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 neighboured 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.

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

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 increasing 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 $m^{2)}$ 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' specialities 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 m^2) 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 supplement 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 SCONUL 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.

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 m², 26 660 m² 16 240 m² 34 103 m²
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 m² 159 855 m² 57 360 m² 55 220 m²

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 theses 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,

	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 theirs 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 theses 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 theirs 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.

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

LIST OF SPEAKERS

Mr. Rick ASHTON, Director of the City Library-Denver Public Library, 10 West 14th Avenue Parkway, CO 80204-2731, Denver USA. E-mail: rashton@denver.lib.co.us.

Mr. Graham BULPITT, Director of the Adsetts Learning Center, Sheffield Hallam University, City Campus Pond Street-S1 1 WB-Sheffield, United Kingdom. E-mail: g.bulpitt@shu.ac.uk.

M. Jean-Marc CZAPLINSKI, Direction de l'informatique et des nouvelles technologies, Bibliothèque nationale de France, Quai François Mauriac, 75706, Paris Cedex 13, France.

E-mail: jean-marc.czaplinski@bnf.fr.

Mr. Kenneth-DOWLIN, Professor, San Jose State University, San Francisco, USA. E-mail: ken@dowlin2000.org.

Mr. Reimer ECK, Leiter der Benutzabteilung, Niedersächsische Staats und Universitätsbibliothek, Platz der Göttinger Sieben 1, PO Box 2932, D-37073, Göttingen, Germany.

E-mail: eck@mail.sub.uni-goettingen.de.

Mr. Hans GELEIJNSE, Director of Library, Katholieke Universiteit Bibliotheek Brabant, Warandelaan 2, 5000 LE, Tilburg, The Netherlands. E-mail: library@kub.nl.

Mr. Harry FAULKNER-BROWN, architect / consultant, Anick House, Anick, Hexham, United Kingdom.

Dr. Ingo KOLASA, Die Deutsche Bibliothek, Adickeallee 1, D-60322, Frankfurt-am-Main, Germany. E-mail: kolasa@dbf.ddb.de.

Dr. Paul LeCLERC, President and Chief executive officer, The New York Public Library, 5th avenue and 42nd street, 10018, 2788, New York, USA.

Mr. Frans MEIJER, Director, Gemeentebibliotheek, Hoogstraat 110-3011, PV Rotterdam, Pays-Bas.

Mr. Jacques MOL, Consultant, Valstar Simonis Consulting, PO Box 1935, 2280 DX, Rijswijk, The Netherlands. E-mail: rijswijk@valstar-simonis.nl.

Mrs. Arq Elvira MUÑOZ-GIMENEZ, Direccion del Proyecto, Arquitectonico Sede Foro Libertador, Biblioteca Nacional de Venezuela, Apartado 6525-1010, Caracas, Venezuela. E-mail : cedinbi@conicit.ve.

Mr. Wim RENES, City Librarian, Dienst Openbare Bibliotheek, Bilderdijstraat 1-3, 2513 CM, The Hague, The Netherlands. E-mail: renes@dobdenhaag.nl.

Mrs. Hanke ROOS, Manager Central Library, Dienst Openbare Bibliotheek, Bilderdijstraat 1-3, 2513 CM, The Hague, The Netherlands. E-mail: roos@dobdenhaag.nl

Mr. Solke VELING, Director, Rekencentrum Katholieke Universiteit Brabant, Tilburg, The Netherlands.

Mr. William D. WALKER, Director of the research Libraries, The New York Public Library, 5th avenue and 42nd street, 10018-2788, New York, USA. E-mail: wwalker@nypl.

LIST OF PARTICIPANTS

Mr. ADCOCK, Gary, Building consultant, National Library Board, Singapore

Mr. ALEXANDER, Jude, National Library Board, Singapore

Mr. ANNEZER, Jean-Claude, Director, Bibliothèque de l'université Le Mirail, Toulouse, France

Ms. AUREN, Birgitta, Director, Vaasa City Library, Vaasa, Finland

Mr. AVAFIA, Kwami, Librarian, University of Namibia, Windhoek, Namibia

Ms. AWCOCK, Frances, Chief Executive, State Library of South Australia, Adelaide, Australia

Ms. AZEVEDO, Ana, Chief librarian, Faculdade de Engenharia, Biblioteca, Porto, Portugal

Ms. BISBROUCK, Marie-Françoise, Librarian, Ministère de l'Enseignement supérieur, DISTNB, sous-direction des bibliothèques, Paris, France

Mr. BOHN, Harald, Deputy Librarian, University Library of Trondheim Norway

Mr. BUJANG, Ithnin, University of Malaysia Sabah, Kota Kinabalu, Malaysia

Ms. CHAINTREAU, Anne-Marie, Librarian, Ministère de l'Enseignement supérieur, DISTNB, sous-direction des bibliothèques, Paris, France

Ms. CHAN TONG MEI-SIN, Kitty, Librarian, Urban Council, Kowloon Central Library, Hong-Kong

Mr. CHAUVEINC, Marc, Librarian, Paris, France

Mr. DAYANG RUKIAH, Amit, Librarian, University of Malaysia Sabah, Kota Kinabalu, Malaysia

Ms. DE BEER, Joan F., Deputy Director, State Library, Pretoria, South Africa

Mr. DEKEYSER, Raf, Director, Centrale Bibliotheek K.U. Leuven, Belgium

Mr. DE LEYE, Luc, Architect, K.U. Leuven, Belgium

Ms. ELONHEIMO, Rispa, Chief Librarian, Seinäjoki Public Library, Seinäjoki, Finland

Mr. EYMARD, Daniel, Librarian, Bibliothèque de l'université de Rennes II, Rennes, France

Ms. FAHY, Catherine, Education Officer, National Library of Ireland, Dublin, Ireland

Mr. GABEL, Gernot, Deputy director, Universitäts- und Stadtbibliothek, Köln, Germany

Ms. GASCUEL, Jacqueline, Librarian, Association des bibliothécaires français, Paris, France

Ms. GÖBBELS, Hanneke, Head Public services, Stadsbibliotheek, Maastricht, The Netherlands

Ms. GRIFFITHS, Vivien, Assistant, Birmingham City Council, Central Library, UK

Ms. GUILLAUME, Nelly, Head, Bibliothèque interuniversitaire des langues orientales, Paris, France

Ms. HARARI, Tamar, Consultant, Library Exact Science and Engineering, Tel Aviv University, Tel Aviv, Israël

Ms. HEIKKILA, Inkeri, Deputy chief librarian, Turku Public Library, Finland

Ms. HOPMA, Margriet, Librarian, Gemeentebibliotheek Utrecht, The Netherlands

Mr. JAYOUSI, Jamal, Architect, Sba / Architects and Engeneers, Amman, Jordan

Mr. KANE, Stephen, Architect, Office of Public Works, Dublin, Ireland

Mr. KERMEL, Philippe, Director, Bibliothèque de l'université d'Evry-Val d'Essonne, Evry, France

Mr. KEUNG, Timothy, National Library Board, Singapore

Ms. KOBIERSKA- MACIUSZKO, Ewa, Librarian, University Library Warsaw, Poland

Mr. VAN KOOTEN, Niekerk, Hoofd Depots, Universiteitsbibliotheek, Utrecht, The Netherlands

Mr. KOSKINEN, Kimmo, Librarian, Science Library, University of Helsinki, Finland

Ms. KUIPERS, Tineke, Librarian, Provincial Library North and South Holland, Alkmaar, The Netherlands

Ms. LEMAU, Elisabeth, Head, Bibliothèque de l'université de Rennes II, Rennes, France

Ms. LEROUGE, Françoise, Librarian, École nationale supérieure des sciences de l'information et des bibliothèques, Villeurbanne, France

Ms. LUHTALA, Tuula, Director, Kokkola Public Library, Kokkola, Finland

Mr. MADER, Bela, Director, Sgezed University Library, Szeged, Hungary

Mr. MATTIELLO, Enrico, Director, Bibliotheca d'area di architettura e urbanistica, Roma, Italy

Ms. MERCIER, Anne, Director, Bibliothèque de l'université de La Rochelle, France

Ms. MILTENBURG, Annemarie van, Building manager, University Library, Utrecht, The Netherlands

Ms. MOUM, Sidsel, Director, Oslo School of Architecture Library, Oslo, Norway

Mr. MÜNCH, Markus, Schulz bibliothekstechnik GMBH, Speyer, Germany

Ms. OOSTRA, Karin, Sub- Head Lending and Inf. University Library, Utrecht, The Netherlands

Ms. PAILLEY-KATZ, Arlette, Director, Bibliothèque de l'université de Paris 7, Paris, France

Ms. PALONEN, Vuokko, Director, Vaasa University Library, Vaasa, Finland

Mr. PERÄLÄ, Keijo, Director, Turku Public Library, Finland

Mr. PRAKOBPOL, Aphai, Director, Central Library Khon Kaen University, Khon Kaen, Thailand

Ms. ROOS, Barbro, Director, Malmö University College, Malmö, Sweden

Mr. SAHLSTEDT, Yrjö, Deputy Chief Architect, City of Turku, Finland

Mr. SASAKI, Hajime, Director, Toyo Eiwa Women's University Library, Yokohama-shi, Japan

Mr. SCHOOTS, Piet, Library Consultant, Rotterdam, The Netherlands

Ms. STEPHAN, Ute, Deutsches Bibliotheksinstitut, Berlin, Germany

Ms. STUEBING, Susan, Technical University Delft, The Netherlands

Mr. SUN, Chengjian, Deputy Director, National library of China, Beijing, China

Mr. TAN, Gene, Special projects, National Library Board, Singapore

Ms. THORFADOTTIR, Anna, Head Main Library, Reykjavik City Library, Reykjavik, Iceland

Ms. TRESSON, Catherine, Librarian, Bibliothèque de l'université de Paris 7, Paris, France

Mr. VAUTHIER, Alain, Director, Departmental Library, La Réunion, France

Ms. VILLANUEVA, Carmen, Pontificia Universidad catolica del Peru, Lima, Peru

Ms. VIRAGOS, Marta, Librarian, Medical University Library, Debrecen, Hungary

Mr. WEI, Guaung-Pu, Director, Shanghai University Library, Shanghaï, China

Mr. WU, Jiangzhong, Deputy director, Shanghai Library, Shanghai, China

Ms. ZAMORA, Rosa Maria de, Investigadora, UNAM-CUIB, Mexico, DF, Mexico

Mr. ZHU, Chen Gong, Librarian, Tsinghua University Library, Beijing, China