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

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

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

2. THE ARCHITECT

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

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

3. THE LIBRARIAN

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

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

TOGETHER

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

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

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

A FEW POSITIVE EXAMPLES

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

1. Floor plan

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

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

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

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

2. Floor height

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

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

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

3. Floor loading

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

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

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

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

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

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

PROBLEMS

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

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

1. Combination of city hall, library and shops:
    1.1. different measurements
    1.2. security

2. The philosophy of the architect:

2.1. open spaces and glasswalls

2.2. columns to remain free-standing

2.3. terraces

1. Combination of city hall, library and shops

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

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

1.1. Hulshoff, different measurements

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

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

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

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

Solution: youth department

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

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

1.2. Combination of city hall and library: security

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

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

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

Solution; keycards/facilitycards

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

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

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

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

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

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

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

2. The philosophy of the architect

2.1. Open spaces with glass walls

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

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

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

Solution; conveyor belt

To this end the library has found an ingenious solution.

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

2.2. Columns to remain free-standing

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

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

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

Solution; floor pillars

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

2.3. Terraces

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

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

But can the library use these terraces?

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

Solution; closing terraces

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

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

IN SHORT

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

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

AT LAST

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

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

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

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

INTELLIGENT BUILDINGS, A DESIGNERS POINT OF VIEW

by Jacques MOL
Consultant, Valstar Simonis consulting engineers, Rijswijk

ABSTRACT

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

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

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

INTRODUCTION

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

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

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

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

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

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

can function.

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

1. TAKE THE OPPORTUNITY TO TELL SOME ABOUT VS

Valstar Simonis

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

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

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

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

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

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

2. CONSUMENTENBOND (DUTCH CONSUMERS ORGANI-ZATION, THE HAGUE)

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

Holland Casino, Scheveningen

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

Feijenoord soccer stadion, Rotterdam

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

Het Concertgebouw, Amsterdam

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

Computer centre Wilgenplas, Rotterdam

Security, fail-safe, flexible, expansion.

American School, Wassenaar

Education, security.

Koningklijke bibliotheek (National Library, The Hague)

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

City hall and library complex, The Hague

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

3.1. Maximize the efficiency of its occupants

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

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

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

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

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

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

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

How this took place Wim Renes explained earlier.

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

- the air handling/conditioning system:

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

- the heating system:

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

- study-rooms:

With individual climate-control.

- automated outside sun screens:

With separate individual control.

3.2. Effective management of resources

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

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

- the escalators:

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

- the data-network:

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

- the computerized climate control:

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

- elevators:

Elevators also controlled by the security key card.

- automated fire alarm:

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

- concealed sprinklers:

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

- integrated security system:

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

3.3. Minimum life-time cost

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

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

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

- Thermal-heat storage system:

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

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

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

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

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

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

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

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

DIE DEUTSCHE BIBLIOTHEK AT FRANKFURT-AM-MAIN

by Ingo Kolasa
Building expert/coordinator der Deutsche Bibliothek, Frankfurt/Main, Germany

THE ARCHITECTURE AND THE STRUCTURE OF THE BUILDING

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

TECHNICAL INSTALLATIONS AND FACILITY MANAGE MENT

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

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

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

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

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

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

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

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

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

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

An example for a wrong coordination: there is a room with several copiers, which produce heat and ozone; of course, this room has to be ventilated and perhaps cooled. The copying room is situated in an area which is not air-conditioned, and we had supposed, that this room could have been air-conditioned individually, as it was laid down in the space requirements. Once we had moved in, we realized that in this case, when we cooled the copying room, the temperature in a large section of the bookstacks went down to 14^0 C at the same time. This revealed that it is not reasonable to connect two spaces with very different requirements to the same part of the air-conditioning plant. This problem also shows that one never should give up permanent control of the planning and the installation, enabling the library to take influence on developments as early as possible. Later alterations are mostly expensive, and they interfere with the complex interdependencies of the systems, thus causing again other alterations and trouble.

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

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

winter, the air-conditioning is run with mixed-air rates, in order to save energy, the fresh air rate being at 30 m^3/hour and person. The different plants consist each of a number of components: air conditioning chamber, filters, intake and exhaust ventilator, heater, cooler, sound absorber, fire gates etc. Coarse aerosol and micro-filters can be exchanged and combined; absorbent carbon filters can be added. In the other sections of the building there are only ventilation plants with a threefold air change rate per hour. All the air-conditioning plants are controlled by sensors and actors through the central computer unit, but in case of failure of the central control, the plants control themselves automatically - the same system works with the heating plant.

For a great number of other technical installations, the central computer records only the values transmitted by sensors. The control of these installations has to be activated if necessary. This is the case in particular for the sprinkler plants which are controlled by the smoke detectors. There are three different sprinkler plants in the building. The most spacious plant was installed in the bookstacks, as a dry tube system. An alarm from at least three smokes detectors causes water pressure to be built up in the tubes, but the sprinkler heads open only when there is enough heat to make the sealing of the sprinkler head burst, there will be a water spray right into the center of the fire, after the air in the tubes is replaced by water. In the underground parking there is a dry tube sprinkler plant which is kept permanently under pressure, which prevents water coming into the tubes in order to avoid freezing at low temperatures. The third version of a sprinkler system is installed in the administration aisle of the building complex. In this system there is permanently water in the tubes, and in the case of a fire alarm and subsequent opening of one or more sprinkler heads, there is an immediate release of water. The water supply for the sprinkler plants is guaranteed by 2 reservoirs of 150 m^3 each, with an additional pressure tank of 30 m^3. The final pressure in the system is supplied by pumps. The central computer controls only the status of the plants, which are subdivided into 17 sections. The plants are released only by the autonomous fire alarm system.

Even more autonomous is the CO_2 fire extinguishing plant for the computer department. The dangerousness of this gas determines the alarm philosophy. The plant is supplied by a central tank. Alarm is given by the fire detectors, but CO_2 is not automatically released. The alarm is immediately given to the fire brigade. They arrive within 4 minutes, and only they can manually release the gas from an outside control. The plant is subdivided into two sections, the first one for the not manually operated hardware and the double floor, the other one for the data strong room and the suspended ceiling. The spaces in which this plant was installed had to be sealed carefully, especially towards the spaces below. The central computer registers only the data of this plant without controlling. In Germany, there is no other solution because of the security regulations.

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

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

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

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

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

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

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

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

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

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

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

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

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

CONCLUSION

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

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

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

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

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ABSTRACT

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

EPIGRAPH

Into the third millennium

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

1. AN INTELLIGENT BUILDING

1.1 Definition

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

1.2. Venezuelan national library building

Flexibility

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

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

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

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

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

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

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

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

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

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

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

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

3. TRANSITION TO THE NEW HEADQUARTERS

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

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

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

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

4. ARCHITECTURAL PROGRAM

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

new national library buildings. [10]

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

5. BASIC DESIGN CRITERIA

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

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

Other factors that promote flexibility in the building are:

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

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

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

6. SIMPLICITY OF DESIGN AND ARRANGEMENTS OF FUNCTIONAL AREAS

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

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

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

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

7. MAJOR ARCHITECTURAL CONSIDERATIONS

Acoustical treatment

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

Lighting

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

Air-conditioning criteria and control

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

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

Calculus of the structure

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

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

The fire protection system

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

- *Compartmentalization*

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

- *Dry pre-action fire cycle system*

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

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

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

- INERGEN/FM200 system [11]

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

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

- Security system

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

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

8. INTERIOR DESIGN AND FACILITIES

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

The building project of Venezuelan national library has been divided

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

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

9. PRESENT STATUS

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

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

Operational systems

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

10. FINANCING AND COSTS

Financing

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

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

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

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

Costs

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

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

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

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

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

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

DEVELOPING A DIGITAL LIBRARY

Strategy and process of a case study:

Tilburg University

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ABSTRACT

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

1. INTRODUCTION

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

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

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

2. TILBURG UNIVERSITY AND ITS LIBRARY BEFORE 1989

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

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

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

2.1. New university strategy

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

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

2.2 The library between 1978 and 1989

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

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

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

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

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

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

3. A STRATEGY FOR THE DEVELOPMENT OF A DIGITAL LIBRARY

3.1 Policy strategy in 1989

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

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

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

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

Basic assumptions were:

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

- Only with the help of other parties can the technological potential in the field of information use be made operational. Hence there should be a clear and active preference for co-operation both within the university and with other parties: libraries, vendors, publishers and others.

- There should be a strong belief in the potential, the creativity and the expertise of the staff of library and computer centre. These two departments already have a history of successful partnership and co-operation. The library could take advantage of the experience of various staff members and, since 1985, has been developing its own applications in specific areas (f.e., the design, development and exploitation of the Excerpta Informatica databases).

3.2 The innovative direction

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

- Databases can be consulted and documents can be requested from the desktop of the individual user.

- Electronic information can be retrieved from computerized collections which are stored remotely and without the intermediate steps of collecting and sending printed documents.

- The different applications on the desktop computer can be integrated.

3.3 Program description 1989

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

- imaging

- electronic publishing

- office automation

-automated circulation

- learning environment

- database development

- networking.

3.4 Start of various projects

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

within six months.

4. SUPPORT AND COMMITMENT

4.1 Support from the University

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

4.2 Funding and support

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

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

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

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

System provided by Pica.

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

5. BUSINESS PLAN AND MANAGEMENT

5.1 Plan of Action, summer 1990

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

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

5.2 Project management

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

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

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

For these reasons, the Program Management decided:

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

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

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

b. The first Campus-wide Information System in the Netherlands.

c. The KUB-Guide as a network navigation instrument to various local library databases, such as the OPAC, the Excerpta Informatica databases, the On-line Contents database and the Community Information System (CWIS).

d. The first version of the « Integrated Desktop » that would directly benefit the users. In order to offer a campus-wide affordable solution, it was decided not to focus on expensive SUN or UNIX workstations but on the PC environment.

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

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

5.3 Developing by prototyping

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

- to buy, whenever possible, what is available on the market,

- to look for open solutions preferably based on international standards,

- to realize co-operation and communication between members of the project teams through electronic conferencing - to give every single member of a project team a task and a responsibility, with a strong emphasis on team spirit

- to report regularly to the Programme Management.

6. REALIZATION AND IMPLEMENTATION

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

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

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

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

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

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

7. FIRST EVALUATION

After five years of operation an evaluation can be made:

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

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

electronic communication facilities in the curricula.

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

There are also problems, of course:

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

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

8. CURRENT SITUATION

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

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

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

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

- Netscape, E-mail.

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

9. STRATEGIC PLANNING BY THE LIBRARY

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

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

- an evaluation of the past period: which goals have been achieved and which have not,

- an SWOT analysis,

- a definition of the goals and objectives for the next period,

- the strategy to realize the goals

- a matching of tasks and means

- implications for staffing

- organisational change

- changes in job description

- educational plan.

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

1. Environmental scan.

2. Meetings with all faculty boards. Interviews and discussions with key people in the university.

3. Internal discussion (brainstorm sessions) and identification of weaknesses, strengths, threats and opportunities. Broad internal consultations.

4. Internal discussion on what should be achieved in the next few years. Identification of key issues.

5. Preparation of first draft by the librarian.

6. Discussion with management teams of library and computer centre, discussion with member of Executive Board.

7. Preparation of a second draft.

8. Discussion in the library, in the departments. Discussion with the personnel committee that should agree with the plan.

9. Approval by Executive Board.

10. STRATEGY FOR THE NEXT FEW YEARS

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

- The library's service is focused on its internal users.

- The concept of the integrated desktop remains the starting point for library services, supporting education and research.

- Uniform access will be provided to heterogeneous databases.

- There will be a focus on systems for selecting and filtering information, tailor-made personal service, and the development of systems for knowledge navigation..

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

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

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

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

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

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

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

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

- determine the information need in dialogue with the user

- select relevant files, and

- search in these files for the user.

11. WHY A DIGITAL LIBRARY INITIATIVE AT TILBURG UNIVERSITY ?

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

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

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

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

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

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

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

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

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