world outside. There is a subtle benefit that occupants' metabolic rhythms are synchronized properly with the time of day and night.

Natural and artificial heating, lighting and ventilation of buildings are interdependent and there has been a noticeable move towards replacing the totally artificial internal environment with a more natural system.

In large library buildings, it is difficult to bring the benefits of daylight to all parts of the floor areas used for human occupancy. A new pattern is appearing where the introduction of an atrium allows natural daylight to reach parts which were previously inaccessible. Too much or too little glazing, of the wrong kind or in the wrong place, will produce heat losses or heat gains, which may have to be counteracted by artificial cooling or heating. This has to be balanced with the avoidance of glare, down draughts, lack of privacy, severe temperature variations or ultra-violet damage. Examples can be seen in Copenhagen, both in the extension to the Royal Library and in the university library at Amager.

The emerging style of library buildings towards the end of this century seems to indicate that the needs of the users are paramount, and that the consideration of using natural daylight, heating, cooling and ventilation is a pattern that must be followed.

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THE CENTRAL LIBRARY OF THE HAGUE

IN THE MOST PROMINENT PLACE IN THE CITY

by Wim Renes,
Director of the City Library of The Hague

1. INTRODUCTION

The moment of completion of the new building in The Hague was and is one of great importance to the city, its library and its citizens.

It was not just the final culmination as the result of many, many years of discussions and planning: with different plans to look at, and to be discussed, but the city has finally got a new and greatly improved library to serve the clients of the city library up to date.

Everyone who was familiar with the distressing accommodation of the central library of The Hague on our previous location on the Bilderdijkstraat, eagerly looked forward to the developments of the new location on the Spui. There, in the « slipstream » of the new city hall, a new central library has been erected and completed in September 1995 ¹.

The complex process of planning this specific new central library in the city centre of The Hague, as part of the much greater city hall/library project, took nearly nine years.

From the remarkable day of the memorable brainwave of alderman Adri Duijvestein on the terrace of a hotel in Kijkduin in May 1986 up to September 2, 1995 - the first day of opening for the public - the library staff was fully involved in this planning- and building process.

30.000 visitors on that first day of opening gave the staff already that same day the intense feeling that the decision to build in combination with the city hall, and specially on this specific location, was exactly right.

At the general IFLA-Conference in Havana, Cuba, August 1994, I presented a paper called: « *From brain-storm to the new central library of The Hague, Netherlands* », in which the first years of detailed planning was described.²

It was already clear in the sixties that a new central library complex was needed. It is surprising that the first serious administrative initiative for

¹ Duijvestein, Adri. *Het Haagse stadhuis, bouwen in een slangenkuil*. Sun, 1994

² Renes, Wim M. *From brain-storm to the new central library of The Hague, Netherlands*. Cuba, Havana, august 1994

a new construction was not actually taken until 1982, when the city council reserved a location for it in a zoning plan in the centre of the city and that determined the programme of requirements.

2. THE THEME: INTELLIGENT BUILDINGS

Recently, there has been considerable fanfare advocating the merits of the « intelligent building ». Numerous articles and publications have been presented and published, promoting this « new-age » technology.

Admittedly, the concept is very enthralling: a state of the art library building with the latest and greatest in design and constructural technology, offering the clients systems that once only existed in the imagination of futurists. It is a dream of engineers, designers and librarians, a forum to marry new technology with creative design applications and a heavily used library building.

Main criteria for me to qualify the building as intelligent is the fundamental objective of meeting the needs of the end user: the visitors of the central library. Keyword therefore is functionality.

Perhaps for the librarian the problem lies in the fact that the building should be utilized according to the requirements of its mentioned end use. It should not be the governing factor for the design only. A really intelligent building is a building with an intelligent owner and an intelligent preparation team, for instance: architects, technicians, consultants, interior lay-out consultants.

« Creation of a new library cannot be the work of one man, or one firm. It requires the co-operation of a whole team, each member with its own contribution to make » is the conclusion of the well-known librarian and library consultant Godfrey Thompson.³

The intelligent building of today is, however, not exclusively the work of specific experts: architects, contractors and constructional and technical advisers/consultants.

In practice every staff member of the library will be involved in its long-term developing process.

An executive summary of the report « The intelligent building in Europe » defines an intelligent building as: « one that maximizes the efficiency of its occupants while at the same time allowing affective management of resources with minimum lifetime costs ».

3. INTELLIGENT LIBRARY BUILDING IN THE HAGUE

For our library project in The Hague concerning the new central library as an intelligent building we were fully focused on:

³ Thompson, Godfrey. *The efficiency of the vertical and horizontal organization*. Bremen, 1977.

- adequate funding of the project
- location of the new central library
- the program of requirements
- the spacebook
- the datasheets

4. FUNDING

« The building budget plays an extremely important part in the final realization of a new library building. On the one hand it constitutes the limits of what is attainable in terms of price and quality, while on the other hand the aims the library wishes to achieve, within the possibilities the building offers, set a clear task for its financing and yearly cost-effectiveness. The building budget for a new library facility is, at least for public libraries in the Netherlands, tightly constrained by the funding capability of the local city council ». ⁴

In preparing the new central library according to the definition of an intelligent building as one that maximizes the efficient management of resources with minimum lifetime costs, proper funding of the project was essential and could be realized. For the library to find and locate the separate funding for the interior layout and the furnishing of the library with extra money from the city was important. At the library disposal the city agreed for a total budget for interior layout, furniture and equipment was app. NFL 5.200.000. For extra staffing the library employed more than 22 full time staff members.

5. LOCATION

The new central library, spacious, clearly structured, in a sparkling white building, has indeed the desired strong visual impact within the city and for all the visitors of the city centre and for those who are coming for the library itself.

The library is for the greater part situated in a circular shaped building of eight floors, standing at the busiest corner in the city: called the Spui and the Kalvermarkt, right in the city centre.

Within 100 meters there are all the important and huge department stores of the city: no better place to create and build the new central library for The Hague.

The location of the central library, within this huge city hall/library complex of approximately 115.000 m², is the very best solution in and for the city and the central library.

⁴ Renes, Wim M. *The library view on controlling construction and running costs of the planned city library of The Hague, Netherlands*. Bordeaux, August, 1989.

To quote Godfrey Thompson for a second time: « the best location for a new building is next to Woolworth ».⁵

6. CREED

Certainly from the very first moment that there were discussions on the building of the library combined with the city hall, the city library wanted to do everything in its power to prevent the new central library building from getting into a tight corner of the complex. My creed was and still is: don't wait but let's take the initiative ourselves. Which means for instance be as clear as possible about the central library and the services from the very first moment of the beginning of the project. Which means already in the competition phase with the five architects.

7. PROGRAM

The five architects in the 1986 competition received two documents from the library:

- the brief or program of requirements;
- an initial brief in which the philosophy and the necessary facilities of the library were clearly stipulated.⁶

The initial brief from August 1986 of the library served requirements which had already been prepared in the original brief dated 1982.⁷ The initial brief primarily served to single out the main points again, and, as far as necessary, to adjust them to the new situation.

Principal elements in this initial brief were:

- The library must develop itself into a social/cultural and information centre which works in close co-operation with the city hall and the city archive;
- Unnecessary duplications of facilities must be avoided. For example, there will be a communal restaurant as well as an exposition hall. The brief also proposes an activity room and adjoining theatre which can be used by both the city hall and the library;
- As you can imagine flexibility was one of our most important requirements.

⁵ Thompson, Godfrey. *Planning and design of library buildings*. 3rd ed. Butterworths, London, etc., 1989.

⁶ *Architect's brief central library*, 2nd version. The Hague, 1986.

⁷ *Architect's brief central library*. The Hague, august 1982.

8. SPACEBOOK FOR THE LIBRARY

Finally, in July 1989, the city Council opted for the architectural plan of the well known American architect Richard Meier. Construction started later, the following year.

In the meantime, the arrangements for the library floors crystallized themselves. In a very detailed « Spacebook DOB »⁸ (see also appendix A) the library described, per floor and per room, what activity should take place where, and what technical standards the space must meet.

Nearly everything was summarized: the functional relations of the room/area, the internal transport, floor covering, floor loading, the required temperatures and humidities, the light requirements and the technical engineering data for the automation processes within the library.

The aim of the library as end user was to provide all participants in this project with sufficient information so that they would know exactly what had to be done.

The building process may have become more complicated in this way, but the timely involvement and deeper concern of all participants in the project made it, at the same time, more controllable and easier to plan.

Later in this process this « library » approach would also be followed for the city hall sections of the complex.

9. DATASHEETS

During the process of preparing the detailed lay-out of all public departments, together with the product description and the exact measurements of all different parts of the furnishing, the interior lay-out company has drawn up datasheets.

All types of shelving for books, magazines, video-tapes and compact discs, including height, width and depth measurements, shelves and other parts of these shelving are described in full detail, together with the product description and the detailed measurements of all other parts of the furnishing.

So all elements of the interior lay-out of the central library were further developed into their final form.

For the library, that was very important as in this way it became possible to get a clearly structured overall view of all different materials.

In drafting these datasheets first of all a firm ground was laid for the contract with the supplier of the library furnishing. A very important side effect was that these datasheets could be used as a important source of information within the own library organization.

⁸ *Spacebook DOB, city hall/library complex*, third version. The Hague, December 1991.

10. INTELLIGENT BUILDINGS ARE ALL ABOUT INTELLIGENT PEOPLE

Libraries all over the world exist in order to bring their users, in a friendly and efficient way, a full range of sources of information, education, recreation and cultural activities provided from their funds and managed for their benefit.

The rate of social, cultural changes is ever increasing. The advent of new technology for library use and development of new building types to satisfy the new scenario for all library customers will have its impact on the libraries in the future.

What do people want from their (public) library?

- they are looking to libraries as more than a source of books, they want information in whatever form it is available. Relevance and fast access are the most important factors;
- they are looking for human contacts, to « network » with others who share their interest, either related to business or hobbies or recreation and culture;
- the most valuable source of information is often providing information that is most relevant to an individual's needs and interest.

Or to quote Marylyn Gell Mason, director of the Cleveland Public Library: « libraries do many things. They collect, organize and preserve; they make knowledge accessible - not books - but knowledge. Knowledge requires organization, context ». ⁹

Without a well designed intelligent building, the result would be disappointing for the users.

11. CONCLUSIONS

Within the many discussions which took place between the library and the architects and between the city and the library, and concerning the intelligent building within the given definition, the following propositions were and still are essential:

- Over a long range of years thousands of satisfied visitors daily determine the success of the always developing library;
- The library - and this may well be one of the most important challenges to the librarian within the process - must have the knowledge and courage to make decisions - towards its own organization, as well as towards the decision-making authorities and the architect, even though there remains a

⁹ Mason, Marylyn Gell. « The Yin and Yang of knowing ». In: *Deadalus*, Fall, 1996, page 169.

chance of making mistakes. Success is by no means certain, but the final result will only improve in that way;

- The direct and intensive participation of the library staff within a team is essential for the functional, architectural and technical quality of this project. Only by working in teams it can become an intelligent library building;
- The intensive participation of the library staff has resulted in, among other things:
 - direct, regular and very intensive contacts with the city council, the architect and all others involved in this project,
 - reaching the best possible compromises;
- Finally, an important element, maybe one of the most important elements, in this complex planning process is the time involved for the total staff of the library. In The Hague, we were working on this project, since 1986, with three full time staff members. They worked together with more than 30 internal working groups (e.g. working groups on furnishing, the removal, the data communication infrastructure, the signposting of the public department). This, together with the frequent consultation and information of all staff through general meetings, was time consuming and costly. But it was also more than worth the effort and thus the investment was well spent.

The close co-operation of all participants: architect, city council, library authority, construction companies and all other organizations and companies involved, as a result of the awareness of each other's specific functions and responsibilities in the process, was essential for the final result.

The central location of the library on the busiest spot in the city centre and the prominent place of the library within this complex, allowed this new central library of The Hague to take a huge step forward in presentation to its citizens and in intelligent planning.

APPENDIX

DESIGN DATA SHEETS: CITY LIBRARY

THE HAGUE, NETHERLANDS. 1991

ACTIVITY DATA:

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- 12 Number of persons involved
- 13 Relationship
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DESIGN:

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- 42 Air changes
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THE NEW CENTRAL LIBRARY OF THE HAGUE

FACTS & FIGURES

1. Why a new central library
2. Improvements
3. General facts and figures
4. Suppliers of furniture

5. Technical facts:
 - 5.1 General
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6. Removal
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8. Departments of the central library
9. Special collections
10. Communication during the building process

1. WHY A NEW CENTRAL LIBRARY

Since the start of the public library work in The Hague in 1906 the housing of the central library has been a recurring source of anxiety. The problems caused by the growth of and the developments in the public library work led to repeated requests to the municipality for adequate housing, preferably a total new building, in the city centre. At last, in 1982, an extensive programme of requirements was drawn up and early in 1987 a revised version followed.

In 1986 the board of burgomaster and aldermen of The Hague proposed the plan for a combination of a new city hall together with a new central library. Five internationally famous architects were invited to join a competition. They were: Rem Koolhaas (The Netherlands), Richard Meier (USA), Helmut Jahn (USA), Saubot/Julien/Webb/Zerefa/Menkes/Housdon (France / Canada) and Hans Boot (The Netherlands).

The jury opted for the plan of Rem Koolhaas, but the municipality strongly preferred the plan of Richard Meier. Therefore both architects received the task to adjust and detail their plans, especially for the library part. After rounding off this phase, a final choice was made for Richard Meier.

Many discussions, between the library and the municipality as well as between the architect and the library followed. At last on July 6, 1989 the council decided to realize the city hall/library complex.

The library is on the most striking location of the total complex: the corner of the Spui and the Kalvermarkt.

On this corner you find the circular facade of the library. The library also occupies almost the whole of the facade on the Spui, with exception of the furniture store on the ground and first floors and the floors eight and nine, where there are offices and technical areas for the city hall as well as the Haagse Salon: a representative area that will also serve as activity area for the library.

2. IMPROVEMENTS

The most important improvements are:

- central location

The new central library is located on the Spui 68: in the city centre, amidst department stores, offices and theatres. An ideal location, close to the central station, on cross-roads of almost all tram- and bus services and thus within optimum access for all.

- extended opening hours

With the removal to the Spui the opening hours have been extended from 39 to 61 hours a week. From now on the central library will be open from Monday till Friday from 10.00 till 21.00 hours and on Saturday from 11.00 till 17.00 hours.

- all materials in open access

In the old library about 75% of the collections were placed in stock-rooms. In the new library almost all materials are in open access, directly accessible to the public.

- integrated collections

In the old library, books, magazines and reference works were dispersed over several areas. Moreover several departments were located on other premises, because of lack of space. In the new library all public and supporting departments are re-united under one roof. The different types of materials are placed integrated on the departments. This means that all materials on a certain subject, whether books, magazines, reference works or videotapes, are placed together.

- more study places

Scattered over all floors are 600 study places. Besides the tables and chairs there are half open study-carrels and 24 closed study-carrels, on floor 3, 4 and 5. Moreover there is a closed study-carrel with a piano on floor 4.

- reading cafe

On the ground floor of the new library will be a reading cafe. Here you will find papers and magazines and of course you will be able to have all kinds of beverages and snacks.

3. GENERAL FACTS AND FIGURES

Commissioner:	National Civic Pension Fund (ABP)
Architect:	Richard Meier & Partners, New York
Project architect:	Rijk Rietveld, New York
Contractor:	Wilma Bouw BV
Owner:	Municipality of The Hague
Sub contractors:	Croon, electro-technics Gartner, facades Schindler, elevators and escalators ULC, heating and air-conditioning
Advisors:	Ingenieursbureau Grabowsky & Poort Adviesbureau Peuts associés Bureau Valstar & Simonis BV
Construction period:	
- work begun	21 December 1990
- completion	22 June 1995
- first open to the public	2 September 1995
- official opening by Queen Beatrix:	8 September 1995
Surface area:	14.486 m ² gross 11.750 m ² net
Dimensions:	length 100 meters breadth 15 to 40 meters height 40 meters
Number of floors:	6 public floors 2 office floors basement
Height of floors:	4,25 meter
Costs of furnishing:	f 5.200.000,-

4. SUPPLIERS OF FURNITURE:

- ALS, Welwyn Garden City, United Kingdom (automation hard- and software))
- AMK, Apeldoorn (conveyor belt, circulation desk)
- Bouter, Zoetermeer (apparatus reading-café)
- Engels, Eindhoven (transport appliances circulation desk)
- Lensvelt, Breda (office furniture)
- NFGD, Zoetermeer (audio visual apparatus)
- Point 3, Haarlem (signposting)
- Schulz Bibliothekstechnik GmbH, Speyer, Germany (library furniture)
- Sensormatic, Bunnik (protective devices library materials)

5. TECHNICAL FACTS

5.1. General

Heating and air-conditioning

The public and office areas are connected to an air-conditioning system.

During the summer surplus cooling is provided by ground water that has been cooled during the winter.

For heating radiators are placed in the public as well as in the office areas. On the ground floor convection heaters are lowered into the ground.

Lifts and escalators

In the library are 3 lifts: two for persons and one for goods. The goods lift is also used by library staff for the transport of book trolleys.

Besides the lifts there are escalators linking the public floors (floor 0 to 5).

Library materials returned by the users to the lending centre on the ground floor are transported to a sorting room in the basement by means of a specially designed conveyor belt.

Sunscreens

The building is provided on the outside of the façade with so-called sunscreens. The screens are activated by certain temperatures and the intensity of the light. In the offices it is possible to manipulate the screens manually.

Lighting

All areas have energy saving fluorescent lighting in the ceilings. The required light level is 450 Lux on the lower shelving.

Ceilings

In the ceilings are fitted: fluorescent lighting, sprinklers, speakers for the public address system, ventilation grids and emergency lighting.

5.2. Security

Burglary alarm

The burglary alarm consists of a number of door contacts, video cameras and alarms signalling broken windows. The alarms are all linked to the central control area.

Fire alarm

The fire alarm consists of dry extinguishing conduits (in case of a fire to be used by the fire brigade), fire hoses, automatic smoke detectors and automatic and manually operated fire alarms.

The building also has a sprinkler installation.

Public address system

The public address system enables the library to make announcements or calls from the security desk to all linked-up speakers. All calls are preceded by an attention signal. Number of speakers: 115.

Protective devices library materials

The library materials are protected against theft by a magnetic strip. Near the entrance/exit detection gates by the firm Sensormatic are placed.

Entrance control

The library has made a very strict separation between the public and staff areas. This means all staff areas are accessible only by means of a facility card. All staff members have been given a coded facility card. Each card can be coded to give the bearer access to certain or all parts of the building at certain or all times, as the case may be.

5.3. Automation

Computer apparatus

All hardware has been placed in a separate, completely conditioned room.

The hardware consists of:

- a ALS file-server SV900 for the library automation with 6 function modules type Pentium, 90 MHz processors, total 96 megabytes RAM;
- 12 disk drives, total capacity over 25 gigabytes;

- back-up ALS SV900, 1 function module type Pentium, 90 MHz, 32 megabytes RAM, 2 disk drives, total capacity 8 gigabytes;
- 6 tape drives for the back-up/restore of the disk drives, total capacity 30 gigabytes;
- a file-server for the office automation with Pentium 90 MHz processor, 64 megabytes RAM, 2 x 2 gigabytes disk drive (disk mirroring) and a 5 gigabytes tape back-up unit;
- two CD-ROM file-servers with Pentium 90 MHz processors, each with 120 megabytes disk drives, 1.44 megabytes floppy disc, 32 megabytes RAM and 3 x 9 gigabytes disk drives, 28 CD-ROM drives in 19" racks, 2 multi-disk drives for in total 12 cm disks;
- a WWW Domain Name Server 486DX2/66 MHz with 8 megabytes RAM, 540 megabytes disk drive;
- a Internet WWW server, Pentium 90 MHz, 16 megabytes RAM, 540 megabytes disk drive;
- UPS (uninterruptable power supply); guaranties power supply to the computer room for 30 minutes in case of main power failure.

Connections

- 21 datalines to external locations;
- 1 x 64 KB dataline to Surfnet/PICA: X.25;
- 1 x 64 KB dataline to Surfnet/Internet: IP;
- appr. 100 terminals of external locations are connected to the library system;
- in the central library over 165 personal computers and workstations are connected to the local area network.

Local area network

The new central library has created a local area network (LAN) to support the different automated business processes. The connections from the personal computers and workstations to the concentration points (satellite equipment rooms - SER's) within the building are realized by means of a standard cabling system of the foiled twisted pair type. The SER's are inter-linked by means of glass fibre cabling. For the library automation the Transmission Control Protocol/Internet Protocol (TCP/IP) is used. For the office automation, the communication protocol IPX of the network managing system Novell, version 3.12, is used. The network managing system of the CD-ROM server is Windows NT. For the automated signposting for the public Windows 95 is used.

Signposting

For the public there are 7 automated signposts, each with a Pentium 90 MHz processor, 32 megabytes RAM and 1 gigabyte disk drive.

5.4. Furnishing

Floor covering

The ground floor has granite tiles (Bianco Sardo) in a light grey colour. All other areas have a grey mixed linoleum floor covering. The so-called « wet areas » have floor tiles.

Colours

The basic colour of the furnishing is white, RAL 9010.

The furniture of public as well as office areas is in this colour. Accents are in natural beech.

Upholstery is in black.

Signposting

Signposting consist of signs by the firm Point 3. Signs are in clear hardened glass. Between the two layers of glass is a clear foil, with lettering in black.

Signposting in the public areas consists of a simple, functional plan of the specific floor. On the ground floor there is also an over-all survey.

These plans are also available in print and obtainable from the information desks on the different floors.

The indications on the shelving consist of a text on the top shelves.

Furthermore the Public Library The Hague, in close co-operation with the firm of ALS, has designed a unique automated signposting system. This system enables the user to browse on subject as well as on title. On the screen of the catalogue terminals and on a number of specially designed terminals, the so-called pedestals, the location of the material looked for, can be shown in graphical three-dimensional form.

6. REMOVAL

In the new central library on the Spui fifteen kilometres of shelving had to be filled. A logistic operation in which five hundred thousand books, fifty thousand items of sheet music, fifty thousand compact discs, six thousand videotapes and thirty five racks with reference materials, dispersed over five locations, had to find their place within the new central library.

For the removal of the collections the automation department of the Public Library The Hague developed a special computer programme. A plan was drawn up, dividing all library materials, being part of the automated library records, over the shelving (addresses) of the new library. The materials were then coded by means of these addresses and subsequently merged on the right shelving.

Besides the library materials also approximately 125 workplaces had to be removed. This meant that, apart from the above mentioned library collections, also 1 250 removal boxes had to be relocated.

This gigantic removal operation was, in close co-operation with the removal firm of Voerman/UTS, realized in a period of fourteen days, in which the library was closed for the public for no more than eleven days.

7. LIBRARY FURNISHING

Parties involved

Three parties were closely involved in the process of furnishing the library:

- the Municipal Library The Hague;
- the firm of Schulz Bibliothekstechnik GmbH as supplier and designer;
- the architect as advisor and - for a number of items - as designer.

In close co-operation with these three parties the lay-out and detailing of the furnishing were decided upon.

Starting points for the furnishing

Starting points for the division of the several library functions over the floors have been:

- an attractive and inviting ground floor
- the lending centre on the ground floor
- departmentalization
- materials in direct accessibility for the public (open access)
- no separate reading room
- the information centre on the first floor

Division of library functions

These starting points have led to the following division over the public areas:

- Ground floor: circulation desk, daily papers and opinion magazines, general interest magazines, exhibition facilities, reading cafe, library shop;
- First floor: information department;
- Second floor: children's department, fiction department;
- Third floor: departments of literature and linguistics, ethnography and geography, Antillian collection, history

- Fourth floor: departments of music and arts, video feature films
- Fifth floor: departments of technology and natural sciences, social sciences, law and economics.

Furthermore on each floor: information desks, terminals to consult the catalogues of the Public Library of The Hague as a whole, including the branches, and over 100 CD-ROMS, individual reading- and studying places, exhibition facilities and photocopiers.

On floors 6 and 7 you find the Project Bureau Maatwerk (groups orientated services) and the staff offices.

8. DEPARTMENTS OF THE CENTRAL LIBRARY

In the **basement**, you find:

- bicycle parking for public and staff;
- locker room for the staff;
- first aid and accident precaution service;
- expedition;
- stockroom for historical and valuable materials;
- sorting room: here library materials brought back by the public are checked and sorted, before being returned to the departments;

On the **ground floor** you find:

- entrance/exit;
- the circulation desk, incorporating the security desk, users administration and customer services;
- papers and opinion magazines;
- general interest magazines;
- the reading cafe, seating fifty-two, where besides beverages and snacks, you will find papers and magazines;
- the library shop;
- over sixty-five reading places;
- a photocopier.

On the **first floor** you find:

- the information centre with:

- reference materials on much used subject, plans, address and telephone directories, encyclopaedias, reference works, dictionaries;
- information on The Hague (local papers, clipping files, municipal information such as the Council information system;
- cutting files on topical subjects and authors;
- microfiches;
- CD-ROM's;
- over eighty-five reading and studying places;
- a photocopier.

On the **second floor** you find:

- the fiction department, with materials in more than ten languages;
- the children's department, with materials for children and youths, but also materials on children's and youth literature on behalf of adults;
- an activity room;
- over fifty reading and studying places for adults and over forty for children/youth;
- photocopier.
- public toilets

On the **third floor** you find:

- the literature and linguistics department;
- the history department;
- the ethnography and geography department;
- the Antillian collection, a large collection of books, reference works, magazines, cutting files, videotapes, music, compact discs and plans on the Dutch Antilles and Aruba. The languages are Dutch, English, Spanish and Papiamento. The materials are directly available for the users, but are not for loan;
- over one hundred and twenty reading and studying places and eight closed study carrels;
- a photocopier.

On the **fourth floor** you find:

- the music department with collections of music scores, compact discs, videotapes and books and magazines on music;
- the art department with collections on art, dance, film and drama;
- the collection video feature films;
- over eighty reading, studying, listening and viewing places, plus nine closed study carrels, among them one with a piano;
- a photocopier;
- public toilets.

On the **fifth floor** you find:

- the technics and natural sciences departments;
- the social sciences, law and economics departments;
- the psychology and education departments;
- the departments on religion and philosophy;
- the departments on medical sciences, sports and plays and handicraft;
- over one hundred reading and studying places, plus eight closed study carrels;
- a photocopier.

On the **six floor** you find:

- the groups oriented services: this department lends collections to institutions for the elderly and mentally handicapped, children's centres and primary schools. Besides the department supports the library work in these institutions. Moreover the department is responsible for the co-ordination of the library work for ethnic cultural groups, with as ultimate objective the complete integration of activities in the regular services of the public library;
- computer room;
- offices for director and management;
- conference room.

On the **seventh floor** you find:

- offices for support departments, public relations and domestic services;

- reproduction department;
- conference room;
- staff canteen.

9. SPECIAL COLLECTIONS

The new central library has an Antillian collection: an extensive collection on the islands of the Dutch Antilles and Aruba and on Antillians and Arubans in the Netherlands.

The basis of the collection was formed by the former Sticusa-library (Sticusa was a foundation for cultural co-operation between the Antilles and the Netherlands). On the liquidation of the Sticusa in 1988 the Municipal Public Library of The Hague was given the free loan of this collection by the Dutch Government. The Municipal Public Library of The Hague extended the collection and now it contains about 4.000 items: books, reference works, magazines, clipping files and video tapes. The languages are Dutch, English and Papiamentu. You will also find sheet music and compact discs. The materials are directly available for the users, but are not for loan. Duplicated titles are integrated in the collection of the Municipal Public Library and are on loan.

The Antillian collection is one of the three features of the Municipal Public Library of The Hague as part of the regional support function for scientific literature on behalf of non-university students. The other two features are European and Northern American architecture since 1960 and Dutch history since the Second World War.

In the youth department, the Municipal Public Library offers, besides materials for the youth itself, a large collection of specialist literature, consisting of materials on youth literature, writers and illustrators of children's books.

Furthermore there is a collection of historic and colonial children's books, award winning books, Pinocchio-books, youth bibles and children's books by Hague writers and illustrators. These parts of the collection are directly available for the users, but are not for loan.

10. COMMUNICATION DURING THE BUILDING PROCESS

During the whole of the building process many staff members have been actively involved.

The director was supported by an assistant to the building project (40 h a week was available) and several working groups.

Externally the Municipal Library The Hague was directly involved in the consultations with the commissioner, the architect and other users of the total complex.

Internally the consultations were organized as follows:

- a « kernteam bouw », consisting of the director, the manager central library, the controller, the assistant to the director and the assistant to the building project. The decisions of the 'kernteam' were based on the information and advice of the different working groups and co-ordinated the building process;
- the working groups researched all kinds of different subjects and recommended solutions to the 'kernteam', solutions based on inventories of possibilities. The most important working groups were:
 - working group on security;
 - working group on signposting;
 - working group on collection building;
 - working group on documentation;
 - working group on information desks;
 - working group on infra-structure;
 - working group on furnishing;
 - working group on internal transport;
 - working group on cleaning;
 - working group on lending centre;
 - working group on removal.

During the whole of the process of building, furnishing and removing, much information was given by means of informative meetings, a monthly column of the assistant to the building project in the staff magazine « *Dobber* » and a special removal paper.

IS AN INTELLIGENT BUILDING AUTOMATICALLY A FUNCTIONAL LIBRARY?

by Hanke Roos
Manager Central library, City Library of The Hague

INTRODUCTION

The theme of this seminar is « Intelligent library buildings ». The subject of this afternoon: The City Library of The Hague.

I will try to connect these two themes and to answer the question that I chose as the title for this lecture. Is an intelligent building automatically a functional library?

PARTICIPANTS

In realizing the central library building as part of the city hall/library complex three participants were involved:

1. the principal, the city of The Hague;
2. the architect, Richard Meier;
3. the library, the team of staff members involved in the preparation of the library, headed by the director.

Of course there were more parties involved, for example the financier, the contractor, the advisors and Hulshoff, the owner of the furniture store, that was located on the site were now the library is.

But for this lecture I will restrict myself to the three main parties mentioned before. Only the furniture store will come up again.

How can three parties, each of course with their own demands and ideas, together arrive at an intelligent building and an intelligent library. And did they succeed for 100% in The Hague?

What did they want with the new building, the city of The Hague (the municipality), the architect and the library.

1. THE MUNICIPALITY

Ten years ago the municipality had two big problems. The first problem was to house the municipal apparatus which was scattered over twenty buildings in the city. An extremely undesirable situation from the

point of efficiency and cost control. The second problem was the development of the Spui area. The solution was obvious. Build a city hall and a library on the Spui and take advantage of all the additional advantages. The combination of a city hall with a public library is just as obvious (or not) as the combination of a city hall with a music theatre, to mention an other example. In the case of The Hague there were several reasons for such a combination. The first was that this prominent location offered enough space for both. The second reason was that bringing together more than one function in one complex is quite simply cheaper. A third reason was the so called « synergy ». Together with the commercial facilities housed in the city hall itself, the library, with its thousands of visitors every day, will make the « complex » more public.

The combination of city hall, public library, which is also open in the evening and on Saturday, and the commercial functions fulfilled by shops and cafés, draws many people to the city centre and thus makes the inner-city more attractive and lively.

In short, the municipality wanted an attractive, lively and efficient building.

2. THE ARCHITECT

The architect wanted a building that fitted into his philosophy. I quote Richard Meier: « *my architecture is not about symbolism, representation or scientific theory. It is about the creation of things, the order of things, the relation between man and the place where he works, communicates, comes together with his fellow man. My intent is the creation of spaces where all kind of things are possible with an awareness of light, its changes during the day and during the seasons* ». (*Stadhuis/Bibliotheek; the city hall/library complex* by Richard Meier in The Hague, 1995).

For the buildings designed by Richard Meier this means: big, open, light areas, the colour white (RAL 9010), free-standing columns, many windows, few walls, coulisses and terraces.

3. THE LIBRARIAN

And as for the librarian: the librarian wants a functional library, meeting the needs of the end-user: the visitors of the central library. Ask a librarian to design a library and he will refer to the ten commandments by Harry Faulkner Brown, the demands that must be met by a library building.

Translating the ten commandments into a building without taking into account architecture, will give you, depending on the necessary area, an amount of rectangular areas, like piled up shoe boxes.

TOGETHER

In the city hall/library complex that had to be built these premises

and approaches of the parties involved, the municipality, the architect and the library, had eventually to result in an intelligent building.

That meant attuning during the process of preparation and design, listening to each other's arguments, inventing intelligent solutions for apparently opposed interests and sometimes compromising.

A FEW POSITIVE EXAMPLES

1. the floor plan of the building, from open book to key;
2. floor height from 3.60 to 4.25 m gross;
3. floor loading: 400 kg/m² and zones of 700 kg/m².

1. Floor plan

I already mentioned that a librarian, taking, as a starting point, the functionality of the library, ends up with clearly structured, rectangular areas. The program of requirements of the library started with a total area of 18,000 m² gross. Translated into clearly structured, rectangular areas this meant 6 rectangular floors of ca. 3,000 m² each.

The first design of Richard Meier however looked totally different. Meier's first proposal had a floor plan in the form of an open book. It was a nice metaphor, but due to the long walking distances, extremely impractical in use.

Spreading over 9 floors the architect created disordered areas. The public floors were narrow and elongated, the ground floor small and not functional.

After discussions with the city and the library, Richard Meier adjusted and greatly improved his design. The open book was replaced by a floor plan in the form of a key. In comparison to the earlier plan, this floor plan was much more usable due to its greater compactness. Not that 6 shoe boxes have been built in the end, but the library is reduced to 7 floors, reasonably fitting within the lines of the desired ground plan of 3,000 m². In the beginning, the library management had been extremely critical of Meier's design, but this new floor plan gave reason to be more confident about the collaboration with the architect. After all, it had turned out to be possible to find an acceptable compromise between two approaches; that of Richard Meier with his individual architecture, and that of the library.

2. Floor height

Another example. From the second floor up the city hall has office floors 3.40 meters in height. A similar floor height was originally envisaged for the library, but this was fiercely opposed by the library management.

To the library this height for the public floors was unacceptable taking

into account the enormous expanses of these areas. Finally Richard Meier found a measurement meeting the demands of the city hall as well as that of the library. The gross floor height in the public departments of the library is now 4,25.

3. Floor loading

Finally the floor loading. In the brief, the library demanded a floor loading of 750 kg/m². This in order to realize maximum flexibility. For, as the collections of the library grow in the future and the library needs more room for shelving, with a floor loading of 750 kg per m² compact shelving is possible.

However financial consequences prevented the realization of this floor loading throughout the whole of the building. The floor loading that is realized is 400 kg/m².

But architect and city listened to the argumentation of the library. So in the end the flexibility that was asked for has been realized. The floor structure is reinforced around the cores in the round part, so that a higher load is possible within a zone of around 100 m² around the elevators. In future compact shelves can be placed here.

Moreover, the construction of the building makes it possible to open also the 6th floor, where now offices are located, to the public. You can see this for yourselves later on, as this office floor also has a height of 4.25 m. What you won't be able to see is that in the construction of the floors, the possibility to place another escalator to the sixth floor, is incorporated.

In short, three examples of attuning which led to an intelligent library.

Already in the stage of preparation, solutions were found for the floor plan, the floor height and the floor loading, fitting within the concepts of the architect, the municipality and the library.

PROBLEMS

But not all contrasts and problems were solved during the stage of preparation. Problems remained.

I will give you some examples of problems the library team encountered while trying to turn this intelligent building into a functional library, together with the solutions chosen to solve these problems.

1. Combination of city hall, library and shops:

1.1. different measurements

1.2. security

2. The philosophy of the architect:

2.1. open spaces and glasswalls

2.2. columns to remain free-standing

2.3. terraces

1. Combination of city hall, library and shops

The municipality wanted a lively building. One building with different functions, a combination of offices, library and shops. With the result that in the part of the building that houses the library, on the ground and first floors a furniture store is located. And the top office floor is being used by another municipal department.

This combination of functions in one part of the building presented the library with problems.

1.1. Hulshoff, different measurements

The furniture store originally was located where now the circular part of the library stands. In exchange for the willingness to give up this location, the municipality promised the furniture store a prominent location within the new complex. The new shop was realized on the Spui.

This meant that on the ground and first floors only a limited amount of m² were available for the library.

More over the floor height of the shop is different from that of the rest of the building, resulting in a difference in height on the second floor. The area at the back, above the shop, is 80 cm higher than the remainder of the floor. In the middle of this department you will find a big « hump », emerging from the elevator of the store below.

And the library, successfully campaigning for a ceiling height of 4.25 m, was confronted with an area of ca. 500 m² with a floor height of only 3.45 m.

Solution: youth department

In the end, virtue was made out of necessity. In this area the youth department was located, accessible by small stairs and a slope. By using less high shelving, adjusted to children's sizes, the lower floor height is hardly noticeable.

The « hump » of 3.60 x 3.60 m created by the elevator of the furniture store, has been transformed into a reading platform for the children. To create a visual balance we created directly opposite an another platform for the youngest readers. Here children can sit within.

1.2. Combination of city hall and library: security

Another problem as a result of the combination of city hall and library. In the brief of 1986 the library clearly formulated that an efficient control of the books taken out requires just one entrance and exit. This has to do with the security of the library materials. Each object has a magnetic strip that is demagnetized during the registration process of the library. Near the main entrance detectors are placed. If people leave the building without proper registration of the library, the detectors give an acoustic signal and the security staff intervenes.

The combination of city hall and library means that the building has many entrances. From floor 2 onwards each floor has a connection between the library and the city hall.

The (emergency)staircase leading from these connections are meant for the staff of the city hall and the library.

Solution; keycards/facilitycards

To prevent library materials disappearing from the library by way of the city hall, the library management took organizational measures in combination with a sophisticated keycard system.

All staff members of city hall and library have a facility card. This facility card serves as a means of payment, for example for the coffee machines and the staff restaurant, but also as keycard.

The cards can be programmed. This means that for each staff member the authorization for each entrance can be individually programmed.

Also some connections between the library and the city hall are equipped with keycardreaders. But only a very selected group is authorized to use these connections, mostly staff responsible for the management of the total complex.

All other connections between city hall and library are locked. The staircase between library and city hall is also closed to library staff. Only in case of an emergency the doors are unlocked automatically.

This means that floors 6 and 7 are only accessible by elevator, as the escalators connecting the other floors, only go to the 5th floor.

To prevent library users to hitch-hike to the office floors, not accessible to them, landings have been installed, also only accessible with an authorized keycard.

2. The philosophy of the architect

2.1. Open spaces with glass walls

The central library consists of 9 floors, of which 6 are accessible to the public. The ground and first floors are situated in the circles, from the

second floor onwards areas above Hulshoff are also used by the library. I did mention this before.

The architect has designed the public areas as large, open, light areas, with a lot of glass. Also the ground floor: a glass circle without walls. In this open space you find the administrative heart of the library, the circulation desk, where all materials are registered. The circulation desk consists of two quarters of a circle put partly together. In this way the form of the circulation desk follows the circular form of the building. The circulation desk is free standing, without backwalls or connecting areas. This presented the library with the following problem: where to go with the materials that are returned. There was no room for shelving or sorting, moreover sorting and checking are not activities you want to confront your clients with the moment they enter the library. The materials that are returned have to disappear from sight as soon as possible. But where to? There was only one possibility: down, under the ground.

Solution; conveyor belt

To this end the library has found an ingenious solution.

The returned materials are collected in transportation boxes. As soon as a box is full, a conveyor belt is activated by means of a push on a button. This conveyor belt runs under the top of the circulation desk, and changes into a chute at the end, to overcome the difference in height between the ground floor and the basement. In the basement, the chute returns to a conveyor belt again. Here materials are checked, sorted on book trolleys and by means of a goods lift transported to the departments where the materials are shelved again.

2.2. Columns to remain free-standing

Another problem was presented by the columns, not the columns in themselves, but the fact that, in the concept of Richard Meier, the columns must remain free-standing. This means that no shelves, tables or appliances may be placed against the columns.

But in the design all data- and electrical-connections were situated in the columns. A decision made to guarantee maximum flexibility.

These connections however could not be used by the library because of the architect's concept.

Solution; floor pillars

After the completion of the building, but before the opening to the public, the library has had installed floor pillars with the necessary provisions everywhere where data or electric connections were necessary. A costly investment. Costly because the building now has a large numbers of provisions in the columns that cannot be used and costly because later on extra provisions had to be installed.

2.3. Terraces

Coulisses, columns placed on the outside, light wells, glass and terraces, are used by the architect to give a transparent feeling to the building, also from the outside.

Clearly the architect reckons the part of the building which houses the library and is situated on the most prominent location, as the flag-ship of his architecture. In the library section of the building, Richard Meier has shown his most virtuoso side. Here, he has taken his game with straight and curved surfaces, now facades, now coulisses, to extremes.

But can the library use these terraces?

No, because of the security policy mentioned before, the public areas are firmly shut. For instance, the windows can not be opened, to prevent materials being thrown that way.

Solution; closing terraces

Therefore the library had only one option: to lock all terrace doors.

Only on the 7th floor, where library staff can take a break in the canteen, the terrace is accessible. But then this floor is not accessible for library users.

IN SHORT

Three examples of good, mutual attuning between architect, municipality and library during the building process: the floor plan, the floor height and the floor loading, but also examples of problems for which the library had to find solutions during the building process.

- the location of the youth department in an area where the combination with the furniture store caused a difference in measurements;
- a ingenious keycard system to safeguard the materials;
- a conveyor belt to transport the materials to a separate sorting-and checking room;
- extra provisions for data and electrical connections as the available connections in the columns could not be used;
- closing of the terraces.

AT LAST

When walking through the city hall/library complex, you will see an intelligent building. A lively building, as was the aim of the municipality, that houses over 3,000 civil servants, a stimulus for the city centre, although the optimum effect will only be realized after the completion of the tramway tunnel. You will see an open and light building, a meeting place for people,

the concept of the architect. And you will see a functional library with - on the whole - satisfied visitors.

Back to the question that I used as the title for this paper: « *Is an intelligent building automatically a functional library?* »

In my opinion, based on the experience during the building of the city hall/library complex, the answer to this question is: no. An intelligent building is the basis for a good library. The specific contribution of the library staff can make an intelligent building into a functional library.

INTELLIGENT BUILDINGS, A DESIGNERS POINT OF VIEW

by Jacques MOL
Consultant, Valstar Simonis consulting engineers, Rijswijk

ABSTRACT

The building services-installations in the new city-library of The Hague are as part of the design of the building-complex, responsible for the level of intelligence of this building.

The integrated design and its flexible lay-out of the installations make the city-library a very intelligent building.

A summary of the installations as being designed by Valstar Simonis and some of its aspects are discussed in this lecture. In particular the environmental friendly thermal-heat storage system for the air-conditioning is explained.

INTRODUCTION

Whether a building is « intelligent » can only be judged if « intelligent building » is defined. This was recently done in the report: The Intelligent Building in Europe. For an intelligent building this report stated: a building that maximizes the efficiency of its occupants, while at the same time allowing effective management of resources with minimum lifetime costs (*quote from DEGW/ Teknibank*).

In this lecture I will give my view on the topic *Intelligent Building* and in specific an *intelligent library building*.

The definition of an intelligent building aims at the optimum between the efficiency of its occupants, effective management of resources, minimum lifetime cost. For a public library, this will result in (many) satisfied visitors for a long period of time.

Apart from the *management of resources*, the building by its design in all aspects, greatly influences how « intelligent » it is. In the case of the library of The Hague, I think we have succeeded in creating an intelligent library building. This I will show to you.

Building services installations can be compared as the organs of a building. Without nerves, lungs and blood, or in installation terms, without heating, air-conditioning, lighting and transportation, a building can not live.

In this perspective, installations are as a part of the total library building design, of big influence on how intelligent a library building is and

can function.

In this lecture I will give an overview on some of the building services installations in the library and the rest of the city hall complex.

1. TAKE THE OPPORTUNITY TO TELL SOME ABOUT VS

Valstar Simonis

Valstar Simonis is an independent consulting engineer, active in the design of building services installations in all sorts of buildings, and active in all other installation related consulting services. Our firm was founded in 1948 and has at the moment over 60 employees. We are situated at two locations in Holland, Rijswijk (ten minutes from The Hague) and Apeldoorn in the East of Holland. At this moment we are planning to open a location in Eindhoven in order to be more close to our clients in the South part of Holland.

Integrated design and high quality standards are part of our motto. In Holland we were the first firm in our field with the ISO 9001 quality certificate.

In a nutshell, the range of our activities regard all parts of a building which are not made of stone.

For the city hall and library complex, this comprises in all installations concerning: heating, ventilation and air-conditioning (HVAC), instrumentation, utilities, piping, plumbing etc., sprinklers, electrical computer networks, communication, security, access-control, fire-alarm system, escalators, elevators, outside window and facade cleaning installations, etc.

One of the « intelligent » aspects in the city hall and library complex is the use of an environment friendly thermal-energy storage system for the air-conditioning. On this, I will come back later.

In order to get an idea of the diversity of the scope of our work, I have put together some slides of a few of our projects and will mention some of the « intelligent aspects » of these buildings.

2. CONSUMENTENBOND (DUTCH CONSUMERS ORGANIZATION, THE HAGUE)

Environmentally friendly products, low-energy consumption, water saving appliances, durable and low-service components

Holland Casino, Scheveningen

High internal heat-loads, many people, safety, security, image.

Feijenoord soccer stadion, Rotterdam

Renovation, expansion, a self supporting roof, VIP-rooms, short planning/time.

Het Concertgebouw, Amsterdam

Monument, new underground construction (foundation), Renovation during performances.

Computer centre Wilgenplas, Rotterdam

Security, fail-safe, flexible, expansion.

American School, Wassenaar

Education, security.

Koninklijke bibliotheek (National Library, The Hague)

Strict ambient conditions, climate zones, depots, public area's.

City hall and library complex, The Hague

3. CITY HALL AND LIBRARY COMPLEX, AN INTELLIGENT BUILDING?

3.1. Maximize the efficiency of its occupants

One of the most important features to maximize the efficiency of a building is its « fitness-for-use ». Part of this is the result of the buildings shape and part of it the ability to change its shape: *flexibility*.

One of the other aspects which makes it possible for occupants to function efficiently is its (working) environment.

The right temperature, the right lighting, efficient safety, accessibility etc., all factors which will result in the « right » atmosphere in order to function effective and efficient.

This complies to both visitors and the employees of the library.

The factors which influence the efficiency of the occupants are mostly dictated in the design of a building. Participants in this design process should be experienced within their expertise and open for the motivation of other disciplines. Therefore a sound symbiosis must occur within the design team and the process must be well managed.

The participants of the design team, in the person(s) of the architect and the consultants, will translate the « needs » of the user into a new building. This is done based on expertise and experience and should be completed within the financial, political, etc., restrictions of the project.

In order to make a sound translation of the needs into specifications and end product, a clear and complete program must be produced which states all necessary « soft and hard » criteria to be met.

How this took place Wim Renes explained earlier.

For the library installations this design-process resulted in, for instance:

- ***the air handling/conditioning system:***

Effective air-conditioning with high quality filters, cooling, humidity control, temperature control per floor, per area and room.

- ***the heating system:***

A mix of centrally controlled convectors, radiation panels and heating via the air handling system.

- ***study-rooms:***

With individual climate-control.

- ***automated outside sun screens:***

With separate individual control.

3.2. Effective management of resources

In order to be able to effectively manage the resources during the life of a building, the design process must translate the soft and hard criteria into a three dimensional and functional plan. Aspects as logistics, flexibility, accessibility, safety and security are of major importance.

For the central library of The Hague this resulted in, for instance:

- ***the escalators:***

Quiet, fast and effective transport of large amounts of people. This for instance during the lunch-peak or closing time. Preparations were made during construction for expanding of the escalators to the sixth floor.

- ***the data-network:***

Flexible and accessible. Patch panels for easy and quick changes. Soft areas in a grid in the floors of the library to be able to expand the data and electrical connections without damaging the construction.

- ***the computerized climate control:***

Central management of the climate installations with automated alarm and control by modem.

- ***elevators:***

Elevators also controlled by the security key card.

- ***automated fire alarm:***

Connected to the security room of the city hall and connected to the evacuation installation and the fire department.

- ***concealed sprinklers:***

A dry, concealed sprinkler system is installed which automatically is connected with the water-supply, when two or more smoke-sensors are activated. This is to prevent damage of the collection when a sprinkler accidentally breaks.

- ***integrated security system:***

Personal, programmable key cards enabling access to floors, area's, elevators and staircases.

3.3. Minimum life-time cost

Being able to control most of the automated installations from a central position, running, maintenance and personal costs are cut down.

Due to the automated control system the (power consuming) installations can be switched off or on at pre-programmed time intervals.

Another intelligent feature of the city hall and library complex is the use of an advanced but simple thermal-heat storage system for the air-conditioning.

- ***Thermal-heat storage system:***

This thermal-heat storage system is at the moment the largest of its kind. Its thermal cooling capacity is over 3.5 Mw. This system makes use of so called aquifers underneath the complex. In total 7 deep wells: 3 « cold wells » and 4 « warm wells ».

These aquifers are layers of sand from former ice-ages embedded between layers of clay. By pumping up water from one well, changing its temperature and injecting it in another well, heat (or cold) can be stored for a longer period of time.

This is done in winter by pumping up water from the warm-well through heat exchangers and injecting it into the cold-well. The heat from this water is used to pre-heat the fresh (outside) air in the air handling units before it is introduced in the offices, atrium and library.

In summer the flow of water is reversed. The chilled water from the cold-well is used to cool down the air in the air-conditioning system.

This thermal-heat storage system does not use any refrigerants and

uses so little energy compared to conventional cooling (and heating) that the « extra investment » has a break-even at about five years. Furthermore it is more fail-safe and a longer life-time expectancy than conventional methods.

4. CITY HALL AND LIBRARY COMPLEX IS AN INTEL- LIGENT BUILDING!

An intelligent building should also be a flexible building. This is especially the case with lease-offices or commercial buildings. A public library is a « tailor made » building and so, not a flexible building. The central library of The Hague is extremely flexible within its function and well prepared for the future and therefore an intelligent building. Part of this is because of the high-tech and flexible building services installations and as a result of an integrated design.

DIE DEUTSCHE BIBLIOTHEK AT FRANKFURT-AM-MAIN

by Ingo Kolasa

Building expert/coordinator der Deutsche Bibliothek, Frankfurt/Main, Germany

THE ARCHITECTURE AND THE STRUCTURE OF THE BUILDING

Please, permit me, at the beginning, to give you a short general description of our new building; without this introduction, the view on its technical and operative infrastructure would be less understandable.

The building was inaugurated in may 1997, as you might have learned by the press. It might to be important to know that the beginning of the planning procedure reaches back to the late seventies. Winner of a two-stage architect's competition - 150 architects took part in the first stage - was the Stuttgart architect's firm Arat - Kaiser - Kaiser. Finally the planning documents were presented in 1986; nevertheless, the construction works did begin only in 1992. The building was finished in December 1996. At the end of March 1997, the building was opened to the public. So far, this is, in very short terms, the history of the project. Now let me make some remarks about the building itself.

The new building of the Deutsche Bibliothek is situated at the northern edge of the city center of Frankfurt.

The site of the library is at a crossroads of two rather important traffic roads. The outer dimensions of the building are orientated towards the building structure of the neighbourhood. There is a suburb of villas at the west side, and a four-to-six story block building structure at the east side. The intention of the architects aimed at closing the street edges. The site has about 19 000 m² and there is a slope of about 4 m, from North to South.

From outside, the building shows two rather different faces. The facade towards the two main roads has a closed appearance. The outside of the building is covered with greenish stone stabs Vert de Salvant from Switzerland, and gives a rather compact impression, with the exception of the removed facade at the corner of the crossroads, which leads to the main entrance into the central foyer. A total contrast is the back, that is the south side of the building, which is completely glazed. On this south side, the volume of the building is structured by recesses and « foldings ».

The building consists of several structural units, differing in shape as well as in their construction and their function, but forming, at the same time, a composition as a whole. This corresponds with the distribution of the spaces and with the organization of the internal procedures of the library.

The administration aisle with the staff rooms, along the Eckenheimer Landstrasse, has two parallel sections of different heights, which are connected by three aisles projecting towards the inner area of the site, thus framing an inner court and a delivery court. The height of the building section towards the garden is three stories lower than the section towards the Eckenheimer Landstrasse.

The building section of the reading rooms is on the west side of the site, that is on the Schlosserstrasse. Adjacent to the reading rooms there is the cubic volume of the conference center, with a grand assembly hall, a conference room, a restaurant and a cafeteria. The junction point of the above mentioned building sections is the central entrance hall, covered by a flat cupola. On the inner side of the V-shaped building complex, there is the library garden, covering largely the underground bookstacks.

One of the most essential claims for modern library buildings is the conspicuousness of the organization, for the user of the library. The new building of Die Deutsche Bibliothek answers this demand convincingly.

The visitor enters the building - after having crossed the entrance court which is protected from the noise of the nearby traffic by a long architectural brick sculpture - by a revolving door into the rotunda of the main entrance hall. From there, he has, in front of him, a view, through a glass partition, into the main reading room, which develops over two floors. At his left, again behind a glass partition, there is the exhibition space, nearby lockers and wardrobe. Then follows the entrance to the administration aisle and the janitor's post. At his right side, the visitor finds the entrance to the cafeteria and the wide stair to the conference section.

Having entered the reading room through the book detection gate, the visitor finds at his left the lending desk, and on his right, with a view towards the garden, a stair downwards to the multi-media reading room, cascading down to the garden side. The shelves on the ground floor of the reading room contain monographs, whereas the periodicals are on the upper floor. This upper floor opens as a gallery on the reading room. Part of the wall of the reading room is covered with a six meter high shelf, as an allusion of the architects to baroque library halls, in a modern interpretation. Beside the entrance of the reading room there are standing-desks with terminals for the access to the OPAC. The reading room offers a generous and well-lighted atmosphere. The garden side of the reading room is glazed over the entire height; in addition, there are 53 pyramid-shaped roof-lights in the ceiling. The architect's choice for only four materials - concrete, steel, glass, and wood - contributed to the aesthetically excellent atmosphere. The working tables are 1,50 x 0,80 m, and have, as a standard, an individual lamp as well as an integrated outlet to plug laptops or notebooks. The three floors of the reading room are accessible by a glazed lift.

Adjacent to the multi-media reading room on the lower floor is the department of the German Exile Archives 1933-1945. This department is separated from the general user's area, and has its own reading room, separate stacks for its holdings, and its own staff rooms.

02

Light and calm are essential conditions for the user's area of a good library building. One of the principles of the architectural conception of our library was to separate the building from the impact of the heavy traffic on the two neighbouring crossing roads. The main reading room as well as the staff rooms are orientated towards the garden, thus giving a very good sound protection, granted also by the rather closed outside of the building.

Essential for every library are its holdings. Thus, the storage of these holdings has an absolute priority. The available materials should be quickly at the user's disposal, there has to be enough space for the holdings, and this has to be under adequate conditions of preservation. These aspects are of particular importance for a national library with its function as « memory of the nation ». The new building meets perfectly these requirements. The 30.000 m² of the bookstacks cover about two thirds of the usable area of the building, and are underground, therefore the appearance of the building is rather modest, far away from monumental or fashionable architecture. The bookstacks are organized in three underground floors of 10 000 m² each. Each of these underground floors has a central corridor, leading at both sides to a number of bookstack sections with compact shelving for books and other materials.

The bookstacks have a total capacity of about 18 million volumes, which is calculated to be enough till the year 2035. The bookstacks are fully air-conditioned with a guaranteed temperature of 18° C and a humidity of 50 %.

In the center of each underground floor there is a service point being exactly at the place where on the main floor of the reading room is the lending desk. Each of these service points is linked with the vertical book transportation system which can be charged at 21 stations in the whole building. The horizontal transportation in the bookstacks is effectuated by staff with electromobiles, and, in the first basement, by an additional horizontal Telelift system. The combination of these transportation systems guarantees a fast delivery of literature to the users, as well as optimal conditions for the internal handling of the holdings.

The processing of the materials arriving daily, the establishment of catalogues and bibliographies have been improved by the organization of the administration aisle in the new building, by a better coordination of the different departments. The staff rooms, generally planned as two-person offices in order to avoid vast multi-person spaces, are mostly orientated towards the quiet garden court of the site, with large glazed window bays. The floor areas on the other side of the building, behind the more or less closed facade towards the noisy street, are occupied by functional spaces and shelves for periodicals, where there are no permanent working places. The quality of the staff rooms is determined by optimizing the access of daylight and by an optimum of flexibility for use. The partitions between the corridors and the staff rooms have an upper glazing, and the doors are glass doors. Therefore the lighting of the corridors is very good. In order to enable a quick modification of the furnishing, the partition walls of the staff rooms

equipped with a standard rail system, allowing to change instantly a number of different furniture elements, as shelves, cupboards and the like. All the floors in the administration aisle are connected by large freight elevators and book lifts. On every floor there are at least two pantries.

The architects spent much care on sun protection, a problem which often receives rather insufficient attention in library planning. The glazed facades of the reading room as well as those of the administration aisle are equipped with venetian blinds or textile sun-blinds. In order to avoid inadequate glare and reflection on computer screens, according to regulations for computer working places, most of staff rooms were equipped with additional inside sun-blinds.

On the ground floor of the administration aisle there are the technical workshops, the room for unpacking deliveries (the library receives every day about 1.000 to 1.200 media units), the mailing room, storage rooms, garbage depots and other technical rooms.

On the same side of that floor of the building there are the separated spaces for the central computing services. This section of the building has a separate air-conditioning and a double floor, and houses all the hardware network equipment for the library.

Flexibility was an important aspect also for the computing network and installations. About one third of the reading places are wired and equipped with personal computers; all other places can eventually be wired and even transformed into multimedia workstations.

TECHNICAL INSTALLATIONS AND FACILITY MANAGEMENT

When I prepared this contribution, I consulted special literature in order to learn the precise meaning of an « intelligent building ». At first, I thought that a building cannot be « intelligent », and I could not believe that our new building would belong to the species « intelligent building ». Let me quote: « If we put knowledge and function for use, maintenance and security of buildings into computer software, technical communication techniques as well as control devices like video stations, thus taking data from sensors and influencing valves, motors and regulating devices, then we like to talk today about installed technical intelligence. That way we created the circumscription *intelligent building*, which means the implementation of automation techniques for the functions of a building. The denomination includes mostly that several automation complexes of a building will be coordinated in a central, from whence the entire building can be controlled. »

Obviously our building seems to be intelligent. Let us take a look at the technical installations in our new building.

In our library, we have a two-stage hierarchical control system. This means that several sub-stations are connected with the central control station by a data bus. The control center - central computing unit - controls the

direct digital control (DDC) sub-stations. The task of the sub-stations is to register and to store connection states, signals, measured values, as well as consumption values, to notice and to communicate changes to the control center, and finally to give signals to the connected plants and devices. The diagram slide shows the structure of the control system as it was planned. In the meantime there have been modifications and extensions, but without essential changes of the system as a whole. The essential modification is that the interlace with the DDC sub-stations is no more based on a linear network only, but is combined now with a star network, and it depends on the position of the switch cabinet whether the linear or the star version is used. The control system covers the air conditioning, the ventilation, the heating, the electric installations, the sprinkler system, the transport systems, and part of the sanitary installations. In the diagram, one can distinguish the DDC sub-stations together with their switching cabinets, which survey sensors and actors of the respective range.

The central control station has to coordinate and to control the subordinated system components towards a direct automatic action or a manual action by staff. At the same time the status of the actual operations shown in the central control station, where a protocol can be also recorded.

So far for the general description of the control system; now some remarks concerning experiences and respective considerations of the user: we moved into the building at the beginning of this year, but still to-day this complex automated control system has to be adjusted continuously, including the software of the central computer. We already had to deal with considerable inconveniences.

At the beginning of my activity as coordinator for the construction, my opinion was that the main task would be to show and to accomplish the interests of the library, that is the user of the building, face to the architect and the building administration, and I tried to do that in the field which I considered important for an adequate function of the building.

To say it clearly: based on the experience that most of the libraries have to undergo alterations immediately after being inaugurated, I tried to make the planners understand what is important for the running of a library building; by this I frequently collided with the architectural conception - well known problem. Finally we succeeded to have a good cooperation with the architect. Our new library building is perhaps not an outstanding monument of modern architecture, but it appeared to be more important to create smoothly operating library.

At the beginning of the project the user had to formulate his requirements and expectations for the functioning building, including normally also the requirements for the technical equipment. For example: the air-conditioning plant has to guarantee the standard and the admissible tolerance of the temperature and of the humidity, and whether and how the air has to be filtered. Figures and data have to be defined in many fields, registered and given to the planners of the different installations to enable them to design the respective system configurations and components, which

have to be coordinated in order to fit into the central control system. Another - but neighbouring - problem is that the combination and the coordination of different systems, devices and installations of different suppliers causes very often great difficulties; this is another subject which goes far beyond the object of our discussion. Nevertheless, these aspects are of prime importance for the risk of failure of the systems and for the maintenance costs. Architects are normally not specialists of the technical equipment, they tend to rely on the capacity and the skill of the engineers. The coordinator of the library for the construction normally also relies on the engineers. The building administration, as commissioner, and/or the coordinating consultant engineers develop, based on the conceptions of the special planners, an overall system for the technical equipment and the control system, which is not easy to achieve, because a number of particular systems does not automatically create a well working comprehensive system. Another difficulty is the fact, that on the side of the future user of the building, that is, among the librarians, there is normally nobody with sufficient technical competence. Nevertheless, the building administration looks as early as possible for a responsible person in the library to accompany the planning process. Our definite advantage was, that we got, one year before the finishing of the building, an operation engineer, who succeeded to have, early enough, an influence on some details.

An example for a wrong coordination: there is a room with several copiers, which produce heat and ozone; of course, this room has to be ventilated and perhaps cooled. The copying room is situated in an area which is not air-conditioned, and we had supposed, that this room could have been air-conditioned individually, as it was laid down in the space requirements. Once we had moved in, we realized that in this case, when we cooled the copying room, the temperature in a large section of the bookstacks went down to 14⁰ C at the same time. This revealed that it is not reasonable to connect two spaces with very different requirements to the same part of the air-conditioning plant. This problem also shows that one never should give up permanent control of the planning and the installation, enabling the library to take influence on developments as early as possible. Later alterations are mostly expensive, and they interfere with the complex interdependencies of the systems, thus causing again other alterations and trouble.

Let me give you some information about the technical installations and their control in the new library building.

An important part of the technical installations is the air-conditioning. In the entire building there are 49 plants with different configurations, from little ventilation to smoke exhaust gates, air-return systems and full air-conditioning systems. Only 5 plants are complete air-conditioning plants, but they serve a great deal of the building, for instance the three underground floors and the computing department. Full air-conditioning guarantees the given standard for the room climate, taking into account the influence of persons, lighting, and equipment, as well as the control of the fresh air rates. During periods of extreme temperature, that is, summer and

winter, the air-conditioning is run with mixed-air rates, in order to save energy, the fresh air rate being at 30 m³/hour and person. The different plants consist each of a number of components: air conditioning chamber, filters, intake and exhaust ventilator, heater, cooler, sound absorber, fire gates etc. Coarse aerosol and micro-filters can be exchanged and combined; absorbent carbon filters can be added. In the other sections of the building there are only ventilation plants with a threefold air change rate per hour. All the air-conditioning plants are controlled by sensors and actors through the central computer unit, but in case of failure of the central control, the plants control themselves automatically - the same system works with the heating plant.

For a great number of other technical installations, the central computer records only the values transmitted by sensors. The control of these installations has to be activated if necessary. This is the case in particular for the sprinkler plants which are controlled by the smoke detectors. There are three different sprinkler plants in the building. The most spacious plant was installed in the bookstacks, as a dry tube system. An alarm from at least three smoke detectors causes water pressure to be built up in the tubes, but the sprinkler heads open only when there is enough heat to make the sealing of the sprinkler head burst, there will be a water spray right into the center of the fire, after the air in the tubes is replaced by water. In the underground parking there is a dry tube sprinkler plant which is kept permanently under pressure, which prevents water coming into the tubes in order to avoid freezing at low temperatures. The third version of a sprinkler system is installed in the administration aisle of the building complex. In this system there is permanently water in the tubes, and in the case of a fire alarm and subsequent opening of one or more sprinkler heads, there is an immediate release of water. The water supply for the sprinkler plants is guaranteed by 2 reservoirs of 150 m³ each, with an additional pressure tank of 30 m³. The final pressure in the system is supplied by pumps. The central computer controls only the status of the plants, which are subdivided into 17 sections. The plants are released only by the autonomous fire alarm system.

Even more autonomous is the CO₂ fire extinguishing plant for the computer department. The dangerousness of this gas determines the alarm philosophy. The plant is supplied by a central tank. Alarm is given by the fire detectors, but CO₂ is not automatically released. The alarm is immediately given to the fire brigade. They arrive within 4 minutes, and only they can manually release the gas from an outside control. The plant is subdivided into two sections, the first one for the not manually operated hardware and the double floor, the other one for the data strong room and the suspended ceiling. The spaces in which this plant was installed had to be sealed carefully, especially towards the spaces below. The central computer registers only the data of this plant without controlling. In Germany, there is no other solution because of the security regulations.

Some remarks about the fire alarm system. The fire alarm central system has its own computer, which cannot be controlled from outside. The fire alarm system controls about 1.500 fire alarms, 1.250 of them are

automatic fire alarms, the others manual fire alarms, situated in the rescue corridors and staircases. There is a survey covering the entire area only in the general and special bookstacks and in the data processing department. The fire detection system controls the sprinkler plant, the emergency exits, the lifts, the electro-acoustic installation, signaling and giving spoken advice for the evacuation of the building, and finally controls the cut-off of the book transportation systems. The central computer receives only the fire alarm, and only as a status record.

The smoke exhaustion gates have to be activated by the fire brigade. There are key buttons on the panels in every floor, which can be operated only by the firemen, with one exception; there are special ventilation plants in the rescue staircases, which produce an overpressure in order to clear these staircases from smoke in case of fire. They are operated either manually or by automatic detectors.

Concerning the water installations, there is a central control of the rise of pressure in the rising mains for the fire extinguishing water supply, the three sewage rising plants, and the central water treatment plant. The latter treats water for the air-conditioning plant, the heating plant, as well as for the dish washers in the restaurant; the plant softens and desalinates the water.

The new building has 10 lifts, four of them are rope lifts, and the other six are hydraulic lifts. These lifts are controlled by a separate computer with its own software, which is not connected to the central computer. Only the fire alarm system has an access to the lift system. In case of emergency, the lift cabins are directed to the next floor with a direct emergency exit, and then the whole lift system is stopped. One exception is the glazed lift in the reading room which, in case of emergency, remains active in order to permit the evacuation of handicapped people and wheel chairs.

The building is also equipped with a book transportation system as a combination of several systems: electromobiles deliver the ordered books in containers - which can be directed by a mechanical code - to the vertical rotary lifts; in addition, but only in the first underground bookstack level, the containers are transported by a horizontal rail-bound trolley system to the rotary lifts. The system was developed and built, using already existing components, by Thyssen-Telelift. The transportation system is controlled by a separate computer which signals only the operational status to the central computer.

Another installation is the intrusion alarm plant, which is controlled also by a separate computer, but the record circuit is interlaced with the central computer, using the bus line. This way status informations can be made available. There is a total of about 400 alarms, among them are contact survey alarms and binary alarms, as a combination of infrared and ultrasonic motion alarms. The system is subdivided into 5 independent activation sections, the bookstacks being the largest section. The central control of this security system is situated in the janitor's post, which is manned around the clock. The central itself is protected against sabotage and

manipulation. Informations about failure and alarm are transmitted to the central computer only as status records.

Electricity subdistribution points, as well as the central control of the lighting of the whole building are controlled by the central computer. Only in a few sections there is a separate lighting control. The status of weak-current, emergency power and security lighting systems are recorded only as information in the central computer.

Only the status of the refrigerator rooms of the restaurant is registered in the central computer; the plant itself has an auto-control.

The control of the emergency escape doors is another important complex. As the lifts, these doors can be controlled only by the fire alarm system. In the central computer, the survey of these doors is only a status information.

For heat and sun protection, the windows and the glass facades of the reading room and the administration aisle are fully equipped with outside venetian blinds, textile sun-blinds or inner sun-blinds, which all have electro motors, and are operated manually, but can also be operated automatically by the central computer.

There is a number of other technical installations, which shall be mentioned only briefly. There is a central search system for staff members, and a central electro-acoustic installation for information of staff and public with 360 loudspeakers in the whole building. The underground parking is monitored by TV cameras to the janitor post. Finally, the digital telephone network counts 700 connections, which are operated alternatively by two centrals. An access control system for staff works with code cards, which don't serve only for access, but also for time check as well as for access to the underground parking and hierarchic access to the bookstacks. Most of the electric installations are buffered by accumulators, some interlaced with the emergency power plant.

CONCLUSION

When we consider the definition of an « Intelligent Building » cited at the beginning, it has to be admitted that our new library building is not intelligent in its full consequence or perhaps even of rather limited intelligence. Certainly many more survey and control processes could have been installed into the central unit. But we have to ask the question: what positive effect additional components would have had. The software for such a central control unit has to be developed individually, step by step. This is a long and painful process. The larger the amount of control functions is included, the larger are the interdependencies between the various functions, which makes the final calibration of the central unit very difficult. The system's susceptibility to malfunctions increases correspondingly, as well as the necessity for permanent maintenance. There are areas where - at least in Germany - an intervention from the central control unit is not permissible unless the already complex coordination and control processes

are further refined. In particular fire control is an important factor here. Up to now I could not notice that such units lead to a reduction of staff or further rationalization. Most certainly these large central control units require highly qualified personal and considerable funding for maintenance contracts. Extremely modern « intelligent » technology has its price. A central unit might create unwanted inter-dependencies between various functions as my paper might have shown.

For these reasons, I plead for a balanced and moderate system of units that can be handled individually. In the planning process, the library planners should carefully evaluate which type of technical systems is necessary, and what influence these systems will have on maintenance and staff costs. Technical units have the characteristic that they have to be maintained, that they are subject to wear and tear, and that they sometimes fail. In spite of just because of this I would like to stress that a complete central steering and control system is not desirable at the current state of the art. What should be aimed at is a central control-system that informs immediately about any malfunction of any individual technical system. This control panel should be installed at a central point within the library where qualified staff can react immediately as the situation requires.

THE NEW HEADQUARTERS OF THE VENEZUELAN NATIONAL LIBRARY: A BUILDING DESIGNED IN 1976 AND PLANNED FOR THE THIRD MILLENIUM.

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National Library of Caracas

ABSTRACT

This paper documents and presents, as a case study, the strategies developed and used by the involved architects to design the new headquarters of the Venezuelan national library. It includes the previous action taken by the Venezuelan Government, the planning process, the main design criteria, the architectural considerations, financing and costs, and the actual status of the building. The analysis is made under the conceptual definition of an « intelligent » building.

EPIGRAPH

Into the third millennium

Set up in modernity, facing the future, and as a result of a radical metamorphosis in terms of concept, material and technology, the Venezuelan national library is a work marching into the third millennium. In qualitative terms, to embrace the complex reality of this institution in the light of present times is to talk about a revolution which means having passed from the notion of document to information, from unit to system, from tangible to virtual, from local to universal, from hand operated to automated, from individual to cooperative, from service unit to network.

1. AN INTELLIGENT BUILDING

1.1 Definition

We can say that a building is « intelligent » when the concept of FLEXIBILITY has been incorporated since the beginning of the planning process, when it is low-costed to operate and maintain, when it increases the productivity of its occupants stimulating them by means of an ergonomic, comfortable and secure setting and when it also takes into consideration the ecological environment (X. Galvez Ruiz).

1.2. Venezuelan national library building

Flexibility

« *The single most important all-pervading design requirement of the national library is flexibility* » (Frazer Poole, statement in the Architectural program of the Venezuelan national library, December 1979.)

Flexibility has several important aspects, each of which shall be discussed below. The freedom to use a given space or area in a variety of ways begins with the availability of large open areas which contain no load-bearing walls and no fixed-function spaces that obstruct or prohibit the use of such areas for any library function it may be desirable to locate there.

A library, especially a national library, must be a dynamic institution if it is to serve the nation's cultural interests effectively. As society changes, the objectives, goals and functions of libraries also change. Such changes necessitate changes in methods, policies, staffing and procedures and these, in turn, necessitate changes and re-arrangements of the spaces.

In the national library, many changes have taken place. It should not be concluded that these result from poor or inadequate planning. Rather, they occur because in a changing society, it is difficult to determine when changes shall occur or the impact of such changes on the institution.

The Venezuelan national library has been on the threshold of its development, in a country undergoing rapid expansion of its economy, its educational activities, and its cultural institutions. The library has already undergone major changes in its functions and organizational structure during the last twenty years and it certainly shall undergo further changes in the years ahead.

In accordance with the above definition, the building of the Venezuelan national library is « intelligent »; however, the concept of « intelligent » applied to inanimate objects is very recent and belongs rightfully to the so-called first world. This is where the peculiarity and importance of our building lies. In spite of having been designed in 1979, it was planned in such a way that it can become an « intelligent » building. It can absorb recent technologies, especially those concerning telecommunications.

2. BACKGROUND/ORIGINS OF THE PROJECT (1974-1979)

By 1974, the outstanding fact was that the national library of Caracas was operating at the same time and place as the national library and a public library.

On November 19, 1974, the Executive decreed the National commission for the establishment of the National Information System - the Venezuelan NATIS - which carried out a wide and detailed evaluation of the existing situation and produced a diagnosis including proposals, objectives,

policies and actions to be taken, as well as a critical analysis of the physical infrastructure of the national library's old building.

The diagnosis of the national library in its old building proved that the physical infrastructure did not meet the minimum requirements for housing the collections, efficiently servicing the public, and accommodating the professional, technical and ancillary staff on a daily basis. The facilities and installations were totally inadequate. The equipment was out of date and out of order and the building did not meet minimum health and security requirements to make the operation feasible.

Taking into consideration the different reports making up the diagnosis, it was recommended to erect the new national library building near the National Pantheon, at the northern-central area of the capital city.

3. TRANSITION TO THE NEW HEADQUARTERS

By the end of 1978, the national library was occupying ten (10) facilities throughout Caracas. In 1979, there began the actions taken as short-term strategies or transition phase towards the construction and final occupancy of the new headquarters.

The national library participated directly in the planning, projecting and construction of a large library building together with the appropriate ministry. This function was legally supported by a Resolution in force throughout four consecutive administrations.

In 1979, the national library authority engaged for the architectural project the technical assistance of Expert Frazer G. Poole, an American library scientist and recognized international consultant in the planning of library buildings. This engagement lasted seven (7) years and Mr. Poole always had as his counterpart a professional representation on the national library's side which made dialoging easier and allowed of the interpretation of the functional and area requirements and the analysis of the formulations expressed by the consultant in order to change them into optional solutions to the different situations according as the latter were being studied.

The technical conception of the project was shared by the professional representation on the national library's side and the Sanabria architectural office, with the assistance of consultant Poole, whereas the construction and financing were taken over by MOP/ MINDUR.

4. ARCHITECTURAL PROGRAM

The preparation of the architectural program was assigned to expert Poole, wherein the following should be incorporated: the old functions of the national library and the new functions as an autonomous institute, a contemporary conception of public library services, a projection of the national library into the future and the 1973 Rome's recommendations for

new national library buildings.¹⁰

The *Architectural program* took into consideration all the aspects that should be included in an architectural project of this nature. It was calculated that the building should approach 69,500 square meters in total area, based on total occupation within 25 to 30 years by 2005, starting in 1980.

5. BASIC DESIGN CRITERIA

Beginning with flexibility, as mentioned above, this may be defined as the adaptability of a given space to serve a variety of functions, both initially and in the future, with a minimum inconvenience and minimum costs. Flexibility has several important aspects. The freedom to use a given space or areas in a variety of ways begins with the availability of large open areas which contain no load-bearing walls and no fixed-functions spaces which obstruct or prohibit the use of such areas for library functions it may be desirable to locate there. Such open areas require modular design.

Modular design, with its absence of load-bearing internal walls, the use of structural columns to support the floors of the building, and the resultant creation of large areas of unrestricted open space within which library functions can be located when needed, is the foundation of the flexibility so essential to contemporary library operations.

Other factors that promote flexibility in the building are:

- the use of self-supporting floors combined with freestanding bookstacks;
- the design of all floors so that they have sufficient load capacity to support bookstacks as well as reading rooms and office operations (the resistance of the floors is two times that of an ordinary building.);
- the development of an air-conditioning system capable of the range of adjustments necessary for both the comfort of people and the preservation and conservation of the collections;
- the use of ambient lighting adaptable to office functions, reading rooms and bookstacks, combined with task lighting where necessary or desirable;
- the use of underfloor duct systems designed to permit easy access to power lines, telephone lines, computer cables and other cables, thus making these facilities immediately available wherever needed;
- the use of partition systems which make possible the reconfiguration of office space as required to adjust to changed working requirements;

¹⁰ Mr. Poole was co-author of the Rome's recommendations Colloquium.

- the use of a bookstack design which permits the assembly and disassembly of bookstack units as required;
- the location of cores, that is, those fixed structural elements of the building, including air shafts, elevators, stairways and restrooms, in locations where they offer minimum restrictions to the utilization of space.

6. SIMPLICITY OF DESIGN AND ARRANGEMENTS OF FUNCTIONAL AREAS

Simplicity of design and, more importantly, simplicity of arrangement of functional areas are an important factor in the success of a library. The size of the national library's building made it a complex structure. The principal areas designed for public use were conveniently located and easily accessible.

At the early stage of the process, the building was planned to accommodate approximately 4 million volumes in the first unit and six or seven million in the final building. There was a significant increase in the size of the non-book materials collection. In addition, the library has expanded its proposed services for these materials.

The building was planned to accommodate the ultimate library collections in each category of material, by the desirability of accommodating non-book materials immediately adjacent to the service units that collect and administer them. For example, maps cannot be housed in the general bookstacks and transported to the map reading room by conveyors. They are housed adjacent to the map reading room. Other non-book materials were handled essentially in the same way.

Likewise, the conception of the reading rooms and storage areas is such that the strict procedures and regulations for the preservation and conservation of the collections are not intended to turn into limitations of the efficient servicing of the public. Also, construction facilities were planned to allow for the progressive automation of all the national library's functional processes.

7. MAJOR ARCHITECTURAL CONSIDERATIONS

Acoustical treatment

Special attention was given to the acoustical properties of the building, including offices and staff working areas, conference rooms, auditoriums and reading rooms. Every effort was made to limit noise in the reading rooms so that it does not exceed 30 decibels, whereas in office areas the noise level should not exceed 35 to 40 decibels. Special attention was given to wall and window design to eliminate outside noise.

Lighting

Lighting received special consideration in the design and in order to deter the damage to book-like collection items a system was adopted of a luminous ceiling controlling the ultraviolet radiation emitted by fluorescent lights by means of ultraviolet filters in the form of sleeves which slip over the tubes wherever this precaution is required.

Air-conditioning criteria and control

The building is equipped with a total air-conditioning system for the health and comfort of staff and readers and for the preservation and conservation of the collections of the national library.

Air conditioning comprises both reading rooms and storage areas; besides, three (03) coolers & freezers measuring approximately 8,070 sq. feet (750 square meters) each were included for the storage, preservation and conservation of color film materials. These coolers & freezers shall be under a strict control of relative humidity (45 %) maintaining temperature ranges of 0° C to -5° C to -18° C. The comprehensive air-conditioning system includes full control of temperature, humidity, airborne dust and dirt and such gaseous contaminants as sulfur dioxide, ozone, nitrous oxide and the like.

Calculus of the structure

This aspect has been treated in accordance with the concept of architectural functionality in contemporary library buildings. The national library building gained flexibility by means of the construction of a highly flexible space with all floors strong enough throughout to accommodate bookstacks as well as people: all floors are structurally independent of the bookstacks, planned to be freestanding, with the shelves cantilevered off of central columns.

Some floors were designed for a double live load of 1,350 kg. per sq. m. to accommodate the installation of compactus type bookstacks, in which each range is individually motorized. In this way, the capacity of storage areas is doubled.

The fire protection system

The fire protection system is designed to meet previously established high-risk protection levels. The adequate, total fire protection system devised incorporates a number of subsystems.

- Compartmentalization

The building is divided into fire zones separated from each other by adequately designed firewalls (double walls) to stop or retard the horizontal spread of fire beyond the zone of origin.

- Dry pre-action fire cycle system

In this system, the branch pipe lines do not become charged with

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water until an associated automatic detection system senses a rise in the temperature to a critical level. Each sprinkler head is activated when the critical temperature of higher than 50° C to 60° C is recorded. When the fire is out and the heat subsides to 55°C/60°C, the water supply valve closes automatically; such a system provides excellent fire protection with minimum damage to the collections.

In office areas a traditional **wet-pipe sprinkler system** was installed.

- *INERGEN/FM200 system*¹¹

Special fire extinguishing facilities were deemed required for rare book and manuscript vaults, the computer room, the preservation research laboratory, restoration workshops and other areas in which wet- and/or dry sprinkler protection is not acceptable.

All the above was complemented by fire hoses and extinguishers. A panic alarm system was also devised and the necessary (independent) water reserve supply was foreseen to make the comprehensive fire protection system operational at all times.

- *Security system*

One major element of a modern security system is a properly designed and equipped command post or security control center into which flow all of the data required for the fast and effective response necessary to cope with emergencies of every type. Such data include, but are not limited to, information as to the existence of fires, areas in which a fire or fires exist, status of automatic fire fighting facilities (sprinkler discharge, Inergen discharge, etc.) intrusion or attempted intrusion into the building or into restricted spaces via unauthorized means; forced entry into exhibit cases and displays; attempted theft of materials from the collections; location and extent of damage to the building by earthquakes and criminal acts committed in the building; as well as elevator failures or other equipment failures, which might affect the safety of the staff or the collections (that is, failure of sewage ejector pumps and the like.)

The security system in a parallel way rests on a system of keys capable of being mastered up to what is known as Master, Grand Master and Great Grand Master keys: all the building's locks make up a system wherein the key that opens each of a given set of locks corresponds to a type of use.

8. INTERIOR DESIGN AND FACILITIES

Spatial distribution of the furniture, design and/or selection of furniture and equipment, technical specification for the manufacture and acquisitions of all the elements that make up the complete project.

The building project of Venezuelan national library has been divided

¹¹ INERGEN/FM 200 are inert gases approved by the Montreal Protocol.

into 4 wings for better understanding, calculation and drawing. Its functioning and design respond to a single architectural unit where wing 1 basically houses the stacks, wing 2, basically services to the public, such as reading rooms and supporting technical services, wing 3, the administrative offices and wing 4 is the auditorium. *See plans.*

9. PRESENT STATUS

In 1989, the national library started moving from the old place to the new one and setting up some public services and some administrative offices in the new headquarters. Three (03) more years were expected for the total occupancy of the building.

Presently, 20 percent of the building is occupied; nevertheless, the construction process continues at a very slow pace. Eighty percent of the infrastructural works are completed, just like the installations that comprise basic services, such as water supply and sewage, general electricity (wiring) and equipment. The installation of the central air-conditioning system and ambient conditioning throughout the building, which shall make possible the move of book-like collections as per the first phase, was foreseen to take place in 1995-1996. *See figure.*

Operational systems

In order to achieve an integrated infrastructure for all those installations that make it possible to operate the building, a project is being developed where the mechanical fire protection, energy power supply, telecommunications, air conditioning and security and control systems can intercommunicate by means of electronic signals. Likewise, there exists the complete security project (being carried out gradually) which shall make the operation and monitoring possible from a central console: air conditioning, pumping and water supply, mechanical communications such as elevators and book transportation, CCTV, etc.

10. FINANCING AND COSTS

Financing

The construction of the new national library building began on January 5, 1981 funded by MINDUR's ordinary budget.

In 1982, the national library authority strove to bring about the passage by the National Congress of a Program-Law that would guarantee for a three-year period the financing of the first phase at the Liberator Forum of the construction process, services and both the furnishing of buildings and the library-material provision of the new national library headquarters, in the charge of MINDUR during 1982-1984.

Later on, in the beginning of 1983, Venezuela started facing serious economic and financial problems which brought about cuts in ordinary

budgets of government agencies, let alone extraordinary budgets. Even though this circumstance affected directly the continuation of the construction process, the rhythm of construction during the preceding years permitted of reaching 65 percent of the building's total structure.

Costs

The initial estimate, done in 1977 by the Sanabria architectural office, as part of the descriptive report included in the architectural pre-project, devised the construction of the new headquarters in stages.

Characteristics	Area sq. meters.	Estimated cost	Total cost in Bolivars	Total cost in Dollars
Specialized areas	2,750	2,000 Bol./sq. m.	5,550,000.00	\$ 1,290,697.00
Highly specialized areas	33,374	2,500 Bol./sq. m	83,435,000.00	\$19,403,488.00
Average areas	30,593	1,500 Bol./sq. m.	45,889,500.00	\$ 10,671,976.00
Total est. cost (1977)			134,855,093.00	\$ 31,366,161.60 4.30 Bs. to the \$

In February 1982, when the Program-Law was passed, the cost of the new national library building was estimated at Bolivars 263,500,000 (US \$ 55,000,000); the construction had already begun. (rate Bolivars 4.30 to US \$1.00.)

The economic and financial crisis, which started in 1983, modified completely the construction cost and by 1985 the total cost of the building was estimated at Bolivars 475,582,300 (US \$ 47,558,230), whereas the investment made until then amounted to Bolivars 289,482,388 (US \$ 28,948,238,80 at a rate of Bolivars 10 to US \$1.)

Inflation played havoc within the construction sector whereby the activity almost stopped. In March 1987, the cost was estimated in Bolivars. 590,500,000 (US \$ 8,435,714,20 at a rate Bolivars 70 to US \$ 1.)

YEAR	Bolivars to the US \$	COST ESTIMATED IN US \$
1982	4.30	55,000,000
1985	10	47,558,230
1987	70	8,435,714
1994	170	12,941,176
1997	490	43,571,428

DEVELOPING A DIGITAL LIBRARY

Strategy and process of a case study:

Tilburg University

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ABSTRACT

This paper described the strategy for the development of a digital library at Tilburg University. This strategy is being developed in close connection with the overall strategy of the university. This is an important explanation for the firm commitment of the executive board of the university. The paper emphasizes the importance of a well-elaborated planning process. A close co-operation between the library and the computer centre in order to realize the goals that were set was one of the success factors. The involvement of staff can be identified as the most important factor.

1. INTRODUCTION

Within a period of three years, Tilburg University managed not only to build a new library but also to reshape library and information services in an innovative fashion.

In the beginning there was an idea, a vision. An important impetus for developing a vision of a library of the future was the decision by the Dutch Minister of Education to fund the construction of a new library in the centre of the university campus. The Board of Governors of the University regarded this decision as a great opportunity and an essential stimulus for reconsidering the current library situation and the future developments with respect to information technology and to work out a program for a « high-tech documentation, information and communication centre ».

When the new library was opened in May 1992, the direction for innovative services was set and various new and exciting facilities could be offered to users campus-wide. Since then these services have been renewed in such a way that the university still maintains a leading position in the innovation of scholarly information provision.

2. TILBURG UNIVERSITY AND ITS LIBRARY BEFORE 1989

Tilburg University is a medium-sized university with a focus on the humanities and the social sciences. Currently 9,000 students are enrolled. The university employs 1,500 staff: researchers, teachers and supporting staff.

In the seventies and early eighties, the University focused very much on growth, in number of students and in number of faculties. This was considered important because of constant threats from governmental bodies that occasionally wanted to decrease the number of universities in the Netherlands. In that period there was an emphasis on diversification of courses that could be offered to the students. A new Department of Arts was started, information management was a new branch in the Department of Economics. In the Department of Social Sciences courses on Labour and Organization, Leisure Studies and Social Security were launched.

Over all, in that period the university could be characterized as an average institution with no special reputation of excellence and with no particularly strong international relations.

2.1. New university strategy

In 1985/1986 the strategy of the university focused very explicitly on the stimulation of excellence in teaching and research. Within the medium term, faculties were to reach the top three of their kind nation-wide. Internationalization was stimulated. The use of information technology had to be fostered both in teaching and research and in the supporting services. In other words, the university wanted to manifest itself as a dynamic, innovative and versatile university for the humanities and the social sciences.

Now, ten years later, the Tilburg Departments of Economics and Law hold a top ranking position in the country both in teaching and in research. Economists from all over the world regularly act as visiting professors at the Tilburg Centre for Economic Research. Other research institutes, such as the Schoordijk Institute (a part of the Law Department), also maintain a prominent position.

2.2 The library between 1978 and 1989

The library had completed the first wave of library automation in 1983 with the launch of the On-line Public Access Catalogue and with the completion of its retro-conversion in 1986.

As early as 1978, the management of the library, as well as its staff, had developed plans and ideas that assigned an important role to modern technology and advanced forms of services. Co-operation with the computer centre and co-operation with others, such as the Dutch organisation for library automation Pica, were regarded as necessary in order to realize new and advanced services. Because of the ideas in the library with respect to the future role of libraries and electronic information, plans for staff education were developed and executed which caused an important improvement of skills in the library and a greater focus on the use of new technologies.

Another important impetus to this was given by the acquisition of a very important national collection on applied computer science in 1985. It stimulated the library to develop in-house databases (Excerpta Informatica) and to attract young and new staff that were committed to new technologies and to the development of new library applications.

In this period, library facilities were decentralized and organised in six different departmental libraries housed in various buildings on the university campus. The library was used quite intensively by faculty but did not play a prominent role in the educational process. Student use of the library, which altogether offered approximately 250 study places in the various locations, was limited.

Initiatives to develop a new and innovative library and to move in the

02

direction of the digital library must be seen against this background. The library was ready to make an important step towards innovation and the university offered an environment which stimulated new initiatives with respect to the use of information technologies in order to improve teaching, learning and research.

3. A STRATEGY FOR THE DEVELOPMENT OF A DIGITAL LIBRARY

3.1 Policy strategy in 1989

The decision of the Dutch government, which enables Tilburg University to build a new library, was an important impetus for broad consultation and intense discussions on the type of library that should be created.

It was obvious to all participants, the library staff, the management of the computer centre and the senior management of the university that a new library should be in compliance complete with the new demands of the forthcoming electronic age.

In May 1989, Tilburg University Press published a basic document for the new library program: « The new library and the development of innovative information services at Tilburg University ». This publication was a co-operative effort by the library staff, the staff of the computer centre and specialists from Digital Equipment Corporation and was inspired by the ideas of Leo Wieers, who at that moment was the university librarian.

In this document the university's policy, which has been described before, was an explicit starting point: « This policy has challenged all faculties and supporting services into actively contributing to the realisation of this aim. »

Basic assumptions were:

- The forthcoming changes in the scientific information chain will provide the author with more facilities both as a consumer and as a producer of new information.
- Close co-operation between the library and the computer centre can have a strong supportive influence in the primary process of academic education and research by making possible an information-oriented workplace, both inside and outside the library building.
- Optimal support can be offered to staff and students in all aspects of the gathering and use of information by focusing on integration of library information services with other computing facilities.
- The technical infrastructure should be characterized by flexibility and stability, and should be based on technological standards and open solutions.

- Only with the help of other parties can the technological potential in the field of information use be made operational. Hence there should be a clear and active preference for co-operation both within the university and with other parties: libraries, vendors, publishers and others.
- There should be a strong belief in the potential, the creativity and the expertise of the staff of library and computer centre. These two departments already have a history of successful partnership and co-operation. The library could take advantage of the experience of various staff members and, since 1985, has been developing its own applications in specific areas (f.e., the design, development and exploitation of the Excerpta Informatica databases).

3.2 The innovative direction

Central element in the concept was person-oriented information management:

- Databases can be consulted and documents can be requested from the desktop of the individual user.
- Electronic information can be retrieved from computerized collections which are stored remotely and without the intermediate steps of collecting and sending printed documents.
- The different applications on the desktop computer can be integrated.

3.3 Program description 1989

Based on the policy strategy and the central items seven projects were defined in order to examine the key areas in which innovative courses of action would be taken such as:

- imaging
- electronic publishing
- office automation
- automated circulation
- learning environment
- database development
- networking.

3.4 Start of various projects

In these seven key areas project teams were assembled using staff from the computer centre and the library, some key personnel from faculties and other university departments, and consultants from Digital Equipment Corporation. These teams had to examine the technical requirements and opportunities and had to deliver a project plan with specific benchmarks

within six months.

4. SUPPORT AND COMMITMENT

4.1 Support from the University

It was of crucial importance that the Board of Governors and the University Council of Tilburg University acknowledged the program as one of the most important initiatives for the coming years and gave it full support. In June 1989 the Council decided to provide additional budgets to start up the first projects and to allocate a yearly budget for the maintenance and the substitution of hardware and software that had to be acquired in order to realize the goals of the programme. From the very start, however, it was obvious that all of the important investments for setting up the various pilot projects could only be realized with external funding.

4.2 Funding and support

This programme was gradually realized with important financial contributions by the Dutch Ministry of Education, the Ministry of Economic Affairs and the Commission of the European Community. An agreement was made with the Dutch organization for library automation, Pica, to the effect that Pica would provide financial support and experts who would take an active part in the programme.

A clear and open technology architecture, based on standards and aimed at integration, was viewed as a prerequisite for success. For that reason, co-operation with business and industry was imperative. As the University's chief industrial partner, Digital Equipment Corp., supplied a large amount of technological expertise as well as financial means for making the programme a success. However, co-operation was not restricted to Digital. Co-operation also took place with companies such as Verity, SPC and ID Systems and with major publishers such as Elsevier Science Publishers and Wolters Kluwer Academic Publishers.

It was never anyone's intention that these pilot projects should be executed in isolation and therefore co-operation was established with other university libraries. A European project within the framework of Comett (The Telephassa project) was realized with the Universitat Autònoma de Barcelona (Spain) and the University of Patras (Greece) aiming at organizing seminars on the use of information technologies in libraries and at developing interactive modules for user instruction.

A memorandum of understanding was signed with Carnegie Mellon University (Pittsburgh, USA) in order to exchange ideas and information. A pilot project on the On-line Contents database (with the Dutch Royal Library in The Hague) was developed and sponsored by the Ministry of Economic Affairs. This Ministry also sponsored the Lendomat project, a project that aimed at the development of a completely self-service system for lending and returning library books and at full integration with the Local Library

System provided by Pica.

Through numerous lectures, workshops, seminars and publications, Tilburg University drew international attention to the programme for a high-tech library.

5. BUSINESS PLAN AND MANAGEMENT

5.1 Plan of Action, summer 1990

Based on the reports of the seven project teams a blueprint was published in the summer of 1990 which described the fashion in which information technology would have to be applied in the total programme: « Documentation, Information and Communication at Tilburg University. Plan of Action - Research -Services ».

A basic characteristic was that the technology architecture had to be able to support multi-vendor offerings, both hardware and software. Another principle was that the architecture had to be based on the use of open standards wherever these were relevant and available.

5.2 Project management

In order to manage the various projects, to monitor the progress of the overall programme and to initiate new activities and projects in compliance with the general vision, a Programme Management was installed. This Programme Management (ProM) consisted of the senior management of the library and the computer centre and the various project managers. It regularly evaluated the results of the seven project teams, presenting state-of-the-art overviews on the seven key areas and proposals for new projects for development and implementation. The management recognized two important problems:

1. The actual budget was limited. It was obvious that not all of the possible projects could be launched.

2. The environment - university staff, students, library and computer centre staff - was rather sceptical about the innovative ideas on the digital library and badly needed a clear perspective. They had to be convinced, they wanted to see, in a concrete form, that bright ideas could become reality.

For these reasons, the Program Management decided:

1. To focus on the realization of clearly defined services such as:

- a. An On-line Contents database with the content pages of the current journals of the library, using the techniques of scanning and optical character recognition and to make it operational for the end-users, by fall 1990. The creation of such a service had already been requested by the library advisory

committees for a very long time. With modern techniques and with governmental support these demands could be fulfilled.

- b. The first Campus-wide Information System in the Netherlands.
- c. The KUB-Guide as a network navigation instrument to various local library databases, such as the OPAC, the Excerpta Informatica databases, the On-line Contents database and the Community Information System (CWIS).
- d. The first version of the « Integrated Desktop » that would directly benefit the users. In order to offer a campus-wide affordable solution, it was decided not to focus on expensive SUN or UNIX workstations but on the PC environment.

2. To develop - in close co-operation with Digital Equipment - a demonstration model (Quasi Modo) in order to give an impression of the impact of the program. To that purpose, equipment was installed in a special room at the university. Presentations and demonstrations for university staff and external visitors could then be organized to visualize the idea of integration of data, texts, and images and to show the new innovative developments that would be possible in a few years.

For each of these services, new project teams were installed in order to develop the deliverables as they were specified in the action plan. Each project team would have one or more working groups in a specific field. In these teams and groups, library staff worked together with staff from the computer centre. In some cases, staff from other university departments and specialists from Digital joined the teams as well.

5.3 Developing by prototyping

The projects were realized without the use of any official standard method for system development. Functional and technical specifications were set. Subsequently, an experimental prototype was built. This prototype was tested and validated. Important principles were:

- to buy, whenever possible, what is available on the market,
- to look for open solutions preferably based on international standards,
 - to realize co-operation and communication between members of the project teams through electronic conferencing - to give every single member of a project team a task and a responsibility, with a strong emphasis on team spirit
- to report regularly to the Programme Management.

6. REALIZATION AND IMPLEMENTATION

In April 1991, a demonstration of the current status of these projects was organized in the main hall of the university, presenting an overview of what would be available in the new library. When the new library was opened by the Minister of Education, Dr. Jo Ritzen, on 21 May 1992, several new services became available to the users:

1. A **fully self-service circulation system**, the «Lendomat», providing users with facilities for borrowing, checking out and returning books without assistance by library staff.

2. An **On-line Contents database** giving users information about articles in 1 600 journals. This is a service comparable to Current Contents, but mapped on the journal collection of the library. The database was produced using scanning and optical character recognition.

In line with this new service a pilot project was launched in co-operation with Elsevier Science Publishers which complemented the standard bibliographical information in the database with keywords and abstracts of articles in the Elsevier journals to which Tilburg University subscribes.

3. The implementation of **KUB Guide**, an on-line information system, offering transparent network navigation between various databases, such as the on-line public access catalogue, bibliographic and abstract databases, and community information.

4. The **realization of the integrated desktop**. By summer 1992, the planned integrated services were functioning on 250 PCs in the library and on about 1300 other PCs all over campus. All these PCs were equipped with a 80386SX processor using MS-Windows. All computers provide access to internal and external databases, Internet access and other communication tools. Various software packages with campus-wide licenses can be used in an integrated fashion. This broad implementation is unique because it offers a number of different computing services in an integrated form. In addition to these services, in January 1993 various CD-ROMS became available via the campus-wide network.

7. FIRST EVALUATION

After five years of operation an evaluation can be made:

1. The new library is a great success. Every day the building is overcrowded with especially students who want to write a paper using one of the desktops or to use the library in a traditional way.

2. The support on the side of the faculty is improving. A development is under way to implement the use of the integrated desktop and the use of electronic information in the curriculum. On the other hand, it is clear that it takes time to persuade faculty to use these new facilities when remodelling their courses and to really integrate electronic information services and

electronic communication facilities in the curricula.

3. The concept of the integrated desktop is widely accepted by the university, by the executive board and by all departments. With the development of new applications in other departments, it is a logical precondition that these new services - for instance with respect to management information - should be fully compatible with the integrated desktop.

There are also problems, of course:

1. First of all, there is a demand for more: more software, more computers, more printers, more support, but also a demand for more money to buy books and journals. As a result, a new collection-management policy was set by the university giving the library and the departments a clear and more solid basis for funding in the next four years.

2. A completely different issue is the maintenance of the systems. It requires a lot of attention and a continuous effort on the part of both the library staff and the staff of the computer centre. Because of the heavy use made of the services, performance problems require attention. New solutions to new problems constantly have to be found.

8. CURRENT SITUATION

In 1994-1996, the library and computer centre focused on the improvement of the various services and on providing access to primary information. Currently all end-users have access, on more than 2400 computers (450 student work stations in the library, 400 student work station elsewhere on campus and approximately 1600 PCs for staff), to

- the full text of more than 100 Elsevier journals the library subscribes to and to journals provided by Kluwer Academic Publishers and Academic Press.

- the full text of research papers produced by researchers of the Departments of Economics and Social Sciences and by researchers of the Centre for Economic Research.

- the coloured images of 13,000 pictures and maps from the Topographic Historical Atlas of the province of Brabant.

- Netscape, E-mail.

The campus-wide information system has been converted to WWW. In September 1997 KUBweb using Netscape will be the logical entry point to all in-house developed databases, to various CD-ROM's and other services. We expect that this soon will be extended with a similar access to the OPAC. In my previous paper presented at this summer school, these developments and the future focus have been elaborated more in detail.

9. STRATEGIC PLANNING BY THE LIBRARY

Strategic planning has become standard practice in Tilburg University library. Every two years the library makes a new plan for the next four years. The whole process of change over the last 10 years that had a major impact on the library staff and on the library as an organisation would have been impossible without planning. Several aspects will be discussed in my paper « Human Resources and the digital library ».

The library plans were constantly made in conjunction with the university plans, especially the process of the development of the digital library described before. In general, the strategic plan of the library contains:

- an evaluation of the past period: which goals have been achieved and which have not,
- an SWOT analysis,
- a definition of the goals and objectives for the next period,
- the strategy to realize the goals
- a matching of tasks and means
- implications for staffing
- organisational change
- changes in job description
- educational plan.

In order to prepare such a plan the following steps are made:

1. Environmental scan.
2. Meetings with all faculty boards. Interviews and discussions with key people in the university.
3. Internal discussion (brainstorm sessions) and identification of weaknesses, strengths, threats and opportunities. Broad internal consultations.
4. Internal discussion on what should be achieved in the next few years. Identification of key issues.
5. Preparation of first draft by the librarian.
6. Discussion with management teams of library and computer centre, discussion with member of Executive Board.
7. Preparation of a second draft.
8. Discussion in the library, in the departments. Discussion with the personnel committee that should agree with the plan.
9. Approval by Executive Board.

10. STRATEGY FOR THE NEXT FEW YEARS

Tilburg University library recently presented an adapted strategic plan for the period 1997-2000. The new strategy was developed as a consequence of earlier steps in the direction of the digital library, based on the vision and the focal points that have been discussed before. The key points of the strategic plan of 1995 were reconfirmed:

- The library's service is focused on its internal users.
- The concept of the integrated desktop remains the starting point for library services, supporting education and research.
- Uniform access will be provided to heterogeneous databases.
- There will be a focus on systems for selecting and filtering information, tailor-made personal service, and the development of systems for knowledge navigation..

In the period 1997-2000, three goals will be highlighted:

1. Improvement of the quality of day-to-day service.

First of all, a greater emphasis on quality management is required. A key issue in user service will be the choice between local availability/storage of primary information on the one hand and the use of data from other information suppliers on the other.

The library confirmed its strong focus on distributed approaches rather than relying on central end-user services provided by commercial suppliers.

2. Optimizing the use of the integrated desktop for education and research.

Various projects will be running in co-operation with faculties in order to make a better use of new facilities, to professionalize lecturers and to take part in the curriculum. The library is also committed in supporting electronic publishing by researchers.

3. The library wishes to maintain a leading position in Europe and to proceed with innovations.

The focus will be on « knowledge navigation ». We will set up a system that aims to:

- determine the information need in dialogue with the user
- select relevant files, and
- search in these files for the user.

11. WHY A DIGITAL LIBRARY INITIATIVE AT TILBURG UNIVERSITY ?

The main factors that made it possible to develop a digital library initiative at Tilburg University can be summarized:

1. The university environment was ready for innovation and prepared to see the use of information technology as an important tool to improve the support of teaching and research.

2. There was an idea, a strategic plan, that completely matched the strategic plan of the university and that was a logical consequence of thorough considerations on technological developments and the increasing importance of electronic information.

3. A close co-operation between the library and the computer centre, not only at the level of senior management but also at the level of developers and other staff.

4. Personal commitment on the part of the Executive Board of the university and a close relationship between the senior managers of the library and the computer centre and the Member of the Board that is in charge of Finance, Library and Computing.

5. Support from the Dutch Government that considered developments in Tilburg as a good stimulus for innovative services in libraries in the rest of the Netherlands.

6. A good network of co-operation. Developments were not initiated in splendid isolation but in close corporations with others: Digital Equipment, Pica, Elsevier Science Publishers, other universities such as Carnegie Mellon University (USA), Limerick University (Ireland), De Montfort University (England) and the partners in the Telephassa project, the University of Patras (Greece) and the Autonomous University of Barcelona (Spain).

7. The most important success factor, however, were the people: staff members who worked with enthusiasm and creativity to make a new library and develop new services. Strategic plans themselves will be worthless and remain paper tigers if there is not the power and the ability to actually realize the goals and objectives that were set in a strategic plan.

These factors were the basis for success and can also be the basis for work in the future, as it is quite obvious that innovation cannot stop once a window to the future has been opened. Because there is a vision, accepted by the University Board as a strategic goal, new projects can and will be started in line with the overall strategy.

THE TILBURG DIGITAL LIBRARY

by Hans Geleijnse

Director of the Katholieke Universiteit Bibliotheek Brabant, Tilburg

ABSTRACT

This paper presents an overview of the current developments in the Digital Library at Tilburg University. I shall discuss our experiences with the on-line provision of primary information to our end-users, of journal articles and papers produced by the researchers of our own institution and other services. Positive experiences as well as problems will be discussed. New projects and prospects will provide direction for the library in the years to come. The university library will focus on the provision of added value to the information process in a global environment and on integration of the retrieval and processing of scholarly (electronic) information with teaching, learning, and research.

1. THE DEVELOPMENT OF THE DIGITAL LIBRARY AT TILBURG UNIVERSITY

Tilburg University in the Netherlands is a medium-sized university focusing on the humanities and social sciences. Currently, approximately 9,000 students are enrolled and the total staff number is about 1,600. The university has a compact campus and a sophisticated infrastructure. The faculties of economics and law have an excellent reputation in both teaching and research.

In 1989, the university started a programme to build a new library and initiated detailed plans for the development of the digital library. The Digital Library Programme at Tilburg University (an action plan for a high-tech Documentation, Information and Communication Centre) aimed to provide staff and students with excellent support facilities for teaching, learning, and research. Key elements in the programme, which initially was supported by Digital Equipment Corp., were:

1. A focus on the use of information technology in order to improve both library procedures and systems, and the services to end-users.
2. The provision of electronic information to the desktop of both faculty and students, on campus and at home.
3. A campus-wide implementation of the concept of the « integrated desktop ».
4. The development of tools for knowledge navigation in order to support the user in locating and retrieving relevant information in the global information environment.

The programme was managed by a partnership of the university library and the computer centre with the firm support of the executive board of the university. The concept of the integrated desktop can be regarded as the cornerstone in the programme. Recognition of the power of electronic communication, the increasing importance of electronic information and the changing opportunities for end-users, who have access to information through their desk-top computer, was the starting point for the development and implementation of this concept. Working on a single computer, the user should have easy and direct access to secondary and primary information, to various software packages and to communication facilities.

In a university environment, the user is a consumer of information, but at the same time students, lecturers, and researchers also produce new information by making full use of the present body of knowledge and enhancing this with new ideas and research results. The output can be a working paper, an article, a thesis, or a book. This process should be supported by the library in close co-operation with the computer centre.

Tilburg University's network connects more than 2,400 PCs, each of them providing access to locally and remotely stored information. For the students, 450 PCs are available in the library along with an additional 400 PCs in seminar rooms. All 1,600 staff have networked PCs on their desktop. The power of the concept of Tilburg University is that all of these 2450 PCs offer the same basic facilities:

1. Access to information

- local OPAC
- local Reference databases, such as the On-line Contents database on journal articles and the Excerpta Informatica database on applied computer science. These references are seamlessly linked to full text information and coloured images;
- networked CD-ROMS
- the National Catalogue and the National On-line Contents database with electronic request and accounting facilities for end-users. Fast document delivery to the end-users can be guaranteed;
- other central databases hosted by Pica, an organisation for library automation, based in the Netherlands and founded by the Dutch university libraries;
- Internet resources;
- networked CD-ROM's;
- management information for both students (including the results of examinations, the reservation system for the desktop computers in the library, etc.) and staff (financial and other administrative information);
- electronic help desk (EVA);

2. Software packages, such as word processing, graphical, and statistical software, which are licensed campus-wide and can also be used from home.

3. Communication facilities, such as electronic mail, FTP, and the Trumpet Newsreader.

The concept of the Integrated Desktop is an example of a user-oriented client/server implementation.

In 1991, the executive board and the faculties agreed to standardize. It was considered that a campus-wide implementation would be facilitated by a homogeneous infrastructure. Standardization was introduced with respect to:

- the network infrastructure within the departments (the standard is the Novell NetWare);
- the desktop computers in the offices and for the students (PCs running Windows are prevalent);
- one preferred PC vendor;
- software that would be supported by the computer centre.

This policy enabled the university to achieve cost-effective solutions.

Although some variations in this approach are currently being introduced as a result of the differences between departments and differences in the level of use of various facilities, basic models for standardization are still accepted and have recently been reconfirmed campus-wide.

2. FIRST INNOVATIONS

- When the new library was opened in 1992, the first version of the «integrated desktop» with access to secondary information, various software packages and electronic mail facilities was made available. Students were encouraged to make reservations for their desktop computers in the library, excellent networked printing facilities were offered, and on-the-spot support was provided.

- A key innovation was the launch of the On-line Contents database. This will be discussed in more detail in the next section. Results from other projects were also available:

- The KUB Guide was a first step in developing a navigational aid in the information environment. In this first version, it was a menu-driven, bilingual terminal interface giving short help in selecting relevant services, such as the OPAC, our local On-line contents database, Excerpta Informatica, and various other dedicated databases. The guide also provided access to local information delivered and maintained by faculties and department,

and was the predecessor of the current KUBweb home pages.

Tilburg University library was also the first European library with a completely automated self-service circulation system, the Lendomaat. With a subsidy from the Dutch Department of Economic Affairs, this service was designed and realized by combining existing technology (local circulation system, bar code reader, security strips, scanners, printers) and with the co-operation of Tilburg university, Pica, the security firm Checkpoint, and SPC, a software house, responsible for the development of the communication software for the various components.

3. FROM SECONDARY TO PRIMARY INFORMATION

Until 1994, the library focused on the electronic provision of secondary (bibliographic) information. In 1991, Tilburg University started its own local On-line Contents database with references to the articles of the 1,600 most important journals the library subscribed to. Content pages were scanned and OCR and the information was locally stored in a database. This local project formed the basis of a national service, which has been running for four years and which is hosted by Pica. In 1995, we closed our scanning department. We now rely on the subset of the national On-line Contents database (containing the 12,000 most important and most requested journals in the interlibrary loan circuit in the Netherlands) maintained by Pica. >From this database, we can download the data that match our own holdings. The data of this On-line Contents database are currently being produced by Swets & Zeitlinger. At Tilburg University, part of this data is supplemented by abstracts delivered by Elsevier Science and other publishers, and abstracts and keywords produced in-house by library staff members.

The provision of the full text of the journal articles to the end-users was a logical next step. In 1994, Tilburg University was the first institution in Europe to enter into a licence agreement with Elsevier Science with respect to their electronic subscriptions. In 1995, electronic access could be provided to the Tiff images of the 120 Elsevier journals on economics and social sciences the university subscribed to. In order to work efficiently with bibliographic data and full text images, Tilburg University developed the KWIK software in co-operation with Digital Equipment. This « KWIK » software is based on the Mercury software, originally developed for UNIX workstations at Carnegie Mellon University. At our university, it runs on PCs equipped with MS-Windows software.

It is clear that browsers such as Netscape and the boom of the Internet motivated us to change from a customized and sophisticated approach to open WWW solutions, although this meant losing some functionality, such as a clear distinction between viewing and printing, and performance. Access to bibliographic and full text information is now being provided via WWW, based on the implementation of the results of the project Decomate (Delivery of Copyright Material to End-Users) which was funded by the European Commission. This project was co-ordinated by Tilburg University,

with the London School of Economics and the Universitat Autònoma de Barcelona as partners, and was completed in March 1997. The project received high praise from independent experts appointed by the EC.

The Decomate software is applicable to various local environments and can handle materials from various publishers in various formats. The Z39.50 protocol is used for the transactions with database servers. The software is now available for implementation in other libraries.

The full text database of Tilburg University was extended with the PDF files provided by Kluwer Academic and Academic Press, and will be expanded in the Autumn of 1997 to include various journals on Dutch law provided by the legal division of Kluwer, including the most popular legal journal in the Netherlands, the « Nederlands Juristenblad ».

The corpus of about 200 full text journals will be extended by a new license agreement with Elsevier Science that will provide access to 160 journals the library does not subscribe to but which are relevant to the subjects taught at the university. Access to this copyright material will be provided on a pay-per-view basis. For Elsevier and the university, it will be interesting to see what happens if these services are offered at affordable costs and with prices compatible with the Inter-Library Loan fees.

In this paper, I will not go into detail about experiences with publishers and our policy with respect to license agreements since these topics will be covered later in the course in more depth.

4. TILBURG UNIVERSITY AND ELECTRONIC PUBLISHING BY RESEARCHERS

It would be unwise for a university library to only focus on digital material delivered by a publisher. Actually, many libraries are discussing a potential new role for libraries in the electronic publication of documents produced by the parent institution.

The library and the computer centre at Tilburg University currently support **the electronic storage and access of research papers** produced by university researchers, in particular, the Department of Economics and Centre, the top institute for economic research in the Netherlands. Faculty members provide the library with a hard copy of their paper as well as an electronic version in Postscript. The library then enters it in the National Catalogue and the local reference database. Conversion of Postscript files to PDF is carried out by the computer centre. Library staff provide the papers with keywords and make these papers accessible through the World Wide Web and the local reference database Attent.

This initiative has been expanded to a nation-wide project (The Degree project). All universities with Economics departments are participating to make most of the economic research papers produced in the Netherlands available through the network. In Tilburg, the papers are accessible through a local reference database Attent, through the national

WEBdoc database (a project of Pica, Dutch and German libraries and the Research Libraries Group in the US), and through WoPEc, the international database of research papers on economics. The National Funding Council regards this initiative as an example for other subject areas.

Another project deals with the creation of a brand-new electronic journal: The **Electronic Review of Comparative Law**. The goal of this project is to develop an editorial, technical, and organisational concept for an electronic journal that publishes high quality articles in English with an international editorial board. Quality is ensured by high editorial standards and a strict electronic peer review system. We would like to see the electronic format used to its fullest effect:

- to link articles with legal sources like legislation and judicial texts;
- to link discussion and comments to published articles, creating an open - but controlled - platform for discussion among peers.

The university library will manage the project in close co-operation with the Faculty of Law (which appointed the editor-in-chief), the Law Faculty of Utrecht University, and our Computer Centre.

5. OTHER PROJECTS

Tilburg University library and the computer centre are currently involved in the following projects:

- the development of a serials management information system (local project);
- IT projects at the university aimed at improving the quality of learning;
- a project to train the university teachers in order to make better use of the infrastructure and current information technology;
- course information on the Web;
- a research project on the use of printed and electronic journals in co-operation with the University of Maastricht (nationally funded project);
- a project on searching heterogeneous databases, such as the On-line Contents database, Excerpta Informatica, the local (Pica)

OPAC and Silverplatter CD-ROMS, using Z39.50 (nationally funded project);

- ELISE II (European project), the second phase of the successful ELISE project from the Third Framework of the Telematics Programme of the EC. ELISE I produced image banks in two libraries (Tilburg University and De Montfort University, UK) and has demonstrated interconnection. ELISE II aims at the development of an operational infrastructure for networked image information in Europe. The project is co-ordinated by De Montfort University in the UK, with IBM Scientific, The Victoria and Albert

Museum, Limerick University, the Université Libre de Bruxelles, and Tilburg University as partners;

- A very interesting and innovative project, « Virtual Library on Economics » started in July, 1997. It is a co-operative effort between Tilburg and two other Dutch university libraries, the University of Maastricht and Erasmus University, Rotterdam. The project aims at developing a virtual serials collection on economics, since the three libraries together have such a comprehensive assortment of resources on this subject. The first phase of the project is to improve the services to end-users with respect to access to, retrieval and delivery of all journals the libraries subscribe to. The partners regard the extension of services as a practical starting point for co-operation on collection management and collection development. It is envisaged that a user from the University of Maastricht will have seamless access from his or her desktop computer to bibliographic information and abstracts of journal articles stored in electronic or printed form in Tilburg or Rotterdam. It should be guaranteed that the user can have the full document (either in electronic form or a copy of the printed version) within a reasonable time span. Once these facilities are in place, they will offer a tool and act as a basis for decisions about journal subscriptions at all three sites. We regard this as a bottom-up approach to a nation-wide policy of co-operation in collection development. It is obvious that heavily used journals will be needed locally for the time being at three different sites, but long-term agreements can be made on hundreds of specialized journals and journals of the second and third categories. This project is funded by the National Science Council as an important initiative to enhance the development of the Dutch Virtual Library.

6. EXPERIENCES WITH THE DIGITAL LIBRARY SERVICES

We have now had five years of experience with the campus-wide use of the services provided on the integrated desktop. On the whole, they have been positive:

1. The library is overcrowded. Students make extensive use of the library resources. Ninety percent of our students regularly use the integrated desktop computers. The library is a meeting point and working place for university students.

2. Most electronic services, which have been implemented since 1992, are heavily used by both students and staff.

3. Currently, the "integrated desktop" is not only a cornerstone of the Digital Library programme, it is also widely accepted as a key element in the strategy of the university. It is the basis for IT innovation projects in teaching, learning, and administration.

4. The university library is drawing more and more national and international visitors. Over the last 5 years, the library was visited by more than 7000 professionals, librarians, computer centre managers, and researchers from more than 24 countries.

We have also identified some important problems:

1. The most important problem is that it takes more time to integrate new information services into the educational process of the university than we expected. Individual use by students is excellent, but more faculty could make full use of the opportunities provided by the electronic information environment. A significant number of teachers have so far been reluctant to invest time in new technologies and in an innovative approach to the educational process. It should also be stressed that a growing number of professors and teachers are engaged in projects in order to present their course material in electronic form and to stimulate interactive use of the current electronic facilities.

2. New services demand instruction, training, and user support. The library should not underestimate this. The fast changes in programmes and interfaces are easily accepted by some users but can be an awful surprise for many others. The need for a coherent and well-elaborated planning and communication policy is obvious. First of all, however, there is a need for a constant interaction with users about what will happen tomorrow and why, and which issues can be decided locally. A balance should be found between the need to offer state-of-the-art services and the need to maintain a homogeneous and well-accepted infrastructure.

3. The open environment in the library requires more regulations with respect to the use of the computers by students (for that reason, a reservation system and a time-out system have been developed), security measures, and clear policies for proper and correct use of the facilities.

7. SOME DATA ON THE USE OF ELECTRONIC SERVICES

One of the advantages of electronic services is that we can log events in our database and generate more detailed information on the use.

Some data on entries to important databases can be provided:

	<i>1994</i>	<i>1995</i>	<i>1996</i>
<i>OPAC</i>	<i>105,521</i>	<i>127,168</i>	<i>190,159</i>
<i>On-line Contents</i>	<i>29,000</i>	<i>52,864</i>	<i>73,828</i>
<i>CD-ROM's</i>	<i>83,291</i>	<i>89,771</i>	<i>105,463</i>

The On-line Contents database is a good example of an excellent new service (started in 1991) that took some time to gather momentum, though it now plays a prominent role in the digital library services. We expect that this will be the case with electronic subscriptions.

It is also interesting to see how the use of the full text articles is developing. The numbers for the use of the reference database are good, the numbers for viewing reasonable, and for printing are, as yet, very limited:

1995 1996

<i>Number of views of articles</i>	<i>11,624</i>	<i>15,784</i>
<i>Number of prints</i>	<i>690</i>	<i>1,237</i>

It should be stressed, however, that there are some implicit and explicit limitations to the full use of the journals provided by Elsevier Science and Kluwer Academic:

1. There is still a lead time of four to six weeks between the arrival of the printed version of the journal in the library and the arrival of the electronic files. Of course this lag will disappear in the near future, but it nevertheless is an impediment. Researchers who are used to immediately browsing through the new issues of their favourite journals frequently complain about it.

2. The critical mass of the electronic information provided is still limited. The Elsevier journals account for less than 5% of the journals covered in our local reference database. This conclusion was also reached in the TULIP project in the US some years ago.

3. In addition, it should be stressed that the delivery of Academic Press files is still not running smoothly.

8. USER DEMANDS

It will take some time for these new facilities to completely mature and be adopted by all users. It is also clear that the development towards the provision of full text articles to the desktop will soon result in a completely normal service. Top researchers who are currently regular users of our database are very enthusiastic about it and want us to proceed. This indicates that in a couple of years the digital library, or rather the networked library, with ample access to digitized or digital material, will be an accepted phenomenon and a standard service.

The initial phase in the development of the digital library too frequently confronted the users with changes. Stability in systems and services is required for users to feel comfortable. It would be a good thing if we could manage to maintain the « look and feel » for the end-users and to make improvements and new versions « behind the screens ».

Another demand from the user community is that we should provide one interface to heterogeneous databases and make everything much simpler : one way to access our OPAC, our reference databases, our CD-ROMS, with full potential for simultaneous searching across these databases and with a guarantee for document retrieval and fast document delivery.

The most important issue that is mentioned by users is that they expect the library to support users and provide tools and tailor-made facilities to deal with the information overload. This offers important opportunities for libraries to redefine traditional roles and functions : selection, service, and support. The skills and know-how of library staff can play a significant role in meeting these challenges.

The important role of library staff was confirmed in a user study carried out in 1996 on the services provided by the computer centre and the Tilburg University library. One of the interesting results of this study was that students very much appreciate the computing facilities and electronic services, but regard the staff of the library as the most important category. The support, skills, and attitude of staff is the most important factor in determining the performance and appreciation of the library from the students' point of view.

9. LIBRARY STRATEGY

9.1 Access and ownership

Libraries will identify their own strengths and weaknesses and decide on their strategy for the future according to their own specific situation. However, one of the important aspects for most libraries deals with the strategy of access and ownership of documents. There is an increasing focus on management information and selection of relevant information, irrespective of where and how the information is stored. This is particularly true for libraries that have limited resources. These libraries have to make firm decisions and choices based on the strengths and scope of their parent institution. The opportunities for co-operation, partnership, and creation of consortia will be carefully considered.

9.2 Knowledge navigation

In addition to a seamless access to heterogeneous databases which are distributed and located at various sites, we would like to implement personalized information services for the end-users : current awareness services based on defined user profiles.

It is clear that for many researchers the key issue is how to deal with the information overload. Most of them do not want to read more, they want to read less. The information selection process is a critical issue. For that reason, it is important to provide and refine tools for tailor-made selection of information. Supporting the discovery of knowledge might become the most important activity with which the library can support the information process making use of traditional library skills that are completely upgraded and adapted to the electronic environment.

These initiatives indicate that we are gradually shifting from activities related to the development of the local digital library to activities that focus on interconnection with other rich information sources, gradually creating user access to the "virtual library". Additional tools to navigate in this virtual environment are imperative.

9.3 Integration with teaching and research

The third cornerstone of the strategic goals of the Tilburg University library for the next three or four years emphasizes local dissemination and stimulation of a structural integration of the digital/virtual library services

with teaching, learning, and research.

The availability of full text information and capabilities to do full text searching, and to cut and paste relevant pieces of information will increase the use of the integrated desktop. Scientific work will be more effectually supported. There are also important opportunities for redesigning the educational process. It will be clear that the key to change can only come from the faculties. Libraries can only support this change in interaction with the users.

From our perspective we can and will focus on:

1. clear information on services and systems;
2. more continuity and stability in the "look and feel" of the end-user environment;
3. tailor-made training facilities for university staff;
4. instruction for students as an integral part of the curriculum;
5. personal and electronic support;
6. tailor-made current awareness service;
7. collaborative research projects with university staff.

For the future of a university library, it will be vital to enter into new partnerships with the staff of each faculty and to support their work in a new fashion. Although the information is available in a virtual environment and users do not necessarily have to go to the library, the library will still be a real organisation dependent on the skills and knowledge of its staff.

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ROTTERDAM LIBRARY PAST 2000

*by Frans Meijer,
Director City Library of Rotterdam*

After having lived in this city for the past 25 years, and developing quite an addiction for her in the process, I started my new job as the Rotterdam Public (Municipal) Library's Director in March, 1995. At the interview for the post I even had to admit I was not a registered member yet. And I still prefer to buy my books rather than borrowing them. One of the new Central Library's regular and enthusiastic visitors, however, I have been from the very first opening day in 1983.

SOME FACTS AND FIGURES

From 1983 on, the Central Library has attracted some 2 million visitors every year. They add up to another 2 million local users of the 22 branches, equally divided over the North and South river banks. No other institution or attraction in the world's no 1 Port boasts this 4 million figure. Nearly a quarter of the city's population are registered members, i.e. 140,000. They account for some 5 million loans, out of a collection of 1.8 million. We subscribe 2,000 periodicals, among them 80 foreign newspapers. Then our collection includes 700 CD-ROM's and 14,000 video's. Every year a 100,000 new books are acquired (30,000 titles). And since we recently freed space to accommodate the (separately run) Record/CD Library, our visitors can now choose from an additional 150,000 records and 180,000 CDs, the largest collection in Europe. We are proud that numerous visiting colleagues from all over the world have mentioned Rotterdam's City Library with some acclaim, and strive to live up to that standard.

CENTRAL LIBRARY

The modern and, like it or not, anyhow from an architectural point of view remarkable building our Central Library is, forms a sound home base for our operations. The City Council still regards its Library as one of Rotterdam's showpieces and has taken many a foreign visitor round our premises. And apart from being impressing the building is also functional, as I can now tell from my own experience. Still, one of my main objectives from the very start I made in 1995 has been a thorough renovation of the library's main entrance. After its 13 years of being intensively used it stroke me as outdated, inconveniently arranged and worn out. Also, as a regular visitor, I have always found fault with the ground floor arrangement. Inspiring examples for better solutions could easily be found in our own country and abroad over the past five years. Such comparisons clearly showed what have turned out to be lapses in the original layout of our building. In fact, there are three obvious reasons for the necessity of a drastic redesign, mainly of the Library's ground floor:

- an update of the late 70s concept and a face„lift owing to unexpectedly rapid wear resulting from intensive use of the building;

- space for new functions: new media; co-operation with the Record/CD Library; a new Information services set-up; switch of first and second floor functions; a new Local Information/Rotterdam Desk run by the Library (previously Civic Centre advice and information desks were staffed by various municipal services);

- adaptation to recent nearby urban developments: a huge open space/market place on the doorstep; a new front entrance to enable easy access from the main street, underground and train station; a new high-rise building opposite.

The original architects Van den Broek & Bakema designed the renovations, for which four million guilders were voted by the City Council.

THE RENOVATION

What disappeared?

- the roofed public passage between the separate newspaper reading room and the main building,
- the book & card shop in the old central hall,
- the imposing security counter right at the front door,
- the space consuming insular circulation desk (combined book collection & lending counters),
- the municipal Civic (Advice &) Information Centre,
- our exposition hall.

What has been added?

- a large revolving front door with easier access from the main street and public transport,
- a spacious central hall (1,000 sq. m roofed agora) with Rotterdam counter overlooking front door and security counter well aside,
- separate book collection and lending counters, also aside,
- Record/CD Library (run separately),
- Library Café next to Theatre foyer,
- first floor/terrace outdoor café,
- bicycle shelter directly attached to façade.

This architectural face-lift solves a number of long„standing user problems at a time:

- easier access between front door and escalators,
- put an end to the security problem of the separate reading room,
- much abused passageway exchanged for valuable interior space,
- a more logical connection created between Library and Library Theatre by linking Library Café between the two,
- Information Dept. connected to related functions in central hall by switching first and second floor functions,
- « musical gap » in own collection filled by accommodating the separately run Record/CD Library,
- adaptation to surrounding urban area realized; entrance hall/agora now suitable for live events, presentations, expositions, performances, etc.,
- visitors no longer confronted by security counter; the Rotterdam counter overlooking front door now also functions as reception desk,
- as the Rotterdam counter is always fully staffed, limited opening hours of the previous Civic Information Centre (40) are now extended to full 60 hours (64 in wintertime),

The first half year since the opening of the new entrance, in July, 1997, actually did prove us right in our assumptions about the above mentioned solutions.

A VISION FOR THE FUTURE

Along with the redesigning process, the Library has thoroughly reflected upon its future position in the Rotterdam community. We wrote a paper entitled « *The Library of 2001* », in which (certain overlaps/lapses cannot be avoided) library issues are roughly regarded from four main perspectives: Information, Education, Culture and Recreation.

1. Information

I often have said I wanted a large « *i* » mounted on the roof, « *i* » for information, to mark our building as the public information centre. The Rotterdam counter has proved itself as a more than adequate successor of the abandoned formula of the municipal Civic Centre, where visitor figures dramatically declined of late. This was also due to the fact that the municipal services, which staffed the desks gradually, reduced their efforts in order to open up their own various information desks spread over town. Since the Library took over, we have been able to extend our services from the 40 town hall office hours to 60 library opening hours. As a public library we aspire to provide a reliable, comprehensive reference service, no more and no less, by means of brochures, up to date on-line-connections and expert, well-trained staff. Since it opened in September, 1997, the Rotterdam counter has put a tenfold increase of questions on the record compared to its predecessor.

This very ambition to become **the** public information centre is sustained by the development of the new media. Rather than regarding the Internet as a threat of traditional library values and procedures we have thought it best to welcome its new opportunities as a medium. It is true, a good deal of the criticism about lack of organization, redundancy, and even trash, on the Net I would not want to refute. But isn't the Internet at the same time, actually more than anything else, a golden chance for librarians to grow into their new roles as « cybrarians? », i.e. reliable pilots who know their way around and guide people through cyberspace.

In our Central Library, we presently have 10 Internet connections at the public's service and soon this service will be extended to the branch libraries. Since 1996, the Library's own website allows for browsing through our catalogue from people's homes.

2. Education

Education makes a growth market for libraries. Especially in our 22 branch libraries there is a most intensive co-operation with local primary schools. This means a minimum of 3 (introductory) school class visits of the local library for all 4-12 year olds and, apart from that, school class lending to 75% of the Rotterdam primary school population. This means that every single one of our branch libraries accommodates 30-80 groups every 4 to 5 weeks. We also operate a special mobile school children's library. Our wish for the future is to be able to extend these activities to secondary schools.

Our Central Library accommodates 700 students, individually or in groups working all over the building, so in specially designed study corners right between those book shelves relevant for their subject. In the near future, we intend to open a so-called Open Learning Centre, where computer courses will be held for the general public (non-students). We have also planned the reintroduction of one or more traditional study rooms (silence areas).

3. Culture

Rotterdam is trying to foster a cultural climate, and the Library strives to play a prominent part in this. In 1996, we had a midnight party with a unique voice performance by 150 meticulously choreographed volunteers reading out aloud in colourful single file on the escalators. To our great pleasure this turned out to be the absolute highlight of the municipal cultural R'96 Festival.

In the autumn of 1997 a local network broadcasts a weekly live cultural & literary programme from the Library Café, including brunch. We often have Author's Dinners and every year, to conclude the annual National Book Week, a Literary Breakfast is served for 120 guests fortunate enough to acquire a ticket, where a prominent author is interviewed. Our Library Theatre (seating 180, some 200 performances per year) was granted a special municipal subsidy in order to further enhance its standard of programming.

The absolute hit among special events so far held in the renovated

library was without a doubt the first and unique « Great Readers' Party » on November 8, 1997, organized in close co-operation with the Rotterdam booksellers. No less than 2,500 visitors filled the Library into the small hours, attracted by a programme well covered on TV, including interviews with writers of fame and many other performances on several stages throughout the building. There was music, drink and food in plenty, and, for the truly fit and brave, disco dancing to exhaustion. As far as I am concerned a new Rotterdam tradition is born.

And with the 1,000 sq. m great hall before my mind's eye, I can see many a cultural highlight to follow.

4. Recreation

Lending out books remains a Library's core business, despite all new developments and functions that may occur. Although the Central Library becomes more and more of a study centre, a meeting place of cultures and an information centre for the general public, the recreational aspect of its existence must not be underestimated, nor denied. With such a vast collection of books in 25 languages, CD-ROMS and videos, the Library caters for, also, the recreational needs of a great many of its customers. In a society where those employed, it is true, work under growing stress, while on the other hand the percentage of people who (have to) live leisurely increases fast, pastime is a main issue. Be it plain pastime as such, or upgraded in terms of permanent education or personal development.

With the accommodation in our main building of the Record/CD Library (with 150,000 records and 180,000 CDs the largest in Europe), which until 1997 was established elsewhere in town, the collection at our users' disposition has been really completed.

We now have « any number » of general as well as specialized books on Bach, the composer's collected musical scores, and, since recently now, a great number of recordings, in various settings and interpretations, of his unrivalled body of work. And, not to worry, the same holds for the jazz, pop, rap, house or you-name-it scene.

URBAN DEVELOPMENTS

The far reaching reconstruction of the ground floor is also a reaction to recent nearby urban developments. The « elevated railway » has disappeared, went underground so to speak, thus allowing for a much better view of the Library. A huge open market space (already nicknamed The Runway) has been created. Except on the two weekly market days this vast space lies deserted, at the same time, because of its main function, being unsuitable for manifestations of a more prolonged character. Thus two market days result in five idle days, which is really a shame on this costly A1 city centre location.

In our « high street » (Hoogstraat), a 17 floor apartment building has been erected, and presently the « cubicle houses » are being renovated.

Activities and changes are taking place, or have already been concluded, at three sides of the Central Library. Urban development schemes have been designed all around the said huge « Runway », with two prominent anchor points which stand out firmly between all these developments: the historic St.-Laurens Church and the new Library.

We already took a first step out upon the street by planning a beautiful outdoor café on a first floor terrace. To be followed by steps like: second hand book markets, musical and open air film performances, etc.

In the 5 to 10 years to come much will change for the better in this part of the Rotterdam City Centre.

SAN FRANCISCO PUBLIC LIBRARY (SFPL)

New Main Library: A case study

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An Intelligent Library Building is a building whose Decision Support System and Command and Control System senses or predicts a need to change some aspect of a function of the building. The system then provides the information to a decision-maker for human intervention, or executes a change in the appropriate building system and reports it to the decision-maker. The San Francisco Public Library main library is a dramatic step in moving the state-of-the-art toward a true Intelligent Library Building for the 21st Century.

For many citizens of San Francisco the new MAIN LIBRARY is a Dream come true. It provides a facility that moved its operations from the Old Main Library, a 19th Century Building, into one of the first 21st Century Library Buildings. In the process, the library became a true City Icon. This project leads me to believe that the LIBRARY OF THE 21st CENTURY will be based on Community Expectations from both the past and the present. The library design was based on information from the community, collected through public opinion surveys, community focus groups, and numerous public hearings on the plans and design. As a result, it became clear that the community wished a continuation of the historic compact. That is, they wanted the library to provide all of the traditional functions such as a repository of knowledge, a centre for reading and learning, and a lively presence in the neighbourhoods and the city. At the same time, it was obvious that the community expected the library to provide leadership in the use of technology for access and preservation, providing expertise in organizing information and knowledge, and ensuring that the traditional librarian's values and leadership would continue. While the book collections remain important to the public, they also expect the 21st Century library to use all current and future Communications Technologies. The energy generated by the process of planning, funding, designing, and building the library transformed it from just a mediocre institution into an Icon and hallmark of the Community.

ROLES FOR LIBRARIES—HISTORIC

Throughout the last hundred years or so, the communities in the

United States have generally supported a number of roles for libraries:

Repository of knowledge

Most of the operations of the libraries designed in the 19th century were designed for collecting books into one facility for the common good of all. Books were scarce resources and sharing them made sense for community economic and social policy. Over the decades the collections were expanded to include journals and other print items. At that time the focus was on collecting and preserving these scarce resources. The users had to come to the facilities and were subject to strict rules about the use of the material. The library was seen as a large book warehouse. Collecting was the priority.

Access to information, knowledge, learning, and the joys of reading

In the 20th Century, the role was expanded to include expansion of access to those who needed it. The collections became better organized and finding tools such as the card catalogue were developed. The warehouse was distributed throughout the community into branch libraries, and even mobile units. Automated inventory and cataloguing systems were then developed to locate specific items for specific requests and to indicate their availability as well as their location. Libraries began allowing the public to take the material home. Reference services were expanded to include information services. The library as an information centre became a large part of their role in the 1960s and 1970s. It was understood that items that could not be located, nor used at the convenience of the user had less value. The shift was from collection to access in most of the public libraries. As the collections grew in size a greater effort was required to organize the items within the buildings so that the users could find them. With the increased use of the libraries, it was necessary to place greater reliance on self-help.

Engaging people in reading and learning

Some functions of educational institutions became a part of the library's purpose. Literacy programs and other structured programs for learning were incorporated for the community. Many librarians realized that a population that could not read would provide little support for libraries and started adult literacy programs. It became more common for the public libraries to co-operate with, and in some cases, supplement the libraries of the schools.

Creating and maintaining community archives

Most local libraries maintained a collection of non-book historic information of their own community. These Local History Collections seldom reached the sophisticated level of the cataloguing of the book collection or the level of archival institutions but these collections became more and more important over the century.

Resource for local government

As the library became more accomplished at both the archiving and the provision of information services the function of a resource centre for the operations of the local government grew. It was often seen as a way to garner support of the elected officials and other decision-makers in the community. Some libraries developed very sophisticated services. Occasionally, librarians and other staff were housed in the city halls to provide a direct link and visible presence for the service.

Research library

As the collections grew, some of the libraries built the resources to meet research level needs for their community. A number of them reached the collection size necessary to be recognized as a state or national resource. Often times, the public perceived any large collection as having the depth and breadth to support work at the graduate or scholar level and assumed that all publicly supported libraries should serve the general public whether or not that was their mandate.

ROLES FOR LIBRARIES – NEW

As the libraries grew in size and the management became more knowledgeable and connected to the communities they served, new roles began to emerge over time.

Community communications centre

The centrality of the services to the social, cultural, and educational life of the community led the library into serving as a centre for community communications. The branch libraries are often pivotal in the neighbourhood and the main library is usually centrally located in the city. The implementation of new technology such as video, television, computer networking, and on-line data systems for the purpose of collecting, organizing, and preserving the collections provided the tools to the library for a much more sophisticated level of communications. At the same time, there was the understanding that the globalization of the mass media was creating a void of communication about and within the local community. Many public libraries became proficient at this new role. It does create new requirements for the library buildings: the provision of meeting rooms, the incorporation of the spaces for the communication technology such as television studios and computer rooms. Often these spaces have to be open different hours than the library, and require a separate controlled entrance. The computers and telecommunications require access to the equipment spaces by the technical staff 24 hours a day.

Incubator for community programs

The ability of the library to collaborate with other organizations can lead to programs that are developed in the library then moved to larger outside facilities. An example is the co-operation between the SFPL

Electronic Discovery Centre for children and the emerging Children's program at the new entertainment complex at the San Francisco Convention Centre. The entertainment complex needed significant work to create and implement the program before their physical building would be available. The library in return received technical help in the development of their program from the staff at the entertainment centre. This kind of collaborative venture requires spaces in the buildings for the teamwork.

Global village library

The rapid growth of the Internet is providing the opportunity for libraries to interconnect and share resources on a scale not even imagined 20 years ago. While the technology is readily available and becoming very cost effective, the organizational infrastructure is not in place to define the roles and responsibilities of local and regional libraries in a systematic fashion that lets a person in need of information readily identify the best library source on the network.

Information technology training and support

There is little question that maturation of computers and telecommunications has brought about one of the most massive change in libraries in history. The utility of the technology, while not changing the basic mission of the library, has changed forever the way of doing business. The design of library buildings must include the spaces and infrastructure to support massive use of information technology. A significant challenge is to design a building that may not even be completed in five to seven years and must last at least 50 years while the technology is changing very rapidly. The use of new technology has forced libraries to incorporate training programs for the users and staff into their facilities. These functions require additional spaces with a different layout.

Electronic archives

The development of electronic archives in most libraries is still in its embryonic stage. There is simply not enough implementation to measure the impact on storage requirements for physical materials such as books. There is some evidence that if the organization is developed to share resources such as journals there could be a significant reduction in physical space. While the magnitude is unknown, planners must be in a position to make decisions of the impact early in the project. On the other hand, if the journals are to be provided by electronic external sources, there must be guarantees that those sources, or replacement sources, will be available during the life of the building.

Hardware & software support

The information technology use of the 21st Century library must be planned, defined, and measured in order to provide the spaces, the telecommunications infrastructure, and the furniture to support the use of these devices. Tables for reading a book are much different than tables that

support computers that are interconnected via the network. Equipment peripheral to the computer like printers and scanners must have adjacent space. The digitization of collections may have the effect of reducing space requirements, but the space needed for the machines and users is greater than what was provided in the 19th Century library. Space must be provided for the set-up and maintenance of the equipment as well.

Networking

The need for the infrastructure for the interconnection of the communication devices such as telephones, computers, and television require the planners and designers to knowledgeable about the spaces and spatial relationships of the network for all of the different technologies. Other elements often overlooked are also networked. The life safety system that includes smoke and heat detectors is usually networked to central control and observation points. Most modern security systems are networked for space observation and perimeter access control. The modern building is a maze of wires, fibre optic glass, conduits, raceways, and vertical risers. The telecommunication system should parallel the electrical system for easy access. Perhaps, at some time one thread of glass will suffice to connect all of the devices that need to be connected. In the meantime designers must deal with the different modes—wire, glass, and wireless broadcast at the same time. While it appears technologically feasible to integrate all of the networked elements into one distribution system the protocols and the segmentation of the designers and industries prevents this integration. The pervasive requirement for networking has forever changed the operations of the library.

The current and projected roles of the library requires a rethinking of the historic paradigm:

« Finding the right book for the right person at the right time »

To a new paradigm:

« Connecting the right data, information, or knowledge to the right person at the right time ».

SAN FRANCISCO PUBLIC LIBRARY

San Francisco is one of the oldest large cities on the West Coast of the United States. It currently has a population of around 750,000 inhabitants and has its population increased by over 40 per cent between 9 to 5 due to the commuters. The population in the city is very dense with the geography covering only 49 square miles with half of the space in parks and other open spaces. It is often characterized as the city that appears the most European of all United States cities. The city has a long literary tradition and has many bookstores. There was a thriving publishing and printing industry for much of the history of the city but most of them have moved to lower cost locations. The library was founded in 1877, making it one of the oldest in the west and grew to include the main library and 26 branches. Most of its

growth was stimulated by the grants from Andrew Carnegie during the early 20th Century. However, in the last 10 years a massive program of retrofitting and expansion of the older facilities was undertaken. More than \$150 million has been spent on buildings, furniture, and equipment. The voters approved a bond measure of \$109.5 million in 1988, the Library Foundation raised more than \$30 million from the private sector in three years, and several seismic safety bond issues city-wide had generated one of the largest capital budgets for a library in the United States. The only cities with larger public library capital budgets have at least three times the population (Chicago and Los Angeles).

Although the old main library, which opened in 1917, was a state-of-the-art building using steel construction techniques the functions of the building were designed on the precepts of library service of the 19th Century. It was basically organized as a large space for book stacks on seven tiers, a reference room, and rooms for readers that were all grouped around a grand staircase. It contained 176,000 square feet of space on three levels. It was anticipated that the building would serve 800 people per day. In the 1960s, the building was re-arranged into subject departments and the stacks were opened to the public. Since the building was not designed for this organization it resulted in very inefficient use of space, loss of security for the collections and users, a maze like organization, and too many staff service points for the budget to adequately support. The building was declared at physical capacity in 1947 and attempts to create funding for a new one continued for over 30 years. The first bond issue failed miserably.

The hiring of a new City Librarian in 1987 served as a stimulus for the leadership to try again. Kenneth Dowlin was hired by the Mayor specifically to create a new main library. Having built a number of main libraries and branches during his twenty-five year career as a library director he had experience in funding, designing, and overseeing the construction of libraries. As a result he developed a set of « laws » based on his experience in building projects, his experience and studies in systems analysis, and his knowledge in the use of information technology. Dowlin was interested in the system elements that comprise a large library operation and posited the following elements and their requirements:

DOWLIN'S LAWS FOR LIBRARY BUILDINGS

The building must facilitate the effective and efficient flow of materials through the library.

The first point of attention should be the location and layout of technical services to minimize handling of books and should be located near the loading dock. The books should be in secure areas at all times, flow through the department in a system, and be easily added to the collections throughout the building when processing is complete. (This requirement led to major dispute with the staff in that department since they wanted to be located on the top floor for aesthetic reasons.)

The second point of attention should be to the return of books from the user to the shelf, the shelving of books used in-house, the flow of books from the shelf through checkout, and the books going out the door. All of these should flow as smoothly as possible.

The third point is the retrieval and return of books to stacks closed to the public. While labour intensive it is an important part of the collection preservation strategy.

Item handling should be minimized in all settings, distances travelled should be minimized, and the building must facilitate the movement of items in bulk through the use of elevators, conveyors, and pallet-based transport. The borrower should be able to return the books to a bookdrop located at the perimeter of the building. The transport system should take the items through an automated check-in procedure to a sorting centre where the books are batched for delivery to the appropriate floor via a vertical conveyor system. While the technology is not mature for full automation of the process, the building is to be designed in such a way that the system can be implemented when developed.

As items are moved through the building, the decision support system should collect statistics at every step of the way and provide management information on the efficient flow of materials. Items used in-house should be scanned during the process of being returned to the shelf in order to provide statistics on use. (The statistic collection and reporting is a key part of the creation of an Intelligent Building.)

Since the most cost-effective way to move items from the shelf to the check out centre is by the user, the signage and directional system is critical to the success of the building. The self-checking machines allow the library to distribute that function throughout the building, thus facilitating self-use by the user.

While the building should facilitate self-help by the user, it must also provide a secure environment for materials that are rare or not replaceable. Closed stack space is a major tool for this preservation strategy. Items that are most used and are replaceable should be out on open shelves. Archives and source material must have additional levels of access validation in place. These two strategies are well understood by the library community and the users. What is not understood is that significant parts of the collection of large, historic libraries are not replaceable even though they are not rare. Thus there needs to be three levels of access:

- Open shelves for browsing
- Closed stacks for an added level of access validation
- Archival shelving for source materials

The movement of people through a building that will attract thousands of people a day is a very important part of the design analysis. There are a variety of types of users: tourists who are just looking at the building, casual users who are retrieving specific items, and people who

need quiet personal space for concentration. The flows of these different types must be understood and plotted to maximize the spaces available. Designing a building that serves thousands of people at a time creates a premium on the spaces for quiet contemplation. These spaces must be located away from the travel zones.

The final law is derived from the fact that all library collections grow over time. When asked « How large should a new library be ? » the response should be « As large as you can afford. » Libraries always fill up. It is only a question of time.

All of these requirements place a premium on the systemic view of the movement of people and materials. The building must serve as a facilitator not a hindrance. People and collection items should flow naturally into, through, and out of the building with a minimum of direction. Having observed library users for decades, it is evident that when people enter a building and don't know where to go, they will go to light (an important role for an atrium). In the United States, they will go to the right. An understanding of these habits can make a significant difference in the efficiency of the building.

EARLY DESIGN

The early design established that the building should be approximately 425,000 square feet in seven levels, must conform to the design criteria for the Civic Centre in which the building was to be located, and would need a budget of \$120 million. Each level was to be as generic as possible, with zones for reading spaces, staff workspaces, closed book stacks, and as open as possible. Functions that were high profile or high use would be located on the entrance level and, while there would be some functions that were grouped by departments, most of the books would be shelved in the Dewey decimal sequence from the entrance level up. It became obvious that the major challenge would be to more than double the usable space of the building; yet do so in the same dimensions of height, length and width of the old building. In other words, put a seven story building in the same exterior dimensions as the old building, which had only had three levels. The plan was approved by the Library Commission and the Chief Administrative Officer (CAO). The CAO had the responsibility and authority for the design and construction of all public works in the city. He was concerned about the \$120 million cost estimate and required a great deal of convincing before he would endorse the bond issue for the funds. He eventually agreed with the City Librarian and took the project to the Board of Supervisors who could decide whether or not to place the bond issue before the voters. The chair of the Finance Committee who had the power to decide the issue required the CAO and City Librarian to reduce the total amount and to include monies for branch renovation, and come back with the plan the very next day. As a result, the 7th level (mostly for book stacks) was eliminated and the library lost over 60,000 square feet. Because of this, the City Librarian made sure that the design incorporated easy access to an

abandoned convention facility underground that would provide expansion space as the library collections grew.

The bond issue passed with 78 per cent approval of the voters and architects were selected and hired. Having seen some of the problems resulting from design competitions, the City Librarian was set against that process. The CAO and City Librarian agreed that the selection of the architects would be based on their ability to design a building that would meet the program needs of the library. A consultant was hired (the retired architectural critic for the New York Times), a committee to review the credentials of architects was selected, and an announcement was posted world-wide. Thirty-two firms responded by submitting their credentials and examples of their previous work. The firms were required to be either local or to partner with local firms. The technical committee assessed the firm's financial capacity to undertake such a project, their ability to design a large public building, and narrowed the field to six firms. A community-based committee including members of the Board of Commissioners, community activists, and political leaders was formed to interview the finalists. After the first series of interviews, three firms were selected for another interview. At no time were they to present a design for the new library. The team selected was composed of the firms of Pei, Cobb, and Freed of New York City and Simon, Martin-Vegue, Winkelstein, and Moris of San Francisco.

PLANNING AND DESIGNING

The survey taken by the library before the bond issue election indicated that the members of the community would support a new library if it was world class, state of the art, and had an outstanding program for children. The Program Plan done by consultants, HBW and Associates, of Dallas, Texas provided the starting point for the design. The plan was based on focus groups of staff, members of the community, and important stakeholders for the library. The architects translated this plan into architectural plans, drawings, and specifications. It was understood by all that in order to function into the 21st Century the building designers must focus on communication functions. These included:

- Video viewing and production inside the building with a connection to the cable television head end for transmission of library programs is required. There must be an internal video network that connects all of the meeting rooms and the auditorium. The infrastructure must include the installation of a satellite receiver and transmitter on the roof to receive microwave or satellite transmissions.

- The building should be designed to support over 1100 computers on a high-speed network and connected directly to the Internet.

- The library will have four times as many telephones as the old library.

All of these systems are to be connected through a sophisticated system of conduits, risers, raceways, and distribution closets. There was a

120

requirement that the changing of the location or pathway of any of the devices can be accomplished quickly by library technicians.

It provides group meeting spaces ranging from intimate conference rooms for the public on every floor to a wired auditorium that seats 265 people. These rooms can be used for training of the public and the staff as well as for meetings.

In addition, the office space for library employees was quadrupled, made secure and designed for the comfort of the staff. And the library must include spaces for a number of enhancements or support functions including:

- A café for the public to enjoy light meals and snacks,
- Extensive exhibit space throughout the building and in a specially created exhibit hall designed for national travelling exhibits,
- Spaces for receptions and even dinner events after hours,
- An office complex for the Friends of the Library,
- An office complex for the Library Foundation of San Francisco,
- Spaces specifically designed for the adult literacy program,
- Spaces specifically designed for programs for the disadvantaged user such as the blind, deaf, and dyslexic.

The old main library was designed to function as a book warehouse with some space for readers. The new main was designed to function in the communication age.

THE BUILDING SUCCEEDS

The new main library is a world class facility, it is state-of-the-art in its use of technology, and it has one of the largest children's library centres in the world. It brings people in, excites and inspires them, increases the space for the users by over 400 per cent, protects and preserves the collections while increasing access, and is ready for the functions in the 21st Century. The building provides the centre for the Community Communications Program for the entire community.

THE PEOPLE OF SAN FRANCISCO LOVE IT!

SFPL – Indicators of Success

Over one million people visited the new library during the first ten weeks. Sometimes there were 14,000 users per day. Within 3 months, the library was averaging service to over 750,000 people per month (the equivalent of entire population). Nearly one third of the users accessed the library electronically since the library had an excellent website. Depending on the indicator, the use of the main library increased seventy to several

thousand percent. At the same time the use of the branches increased 28 percent. The City Librarian took a community dream, created a vision, raised the funding, and led the design and construction to turn the dream into reality. (A 21st Century Building)

Standards for Excellence

Almost all groups in the design and construction of the library were committed to excellence. As a result there are many elements that create a new standard of excellence in architecture, community support, and library programs. These are:

- Funding

The voters of San Francisco, by 78 per cent, approved the largest bond issue in the history of the city in 1988. This vote committed \$104.5 million to the building. Over the next several years bond issue for city-wide seismic safety improvements to city buildings increased the library's capital budget by another \$20 million. The San Francisco Public Library Foundation raised over \$30 million in less than 3 years to fund furniture, equipment and building enhancements. In 1994, the issue of long term operational funding was taken to the voters. Again, over 70 per cent of them approved amending the city charter to guarantee that the library's operational budget would be set by a formula that raised the budget over 100 per cent within two years and prohibited the elected officials from reducing the level of funding. This action committed over \$450 million to the library over a 15-year period. The people of San Francisco believed in this project so much that they were willing to commit over \$600 million to their library.

- High volumes of users

The building sets a new standard for public buildings in the service to high levels of user attendance. The building facilitates the flow of thousands of people through the building, provides different spaces to meet their specific needs (quiet spaces, group work areas, traffic areas), and through the horizontal and vertical traffic zones moves thousands of people to where they need to go in a very efficient way.

- Special service areas

The library was intensely crafted to meet the requirements in the program plan. The Children's centre is one of the best in the world. It provides special areas for the pre-schooler, for children in the first few grades, and for the older children. For the first time the SFPL has an area for teenagers. The affinity group centres are celebration spaces for the diverse populations in the city. San Francisco is one of the most diverse cities in the world in terms of ethnic, cultural, and linguistic differences. These centres which required the raising of private funds created collaborations between the library and the Gay/Lesbian community, the Chinese/American community, the Filipino/American Community, the African/American community, the Latino/Hispanic community, the environmental

community, the supporters of rare books and fine printing, and the San Francisco history buffs. They are showcases for collaboration and community support. The library contains numerous exhibit spaces ranging from departmental or special centre to a gallery for national travelling exhibits. The building supports the varied and diverse service programs with its ability to provide visual enhancement to the collections.

- Life/safety

The systems for the detection and notification of safety services such as the police department and fire department as well as the building engineers and security force create a new level of security to the workers and users in the building. Upon detection, the building can evacuate smoke from the entire building in less than 12 minutes and the exiting allows the evacuation of over 10,000 people in less than 12 minutes as well. Base isolators to absorb shock in the event of an earthquake support the building itself. This building is one of the safest in the world for seismic events.

- Lighting

The lighting is exceptional, maximizing natural, shielded light for the reader and staff, yet supplementing it with artificial light when needed to raise the level. The variety of light fixtures provides the reader with a choice of types of lights. The tables and other work surfaces provide task lighting that can be switched on and off depending on the users preferences. The east, south, and west windows contain computer-controlled shades that are activated by light sensors on the roof. The north side windows provide exceptional natural light for the reader. The incorporation of hundreds of computer screens as well as video screens required special attention to the placement of the lighting for the computers. Most of the lighting over the work surfaces is reflective and contains special spectrum florescent light tubes. The artificial lighting is placed so that at night or on cloudy days the difference to the user is not detectable. The atrium, the light wells, open vistas, and windows allow natural light to reach every floor and public space of the building. At the same time, sunlight directly on the book collections or in the eyes of the readers or staff is prevented.

- Attracting people

The architecture with windows that allow people inside to see out and people outside to see in creates a beacon that lights up the entire civic centre and encourages people to enter. The spaces are comfortable and inviting.

- Furniture

The furniture is all custom designed to meet program specifications. All pieces of furniture are modular which allows interchangeability of parts. The user tables are constructed for easy disassembly for repair yet prevents the vandal from taking it apart without special tools. Tabletops may be

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quickly removed and refinished in the event of vandals. The chairs are designed to be solid yet comfortable and were tested for strength at a national furniture testing laboratory for ability to take long and rough use. All tables are designed to support computers and other information technology. They are certified as electrical appliances by the national testing bureau and provide access to power at every work surface as well as connections to the telecommunication distribution system. The staff desks were selected with the advice and testing of staff. While every piece of furniture was designed to be artistically pleasing, they are functional and were all tested for strength and endurance.

- Electrical distribution and supply

A key system in an intelligent building that must support information technology is the power source. It is fortunate that the building was located at the intersection of three different high voltage, under-ground power lines. Thus the building has three different network feeds; any one of which can supply the building. In addition a high capacity generator is tuned to support the electrical needs of the life safety system and the main computer centre in the event of a catastrophic power failure from outside.

- Security

The security system for the interior of the building provides visual surveillance and motion detection of the entire building to the security control centre. This centre is adjacent to the user entrance and exit point that contains the collection theft detectors. It was specifically located there because it is at the point where security personnel can physically reach any part of the library that needs their attention quickly. Even though there are three exterior entrances, there is only one point to staff for monitoring the public's access to collections. The entrance and exiting control is one of the major design triumphs for the architects. That location also facilitates the supervision of the community communications centre, which may be open, when the rest of the library is closed. They have computerized control over the perimeter security system, the elevators, and all of the internal security zones such as staff work areas. The entrance to any secure area is logged and the identification badge scanned is checked for authorized entrance. While the security staff is trained to mitigate any life safety situation they are also trained for customer service to the user who is not a problem.

- Custodian

The managers and staff of the custodial department were involved in the design of the building and were able to contribute their expertise to the architects to ensure that the building could be cleaned. The staff changed their schedules so that the building is cleaned during hours that the library is closed to the public except for those areas that must have cleaning during the day, like the toilet rooms. Spaces were programmed into each floor to provide storage of equipment and supplies for the cleaning function.

- Maintenance

The head of the maintenance department was involved in the design of the building at the highest level. He was relieved of his ongoing responsibilities one year before opening in order to monitor the construction and to receive training on the new systems such as the heating, ventilation, and air conditioning. Even that was not enough time to be as well prepared as he should have been. In the new building, he is responsible for very sophisticated mechanical, electrical, and computer monitor systems. Every one of the maintenance crew became knowledgeable in the operation of computers and the systems. The technical knowledge required was increased by a factor of ten. The maintenance staff's involvement in the design resulted in significant cost savings for the life of the building. One example is the 5-story work of art containing backlit disks with author's names inscribed. The head of maintenance noticed that the design called for hundreds of small light bulbs and expressed his concern over the maintenance. His work with the architects and the artist resulted in the disks receiving their light via a fibre optic distribution system lit by a handful of bulbs in a place easily accessible for maintenance. The planning not only allowed long term cost savings for maintenance but also enhanced the sculpture with the fibres becoming part of the visual effect. In a metaphorical vein the sculpture not only displayed the names of authors, it showed that with networking and the location of their works in a library their value were extended.

Because the head of maintenance had significant academic education as well as experience and training in his field, he led the development of a computerized system that provided the scheduling and supplies inventory system for the building systems. Maintenance takes place on a schedule that emphasizes preventative work, which reduces the fixing of problems.

- Air Quality

A major effort occurred to prevent the air from becoming stale, even unhealthy. There had been a number of large public buildings identified as having «sick building» syndrome and everyone on the project was committed to take every step possible to prevent that situation. During the process, one of the architects became quite knowledgeable and was responsible for monitoring all the systems for quality. The air is constantly refreshed and redistributed throughout the building. The ventilation system ensures fresh, filtered air constantly. However, the open spaces within the building also allow the air to move naturally. The light wells on two sides of the building are topped by open louvers that allow air to exit the building of its own course. This supplements the artificial system and in the event of failure of the ventilation system the hot air can exit naturally. In the early operation of the building part of the air-conditioning failed. Even though it was a record high temperature outside the building never became uncomfortable for people. A great deal of attention was paid to preventing toxins from entering the building. There is no laminated furniture or woodwork in the building. All adhesives had to meet air quality standards. Machines, such as photocopiers, are located in specially vented rooms. The

air entering the distribution system from the roof is not only the cleanest air in the area; it is filtered to the micro level.

- *Art work*

The building contains 6 major works of art. All of them were collaborations between the artists and the architects and all of them contain metaphors pertaining to books, the library, and knowledge. The staircase connecting the sixth and fifth floor and its accompanying piece suspended from the ceiling portray the artist and architects' impression that the path to knowledge is not linear, it is like a cyclone with knowledge at the centre of the vortex. The five level black granite wall with illuminated author's names is a tribute to the creators of knowledge and literature. It carries forward the tradition in beaux art library architecture of inscribing the names of authors around the top perimeter of the outside of the building. This can be seen in libraries all over the world. James Ingo Freed, one of the principal architects, wanted to bring the names inside and the artist insisted that the selection of the names a community committee task. This true library of the community lists the works that the people in the community use and value, not some list developed by those in authority. The ceiling of the Gay/Lesbian centre is a heroic mural with special significance to that community. A wall that divides the open public spaces from the back of the house on three floors contains cards from an out dated shelf list catalogue. Over 50,000 cards were selected and annotated by members of the public and mounted on the walls. There is no protective surface over them and it is the intention of the artists that over time they will fade to a patina. The artists saw their work as portraying the role of the card catalogue for many years – serving as the intermediary between the seeker and the collection. The card catalogues of most libraries in the U. S. have been displaced by the computerized catalogues and will become historic artefacts. The cards in the work of art will fade away over time as well. The ceiling above the service desk of the children's department contains a glass sculpture outlining the dimensions of the desk in the ceiling. The glass is etched with the word « book » in over 50 languages, symbolizing the fact that the collections in the children's department contains many languages (over 70 at last count). A mural containing much of the literary history from central and South America graces the Hispanic/Latino community meeting room. A member of the Hispanic/Latino affinity group who raised the money to enhance the room commissioned this work of art with the library's approval. Many features of the building show the artistic touch. The elevator doors, the metal grill works, the light fixtures, and even the top of the atrium are works of art.

- *Vistas*

The building contains many open spaces that allow the visitor to view across the floors or down to other floors. There is a sense of openness. Yet, it provides intimate spaces as well. There are many visual surprises for the people going through the building. Many people are delighted with what they see. These vistas also allow the air and light to move through the

building creating a very comfortable atmosphere for the user and staff.

- *Communication Centre*

This centre houses the wired auditorium that seats 265 people in a room with wonderful finishes and very comfortable seating. Every part of the room is easily accessible to the handicapped including the stage. The acoustics are wonderful and the sound system is very effective, yet unobtrusive. Full audio-visual equipment is built in and the room is designed for video taping and simultaneous translation for foreign visitors. The hearing impaired may use a special system to enhance their hearing. The Hispanic/Latino community meeting room contains a catering kitchen and can be divided into two meeting rooms when needed. Public restrooms, toilets, the gallery, and the café are located in this space which can be made accessible when the rest of the library is closed.

- *Disabled access*

The building was designed to not only provide full access to disabled users; it was designed for them to enjoy and to be part of all that goes on. Special committees for each handicap reviewed the plans for elevators, ramps, and other transportation zones. The building contains centres for the blind and visually handicapped, the deaf and hearing-impaired, the dyslexic, and the illiterate. The building contains over 200 talking signs for the visually impaired. A person needing assistance may pick up a device that is about the size of a garage door opener at the blind centre. When the infrared beam on the device « touches » a talking sign, the sign transmits a message to the receiver indicating what is located at the sign or what is ahead. This was a new technology at the time and the building is one of the largest implementations in the world. The system has now been adopted as a standard by the U. S. government and many cities are implementing it on streets and transportation systems. It is possible for a blind person to navigate from various facilities in the Civic Centre Area using this technology.

- *Project management*

The management of the project, while failing in some respects did establish a new standard for San Francisco for the hiring of minorities in the trades, consultants and professionals. The cost estimating process was exceptional. This resulted in the city not only obtaining the construction contract for the estimated price, but also allowing the addition of all of the alternative proposals requested by the City Librarian and the architects. In addition, the base isolation system costing over \$7 million was included in the contract price. This excellence in cost management resulted in a \$130 million building for only \$115 million. The management was also able to avoid any labour disputes or work stoppages from labour problems.

- Telecommunications

The telecommunications system supported over 300 personal computers and 600 terminals in the building at the time of opening. Changing equipment or their locations is much easier than in the old library where electricians were required to make any changes. Library staff can now make the changes. The building supports a very dynamic environment. The telecommunications network parallels the electrical network. There are telecommunication closets with switching panels on every floor and in every department. The under-floor ducts, raceways and vertical risers ensure that the access to the network is never more than four feet from any spot (except for the areas with bookshelves). The staff work areas and public service areas are entirely flexible.

RECOMMENDATIONS FOR IMPROVEMENTS TO THE PROCESS

Management

The library did have some difficulties dealing with the huge volume of users during the first months and required time to work out the operational patterns. The building has performed extremely well and the difficulties that have surfaced are due to staffing and organization problems. Most of them stemmed from the fact that the City Librarian had the responsibility for the project but, because of the complicated city legal structure, did not have the direct authority over most of the project. The City has a Commission form of government where the Mayor appoints seven members of the community to have responsibility for the operation of each of the departments. During the nine years that the project was underway there were four different mayors and over forty different commissioners (7 at a time). Since two of the mayors were at the opposite poles politically, it was surprising that the City Librarian was retained when the administration changed. In addition, the contracting function for capital projects in the city is the responsibility of a Chief Administrative Officer through the Department of Public Works. It had been nearly 20 years since the city had undertaken a project of this size and public nature. The City Architect, the Head of the Department Works and the different staff members had little current experience. In addition, a City Controller and a Board of Supervisors controlled all of the funds. The 11 members of the board (there were over 40 different members during the project) had little knowledge of building projects and no understanding of the requirements for a 21st Century library.

As a result of lack of authority, a number of elements contained in Dowlin's Laws and the Program Plan were not successfully carried out. The City Librarian knew from experience that there must be a major program of organization development that would involve the staff in the design and to prepare them for the move. The city, however, did not see the need and would not allocate funds in the budget for training, communication, and team building. In addition, the employee organizations with the backing of

elected officials successfully opposed the shifting of labour costs to lower pay employees for the materials handling function that was critical to a smooth operation.

Technology

Some of the elements for the intelligent building were not implemented. The on-line Decision Support System was not created due to the lack of resources for the unobtrusive data collection throughout the building nor for a real-time data display system. This was a field for which there was little experience in libraries and the architects and consultants did not have the expertise to create such a system. While the City Librarian was able to locate private and federal funds to acquire and install a system for traditional library house keeping functions such as circulation, serials control, and an on-line public catalogue, funds were not forthcoming for programs that needed significant development by staff or by contractor. The same was true for the system for sophisticated fund accounting. The responsibility for the budget and accounting for the city rests with the City Controller who did not have the capacity to implement a sophisticated accounting system for the library. One was promised, but not delivered until over a year after opening.

The systems for the self check out of books by users, automated check in, and interactive networked directional systems were not implemented for the same reason. The city was reluctant to spend money for experimental technology or systems.

The plan for the minimization of handling of materials failed when the contractor was forced to make some changes to the design in order to accommodate structural changes needed for seismic safety. Additional changes in the emergency exiting plan were made due to requirements of the fire department. The changes were made without the City Librarian's knowledge and it is assumed the contractor, architects, and city agencies involved did not understand the impact that these changes would have to the long-term efficiency of the building. Similarly the contractor selected a sub-contractor to develop the chute system and vertical transportation system for the books that had no experience in book drops, book chutes, or other means of moving books through mechanical means. The book drop, chiselled into granite was too small to receive most of the collection, the books dropped precipitously thereby damaging many of them, and the conveyor belt was not adequately designed and installed to protect the books.

It was the hope of the City Librarian that with the recent advances in the telecommunications technology there would be one network with a large bandwidth and high speeds support all of the telecommunications (computer network, video, security, life/safety, public announcement system, networked building graphics and directional technology). It seemed reasonable to expect that they could all run on one fibre-optic distribution system. Or conversely, all of the protocols for all of the signals from the

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different systems could be digitized to one standard system to flow through the computer network. While there are some systems that combine some of the functions they are rare and the specific industries and suppliers are not interested in them.

In the rush to get things done and the interest in involving the staff in the planning process for their area the original plan to reduce service points throughout the building was not implemented. The staff in each department worked with the junior architects to create very large, traditional service desks that appear to be dramatic over-kill and extremely inflexible. The original concept of shelving the books in one numerical sequence in the two zones (public stacks, and closed stacks) fell apart during the process of staff involvement in the plan for the move and the actual movement. To be fair to the staff, the move was required to take place in less than $\frac{1}{4}$ of the time originally planned. The date for opening was set by the political leaders and it had to open on time even though the contractor did not get his work done three months before opening as planned. This situation meant that the formal commissioning process that had been in the plan and timeline, the well-organized movement of materials, and the time for staff to be trained in their new home fell by the wayside. The last six months were frantic.

PROBLEMS

Space

The incorporation of the old convention centre into the plans and program for library remote storage has not taken place for political reasons and the library is short of space. (Remember that the Board of Supervisors eliminated an entire floor of nearly 60,000-sq. ft. for shelving due to concerns about cost.) In addition, a change order in the middle of construction lowered the ceiling in a shelving area that reduced the shelving. The full implementation of the American Disability Act during the construction reduced the shelving in the open public shelves as much as 33 percent. As a result, the library does not have the capacity for shelving that was originally specified.

Steps

It was the desire of the City Librarian to have a facility with no steps. Steps make second class citizens out of mobility impaired people. While ramps can be constructed to alleviate the barriers they create additional cost and create a perception of secondary status. In libraries, they create difficulties in moving books on carts or in bulk on pallets. Exterior steps create spaces for homeless people to park. They also create situations where people can easily fall. In fact the exterior steps along with raised planters attracted skate boarders from all over the area who saw the library as a new skating ground. Some of them are intent with marking the public architecture with their boards. This seems to give them status with their peers. There are mitigation strategies for both problems. Hand rails, barriers,

and visual clues had to be retrofitted to prevent people from falling down the steps in the base of the atrium. It was a disaster waiting to happen. The grand views and vistas stimulated people to look up – not down to the steps. Several people broke arms and legs before the city could provide the mitigation. The skateboarders can be mitigated by cross cutting grooves into the surfaces that they skate on. (It is estimated that the cost for discouraging the skate boarders is in excess of \$200,000 at SFPL.)

Toilets

It was the desire of the architects and many of the staff to provide toilet facilities on every floor. The cost of cleaning and security for this would have been prohibitive. The library is the only public toilet facility in a large part of the city and the facilities are used by a large number of people. The City Librarian was able to reduce the size of the public toilets on the upper floors to smaller ones and with a large facility on the first floor near security and custodian facilities. Unfortunately, the small toilets had interior locks on the doors and became a tremendous security problem.

Terraces

The architecture of the building called for various exterior terraces at different levels. While experience showed that they could not be secured for public use, the staff could have the opportunity for pleasant exterior spaces that were protected from the street and the public. Only one of the terraces was provided with doors, a terrace surface, and railing. This is a pleasant area for staff, especially the smokers.

Carpet

The architects were convinced that they could use the carpet to provide visual clues to uses of the spaces and to provide an intimate setting for large open spaces. The City Librarian, having had extensive experience with problems with carpet was just as convinced that the carpet design would be expensive to implement, would be too complicated to install, and would lead to major problems in time. The City Librarian was proven correct. The carpet had problems even before installation was complete. The design was too complicated for the mill to meet the specifications, too complicated for successful installation, and was delivered late. The moving of the books was delayed due to the installation of the shelving, which was delayed due to the carpet manufacturing and installation. The carpet seams began fraying immediately. The entire carpeting will have to be replaced.

Fixtures

Irrespective of constantly being reminded that the library would be an attraction to a wide diversity of populations and that all furniture and fixtures should be designed for ruggedness and prevention of theft, some slipped by. The soap dispensers in the toilet rooms were removable and became prized items for the homeless. The beautiful chrome fixtures identifying each floor at the elevators became favourites with someone and

disappeared within days. Other items such as wastebaskets in public areas were overlooked. Library staff had to make an emergency purchase to remedy the situation.

RECOMMENDATIONS TO OTHERS

Services to users with special needs

It is recommended that the special services for the handicapped be grouped together and centrally located. Access to this centre should be easy and inviting. At SFPL, these functions were distributed throughout the library. This requires a higher level of staffing for these programs and distributes the specialized technology which complicates maintenance and staff support. In most cases the technology is not used since the public and staff does not know how to use it. In addition, the individual who does not know how to use the on-line public access catalogue and other information technology should be considered educationally disadvantaged and training and support should be provided in the centre.

Management

Adopt the shelving pattern early in the process and stick with it. The location of materials should be based on use patterns. Old bound volumes and government documents that are seldom used don't need to be on browsing shelves. The statistics collection for the management of the collections in the building is critical if the three level access program is to succeed. Ensure that the library has full time expert staff adequate to the level of the project. SFPL suffered from the lack of authority and expertise on staff. Funding for an organization plan with either outside consultants or an adequate internal staff needs to be available early in the project.

Staffing

Create the staffing patterns needed before the building opens. If at all possible the re-shelving of books should take place at night when there are no users to ask the shelvers directional questions. Be prepared to have more flexible coverage at service points to deal with the ebb and flow of users. At SFPL the usage on the weekends is two or three times higher than during the week. This is a significant shift and is probably due to the fact that a much higher proportion of users is from out of the city and travel greater distances. Minimize the user service points and centralize the Information Technology near the service points. Much of the librarian's time now is in training and directing the user in the use of Information Technology.

Schedule

If a long-term project needs more time for completion the opening should be delayed. This is usually difficult due to political agendas or public relations reasons. There must be adequate time for training, moving, and breaking in all of the systems and equipment. When a project is complicated

and lengthy there is pressure to get it finished. People get burned out and want it to be over. The formal Commissioning Process was part of the plan for SFPL but there was no time to implement it. Because of the furious pace at the end of the project, it was like converting from a DC-3 to a 747 in mid-air. There were less than six weeks to move, and the contractor was still working on the building. Then the people poured in. The conversion was made even more challenging since the city would not fund the modern instruments (the Decision Support System) or the training for the crew to make the transition.

CONCLUSION

The SFPL new Main Library was one of the largest and most complicated projects in the history of public libraries. Thanks to the efforts of hundreds of people, thousands of donors, and several hundred thousand voters the library is complete. It has become a city icon. The funding and creation of the building and equipment was a tremendous challenge for the City Librarian. The ultimate challenge will be the acceptance of the elected officials, the press, and the staff of the changes needed in the organizational culture, staffing patterns, and labour costs to enable the building to function at full efficiency and effectiveness. The building is there -- one of the first 21st Century libraries. It remains to be seen if the city leadership and staff can take the next steps in services and collections.

The Magic of libraries is not in the building, not in the collections, and not even the staff. The Magic is in the CONNECTION. Connecting minds with different knowledge, ages, and cultures. The successful library in the 21st Century will focus on connections. The successful library building in the 21st Century will enable those connections to happen.

A BEAUTIFUL, USEFUL MACHINE FOR SERVICE:

THE DENVER PUBLIC LIBRARY

*by Rick J. Ashton
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ABSTRACT

A successful public library building serves first of all as an effective machine for the provision of library service, both traditional and forward-looking. It provides both the backdrop and large portions of the script for the fruitful dialogue of exploration and discovery in which the work of the public library takes place. Supporting both customers and staff, it helps educate, inform, inspire, and entertain the community it serves.

Second, the successful public library building marshals in an energetic collaboration the talents, skills, and ambitions of a host of people. These people create a product whose usefulness and beauty give it enduring value for its community. The Central Library of the Denver Public Library, a major building project completed in 1995, provides a vehicle for the demonstration of these points. It is a beautiful and useful machine for service, produced by a complex collaboration, and treasured by its community.

1. DENVER AND ITS LIBRARY

Denver, Colorado, USA, founded in 1859, is home to five hundred thousand people, the centre of a metropolitan area of two million people, one mile above sea level, at the eastern base of the Rocky Mountains. The Denver Public Library, founded in 1889, has pursued an ambitious agenda of service to this community. The first sentence of its current Mission Statement reflects this ambition: « The Mission of the Denver Public Library is to help the people of our community achieve their full potential. »

In addition to its large Central Library, the Denver Public Library operates twenty-two branch libraries of varying sizes and a bookmobile. It employs about five hundred full-time and part-time staff members, with a full-time equivalent of 440. It holds two million catalogued volumes, two million United States Government Publications as a Regional Depository Library, thousands of feet of archives and manuscripts, more than half a million historical photographs of the American West, and a significant regional art collection.

In 1996 it circulated 7.5 million items and completed 1.4 million reference transactions. It delivers its catalogue to the public, along with free Internet access and many other on-line products, through a network of 500

personal computers. It has offered remote dial-in access to its catalogue since 1986.

2. THE LIBRARY BUILDING: A MACHINE FOR SERVICE

John Cotton Dana, the first City Librarian of the Denver Public Library, had a favourite maxim that should be engraved in stone above the door of every public library building: « The worth of a library is in its use. » To this end, Dana acquired books that people wanted to read, opened the shelves to their direct contact, encouraged the active presence of children, and promoted the library to the community at large.

3. THE DENVER PUBLIC LIBRARY BEFORE 1995

The Denver Public Library learned a great deal about a library building as a machine for service the hard way: by operating for many years in a building that frustrated effective service at every turn. A characteristic International Style building of 1956, it featured a non-monumental limestone, glass, and aluminium exterior and a plain, bare interior with vinyl asphalt tile floors, low acoustical tile ceilings, painted walls, and a minimum of millwork.

Although this style was attractive when the building was new and boring thirty years later, much more important were two basic problems, one of which was predictable: the lack of space. Because of the initial space deficit, the two basement floors were fully devoted to closely packed, built-in closed stacks, not open to the public. This arrangement placed a difficult limitation on the library's « ability to serve customers from the very beginning, for it forced them into a catalogue-and-call-slip style of library use which violated the Denver Public Library »'s own traditions. Closed stacks required a pneumatic tube message system, chain-driven mechanical booklifts, and the employment of staff who initially (at least in the pictures published at the opening of the building) roller skated through the stacks to retrieve books. On upper floors, the open shelves were soon overcrowded too. The entire building exceeded its capacity after only eleven years, in 1967. For decades to follow, this lack of space put a great variety of burdens on the opportunity to provide excellent customer service.

The second, less predictable problem was the rapid technological and operational obsolescence of the building. While no architect of the mid-1950s foresaw the impact of the computer, electrical, and telecommunications requirements of the 1990s and beyond, this building barely met the standards of its own day. Well before the advent of computer terminals, electrical outlets sprouted octopus-like gatherings of extension cords, while telephone cables snaked across ceilings and floors, with staples and tape as favourite means of holding them in place.

The arrival of a few computer terminals in the late 1970s, followed by the onrush of personal computers since the mid-1980s, merely added to the

impediments that the building placed in the way of good service. Inadequate power supplies, spaghetti-like tangles of cables and cords, and the loss of public seating space necessitated by the placement of terminals on tables added to the frustration.

The inadequacies of this situation were so great that service quality and quantity were at serious risk. When combined with the tight budgetary straits of all Denver City government entities in the early 1980s, the building had become a real detriment to service and a threat to the long-term health of the institution.

4. A TRANSFORMATION

Through an institutional and political reorientation whose full story is outside the scope of this paper, the Denver Public Library secured the opportunity to correct its course. In August 1990, Denver voters approved by a 3-to-1 margin a measure which made available \$91.6 million in public funds for a new Central Library and the renovation, expansion, or replacement of 19 branch library buildings. In addition, between 1990 and 1996, generous donors gave \$6.6 million in voluntary contributions for capital improvements.

Leaping over events whose retelling would rival the Perils of Pauline, we come to the description of the beautiful machine for service. It opened in two phases: a new building of 404,450 gross square feet (37,800 m) in March 1995; and the 1956 building, completely gutted and renovated, at 133,900 gross square feet (12,500 m), in December 1995.

4.1. Space

The new building has eight occupied floors, seven above ground and one below, and two partial floors, one below ground and one high above, for mechanical equipment. The old building still has four floors above and two below ground. Only two of these six floors align laterally with the floor levels of the new building. The two buildings are joined by ramps and stairs and a complete integration of interior finishes and furniture.

4.2. Circulation (As architects mean it):

Two major public entrances are at the east and west ends of the great three-story hall which forms the backbone of the building. A separate entrance for staff is used only when the public entrances are not open. A below-grade loading ramp, enabling delivery and service vehicles to come directly into the building, supports the arrival of books, supplies, and service personnel. Escalators carry customers and staff from the first to the fourth floors. Four public elevators operate to all public floors, and two service elevators move staff and materials throughout the building. A small shuttle elevator takes passengers down to the below-grade conference room areas.

4.3. Service Points:

The full complex has only eleven service points, which must be staffed when the building is open, eight of which are on the ground floor. Of these eight, two are security checkpoints staffed by guards and one is a directional information desk staffed by trained volunteer docents. Departmental specialization has been kept to a minimum, both to improve customer service and to control the costs of staffing additional service desks.

4.4. Collections:

All of the general interest collections of the building are available on open shelves, and some materials that are kept in closed areas in most libraries are also on open shelves. In the open stack areas on the second and third levels, the entire adult non-fiction collection appears sequentially in Dewey Decimal order. In the second and third level open stacks, there are no fixed service points. Staff, including librarians and shelvers, move about in these areas and offer assistance to customers. Networked computers are deployed throughout these areas so that foot travel around the large building is reduced. On the fourth level, a large portion of the Denver Public Library century-long accumulation of United States Government Publications is presented in open shelves. The challenges of the Superintendent of Documents Classification System and the surprises buried in these publications mean that this is not a very browsable collection, even though it is physically accessible. Some degree of staff assistance is usually required.

4.5. General library services:

On the first level are the desks for Check Out and Return, both near the west entrance, the Children's Library, the Reference Room, and the Burnham Hoyt Room. Check Out and Return perform the functions their names imply, and their back areas serve as the operational centre for the movement of materials in the building.

The Children's Library, strategically located in prime space on the first level of the 1956 building, guides children from birth through the sixth grade into the world of reading and books. Its design is the result of a fruitful collaboration among children, parents, librarians, and talented architects. It is the portion of the building most densely supplied with computers.

The Burnham Hoyt Room, named for the architect of the 1956 building, is located in the remainder of the first level of that building. It serves as a popular browsing library, housing the Central Library's fiction collection, selected new non-fiction, popular paperbacks, videos, and music recordings. A special space for teenagers is located between the Children's Library and the Burnham Hoyt Room, allowing for both physical and intellectual transition.

Also centrally located on the first level is the Reference Room, a two-story circular space which houses about ten thousand core reference

volumes, an ample provision of networked computers supporting electronic information delivery, and a skilled, mobile staff. Both on-site and telephone reference work are performed in this area, with librarians moving back and forth between desk and telephone assignments. When they are on telephone duty, librarians wear cordless portable telephone headsets that are keyed to the main reference telephone numbers. This arrangement allows them to move freely around the large room and into other areas of the building to answer telephone reference questions. It is not unusual to encounter a reference librarian on an escalator, moving up to the open stacks while discussing the question with a telephone customer.

4.6. Specialized services:

On the third level, directly above the Reference Room, is another handsome circular area, which is the home base for periodical services. The Magazine Centre provides about 2500 current subscriptions, including many US and world newspapers, popular magazines, and other periodicals of public interest.

Government Publications and Business Reference services are housed on the fourth level, with an expert staff of specialists.

4.7. Western History and Genealogy.

Western History, a traditional area of special emphasis for the Denver Public Library, has been combined with Genealogy, a relatively new specialization, on the fifth floor of the Central Library. The crossover among the customers who use these two are as for research and the need to control the number of staffed service desks contributed to this decision, which has proved to be very enriching. In this case, a two-sided reference desk, with Western History materials under higher security on one side and genealogy materials and seating on the other, is served by a single integrated staff. \par

4.8. Other spaces:

The rest of the building, from the janitor's closet to the City Librarian's office, exists to support these key service areas and to provide the headquarters functions for the entire library system. In addition, several conference spaces of varying size and character and a dramatic, privately-funded gallery on the seventh level allow for meetings, programs, and social events.

4.9. Space as a service:

One traditional service that the Denver Public Library's Central building supplies in abundance is the provision of space. A customer can sit in a chair and read a book. A group of students can gather to confer. A researcher can spread her materials on a large table. Some space provisions are in busy public settings, while others offer a sense of privacy and quiet. There are over 1100 seats.

All these spaces feature the substantial wooden chairs of the type

known as « courthouse chairs » in the United States. As some libraries have learned to their dismay, dirty clothes will destroy even the sturdiest institutional upholstery quickly.

5. HOW DO WE MAKE A MACHINE FOR SERVICE?

One of our biggest challenges as a profession concerned with buildings is the question I hope to address in the remainder of this paper: How do we create this machine for service ? What processes can help us succeed in this demanding endeavour ? Further, how can we create a machine for service that not only serves well, but also gains the admiration, respect, and support of the community ? How can we use the package to make them love the contents ?

6. LOCATING THE BUILDING

When the Denver Public Library set out to create an effective machine for the delivery of outstanding library service, the first large decision concerned its location. The site of the 1956 Central Library, part of Denver's defining Civic Centre, was the obvious choice. It was neighbored by the Denver City and County Building, the Colorado State Capitol, the Denver Art Museum, the Colorado Supreme Court, and the Colorado History Museum. It faced an attractive city park.

The site was large enough to accommodate the contemplated building program of half a million square feet, visible to travellers on major downtown arterial streets, and accessible to bus transportation. It had all the necessary utility infrastructure in place. Across the street was acquirable vacant land to accommodate more than four hundred parking spaces, an important consideration in a car-dependent city. To the Library staff and Commission, the site answer seemed obvious: tear down the 1956 building and replace it with an all-new Central Library.

Puzzling as the phenomenon may be to most readers of this paper, this 1956 building had an unexpected political constituency: historic preservationists. To Denverites, 1956 is long ago, and designs produced in the 1950s have their fans. The preservationists succeeded in placing the 1956 building on the National Register of Historic Places, whose regulations would significantly impede any attempt to raze the building. This introduced an important issue: should the Library stay on the best site and embrace, as part of the challenge, an existing building which was not very useful for the intended purpose ? Ultimately, the decision was to remain on the existing site; enfold the existing building into a much larger complex, purchase a neighbouring developer's land for parking; close the street between the Library and the Art Museum and develop the area as a pedestrian plaza; and build plenty of room for people, books, and computers, with the expectation that the proportional mixture of those elements is sure to change in the centuries to come.

7. CHOOSING A TEAM OF COLLABORATORS

On the day following the voters' decision to fund library improvements, Federico Pefa, Mayor of Denver, called a press conference to announce that a design competition would be held. Through a complex, iterative process, the Selection Committee, especially Denver Public Library staff and City public works officials who would be responsible for carrying out the project, could understand not only the creativity, but also the listening ability, the realism, the work ethic, and the energy of each finalist competing team. Following the final conceptual presentations, which were made before a large public audience in the Colorado Convention Centre, the Selection Committee unanimously chose the Michael Graves/Klipp Colussy Jenks DuBois team. This was a combination of a celebrity superstar architect and an ambitious young local firm.

The Graves/Klipp team won the competition for several reasons, in addition to the elegance and ingenuity of its proposed conceptual design. In grand concept, its proposal was quite similar to that put forth by a team led by Robert Stern. However, Michael Graves, the architectural superstar, demonstrated an extraordinary capacity to listen, both to the client and to the other members of his team. When some early ideas were rejected by members of the Selection Committee, he did not attempt to sell or persuade. He brought back better ideas. He did not dominate every presentation, allowing the strengths of other members of his team to shine forth.

Above all, the Graves/Klipp team presented the opportunity for a significant collaborative venture. As Michael Graves said on more than one occasion, a great building is a partnership between a great architect and a great client. By this, he did not mean, as some of his professional brethren do, that a great client is someone with an open checkbook. He meant, rather, that the great client effectively communicates its needs, aspirations, and beliefs, which receive expression through the unique talents of the designer.

8. DESIGNING THE LIBRARY

Designing the new Central Library was the joint responsibility of several parties.

In addition to the two architectural firms, a roomful of consultants, employed by the architects, participated. They practised structural, civil, mechanical, electrical, acoustical, lighting, graphics, interiors, elevators, kitchens, landscape, security, furniture, and historic preservation specialities.

Across the table from this massive team sat another large team, the Denver Public Library's Cast of Thousands. In addition to the senior management of the Library, the City's public works managers were present, as were the library's own consultants and experts and many Library staff. Throughout the months of meetings, reviews, and approvals, staff members mightily voiced their ideas and opinions. These mighty voicings made for a great client, sensitizing and inspiring the designers to their best work.

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The main check out desk, the book return facilities, and the interactions of ceilings, lighting, and shelving, to cite only a few examples, benefited from staff participation. Mockups of these elements were put to use in the old Central Library building. Staff tested modular office systems, lamps, chairs, and computer keyboard trays. They designed workflows for the handling of the great volume of material passing into and out of the building.

Library staff did not love every aspect of the design as it emerged. Technical services staff, for example, knew that they would be moving from a second-floor area in a rented office building, complete with windows and a mountain view, to a below-ground space whose natural light comes indirectly from glass block walls facing a driveway. Shelving staff struggled to find ways to reduce the handling of materials. They learned to sort returned books « on the fly », not in the special back room which the 1956 building had provided.

Staff members voiced concerns about the ergonomic operation of the building and about potential « sick building » issues. These concerns led to additional focus by the design team and the senior management of the Library. Proper specifications of furniture and equipment were developed. Environmentally safe and healthy paints, wood finishes, carpets, fabrics, and ventilation system features received great attention. A firm specializing in healthy building issues joined the team, making recommendations on materials and construction techniques, further reducing health risks.

The children of Denver and the general public spoke up too. Focus groups of Denver kids began helping with design as early as 1989. During the early planning stages they came together to tell the Denver Public Library what the new children's area should be like. From these children came a few important points: while they were interested in a colourful, lively place, they were not particularly impressed by the bright primary « circus » colours often used in design for children.

They wanted a place that allowed for both noisy group activities like clustering around a computer and for quiet solitary reading. The older children, ages 10-12, wanted an area of their own, separated from the « little kids » by some obvious barrier. The older children had some level of awareness of the dreaded Dewey Decimal System, but they also wanted a more intuitive, visual method of finding books. While many hours of architects' time were expended on this iconographic challenge, it was ultimately solved by the children's librarians, who secured Dorling Kindersley photographic images of all kinds for poster-sized reproduction, to be placed atop the shelves. While the design could not incorporate some of the most imaginative proposals made by children: tree houses, entry through a tunnel or a slide, a small petting zoo, to name only a few, the design felt their influence.

At the completion of each stage of the design process, the architects made a well-publicized public presentation of the work to date. Members of the community could see and comment on the design. Although general

public turnout was light, with fewer than one hundred persons present at each presentation, other architects attended and had their say. An occasional Denver architect succumbed to the temptation to criticize the work of the famous Michael Graves, who always responded politely. The design that emerged from this demanding collaboration is a success. It fulfills the program requirements; makes excellent use of the 1956 building; responds to the Denver Art Museum's worries about its neighbour's massiveness by breaking the bulk into a variety of shapes and masses; mixes natural stone, copper, and manufactured cast stone on the exterior and stone, wood, plaster, and carpet on the interior; integrates the lighting, furnishings, and fixtures into a useful, beautiful service machine.

9. A NEW LANDMARK

Skipping over the period of construction, which began in April 1993 and continued to December 1995, the story of the Central Library advances in a rush to today. No longer a beleaguered organization headquartered in a building which impeded its mission, the Denver Public Library has become a visible, active participant in a growing city. Chamber of Commerce publications feature it. Elected officials proudly claim credit for its success. Collaborators seek it out.

In addition to the four thousand daily customers, tour buses drop their passengers for a visit. Children arrive in droves, with school groups during the week and with their families on the weekend. No more a noisome nuisance, the Central Library is a destination for business and pleasure.

In June 1997, Denver was the host city for the annual gathering of the leaders of the world's seven major economic powers: Britain, Canada, France, Germany, Italy, Japan, and the United States. Russia was a full participant this year for the first time, so the meeting was called the Denver Summit of the Eight. Presidents and Prime Ministers gathered for their discussions around a large conference table in the Reference Room of the Central Library. President Clinton exclaimed as he arrived, « What a beautiful library ! » and the Denver Public Library had arrived at a new and exciting position in the world.

SIBL PRESENTATION AT THE CITY LIBRARY

*by Paul LeClerc
President of the New York Public Library*

My colleague, Bill Walker, and I are delighted to have this opportunity to present a report on The New York Public Library's newest--and, arguably, most successful--new library: the Science, Industry, and Business Library, better known by its acronym SIBL.

SIBL is very much Bill's creation and he and his staff deserve all the credit for the conception of library service at SIBL and that assured its success with readers from the very day that it first opened its doors. Bill, in fact, turned in such a brilliant performance on the SIBL project that the Library's Board and I subsequently gave him the overall responsibility of managing all of our Research Libraries. And so, even though your program indicates that this is a joint presentation by Bill and me, I will most appropriately leave Bill with the pleasure of describing the wonderful--and pioneering--new library that he has brought to New York.

My own task will be to tell you how we have financed this enterprise. Because The Research Libraries of The New York Public always operate through a combination of private and public sector funding sources, the financial package that we created for SIBL will no doubt strike everyone in this room as so exotic that it will have little applicability to your own contexts. Nonetheless, because many, if not most publicly-funded libraries are now being asked to seek private support for some aspect of their operations, the way that we managed to finance a \$100 million new library in New York could be of more than academic interest to you.

Having said that The New York Public is used to relying on both the public and private sectors for funding its Research Libraries, I must add quickly that in creating SIBL we also created a new, and highly innovative, way of capitalizing a library project.

SIBL required an investment of \$105 million. This amount covered the cost of:

- site acquisition, approximately 200,000 square feet in a former department store (\$18 million);
- refurbishing that site (\$46 million for construction and architects' fees);
- moving pre-existing print collections (\$1 million);

- furniture and equipment, including the massive state-of-the-art technology platform Bill Walker and his colleagues designed (\$6 million);
- program planning and staff training (\$1 million);
- financing, legal, and other overhead associated with this massive
- project (\$13 million);
- annual operating support (\$5 million);
- a permanent endowment for SIBL (\$15 million).

Early on in the planning phase of SIBL, the Library's Trustees decided that the private sector would bear more than 75% of this total cost--that is \$80 million--and that the public sector should bear the remainder, or \$25 million. We then lobbied--successfully--New York City, New York State, and the Federal government for capital appropriations of this magnitude and received \$14 million from the City, \$7 million from the state, and \$4 million from Congress.

The latter, public sector numbers, are not, admittedly, trivial amounts of money. But what is remarkable about the Trustees' decision in structuring SIBL's financing was to place such a heavy burden on the private sector side of the ledger book. SIBL was to be a state-of-the-art specialized library, opened entirely to the public and without charge, and yet \$75 million of its cost was to be borne by the public sector !

But where, precisely, were these huge amounts of private money to come from ? Embedded within the answer to this question lies a truly fascinating story. It is as follows: thanks to the ingenuity of the Chairman of the Library's Board of Trustees, the Library committed to borrowing up to \$55 million dollars through the State of New York to build SIBL. This would be financed through re-allocation of existing Library resources and through income earned on new gifts to endowment in support of the Library. It then asked a number of corporations and individuals to guarantee the loan; that is, if the Library were to default on repaying the loans, these guarantors would accept the responsibility of repaying them on our behalf. Some 37 corporations, foundations, and individuals decided to guarantee a total of \$25 million in debt. Now comes the ingenious part. About 18 months after the loan guarantees were assured, representatives of the Library, usually Trustees and my predecessor, Timothy Healy, paid calls on the loan guarantors and asked them to convert their guarantees to outright gifts to library. Believe it or not, approximately 51% of the loan guarantors accepted this proposition, resulting in \$19 million in outright gifts for SIBL. These have been raised toward a total private funds goal of \$55 million, to cover project costs, initial operating costs of the new library, and for creation of an endowment. To date, we have raised \$40 million from individuals, foundations and corporations. The remaining amount, that we are now raising, is \$15 million, to be set aside for a permanent endowment for SIBL.

Over the next 25 years, the Library will pay an average of \$4.7 million per year in interest, principal amortization and fees on the funds it borrowed

to construct the new facility. The expected average annual interest rate is approximately 5%. Most of the annual cost will be met through the Library's reallocation of existing resources, made possible by the SIBL project. For example, the Library had previously paid more than \$1 million per year to lease space for Library operations that are now housed in the new facility. In addition, by purchasing two adjacent floors in the former department store, the Library was able to secure a source of net income from commercial rentals, while also providing for long-term expansion for our own needs. Income from the endowment to be raised for SIBL will cover more than \$1 million per year of the total debt service cost.

Let me now turn the podium over to Bill Walker, who will describe just what kind of a Library he was able to design with these sums of money.

THE NEW YORK PUBLIC LIBRARY'S SCIENCE, INDUSTRY AND BUSINESS LIBRARY

A Library for the twenty-first Century

by William D. Walker

The Andrew W. Mellon Director, The New York Public Library

Abstract

The new Science, Industry and Business Library provides The New York Public Library with a facility that is both flexible and intelligent. The Library's administration took great care to insure that SIBL would be a high-tech library model that worked for staff and a broad range of users. Nevertheless, considerable attention was given to the storage of and access to print collections in order to insure that this library would meet the needs of all public who enter its doors. Despite the attention to the traditional, SIBL's technologies and design have assisted researchers, scholars, business persons, and the lay public to move more quickly into an information age where electronic information plays a very key role.

Following five years of program planning, design, and construction, The New York Public Library (NYPL) opened the doors of its new Science, Industry, and Business Library (SIBL) on May 2, 1996. Located in mid-town Manhattan, near the Empire State Building, SIBL represents the culmination of a massive project to build a separate facility for the Library's burgeoning print holdings in science and business, to demonstrate the integration of state-of-the-art information technologies and electronic content into the Library's service agenda, and to provide a distinct focal point for audiences who need business and science information.

Since its opening, SIBL has proven to be an extremely popular information resource for the public. Staff served over 750,000 onsite users during SIBL's first year of operation (an average of 2,400 daily users), and an additional 400,000 users visited SIBL via the Library's World Wide Web site. In great part, SIBL's success is based in a market research and planning process which enabled the Library to incorporate the best thinking and best practices of librarians, library clients (actual and potential), library educators, technologists, science and business practitioners, and, last but by no means least, architects.

THE SIBL PLANNING PROCESS - THE FOUNDATION OF AN INTELLIGENT BUILDING

The goals of the SIBL project were to develop a program that would provide both a facility and a companion information services agenda to

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serve as a prototype for the Library in the 21st Century. In order to create SIBL, the Library embarked on a four year planning process that: 1) reinvented the service programs; 2) established SIBL as an electronic place, while continuing to house and service a large collection of print materials; and 3) clarified the identify of the audience and provided a better understanding of clients' information needs and information seeking preferences.

Library staff, working with architectural consultants, developed a comprehensive facility program statement which was based on the information and data gleaned from market research efforts. Staff employed various market research techniques, including focus groups, telephone, and exit surveys, user interviews, and direct mail questionnaires. These activities provided SIBL's managers with valuable insight into users' expectations about access to technology and electronic content, noise acceptance, confidentiality, preferences regarding levels of staff intervention/assistance, and library design and layout. During the process, it became evident that if the Library wished to attract new user groups to the facility, clarity of design, and the ability to navigate a new facility independently were necessary features.

NEGOTIATING THE DESIGN

Following a competition, The Library's Board of Trustees entrusted the design of SIBL to Gwathmey, Siegel, and Associates, a New York City based architectural firm. Gwathmey, Siegel's work is modernistic - a style that is appropriate for the SIBL project since it helps signal a futuristic library environment. In addition, the Gwathmey team demonstrated an understanding of cutting-edge technology since they had successfully executed the design of Cornell University's supercomputer centre. Furthermore, Gwathmey's recently completed expansion of the Guggenheim Museum provided proof that they could create impressive, yet functional public spaces.

In great part, SIBL has been successful because of the magical synergy between the library staff and the design team. Typically, no first solution was accepted. Rather solutions were discussed and rediscussed - and - solutions were designed and redesigned. The architects synthesized the programmatic vision for library services, and they were unusually helpful in expanding and ameliorating the original facility program statement. To encourage staff "ownership" in the project, the rank-and-file staff were given access to the architects and exposure to the designs for comment and critique.

Perhaps the most difficult aspect of program development proved to be the technology applications and the surrounding design. The Library worked closely with lead consultant Clifford Lynch, Ph.D. (currently the Executive Director of the Coalition for Networked Information) to develop a technology vision. Additional assistance was provided by corporate partners (IBM, RJR Nabisco, and Paine Webber), and The Library engaged several

independent audio-visual and technology infrastructure consultants. However, even with the advice of this impressive corps of experts, the rapid roll out of technology applications during the planning years made it very difficult to pin down the specifications for desktop equipment, the training facilities, and back office servers. Ultimately, decisions were deferred until the latest possible moment.

To be considered an *Intelligent Building*, the SIBL design needed to demonstrate, first and foremost, the element of flexibility since no one really can predict what a library or library services will look like in ten or fifteen years as our society becomes increasingly networked. In addition to a requirement of flexibility, the library staff also gave the architects several other objectives, including a design that would allow for an integration of print and electronic resources, enable the library to deploy staff economically, and provide users with a sense of clear physical orientation to resources and services.

ARCHITECTURAL DESCRIPTION

For the SIBL project, Gwathmey Siegel & Associates transformed a portion of the turn-of-the-century building that housed the former B. Altman Department Store into a modern library. Located at 34th Street and Madison Avenue, this building met the Library's needs. The building's 1906 Renaissance Revival exterior holds landmark status granted by the City of New York, meaning that the exterior can be maintained, but not changed. However, the interior spaces are not landmarked, making it possible for the architects to install an elegant modernist interior, without regard to former walls, ceilings, or floors. The result reflects a balance between the Library's 19th Century origins as a "temple of wisdom" and its 21st Century role as an emporium of rapidly changing information. From the users' perspective, the design presents a blend of the traditional and the new - providing users with a sense of the familiar and the cutting-edge.

The renovated facility reinforces SIBL's image as a "library without walls," a transparent membrane through which information and resources flow freely between the Library, international business and research communities, and the public. The sight lines for both public and staff are brilliantly conceived, providing a superb sense of physical orientation and personal security. Whereas The New York Public Library's Main Library on Fifth Avenue contains a staircase which lifts its imposing facade above the urban bustle, SIBL's monumental window arcade invites Madison Avenue pedestrians to look into one of the few monumental public spaces in New York with an immediate street-level impact.

With an airy 33-foot (10 m) tall, two-story volume, the Healy Hall atrium, provides a highly visible venue for changing exhibitions, receptions, and other events sponsored by the Library and community organizations. For example, small business groups frequently hold early morning breakfast meetings in this space. Video monitors broadcast the news of the day, and an LED ribbon flashes stock market quotations to passers-by with an urgency

that combats the traditional perception of the Library as an ivory tower. In the main lobby, users are greeted by staff at reception desks and by a bank of touch-screen kiosks. Both stand ready to provide orientation, instruction, and advice. However, only the kiosks enable users to reserve electronic workstations and sign up for training classes.

The Lewis B. and Dorothy Cullman Circulating Library (Diagram 2) on the street level is easily accessible to people who want to browse through current periodicals or pick up a book on their lunch hour. This ground level reading room houses a collection of 50,000 popular business and science books and multimedia titles, and it gives readers access to networked workstations for Internet access. A curved glass wall allows readers to look out from the busy Reading Room through the main lobby and the exterior windows to see the movement of traffic and people on the street. A circulation desk is situated in the lobby, adjacent to the Cullman Reading Room.

In a surprising reversal of architectural tradition, a dramatic stainless steel and terrazzo staircase and a pair of glass and stainless steel elevators in Healy Hall lead down from the entrance lobby to the Research Library. This 45,000 sq. ft. (4,200 m²) level (Diagram 3) accommodates SIBL's extensive research facilities, which include the primary reference services and collections, the research library reading room, the electronic information complex, and a 125-seat Conference Centre. In addition to creating an inviting public gathering space, the generous proportions of Healy Hall bring natural light to researchers working in the core of the Library on this lower level.

The architects deliberately avoided a high-tech, « cyberspace » aesthetic in favour of a more subtle approach that bridges the comfortable familiarity of books and the often-intimidating abstractions of networks and databases. Traditional 19th Century materials such as oak and terrazzo play off contemporary stainless steel and brushed aluminium, emphasizing both the humanist roots of the Library and its futurist aspirations. Materials were chosen for their symbolic associations, as well as for their durability and responsiveness to handling. The terrazzo steps of the main staircase and the undulating "wall of words" above recall the continuum of knowledge that the Library represents. The balustrade is an unconventional series of frames, composed of steel tubes welded into rectangular panels, that suggests the incremental nature of learning through the step-by-step acquisition of information. Insets of perforated stainless steel refer to the positive and negative electronic impulses that constitute the co-ordinate system of all digital information.

Because SIBL must accommodate new information technologies as they emerge, flexibility and accessibility were the goals of every aspect of the design, from seating to mechanical and electronic systems. One hundred computerized workstations in the Electronic Information Centre provide free public access to the Internet and electronic research tools. In addition, every traditional reader position (500 places) in the Research and Circulating

Libraries are set up to accommodate patrons' laptop docking. As mentioned earlier, the unpredictability of equipment sizes made standard library carrel dimensions inadequate. Instead, workstations are separated by adjustable perforated stainless steel acoustic dividers that provide lateral flexibility while maintaining a sense of privacy and a definable territory for each reader. An additional benefit was the ease with which the basic design accommodated, with only minor modifications, both the Library's mandate that half of the workstations be barrier-free and the broad evolution in computer equipment since the project's inception.

The information counters are also handicapped accessible along their entire length to both patrons and staff. Suspended LED signs can be instantly reworded to give information about librarians' specialties or current programs. The excellent sight lines allow the entire Research Library to be "supervised" by five people, maximizing staffing resources. This arrangement frees the librarians from "security duty" and allows them to do specialized research or to consult with individual readers in small conference rooms.

A grid of removable 2x2 ft (60x60 cm) concrete panels raises the floor six inches (15 cm) and allows power and data lines to be easily reconfigured in the future. In the Research Reading Room and Information Centre, the original terra cotta vaulted ceiling that forms the structure of the first floor has been exposed, defining the public spaces architecturally and maximizing their height. An innovative stainless steel custom fixture that incorporates fluorescent lamps, sprinklers, and acoustic panels into a single linear element runs the length of each vault. The vaults' shape focuses sound towards the acoustic panels, and, at the same time, reflects light back onto the workstations, maintaining the required foot-candles for reading without glare on the monitor screens.

Behind the scenes, the 250,000-sq. ft. (23,000 m²) space accommodates the storage and movement of over 1.5 million books (Diagram 1). The construction budget of \$43 million included major internal structural reconfigurations to fit five levels of high-density (compact shelving) closed stacks into three floors at the core of the building. SIBL staff areas (Diagram 4) surround the stacks on the second through fourth floors, and the fifth level is used for general New York Public Library administration. Most staff areas are designed with open landscaping (Knoll furniture) which the staff preferred to individual offices. Despite its state-of-the-art storage, the Library still uses the traditional (and efficient) pneumatic tube/dumbwaiter system developed in the 19th century to process requests for books in less than ten minutes.

SIBL SECURITY AND MECHANICAL SYSTEMS

To manage security, a sophisticated card access replaces a traditional key system. Each staff member is issued an electronic photo ID card which is programmed to afford access to areas throughout the building according to each holder's security profile, including place and time of day. The SIBL

Security Office has the capability to monitor staff movement throughout SIBL at all times. This system is supplemented by a robust placement of video cameras which are monitored in real time by the central security office (both onsite and from other buildings). A videotape record is also made to allow for retrospective monitoring of activities.

The Electronic Information Centre has a security system to protect the equipment, employing a laser fibre optic connection to each workstation and printer. When that connection is severed, a loud tone sounds, staff is alerted and security officers are notified.

The HVAC system is technologically sophisticated. There are twenty-one separate air conditioning units controlled by a computer that tracks all temperature and humidity conditions twenty-four hours a day. This Building Management System also alerts the building manager to water leaks or another abnormal conditions that requires immediate attention.

All lighting in SIBL is computerized, again controlled by the Building Management System. The lights turn on and off according to library schedules or as programmed for special events. The lighting takes advantage of the newest energy saving technology, and the office and conference rooms lighting is controlled by motion sensors that turn it off if there is no movement in the room for ten minutes.

Finally, SIBL has the latest emergency equipment. There is an E-class high rise evacuation system that can communicate with people no matter where they are in the building. There is a large water supply (38,000 gallon water tank), in addition to the New York City supply, available for fighting a fire. Furthermore, SIBL has six large fans to keep the stairwells free of smoke and help people exit.

THE COLLECTIONS OF SIBL

Library management influenced SIBL's final design and layout in order to reshape public services and staff working patterns. However, access to print and electronic resources was also greatly enhanced. One of the most immediate benefits is the reunification of related collections that until now have been dispersed among several locations and service points within Manhattan. Recent science and technology materials were available in the former Science and Technology Division on the first floor of the Central Research Library, while science microforms were located on the third floor. Less recent materials, accounting for approximately 75% of the collections, were housed at an Annex on West 43rd Street and delivered to readers at the Central Research Library. The Patents Collection, which has been nominally a part of the Science and Technology Division, was both housed and serviced, first at the Annex, and later in the Science and Technology Division. Thus, there were three separate locations that a science researcher might need to visit within the Research Libraries alone. Reunification has greatly improved access to the science and technology collections. The major scientific and technical subjects now at SIBL are astronomy, biology,

chemistry, computer science, earth sciences, electronics, energy, engineering, food science, manufacturing, materials science, mathematics, patents, and physics.

SIBL has gathered together all of the separate parts of the science and technology collections and added to them related collections in business, industry, economics, finance, law, and government documents, which were held by the former Economic and Public Affairs Division. All in all, the materials that have become SIBL amount to approximately 1.5 million volumes and 90 thousand microfilm reels. Opportunities for interdisciplinary research are greatly increased by the merger of these collections and their staffs. Research in new, inherently interdisciplinary fields, such as biotechnology, can be properly supported with the wide spectrum of complementary resources assembled in SIBL. Marketing decisions, advertising strategies, projections regarding sales and markets, issues in management, public policy research, and legal strategies are some of the kinds of research needs that are supported by the resources of SIBL. For the first time, the patents information is available for use in conjunction with materials in law and business, making it possible for researchers to explore the technological and commercial aspects of new products.

SIBL'S TECHNOLOGY BASE

The most talked about collections at SIBL are those housed in the Electronic Information Centre, including over 100 networked and stand-alone databases in electronic formats (including over 800 full-text electronic journals). Here may be found the NEXIS and Dow Jones services; the Dun & Bradstreet family of databases; full-text electronic journals and indexes from the Institute for Scientific Information (ISI); and a host of other full text and index/abstract business and science related information resources in electronic format.

SIBL's electronic content is undergirded by a fibre backbone, with Category 5 Copper wiring running to desktops. Onsite, the Library maintains seventeen distinct data servers; the networked CD-ROM servers are equipped with 72 drives. Internet/World Wide Web resources are transmitted over T-3 connections. Both users and staff benefit from state-of-the-art Pentium workstations (with 17" monitors). Most public workstations are connected to dedicated laser printers, and SIBL public pays for laser printouts via a debit card system. Debit card may also be used to pay for photocopies throughout the NYPL system, regardless of location.

PROJECT TEAM

Completion date	May 1996
Size.....	250,000-sq. ft. (23,000 m ²)
Cost	\$43,000,000
Architects	Gwathmey Siegel & Associates
Principals in charge:.....	Charles Gwathmey and Robert Siegel

Associate in charge: Jacob Alspector
Structural Engineers..... Severud Associates
Project Manager: Edward Messina
Electro/Mechanical Engineers..... Jaros Baum & Bolles
Project Manager: Augustine A. DiGiacomo
Construction Manager A J Contracting Company
Project Manager: Art Pedersen
Financing Agency..... Dormitory Authority of the State of New
York
Project manager: Narinder Sarin
A/V Consultant..... Shen Milsom & Wilke
Graphics/Signage Consultant..... Spagnola & Associates
Electronic Display Consultant..... Edwin Schlossberg Inc.
Elevator Consultant..... Jaros Baum & Bolles
Furniture Consultant..... Logistics Inc.
Lighting Consultant Hillman DiBernardo & Assoc., Inc.
Security Consultant..... Chapman Ducibella Associates
Specifications Consultant Specifications Associates Inc.
Telecommunications Consultant. DVI Communications, Inc.

THE ADSETTS LEARNING CENTRE, SHEFFIELD HALLAM UNIVERSITY

by *Graham Bulpitt*
Director Learning Center , Sheffield Hallam University

SUMMARY

This paper provides an overview of the educational changes affecting British universities which were behind the design brief for the Adsetts Centre at Sheffield Hallam University which opened in September 1996. The project is considered in the context of other strategic changes at the University and the key elements of the new department are described. The key features of the building are noted and related to the design brief. The conclusion reflects on the first year's experience of working in the building. This article is based on the presentation given in The Hague in August 1997, but it has been updated to take account of recent changes and amended to compensate for the lack of slides which provided the basis for the original talk.

Graham Bulpitt was appointed University Librarian at Sheffield Hallam University in 1990, and since September 1996, he has been Director of the Learning Centre. He is currently Chair of the Library Association University College and Research Group and a member of the SCUNUL Executive Board. He is also a member of the Advisory Council on Libraries, which advises the Secretary of State, Department of Culture, Media and Sport, on public library provision.

CHANGES AFFECTING HIGHER EDUCATION IN THE UNITED KINGDOM

The major challenge for universities in the United Kingdom, as in other countries, has been to respond to increases in the numbers of students at the same time as a decline in the funding for teaching.

Over the ten years from 1985 to 1995 the number of young people entering higher education doubled, and the age participation rate of school-leavers entering universities increased from approximately 15% to over 30%¹². There are now a total of 1,500,000 students in universities, of whom 500,000 are studying part-time. The new Labour government has recently announced plans for a further 500,000 students to be recruited to the further and higher education sectors by the year 2002. There has also been a steady reduction in the level of public funding per student, with a decline (at constant prices) of 40% since 1976.

These factors were behind the decision of the previous Conservative

¹² Organisation for Economic Co-operation and Development. *Thematic review of tertiary education: UK background note*. August 1996.

government, with support from the other major political parties, to initiate the National Committee of Inquiry into Higher Education under the chairmanship of Sir Ron Dearing. This has been the first comprehensive review of higher education since the Robbins Report, which was published in 1963, and which had been responsible for an earlier period of rapid expansion of universities so that « courses of higher education should be available for all those who are qualified by ability and attainment to pursue them and who wish to do so »¹³.

The Dearing Committee's report, *Higher education in the learning society*¹⁴, was published in July 1997. In addition to reinvigorating the debate on funding - for both universities and student support - the report emphasised that « all institutions of higher education [should] give high priority to developing and implementing teaching and learning strategies which focus on the promotion of students' learning. »

The potential to exploit communications and information technology in learning was considered in some detail in the report of the Dearing Committee, and has been pursued in two more recent reports *Connecting the learning society*¹⁵ and *New library: the people's network*¹⁶. In the forward to the government's proposals for the learning society, the Prime Minister notes that « technology has revolutionised the way we work and is now set to transform education. »

It appears that communications and information technology now has the potential to change the learning process in a way which earlier technologies, particularly audio-visual media, have failed to do. The false dawns of older technologies, promulgated in works such as *A challenge for librarians*¹⁷ remain in the minds of teachers who are often sceptical about alternatives to traditional teaching. There is still much work to do before new technology is embedded in mainstream teaching and learning activities; the issue here is a human one: « human resources and organisational aspects are probably more important than technology in ensuring the full potential

¹³ Committee on Higher Education. Report of the Committee appointed by the Prime Minister under the Chairmanship of Lord Robbins. HMSO, 1963.

¹⁴ Higher education in the learning society: report of the National Committee of Inquiry into Higher Education [Chairman, Sir Ron Dearing]. HMSO, 1997. (Also available on URL <http://www.leeds.ac.uk/ncihe/index.htm>).

¹⁵ *Connecting the learning society: the National Grid for Learning*. The Government's consultation paper. Department for Education and Employment, 1997. (also available on URL <http://www.open.gov.uk/dfee/dfeehome.htm>).

¹⁶ Library and Information Services Commission. *New library: the people's network*. The Commission, 1997. (also available on URL <http://www.ukoln.ac.uk/services/lic/newlibrary/>).

¹⁷ Fothergill, Richard. *A challenge for librarians?* National Council for Educational Technology, 1971. (NCET Working Paper 4).

of information systems is exploited ¹⁸.

A further theme to note in this overview of changes affecting higher education is the increasing emphasis on lifelong learning which has been a major interest of the new British government. The Report of the Advisory Committee on Continuing Education and Lifelong Learning, chaired by Professor Bob Fryer, published in November 1997 ¹⁹, proposed action on a number of levels to extend access to educational opportunities throughout adult life, and the theme is to be taken up in the forthcoming government White Paper on Lifelong Learning, due to be published in January 1998. It is likely that universities will increasingly be drawn into a framework of lifelong learning which focuses on individual needs ²⁰.

These changes in the scope and nature of higher education have been anticipated in recent developments at Sheffield Hallam University, which are noted in the next section. Changes in teaching and learning, particularly the trend towards independent learning by students, and the potential of communications and information technology, were also critical to the concept and design of the Adsetts Centre.

AN INTRODUCTION TO SHEFFIELD HALLAM UNIVERSITY

The University was designated in 1992, is one of the six largest teaching institutions in the UK higher education sector, and may be characterised as a national professional university where teaching takes place within a strong environment of scholarship. There are twelve Schools of Study, which are responsible for some 22,000 students and which deliver diploma, undergraduate and postgraduate courses across almost all disciplines. There are six research institutes, and Sheffield Hallam has been the most successful new university to compete in the recent Research Assessment Exercises (in 1992 and 1996) which determine the allocation of research funding.

The professional orientation of the University is reflected in all its activities. Diploma and undergraduate programmes are linked firmly to the industry, commerce, and the professions and graduates have a very high employment rate. The University is the largest provider of awards issued by the Business and Technician Education Council and the largest provider of sandwich education in Europe - Sheffield Hallam students normally spend one year of their undergraduate course in industry. The University's research is generally applied rather than theoretical, and many projects are

¹⁸ Joint Information Systems Committee [of the United Kingdom Higher Education Funding Councils]. *Exploiting information systems in higher education: an issues paper*. JISC, 1995.

¹⁹ *Learning for the twenty-first century: First Report of the Advisory Committee on Continuing Education and Lifelong Learning*. (Chair, Professor R H Fryer). Department for Education and Employment, 1997.

²⁰ Standing Conference of National and University Libraries. *Vision statement*. SCONUL, 1998.

carried out in collaboration with industry. There is also an established programme of consultancy work and specialist postgraduate and post-experience training programmes. The University's annual budget is approaching £100 million, and there are some 2,500 staff based on three campuses in the city of Sheffield.

The university has made adopted a number of strategies which anticipate the changes in the higher education environment described earlier. A new academic framework has been adopted for programmes of study, which develop core skills (within the context of subject competence), develop student-based learning, and provide enhanced student choice. Post-graduate work, consultancy, and research has been developed and expanded. The Learning and Teaching Institute was established, initially as a separate unit, to work with academic staff on new approaches to course delivery.

House services and commercial activities were consolidated into a new Facilities Directorate, which has provided considerable economies in operations. A major part of these economies have come from a rationalisation of the University estate: two small campuses have been closed, leased accommodation has been relinquished and the main city centre campus has had major refurbishment and redevelopment to provide high quality, purpose-designed accommodation. The Adsetts Centre constituted the second major phase of this development and opened in September 1996.

THE ADSETTS CENTRE

The building consists of 11,000 square metres of space allocated across seven floors. It contains some 1600 study places and the total project cost was £14 million. It is an extremely busy building: there are 10,000 visits on a typical day during teaching weeks. 50% of the students use the Learning Centre every day; 93% visit the department at least once each week.

The project was conceived from the start as a multi-purpose Learning Centre which would bring together four key elements to support learning:

- library collections, including half a million volumes of books and journals occupying some five kilometres of shelving;
- computing provision: access to electronic databases and the Internet as well as desktop services such as word processing, electronic mail and spreadsheets (other aspects of information technology provision, including technical and infrastructure support, remain the responsibility of a separate department of Corporate Information Systems);
- production facilities such as graphic design and photography units, a TV studio, a multimedia production team, print unit and the University's publishing house;
- the Learning and Teaching Institute, which acts as a professional centre for teaching staff by working with them on new approaches to course delivery, particularly

resource-based and independent learning. The Institute also co-ordinates educational research and evaluates new developments.

These elements were integrated in a new department which was established to coincide with the opening of the building in September 1996.

The Adsetts Centre also contains teaching accommodation, including two lecture theatres, seminar rooms and meeting/tutorial rooms, all equipped with high specification presentational equipment for use with audio-visual and electronic material.

THE ARCHITECT'S BRIEF

The initial work on the building started in the summer 1993 with the appointment of the Project Managers, Turner and Townsend Ltd, and architects, Faulkner-Browns of Newcastle-upon-Tyne. The architects brought a strong track record of library design to the project and also had a local reputation in Sheffield as a result of their design for the Ponds Forge swimming pool, which is close to the University's city campus.

The brief for Faulkner-Browns was challenging, and had five key elements:

1. *Excitement*: We wanted to create a building which was exciting. Learning and discovery is an exciting experience and we wanted a building which would convey that sense of excitement to our students. We were keen to encourage use of the building through providing a creative and stimulating environment which would attract students.
2. *Visibility*: The building contains a wealth of resources and expertise, and we wanted it all to be highly visible so as to make students and academic staff aware of all the possibilities. The design deliberately puts everything on show, and we looked to department stores and recreation centres for our ideas here, rather than to traditional educational buildings. Linked to this was the need for the building to be easy to use; it should, for example, be easy to orient yourself without the use of elaborate guiding systems.
3. *Flexibility*. Given the likely changes in technology, for example as electronic information replaces print, and changing patterns of use, it was essential that the building should be highly flexible. It also needed to be integrative, to allow services to develop and staff to work together.
4. *Environmentally responsible*. There was a requirement for the design to be environmentally responsible, with a high degree of natural lighting, heating and ventilation, minimum energy use and the use of appropriate materials for construction and finishes.
5. *The site*. Finally, there was the need to deal with an unusual site. The building was to be located in the city centre, on the side of a hill

with a twenty metre drop from the top on Arundel gate to the bottom on Pond Street, and located over old mine workings.

The initial design brief was developed by the project team who worked closely together - indeed, the close partnership which developed between the University, the architects and project managers was one of the successes of the project. At the very beginning of the design phase, a number of joint visits were made to new libraries and learning resource centres in the London area and this was followed by a study tour to the United States to see new buildings in Boston and New York. In addition to libraries, the team looked to other public buildings for ideas, including department stores, leisure centres, and civic buildings.

The architect's view of the project is described in a paper presented at a conference held at the Royal Institute of British Architects in 1995 ²¹. The consultations within the University to develop the design brief are described in an interview with the author ²².

BUILDING DESIGN AND LAYOUT

The most distinctive feature of the Adsetts Centre is the design of the southern face of the building. This consists of a series of gulls' wing roofs which are striking from the outside; they create a variety of ceiling heights within the building which bring a sense of space and visual interest. They also allow for a very high penetration of natural light into the building but have been designed to prevent direct sunlight falling on to reading surfaces and PC screens (see Photograph 1).

The Adsetts Centre is located at the northern end of the city campus and it is linked to the main University complex via an external walkway on Level 4, which is in the middle of the building. The seven floors are laid out as follows:

- 7 Learning and Teaching Institute
- 6 Law and official publications
- 5 Business and management
- 4 Entrance, General Services, Media Studio
- 3 Technology and Environment
- 2 Science and Computing
- 1 Stack; Print Unit

The Learning and Teaching Institute (LTI) on the top floor is designed

²¹ *The development of Learning Resource Centres for the future*, proceedings of a conference held at the Royal Institute of British Architects, 10 October 1995. SCONUL, 1996.

²² The development of the Adsetts Centre, Sheffield Hallam University, based on an interview with Graham Bulpitt in *Deliberations on teaching and learning in higher education*. (Electronic journal: <http://www.lgu.ac.uk/deliberations/lrc/sheffield.html>).

to act as a professional centre for teachers, and consists of an open plan area for LTI staff and teaching staff who are working on projects. The heavy printing equipment and compact storage is on Level 1 at ground level. The two tiered lecture theatres and seminar rooms are on Level 6.

The remainder of the building contains the main open area from Level 2 to Level 6 which is vertically linked by the space underneath the gulls' wings and two central light wells. The reception, issue desk, media studio, shop, and key text collection are located on Level 4, which also houses the open plan area for administrative staff and senior staff offices (see the floor plan). It is possible to see glimpses of the entire building from the entrance area: this meets one of the key elements of the design brief: that the building should be highly visible. Even on the shortest of visits, students are exposed to the range of facilities contained in the building and the open design and layout ensures that nothing is hidden away.

The remaining four floors, Levels 2, 3, 5, and 6, are dedicated to the building's main collections and services and house most of the study accommodation. The building follows the tradition of many UK universities of arranging services by broad discipline: the intention at Sheffield Hallam is that students should find most of what they require on a single visit housed on the relevant subject floor: books, journals, audio-visual material, electronic information sources, multimedia materials, desktop services, specialist software, a variety of study accommodation and help from staff. The teams of Information Advisers are trained to deal with enquiries across the range of services: library, information, and computing ²³.

BUILDING SERVICES AND INFRASTRUCTURE

Given the likely changes affecting the activities taking place in the Adsetts Centre, flexibility was the key element in planning the internal space and the delivery of building services.

The building structure is based on a 6.5m x 6.5m grid and the reinforced plate slab floors are built to a specification that will allow book shelving to be placed anywhere. A raised floor allows power and data to be delivered throughout the building and is also used for the distribution of air through perforated carpet tiles. There are few hard walls within the building, except for the essential cores containing lifts, stairs, toilets, and plant.

The main fluorescent lighting is provided in a grid which is set at 45 degrees to the external walls: this allows furniture and shelving to be placed in any direction. The lighting is also moveable along the strips and is programmable for different lighting levels from 100% to 30%. Additional uplighting and spotlighting is provided around perimeter walls and

²³ Information concerning Learning Centre services is contained in the Sheffield Hallam University Web pages (<http://www.shu.ac.uk/services/lc/index.html>). There are also pages for the Adsetts Centre (<http://www.shu.ac.uk/services/lc/people/lcintro5.html>).

stairways and also under the gulls' wing roofs. This artificial lighting produces a stunning external view at night, and the layer of glass near the top of the building creates the illusion that the top floor is floating in mid-air!

Security has been a major consideration in the design and operation of the Adsetts Centre. The city centre location, next to railway and bus stations, and the long opening hours make it essential to provide a high standard of protection for people working in the building and for its contents - particularly books and computing equipment. The building is currently open for 72 hours over seven days each week during teaching weeks, but it has been designed for 24 hour operation. The underlying assumption here has been that all the major areas of the building would be accessible at night.

The main public areas are in a security zone which is controlled through the entrance and exit on Level 4. This has entry gates which can be controlled by identity cards (containing bar-codes or magnetic stripes) and a book security system. Proximity cards are used to control access to a small number of staff areas and to allow staff to use other routes in and out of the main security zone. Closed-circuit television is installed throughout the building: there are public monitors on each floor and the system is monitored and recorded in the main University control room.

A number of features in the building design make the building easy to use. The gulls' wings and light-wells provide a strong sense of orientation as people move around the building. A standard layout has been adopted on each of the four subject floors which mean that the information desk, books, periodicals, computers and study seating are easy to locate.

A major challenge for the architects was for the building to accommodate a variety of study accommodations. The annual user surveys show that approximately half of the use is for group work and the remainder is for quiet and individual study. The building also has to provide suitable environments for work with audio-visual media and computers as well as printed materials.

A variety of purpose-built seating is provided on each floor: this comprises study carrels divided by black mesh screens, open group worktables (with a distinctive curved shape), and standing-height tables for use with OPACs. The western side of the building contains noisy areas for group work and traffic around the building and the level of noise reduces towards the eastern side. This is achieved through the use of absorbent surface materials, the location of book-stacks and the white noise created by the air-handling plant. It is intended that the variety of space will allow staff and students to find optimum working conditions on each visit: the type of study places which suits them, the right level of noise, and the appropriate equipment.

SUMMARY

It may be useful to conclude with a summary of our impressions after

a year or so of the building in use. The Adsetts Centre is already popular with students - as noted earlier, half of the university's students visit the building every day. The benefits of integration, which were key to the design of the building, are emerging as students start to work with a range of different materials and as integrated staff teams work together to support them.

In many ways, the building has worked even better than we had expected. The building has coped well with a substantial increase in use in the current session which started in September 1997. The buzz created by movement and activity creates a strong sense of purpose and stimulates students to work. The building is easy to manage since the design makes it easy to sense what is going on throughout the different floors. The open design has also created a stronger sense of community - both among the Learning Centre staff and with the academic staff and students who use it every day.

LA BIBLIOTHÈQUE NATIONALE DE FRANCE

An overview of its new building, network and information systems

*by Jean-Marc Czaplinski,
Head Division Études et développement, Direction des systèmes informatiques,
Bibliothèque nationale de France*

Abstract: *Launched in 1988, the project of a new national library of France will reach a major step in his life: the opening of the research rooms, giving access to the patrimonial collections, in mid-1998. This project of a new library has soon implied the conception and construction of a new building, and then the need of a large information system using up-to-date technologies.*

In this communication, we start to briefly present the building and how the library will use it. Then the different information systems currently in use or in development are presented. To focus on the close link between the building and its information systems, we describe how the circulation system will work and be automated in the library, and the place taken by network installations in the library. To finish, some technical data's are given on the network equipment and the information systems.

This document and all information included, are copyright Bibliothèque Nationale de France.

Thanks to Daniel Renoult (Director of DSI), Dominique Guiffard (network engineer in DSI), Sylvie Mony (Audio-visual Department) and the DDC (Direction du Développement Culturel) for all information given.

1. INSTALLATION OF THE LIBRARY IN THE BUILDING

Dominique Perrault's design for the building is schematically based on a hollow rectangular podium block supporting a tower in the shape of an open book at each corner. The four glass-covered 79 meter-high towers accommodate seven office levels shielded by movable wooden screens and eleven storage levels protected by matching screens of insulating material.

The podium area forms a single esplanade with wide passageways giving access from the Seine embankment. To reach the library entrances, readers cross the esplanade, which is floored in wood and serves as both a public square and a terrace. The library itself is first observed through the treetops emerging from a garden covering more than one hectare in the central area.

The reading rooms occupy two levels around the garden, with

workshops and stack areas encircling them on the outer side. The stacks provide 395 linear kilometres of shelving altogether and are located partly within the podium block, next to the reading rooms, and partly in the upper stores of the tower blocks. Service areas encircle both the stacks and reading rooms at each level.

Crossing the esplanade, the library entrances are reached by two symmetrical gently sloping walkways along the shorter sides of the garden on the east and west sides of the building.

Below the podium area, the library is structured around the garden on two levels: *the upper garden level* (haut-de-jardin) and the *garden level* (rez-de-jardin).

The *upper garden level* is the level intended for the general public. Beside the two main entrance halls and the nine reading rooms, each one specialized in one theme, it includes two exhibition rooms, six small meeting rooms and two auditoriums. (see figure 2)

The *garden level* is the level intended for researchers. It includes twelve reading rooms and a series of study - carrels on the mezzanine. Patrimonial collections will only be available in these reading rooms: over 10 million printed volumes, about 350,000 periodicals titles, and 1 million sound recordings. (see figure 3)

The reading rooms and collections on both levels - *upper garden level and garden level* - are organized into four thematic departments, one audio-visual department and one bibliographic research department.

The four thematic departments relate to the four major fields of knowledge.

- D1: department of philosophy, history, and human sciences
- D2: department of political, economic and legal sciences,
- D3: department of science and technology,
- D4: department of art and literature.

Main figures to remember about the building :

Podium	Length; Width (east side; west side) : Surface (without stairs)	375 m; (237 m; 187 m) 58 811 m ²
Garden	Length; Width : Surface :	187,20 m; 57,60 m 10 782 m ²
Public areas	Upper garden level - surface; height; seats : Garden level - surface; height; seats :	26 540 m ² ; 7 meters; 1600 28 680 m ² ; 13 meters; 2100

Professional areas	Surfaces : - book stacks (garden level, towers) - offices (towers) - workshop, book circuit	30 700 m ² · 26 660 m ² 16 240 m ² 34 103 m ²
Towers	Height : External length of each half tower : Levels by tower :	76 m 46.80 m 20 (7 office levels, 11 book stacks levels, 2 technical levels)
Total	Total floor spaces : Total usable surfaces including book stacks : including public areas :	365 178 m ² 159 855 m ² 57 360 m ² 55 220 m ²

4. OVERVIEW ON THE MAJOR INFORMATION SYSTEM PROJECTS OF THE LIBRARY

Related to the installation of the Bibliothèque Nationale de France in the new Tolbiac building three major information systems projects were launched, together with two data-acquisition projects:

4.1. main information system project

The Bibliothèque Nationale de France is in the process of installing a fully integrated information system covering most of the different applications used by the library:

- resource management: accounting, human resources management, office automation systems, meetings and exhibitions;
- physical plant management: storage, conservation, building and equipment, transportation ;
- internal bibliographic services: receiving (copyright deposit, acquisitions, gifts, exchanges), cataloguing, digitization;
- public services in the library: ticket sales, readers' check - in and accreditation, access control, general information services
- communication of documents: catalogue research, reservation and delivery of documents at garden level, library lending and document delivery, long - distance document consultation, catalogue research, direct access to text documents available in digitized form, network of 200 CD-ROM titles, access to Internet.
- external access to the library: long - distance reservation of readers' seats and documents, catalogue research, general information services

Added to these applications, readers will have possibility to use their own personal computer to access the system and even store some document extracts on

magnetic supports.

This project is realized by Cap Gemini Corporation for software integration and development, and by a consortium headed by the Bull Corporation for the hardware

This new system is planned for introduction in three successive versions, from mid 1998 through 1999.

4.2. Audio-visual system project

A system dedicated to the audio-visual documents management and consultation is also in the process of development and installation. Linked to the main integrated system, it will deliver audio-visual and multimedia documents to multimedia workstations installed at the two levels of the library: *Upper Garden and Garden Level*. This system is designed and set-up in three phases during 2 years, finishing mid-1998, by a group of three companies: L'Entreprise Industrielle / OTH / SETEN.

4.3. Automated document transport system project

The library is equipped with an "automated document transport system" (TAD), used both for delivering work from the book stacks to the reading rooms and for the different stages in storing and preserving documents. This system, set-up by two companies Teledoc and Cap Gemini, is already in place and working.

4.4. Union CATALOGUE

The various catalogues will be combined into a single one. This *union catalogue* of all of the printed and audio-visual works will include 8 million bibliographic records. As a precondition of this undertaking, a retrospective conversion of older records has taken five years of work: it is one of the grand technical tasks of the project. It will permit, by 1998, access to a catalogue describing all of the public documents in France, from the beginning to our day.

4.5. Digitized documents

A vast *digitized collection* is in the process of being assembled. Composed primarily of patrimonial documents, it will include 100,000 works in TIFF and SGML format, 300,000 images in JPEG format, and the equivalent of 1000 hours of sound recordings in MPEG2 format.

The following figures give a better idea of the size and complexity of these information systems:

Catalog	8,3 millions of bibliographic records in 1998, with an annual increase of 300.000, representing 5 Gbytes of information in year 2000, 10,2 millions of holding records in 1998, with an annual increase of 880.000, representing 1,9 Gbytes in year 2000, 4,8 millions of authority records in 1998, with an annual increase of 150.000, representing 2,5 Gbytes in year 2000,
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	Catalog engine will have to support peaks of 150 searches by second, 33 % keyword searches. 2300 creations or updates of bibliographic records by day
Communication and public services	260.000 public users (including 100.000 researchers) a maximum of 18.000 document requests by day, 4.000 seat requests by day, 1.000 requests by day for duplication of documents, photocopies, prints, magnetic copies. 2100 seats at garden level
Books stacks	10,5 Gbytes of storage address, location, shelf numbers, 180.000 physical document movements traced by the system each day, representing 3,6 Gbytes of information
Digitized documents	100.000 documents, 30 millions pages representing 2,4 Gbytes of data in 1998 300.000 images in 1998 1000 movies in 1998
Number of terminals	3000 terminals of public and professional users 1000 printers

5. INFORMATION SYSTEM: PRESENTATION OF CIRCULATION

In order to offer circulation of patrimonial documents in the garden level reading rooms, a specific circulation organisation was defined, and then, a specific circulation system has been specified and is currently in development.

The following picture represents all the processes and organisation covered by circulation:

- Step 1: reader must be registered as a researcher to access the garden level. If he is not, he has to go to registration desks and get a researcher access card.
- Step 2: to enter the reading room, reader must have a seat booked for him. When a reader requests a seat, he can, at the same time, specify documents he wants to consult. This step of seat booking must be done before entering reading rooms.
- Step 3: reader enters reading room and go to his seat. There should be a check-in to see if he has booked a seat.
- Step 4: books stacks personnel are immediately informed of all documents needed by readers in reading room, stored on their shelves.
- Step 5: documents are directed to the circulation desk in charge of the seat reserved to the reader.

- Step 6: when documents reach circulation desk, reader is informed at his seat that his documents are ready for him. He can pickup these books and later discharge them at the same circulation desk.
- Step 7: documents are returned to their initial bookstacks.
- Step 8: reader leaves the reading room: a checkout should be done to see if he has returned all his documents.

All these steps will be covered and automated by the information system as much as possible:

- In step 1: registration desks will be equipped with a registration application allowing immediate registration of the reader and delivery of its access card. Photos will be taken and printed by the system on access card.
- In step 2: public workstations will be installed in reading rooms and outside reading room. They will provide orientation information, catalogue access and seat request functions. Reader can also cancel or postpone requests
- In step 3: to enter reading rooms, reader will pass through access control equipments using his access card, checking card validity and existence of seat booking in the information system. If check-in OK, reader will be allowed to enter reading room and the information system is informed of user arrival, and automatically starts step 4.
- In step 4: workstations installed in each books stacks will display list of documents needed in reading room and lists of documents sent back by the circulation desks. Task of getting and storing documents on shelves will remain manual.
- In step 5: an automatic transport system (TAD) will serve the entire building, using 152 service points throughout the library and eight kilometres of rails: it is composed of 450 automated carts equipped with bins which hold the documents. Delivery time for a document from the stacks to the reading rooms is to be less than 20 minutes. Traffic management for the carts is administered by a computer sub - system that is integrated with the main information system of the library.
- In step 6: workstations installed in the back office part of circulation desks will display lists of documents coming from books stacks with associate user/seat and list of documents sent back to books stacks after discharge by users. When all documents of a reader are ready, they are given to the front office part of circulation desk where librarians use workstations to register issue / discharge movements.
- In step 7: documents are automatically returned to their original bookstack, using the automatic transport system.
- In step 8: After reading of the reader's access card, the access control system will automatically ask the main system to get confirmation that reader has returned all his documents.

To make all this more efficient and more convenient to readers and librarian personnel, requests of seat and books will be allowed days, or even weeks, before arrival in library. This will be possible from all public workstations in the library, but also, from home, using MINITEL terminals and later Internet access.

With knowledge of all dates of arrival of readers and documents

requested, the circulation system will create and manage its own planning of document movements, and automatically start step 4 half a day before reader arrival. Documents should then be immediately available in circulation desk at reader arrival, avoiding the 20 normal minutes of waiting due to transport.

To improve this feature a step further, documents will then be manually stored near circulation desks in deposit boxes. Identification of box used will be determined by circulation system, managing status of all deposit boxes available in the garden level. At arrival, reader will just have to go to these deposit boxes, read its access card and get its deposit box open for immediate delivery of its document without help of librarian. The information system will be automatically informed that a reader has opened its box and then taken its book.

All these features should reduce the workload of librarians working in circulation desks and books stacks at peak time - opening of reading room - when everybody waits for documents at the same time.

Another facility offered in reading room is the « calling lights » system (lampe d'appel). Each reading table will be equipped with two small lights. The first one will be lighted when the reading table is booked by somebody and supposed occupied by somebody. The second one will be flashing when reader is called by the circulation desk for information or book delivery. All these lights will be controlled by a central control system by radio waves connections. This central control system will be connected to the information system, allowing automatic control of these lights from the main information system. Readers will see their lights flashing automatically when one of their documents is available at circulation desk.

In the reading rooms of the garden level, librarian personnel will be located in 10 circulation desks, each one in charge of around 200 seats with a charge of 1800 document requests by day. This high level of activity and document movements means a special attention must be given to the layout of these circulation desks.

Each circulation desk is organised in two parts: the back office desk and the front office desk.

The back office desk, not visible by the public, is in charge of: sending and receiving documents with the automatic transport system, and sorting of documents received by user request. To help this task, processing shelves and special shelves for large format are installed around the room.

It is equipped with 2 workstations running the communication sub-system and 1 workstation dedicated and connected to automatic transport system (TAD).

The front office desk is the visible part of the circulation desk for the public. It is the place where he has to go to pick up and discharge his documents, or ask for services and information.

It is equipped with 4 workstations running the circulation sub-system

for all the operations of issue/discharge and seats management, and 4 public workstations used by librarians to help users doing searches in catalogue for example.

Rows of deposit boxes are located close to each circulation desk in order to reduce distance with the back office desk for document manipulations.

6. NETWORK INSTALLATION IN THE TOLBIAC BUILDING

Create a new large library with such a use of information systems, without thinking from the beginning to a large network using up-to-date technologies would have been a major error. The idea of a network installation, backbone of all the information systems installation in the new building was introduced during the design of the building. So, the construction of the new building includes the installation of the network infrastructure: cables, fibres, technical rooms, network plugs,...

The network installation in the building looks like a huge web linking together workstations, servers, printers, and various equipments, based on three families of nodes.

- the computer room (at L2 level)
- the four Primary Technical Rooms (LTP)
- the sixty eight Secondary Technical Rooms (LTS)
-

The 68 LTS are distributed over all the building and allow connection between the 17000 plugs (RJ45) installed and the main network. Cables used are twisted copper cables 120 Ohms, category 5 and represent about 450 km of cables.

Each LTS is then connected to one of the four LTP by optical fibre (each LTP is located at the bottom of a tower).

All LTPs are then connected to the computer room at L2 level with optic fibre.

The computer room at L2 level is the heart of the system as it houses all the main and secondary servers of the systems and all the magnetic storage equipment.

Added to these connections, special connections are allocated to the Computer Department of the library, located in tower 3 level 5,6 and 7.

A total of 8200 optical fibres in monomode (indice 9,5/125 μm) or multimode (62,5/125 μm) categories have been used, representing a length of 100 km.

7. SOME TECHNICAL INFORMATIONS ABOUT INFORMATION SYSTEMS

7.1. Networks

1) Networks of main information system

- ATM 155 Mbytes/s is used to connect together all servers, anteservers and even all workstations.
- All network hardware and software is provided by FORE SYSTEMS et BAY NETWORKS
- An Ethernet 10 Mbytes network is used for printers, access control, automatic transport and all equipments not supporting ATM.

ATM switches used are FORE SYSTEMS ASX1000, ASX-200BX and ASX-200WG. The ASX1000 equipments are installed in the main computer room and the four LTP. They create the backbone of the ATM network. The ASX-200 are located in each of the 68 LTP.

For Ethernet, equipments used are Hubs 2814 and 2804 from BAYNETWORKS, installed in each LTS and PowerHub 7000 from FORE SYSTEMS, installed in each LTP, providing connection between Ethernet and the main ATM network.

On ATM network: LAN Emulation 1.0 and DHCP technologies are used, together with IP protocol

On Ethernet network: DHCP technology is used together with TCP/IP protocol.

2) Networks dedicated to the audio-visual system

The audio-visual system network has an analogue part and a digital part. The analogue part (optical fibre) is dedicated to the transmission of the analogue video stored in the robot. All others types of documents (including digital video) are transmitted through the digital network. This network uses ATM technology (Asynchronous Transfer Mode). Two backbone switches COLLAGE 740 (MADGE NETWORKS) are used; they are connected to 5 others switches called "stage switches" with links at 155 Mb/s. Connection between these stage switches and the workstations are linked at 25 Mb/s. We can say that the audio-visual system's digital network is « all ATM ».

7.2. Main information system

After different steps of specifications, conceptions, technical studies and prototypes, the new system will be developed in three sequential versions scheduled for completion in may 1998, end 1998 and mid 1999. First version of the system is focused on all the public applications and resource management. It is currently reaching end of its programming phase and will enter integration, test and reception phases. This first version will allow opening of the garden level reading room in June 1998.

The main system, divided in 20 applications, is a specific development using client-server, graphic and objet technologies. All developments are done in C++. As one requirement of the catalogue was support of multiple character sets, including non-Latin ones, developments of al the software around the catalogue management is done with support of Unicode in 16 bits. One other specific point of the catalogue is the use of Fulcrum engine for keywords searches on the 8 millions bibliographic records.

Some applications, like human resources management system, accounting system or office automation, are however built around standard software packages: HR Access, Microsoft Office 97, Lotus Notes 4.6.

The 10 main servers are all Sequent SMP UNIX machines running UNIX System V, Oracle parallel server release 7.1 and Tuxedo release 6. The 47 secondary servers are small Sequent machines running UNIX System V, Bull Escala machines running UNIX System V or Microsoft NT 4.0 server and Zenith Bi-Pentium machines running Microsoft NT 4.0 server. All digitized documents are stored on 8 PLASMON jukeboxes, each one supporting up to 255 CD-WORM. Storage capacity at opening will be 3 Tbytes.

The 3000 workstations are Zenith PC workstations (Pentium 133 MHz, 32 to 64 Mb ram), mainly equipped of 17' screens, and running Microsoft Windows NT 4.0 operating system. They are all equipped with a Fore-System ATM network card at 155 MHz. Except special purpose printer (like ticket printer), all printers are KYOCERA printers.

7.3. Audio visual system

The audio-visual system is divided in two parts connected together through its own dedicated ATM network: the set of servers and robots called the "studio" and the workstations.

1) Servers and robots

The studio are a combination between servers and robots. Schematically, we can say that servers provide digitized documents while robots provide analogic documents. The studio of the General Public level consists of servers and automatic robots, and the studio of the Researchers Level consists of semi-automatic robots and manual units.

Video encoding operations, that are subcontracted, are made with an encoding station MINERVA. The standard compression for video is MPEG-2, and the bitrate is 4 Mb/s; for audio, MPEG Audio Layer 2 was chosen, with a bit rate of 384 KB/s. The audio encoding is made on PC with software provided by the CCETT (Centre Commun d'Études de Télévision et Télécommunications - Rennes).

The storage is made with DLT (Digital Linear Tape).The server for display is an ALEX machine, using a MPP architecture (Massively Parallel Processing) with a useful capacity of 648 Gbytes.

For pictures, the operations of digitisation are also subcontracted to external companies. The compression standard is JPEG. The loading station is a PC Pentium, and another ALEX machine is used for display (useful capacity: 164 Gbytes). Each photo is stored in 3 different resolutions (128*192, 512*768, 1024*1536).

At last, a jukebox that can contain 300 multimedia CD-ROM provides display on 8 dedicated workstations.

In September 1997, 2 robots (GRAU) will complete the servers: the first will hold 2880 videocassettes S-VHS, and the second will hold 11 520 compact discs. In May 1998, a third robot, semi-automatic, will complete the mechanism of video and audio display for the Researchers level.

For records (78 t, long-playing records) which are the most important part of the audio materials at the Researchers level, some manual turntables will be necessary. However, a real time digitisation will help to meet again the diversity of functions needed for an interactive consultation.

2) The audio-visual workstations

There will be 145 when the whole system will be set up. Each workstation is a PC Pentium (133 MHz, RAM: 32 Mbytes, hard disk: 1,2 Gbytes), equipped with several cards: a video MPEG-2 decoding card (Videoplex by OPTIBASE), graphic and video encrustation card (Integral Technologies Flashpoint Lite 4 Mbytes), audio card (Soundblaster 64), network card ATM 25 (MADGE). These workstations will works under Windows NT 4.0.

CONCLUSIONS

*by Wim RENES,
City Librarian, Dienst Openbare Bibliotheek, The Hague, The Netherlands.
with contributions by participants of the Seminar*

The construction of a new library takes a long time. This was the conclusion of most of the lectures you have heard this week. Nearly all of you are in the beginning or in the midst of the planning process of your library. This is the main reason why you join colleagues' librarians and architects in this seminar; this is to learn something you will be able to use, not only from the lectures, but also between the meetings. During coffee breaks, breakfasts, or evenings, you have discussed special items in more depth with your colleagues. This is the essence of a seminar. It is the personal feeling I got from attending eight Section seminars, even if I am not the one who got the record for attending nine seminars. During the period when we were planning our library, here in The Hague, I had many contacts and went through several seminars and it works.

Already in 1985, there was a seminar in Hungary, just at the beginning phase of the planning process of the new City Library in The Hague. I had to present a paper, but was not the only one from The Hague, since I took one of the civil servants from the planning department of the City with me. Thus, he could have the same feeling and ideas, discussing subjects on library buildings with colleagues during the seminar. This is a marvellous opportunity to get more information out of the seminar and not only from the lectures themselves. For the lectures, the organizing committee can do little, other than thinking on a theme like « Intelligent Buildings », and choose a large variety of experiences that can be provided to all the participants.

You came from all over the world, through long distances, you are a week away from your office and your home; it costs you a lot of time and money. I only hope that, at the end of the seminar, at least you all have the feeling that it was worth coming to The Hague, because of the situation I just described.

There are a few items I want to go into some details. For me, for the Organizing Committee and for the Standing Committee, of which Marc is the Chairman and Marie-Françoise the Secretary, it is important to hear, to know your ideas, your feelings, your comments about this seminar and also what can be picked up for the next seminar. I am sure that there will be, in a short time, an eleventh seminar, somewhere in the world. By the way, the Section on Library Buildings and Equipment is an IFLA Section and is a very hard working section; I can say that since I am not an officer anymore. Ten seminars prepared in a rather short time, study tours organized in Finland, Sweden and Germany, four leaflets prepared. All volunteered by colleagues

from all over the world, and I never heard someone complaining about the Section.

We will send out a questionnaire, please send it back to us. You will also receive at the coffee break a complete list of participants, with all references, addresses, telephone, fax, e-mail. I expect also your personal comments on this list by fax or e-mail.

But, if you have comments to present now on the seminar, please take the microphone.

Mrs. Tamar Harari: I think that the subject chosen for the seminar was a very wise one, and what we have seen and heard will help us to be more aware of the intelligent buildings whatever they can be called. I think that we are just at the beginning of thinking of planning intelligent buildings. At this point, I feel we don't have enough experience to evaluate better how our services are being improved but I feel that we are on the right track and... the sky is the limit.

Mr. Marc Chauveinc: Besides the comments on the present seminar, we would also like to have your ideas on the theme of the future seminar, two year from now.

Mr. Wu Jiangzhong: I am very pleased to attend this seminar and am very happy. I have now a very clear idea of the library building of the future. Many years ago, people were saying that libraries are going to disappear. On the contrary, I think that libraries will grow, because libraries are not only information but also knowledge and culture. May be, ten years from now, libraries will be first, because libraries and librarians are very important.

My second comment is on the future seminar. I just put forward a proposal to the chairman, that the Shanghai library would like to hold the next seminar in Shanghai. The first reason is that Shanghai is not far from Bangkok. The second reason is that Shanghai has just opened a very good library of 83 000-sq. m.². We have the latest technology, with an on-line Windows based system and a client -server structure. We also have a Telelift and an air-conditioning system using gas. So, in two years time, we can accumulate a rich experience. The third reason is that we have good facilities for holding seminars, such as three seminar rooms and a lecture hall of 872 seats, a multi-functional room of 200 seats. The stage of this room is movable and there is a simultaneous translation system for five languages. In China, there is a bloom of new library buildings. In the year 2000, we will have about twenty provincial libraries being built. Near Shanghai, there are three provincial libraries at Nanjing, Hangzhou and Fujian. If you go there, you can see new Chinese libraries, though the quality of the building is not as good as the one of the City Library of The Hague and of other libraries, but for a developing country it is worthwhile looking at these developing libraries.

Finally, I thank the staff of the City Library of The Hague and also the Standing Committee of the Section.

Marc Chauveinc: The Section thanks you very much for your proposal and accepts it. I assure you that this proposal will be submitted to the Standing Committee to-morrow morning when we have our first meeting in Copenhagen.

Wim Renes: I would like to support the suggestion of Mr. Wu. I have been in China and the combination of a Pre-conference Seminar before the IFLA General Conference works out very well. Considering the long distances involved in the congress, the combination is easier than one separate meeting. I strongly support this proposal.

Marc Chauveinc: We still have to find the theme of this seminar.

Wim Renes: There are two other items on our agenda that came to my mind last night and I would like to present them to you. At the beginning of our seminar, a lot of definitions of an « Intelligent building » have been presented. I think of the first one, given by Harry Faulkner-Brown, but also of the definitions given by Mrs. Muñoz and Dr. Kolasa in their presentations. In all the papers, I recognize the words « flexibility », « functionality ». Without specifically speaking on a topic like intelligent buildings, but only of library buildings used by people, of libraries created for today and tomorrow, functionality and flexibility are still the keywords.

Moreover, during this period, an extra item has been brought in, which is Information Technology. We did not have Information Technology to think of twenty or thirty years ago, but we needed already at that time functional and flexible libraries. It was the same as today, information technology was just an extra when it came in. For the future of libraries it is essential that always new developments in technique and in the way of working within libraries, will fit into the library buildings. Functionality today means also functionality in the future of libraries. Planning a new building today is planning for the unknown future.

In Venezuela, the process of planning started in 1978, and is still in progress. They ask for flexibility and functionality and put them into the planning.

An « Intelligent Library » mentioned by Hanke Roos in her paper on Monday, is the basis for a good library. But what makes a library intelligent is that it is a functional and flexible library properly working.

These are some of the items I wanted to mention.

Another problem was mentioned by different speakers, concerning the custom-made software; what we saw and what was presented in Tilburg on Wednesday. This was also mentioned by the Bibliothèque nationale de France and by other libraries like the Deutsche Bibliothek in Frankfurt. Which direction do we have to go ? The best solution is still to take up one of Ken Dowlin's laws, to build as big as possible, it will last. When you accomplish these principles, it is always good for the library, since it brings people in. This is the aim of a library, which is not a building with books, but a building with people in. We have to excite them, to inspire them.

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The title of Rick Ashton's paper is also a very good one: « a machine for service »; we must think about it. That machine for service has to be developed as an intelligent machine for library services. Intelligent for now and for the coming decades. The result of intelligence towards flexibility for library building for the next 20 to 40 years is presenting a modern library system at the grand opening of the building and the years to come.

At the end of the seminar, I would like to repeat some of the keywords I personally picked up.

First, « staff training ». It was discussed several times, by the Denver Public Library, by the San Francisco Public Library, The Hague, etc.. It is essential, in a library working for its users, that the staff receives proper and durable training.

Second, « funding, capital cost, running cost », are important, especially for all these information technology developments that we are looking for and adding to our libraries. Lots of you have mentioned that funding and maintaining of information technology is essential in the future.

« Teamwork ». Building and planning a library can only be done in teamwork; I mentioned already the working groups of the City Library of The Hague, 30 or 35 persons for small or big subjects. In Denver, the children of the city were involved in the planning of their rooms. Bill Walker mentioned the combination of junior and senior staff members to get a higher grade in coming to the people and helping the people do their work.

In total, teamwork is essential, not librarians working independently from architects or engineers or from consultants, but all working together.

My last point, we have to listen, we must have open ears, continuously to all contributions of all, municipality, politicians, librarians, architects, consultants to obtain what we aim at that is an « Intelligent library building » which can cope with the coming next decades . This my conclusion.

CLOSING REMARKS

by Marc Chauveinc

Chairman of the Section on Library Buildings and Equipment

This is the end of our trip to some nice and impressive intelligent buildings of the world. From the USA to Venezuela, from Germany to the Netherlands, from England to France, we covered a lot of ground without moving from our chairs.

Wim Renes has given us the scientific conclusions of the seminar. But, after all these days of listening to our speakers, it occurs to me that there is a definition of intelligent buildings. Even if Harry Faulkner-Brown thinks that only men can be intelligent.

May be, we should not have chosen the word intelligent (it was a bit provocative), but another term, such as reactivity. My own conclusion is that an intelligent building is a building that can automatically react to external and internal conditions. Adaptability and reactivity are, together with functionality and flexibility given by Wim Renes, the keywords of an « intelligent building ». And behind the scene, electronics and telecommunications are the key factors for a building to decide more and more operations. Microprocessors will be located inside objects and will communicate between them. Sensors will be added to various apparatus and will provide interactions between the building and many processes inside and outside. There will be « intelligent » interactions and adaptations between things.

But above all, my conclusions are that the Seminar took advantage of the superior and successful organization of the City library of The Hague.

Meetings rooms were more than adequate, they were quiet and clear and comfortable. AV materials were functioning without difficulties; papers, coffees, meals were delivered perfectly on time in a very pleasant environment and with great kindness. All the invisible details that make a meeting runs smoothly, and I know the degree of competence and goodwill that is needed for such a result, were there.

On your behalf and in mine, I would like to thank very warmly Wim Renes and his staff, in particular Hanke Roos who was looking after everything. They all made our stay in The Hague comfortable and enjoyable.

ANNEXES

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