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## INTELLIGENT SPACES

The title of my thesis topic is INTELLIGENT SPACE. By this title I mean the intelligent buildings, intelligent architectures with all their formal, functional and structural attributes.

*The topic of my thesis consist of the following points:*

- The analysis of the term "intelligent building".
- The historical development of the intelligent buildings.
- The characteristic of the intelligent buildings.
- The foreign intelligent buildings, their characteristics and examples,
- The situation in Slovakia (possibly in Czech republic).
- The determining factors which influence the design of internal space.

The purpose of my topic would be the definition and characteristic of the fundamental methods to design the interior of the intelligent buildings. I am concentrating upon the interior design of intelligent buildings.

### The term "intelligence"

Human Intelligence is the structure of general human abilities correctly to sense, to mean, to react.<sup>1</sup> Intelligence of the buildings is deduced from cybernetics. Cybernetics is the science of communication and automatic control systems in both machines and living things.<sup>2</sup>

The modern and frequent term "intelligent" is currently used to denote not only the human qualities but also specific qualities of different products and architecture: systems, products, materials. The term "intelligent building" is being more used by technical professionals in architecture and civil engineering.

### Intelligent buildings

By „intelligent building" we mean the object which can react to the changes in indoor and outdoor conditions. All these changes take part in the so called Central operative system. The purpose of this mentioned system is the achievement of maximum effective function in any case.

Intelligent systems in the building can process

internal and external environmental changes so that they become user friendly at the lowest possible cost towards energy consumption.

The basic components of the building are segregated at the process of its development: architectural design, structure, technical facilities, management, services. The building is being "intelligent" by integrating and by considering influence of these components.

### Computer systems

The intelligence was achieved by the rapid development of the decentralized computer systems in the last ten years, and especially by their price decline on the world market.

Computer systems in building are used in two ways: first way is the application of the management systems of building, and second way is the application of the systems of the automatisisation services.

The configuration and the concept of using of these systems are different according to the character of the building specification, that means, whether it is a commercial building or a residential building.

### Internal space of intelligent buildings

Many of the mentioned components which create the intelligence influence directly the quality, the look and the organisation of the internal spaces. The quality and good design of internal space (interior) is as important as the external design (fasade). Therefore, the purpose of my thesis topic should be the concern for interior design aspects of an intelligent building. Certainly, is not possible to separate the exterior and interior of a building. They both create a unit.

The problem of the design of an intelligent building is very difficult and requires an interdisciplinary cooperation of architects, technical engineers, sociologists, psychologists and other professionals.

### Characteristics of the book

The book I have worked with is called INTELLIGENT SPACES - Architecture for the Information Age. It offers a new sight to the topic of intelligence in architecture.

The author of this book is Otto Riewold, a former editor of the German design magazine Ambiente. He

is a freelance journalist, an exhibition curator and an architecture and design consultant for various European companies. This book reviews examples of fifty building projects in Europe, the USA and Far East.

The book is looking for the response to the question: "Are the changes, brought by electronic revolution, provoking a fundamental revolution in the forms and functions of architecture?"

The book focuses on five areas. Each area pays attention to different examples of intelligent spaces: the multimedia industry, publishing, advertising and software companies, using architectural statements to develop their corporate identities; advanced office environments designed for banks, finance institutions and public corporation; multifunctional technological, business, administration and research facilities that require hybrid structures combining previously separate facilities under one roof; the new infotainment centres, packed with multimedia equipment and interactive computer simulations; and cultural and educational institutions facing an influx of electronic storage media and data networks.

#### **The media revolution and virtual reality are transforming both work and leisure.**

At the end of the twentieth century the media revolution is becoming a perceptible reality. The aspects of the media revolution, like data high-ways, electronic networks, information systems, computer and television technologies are producing a wide range of responses from architects and interior designers. The professional users and private clients want an appropriate architectural setting, not only the latest technology.

When the building will reflect this market desing they will be a key factor in promoting a company and enhancing its image. The architecture and design with their own special role in the Information Age create the promising, visual setting that provides a foretaste of the virtual delights included within.

The paradox is that the virtual reality by its very essence has less and less need for architecture. The digital revolution is simultaneous, synchronous, permanent, immaterial, immediate and global.

The virtual image is a medium for electronic information, communication and entertainment. The users ( employees, customers...) are dispersed and isolated, connected only by modem of Internet and Intranets. They see and experience a new immaterial reality of its own kind.

This revolution is at sign of information speed and as the French philosopher Paul Virilio said: "speed

burns up space. With telecommunications the modern age has reached absolute speed. Everything is live, direct - in real time."

The real design innovations of the Information Age relate to the presentation of electronic data.

#### **Concern about the relation between architecture and media revolution**

The above mentioned book presents the case studies which do not form a cohesive new architectural trend - rather they are widely varying responses to the challenge of electronic age. The USA and Japan are the countries where the multimedia revolution has had its strongest technical and economic impact.

The book is divided into five chapters, they comprise the following basic questions: How is architecture responding in places where the new technologies are used professionally?

What kind of architectural corporate identity is being developed by companies in the multimedia industry?

How are electronically networked office worlds being redefined?

How is computerization changing the programmes and constructional features of multifunctional projects?

How are the new information and entertainment centres negotiating with the challenge?

How is the influx of electronic storage media and data networks affecting cultural and educational institutions?

#### **Search for architectural design. The commercial users equipped by computers manipulate the architecture which activates different stylistic features.**

The diversity of individual architectural solutions exist, but three general trends can be formulated: affecting the form, function and construction of buildings.

In formal terms, architects are exploiting the futuristic potential contained within the buildings, turning actuality and progressiveness into stylistic features. The fashion of architecture inspired by the new virtual reality is passing from science-fiction across the deconstructivist design to the postmodernist pre-occupation. Reductionist architecture including high-tech seems to be opposite to the expressive architectural trends, but it can be seen as an alternative to the same problem. Architecture becomes increasingly individualized by reacting to the digital dematerialization of the world.

The dynamic multimedia industry is rapidly

changing. The companies like mega-mergers and record-breaking stock market flotations need such architectural setting which convey and enhance their corporate image.

The current trend is towards multi-function building, hybrid constructions joining functions under a single roof, which had previously been separated. This process of concentration and interpretation is taking place across the scale: from the urbanization of individual buildings, to the development of new urban mega-structure.

**Computer systems are used for the automation services and for management of buildings. Intelligence in a building does not exist without computer management systems. However, computer automation systems are an inseparable component of today's companies.**

It is interesting for architecture, that on-line computer is no longer just an administrative tool, it has become a multiple medium for information and communication. Today's companies have the work processes and structures which are becoming increasingly virtual: they exist and function through software and the Internet rather than the rational and hierarchical structures of an architectural environment. Hyperlinks replaced spatial relations.

The principle of fall of traditional bureaucracy is redefining the workplace. Some bigger companies are working by adding a free laptop trolleys and sockets, which await the company's workers.

The global enterprise of the future will be a composite, changing network of autonomous units. The experts of some American enterprises are predicting the total computerization of living environments: "things that think" will offer integrated "smart" systems controlling all domestic functions. The digital paradise will finally conquer over private and professional sphere and will merge them. This future idea is planned by leading Hollywood figures Steven Spielberg, Jeffrey Katzenberg and David Geffen. They are going to create Playa Vista, "a prototype of a twenty-first century community", a joint venture with industrial partners including GTE, IBM and Silicon Graphic. A multimedia commercial park and private houses will surround the studio.

**Realized architecture. Computer systems and management of building. Computer management systems process all changes (indoor and outdoor) of building so that the building can achieve maximum effective function in any case.**

In constructional terms, the architecture in the Information age is finally started to be realised. The

intelligent buildings are self-regulating machines which can adapt their internal conditions to suit changing environmental factors and these are still developing. Computers control and manage many of important building's technology functions like climate, heating, sun-protection, lighting. By the intelligent systems they minimize energy consumption and enhance the economic, ergonomic and ecological profiles of building.

The buildings can be self-sufficient in electric energy consumption by using solar cells on the roof or the walls, for example. The solar cells provide some of the energy if it is needed. The outer layer of building is becoming a skin and creates aesthetic qualities. The intelligent buildings can be a self-regulating biosphere, with internal courtyards full of hanging gardens and high level of energy efficiency, like the new Commerzbank in Frankfurt.

The previous three trends of architecture: formal, functional and construction can not exist entirely separated. They must overlap and intersect. The representatives of the avant-garde in 1960s and 1970s hoped that the media revolution would act as a spur to architectural progress and the propagandists of the Light Architecture believe that this is happening. They organized an exhibition in New York museum of Modern Art in 1995 where they presented an idea that the contemporary culture of film, television, video, computer screens represent a unique sensibility light, movement and information. This sensibility should find its way into architecture.

**Architecture is not dependent on the media revolution, but it is walking ahead with own progressive face. The virtual reality is only for fun, it is not real and not for life. Architecture is for life, it must be real. However, the media revolution is a strong partner for us (users and architects) and we should take the positives from it. Electronic world can help architecture to be more healthy, economical, ecological, aesthetical.**

**The starting electronic shock will change, it will calm down.**

The reality does not offer any conclusive proof that the media revolution and architectural progress are necessarily connected.

The architects could create a dematerialized architecture by borrowing from the new technologies. However, the ambitious plans by Jean Nouvel and others to make houses and streets into living picture screens have not been realized, but instead, the leading entertainment companies are preparing to take over the whole areas of the world's cities.

The new design based on the preference for glass, metal and new composite materials have the high flexibility and does not necessarily indicate a new media-based architecture. The unity of content and form (indeed between function and construction) is not absolute true, because computer networks can function in the most diverse of context. This principle shows, that old historical buildings can be changed to modern banking centers or some leading scientific institution can be housed in diverse face of form (wooden shacks or high-tech research station). Anything goes: artistic improvisation, rigid structures, post-modern irony, cybernetics, high-tech as a gesture or as hyper-functionalism. The computer building management system can be installed in a new as well as in an old building.

The fact that anything is possible owes much to CAD design systems. The architects by using the computers have new possibilities. The computers enable to calculate, depict and construct any type of stylistic experiment.

The architecture in the Information Age must return to its elementary protective and identity-creating function, to its basic role of providing a real living environment separate from the insubstantial worlds of the computer. This is because the cyberspace is no home to live. Thanks to some change in economics (a threat of mass of unemployment, a growth of profit, lost of importance of centralized workplaces, the trends towards teleworking...) companies are relocating the whole operational units from high-cost sites to cheaper locations. Work is emigrating to the far corners of the earth and the webs of commercial enterprises span the whole world, coordinated and networked electronically. This automatization is eliminating the layers of management and predicting the end of the administrative corporate colossus.

This process gives the real chance for architecture in the Information Age which should invert the relationship between purpose and means. In this context, intelligent spaces would not be those designed for the optimal accommodation or display of multimedia technologies but those that use the opportunities provided by the new technologies to humanize living environments.

Digital technologies can add a new dimension to architecture, but they cannot redefine its fundamental character. According to the words of Toyo Ito, current building types must re-constitute the architectural programs because they no longer have the strength to keep up with the realities of society and the digital network.

The two most interesting chapters in the above mentioned publication are called **Hybrid constructions** and **Knowledge exchanges**.

### HYBRID CONSTRUCTION

The list of examples of Hybrid Construction cite different typological buildings: administrative, production, government, educational, traffic, service, commercial.

An important feature of Hybrid Construction is its multifunctionality. At the same time a hybrid construction, combines production, administrative, communications and scientific facilities under a single roof. Some of these constructions use progressive, complex constructional methods and computer-controlled building management systems. They feature the latest glass and façade technologies, temperature-regulation and energy-saving systems. These architectures re-obtain public space, what is its striking feature.

Living forums, glazed piazzas, shops, cafés, information kiosks and event halls play their part in counteracting the increasing everyday's virtualization.

**The first example of hybrid construction is the design of electricity supply company by architect Frank O. Gehry.**

### ENERGIE FORUM - INNOVATION

Bad Oeynhausen, Germany

Architect/interior designer: Frank O. Gehry & Associates, 1995

The new architecture by Gehry is set in a provincial spa-town of Bad Oeynhausen designed for the local electricity supply company, Elektrizitätswerk Minden-Ravensberg (EMR). The company (means EMR) has planned to build its new regional network facility on the edge of an industrial wasteland.

The building was to incorporate all the latest environmental technologies. The company area: is a combination of office spaces, conference facilities, exhibition area, electricity supply centre and power station. The author of the project, F.O. Gehry, returned to the style of his early low-budget masterpieces, based on the basic form and materials.

The Energie Forum Innovation ( next EFI) is a complex of intersecting buildings, roof extensions and wall section, surrounded by asphalt pathways. When you enter and explore the space its structural logic becomes clear.

The building is a three-storey one with 4,500 square metres and it makes optimal use of daylight,

especially in the office area. The conception of disposition consists of building's winding central axis. The EFI demonstrates the practical use of the following advanced ecological technologies:

- the photoelectric cells on the roof
- heat-insulated glass façades
- water recycling
- computer-controlled temperature regulation
- collectors for solar and wind energy
- cooling systems in the ceilings
- exploitation of the rain water for the lavatory flushing system

The architecture of the mentioned structure in Bad Oeynhausen is an architectural showpiece where the very latest systems in energy and resource management is used. Gehry here again uses his famous idea of cardboard furniture, which makes an important ecological aspect of the whole design.

The second example of hybrid construction is located on well-know city of the exhibitions - Leipzig. The new architecture of exhibition and conference complex is a celebration of the glass, construction and the light.

### NEUE MESSE

Leipzig, Germany

Architect: Von Gerkan, Marg & Partner, 1996

The new exhibition of conference complex was built on the site of a former airport outside the city and was completed in the record time of only three years.

Compared with competitors like Hanover and Frankfurt its dimensions are relatively modest because they provide a built-up area of 272,300 square metres, with 102,500 square metres of exhibition space. The Neue Messe is exceptional for its design, which consists of the central glass hall designed in collaboration with London-based specialist Ian Ritchie. This central glass hall serve as both: as entrance hall and as main axis of the complex.

The hall is 250 metres long, and its arched roof is 80 metres wide and 30 metres high. The exhibition halls, conference centre and administrative buldings are arranged on either side of this glass pasageway. The glass hall contents a reception area, shops and a restaurant too. They use the minimun of heat-regulating equipment. Service pipes and the cabling for the multimedia network are hidden from view, the chimneys of the heating plant look like a high-tech campanile.

This architecture can be compared to the legendary iron and glass constructions of the nine

teenth century, displaying the very best of contemporary engineering skills.

The author of the book included the designs of libraries and educational centres to the content and the called it "knowledge exchanges".

### KNOWLEDGE EXCHANGES

The invasion of electronic media is changing the appearance and functions of libraries, institutes and cultural centres by the redefinition of a contemporary way and not by replacing their traditional programme of functions. The libraries of the last century are turning into a digitally-networked knowledge exchange. These functional changes don't need a radical modification of architectural style, but the traditional combination of solemnity and improvised workshops style prevails.

Many people love Paris because it is a wonderful city. Paris is an architectural poem where the old buildings tendrely embrace new architectures. The era of new shocking architecture was started by the Mitterand's plan. It brought a new face for France. We can hope that it will be a neverending story.

### BIBLIOTHÈQUE NATIONALE DE FRANCE

Paris, France

Architect: Dominique Perrault, 1995-97

The National Library of France in Paris is a latest masterpiece of Miterand's "grands project". Dominique Perrault promised: "a square for Paris and a library for France."

Perrault's hyperminimalist creation is two-thirds concealed a wooden platform with four-glass tower blocks at the corners where the books are stored (each blocks nearly 80 metres high).

This building has a colosal dimension:

- *the extended complex stands on a plot measuring 7,5 ha*
- *it has a 168,000 square metres of usable floor space*
- *can hold 12 million books*

The complex include a six-storey base, which is a library itself with separate reading rooms for academics, and the general public arranged around an internal courtyard with a miniature forest. This forest is a "heart" of building's geometrical landscape and it is also an area of relaxation and contemplation..

In 1997, the library has had an equipment of the latest electronic technology. Books are transported on a computer-controlled track network, and are lent to the reader 20 minutes after they have been ordered. The users can access the general catalogue and specialist bibliographies on-line from their desk at home. The library contains videos and CD collections too.

**What has been new about Sir Foster's architecture design? We know his high-tech and striking clear forms, and that he always brings an interesting design. A typical example is his Law Faculty in Cambridge.**

#### **LAW FACULTY**

Cambridge, UK

Architect: Sir Norman Foster and Partners, 1995

Sir Norman Foster with partners was a winner of a restricted competition because he was the only entrant to take the context into account. He designed a new Law Faculty near the existing architectural fabric of the site.

This new university building is a striking, partly transparent, semi-cylindrical building.

It is a respectfulness and self-confidence and it illustrates a continuing shift in the architect's style, towards large geometrical forms. The architecture form is created by the splendid roof, which arches up from ground level to well above the level of the ridge.

The architecture has 9,000 square metres of usable floor space, and it has a two storeys below ground level where are located the lecture halls and seminar rooms. Next, the building has administrative offices in the ground floor and the library in the three upper storeys, which are suspended freely in the reclining glass cylinder. The reading desks are arranged in the glass front, but the bookshelves are located in the closed, vertical side of the building to the south. The architecture style is designed with traditional and sober manner, nevertheless the building is provided with progressive technologies, the progressive lawyers have long made use of on-line databases and electronic catalogues. The facilities are managed without the use of air conditioning (except in the basement levels) and an energy-saving lighting-control system regulates the balance between natural and artificial light.

**The comparison of the above mentioned ideas concerning intelligent buildings with the professional situation in Slovakia.**

This book raises the question of whether architecture and design should mirror the futurist potential of the new technology or seek to counter the insubstantial world of the computer by providing a real, humanized environment.

The mentioned book uses the term "space" to denote intelligent space or intelligent buildings whereas the Slovak professionals preferably use the term intelligent building or intelligent architecture.

The author means by the term "space" the entertainment companies and cyberspaces, libraries, educational buildings, banks, insurance companies, exhibition halls and others administrative colossus. Cyberspaces are a typical examples of intelligent indoor spaces, but the author does not use a term "intelligent interior". The term "space" provide more than conventional words: interior and exterior.

After all, the Slovak professionals once do not consider about cybertainment or infotainment and entertainment industry as an intelligent space.

In reality, we may say that so far there has no real intelligent building been in Slovakia. There are some sophisticated buildings like: Bratislava Business Center, VUB Bank, Social Insurance Company, and some others.

Now, the new building of The National Bank of Slovakia, which is before a completion, is hopeful intelligent architecture in our midst.

The both, Slovak University of Technology Department of Technical equipments of buildings in Bratislava and Slovak company for a safety and a sanitation of work in Bratislava (SCSSW) organize the conference of intelligent buildings. This conference is organised year after year from 1995 and on 2000 would be a sixth. The SCSSW edited yearly a year-book with all conference contributions. The technical areas overwhelm the academic topics in these year-books.

These contributions and others professionals articles edited by different technical magazines are available to study for my thesis topic in Slovak or Czech language. An integrated book on the topic of intelligent buildings has not been available in Slovak or Czech languages because this problematic is young for the present.

The problem of the design of an intelligent building is very difficult and requires an interdisciplinary cooperation of architects, technical engineers, sociologists, psychologists and other professionals.

**The difficulties in my study of the book and my final goals**

The most difficult in my study of the book was the descriptive character of the text, a lot of unknown

technical words and expressions. The most difficult for my understanding was that the author uses such expressions like: the cybertainment, infotainment and entertainment. These expressions are new for me from both the aspect of etymology and significant aspect.

Cybertainment, infotainment and entertainment industry are not known very much in our country and the previous countries of the east block. These problems are new for me as well.

For all that the book INTELLIGENT SPACE by Otto Riewoldt required me many new and rich informations and enabled me to see the problematic of intelligent spaces not only one-sidedly. The book offers many examples of real architectural designs which I consider the argument that the intelligent architecture is not virtual, but real. I would like to use some informations from mentioned book for the continuation of my thesis topic.

#### Notes:

- 1) Ivanová, M. a kol.: Slovník cudzích slov, SPN, Bratislava 1983, s. 407
- 2) ibidem, s. 506

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