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## ENVIRONMENTAL ASPECTS AND THEIR EFFECT ON ARCHITECTURE - CYBERSPACE ARCHITECTURE

### Keywords

#### Architecture and Environment.

physical world; physical factors; cultural and aesthetic factors; social and economic factors; physical and virtual architecture and their own constraints

#### Cyberspace

genesis, evolution /development/ the architecture of virtual space; virtual real; cyberspace as an individual/independent/ environmental system; opportunity and use /effect/ of cyberspace architecture; virtual versus real architectural problems; a parallel to reality; architecture between a human and technology

### Abstract

Architecture, whether physical or virtual, is the expression of a society realized as a meaningful space. Physical and virtual architecture have their own constraints and context, yet they both use architectural organization as a way to order forms and spaces in the environment. Both strive to create a meaningful place by defining space. The lack of physics, of time and space in the virtual realm requires special attention and expression of its architecture.

Architecture can be described as a concept or idea that has both physical and virtual expressions.

Physical architecture is the embodiment and expression of societal values in physical form. It is that which is traditionally studied in schools of architecture and for which designers become licensed professionals. Virtual architecture embodies and expresses values of society in electronic form, with polygons, vectors, and texture maps. Lacking physicality, it does not exist on a genius locus as traditionally understood. However, it is accessible via computer and human-interface technology anywhere.

### Architecture and Environment

The environment /background/ is considered as a determining factor of architecture.

Environment – it means any type of space in which architecture exists or coexists. Then, if we accept the environment as a large phenomenon and as a summary of many factors, which apply to creation of the architecture in various dimensions, the result is interactive architecture.

Environment - forming factors.

With scientific abstraction of input of architecture into the environment, it is possible to divide it into two main groups: 1/ natural environment /authentic/ and 2/ artificial environment /human/

The forming elements in both groups are physical, cultural, aesthetic, social and economic factors, with respect to their different proportion of importance. It is obvious that the natural constituents are losing their predominance during the evolution and globalisation processes. Today, physical scene as forming factor /mostly in urban environment/ is completed and substituted by cultural, aesthetic, social and economic factors, which are becoming more and more important. In the natural environment, such landscape conditions as relief, climatic and natural resources are the most important factors, in opposite to the artificial environment, where cultural, aesthetic context as well as social and economic resources play the main role. The both versions exist in real physical world.

### Cyberspace

Looking at the artificial environment from different point of view, in context of today's informatic age, beside real world, there is also new possibility for using virtual /cyber/ environment.

Marcos Novak, head of the RealityLab at the University of Texas, thinks there are no borders to input space into the electronic world wide net. In fact the net enables the existence of a central computer factory for making reality. From this point of view, possibilities of usage of virtual cyberspace for human society are still in their early age.

The history of inventions, gradual improvement of distribution possibilities and improvement in communication started with relatively simple movement and transformation of objects and continued to very sophisticated transmission of ideas, object images, or even the presence. Since Antiquity till these days the development is based on symbioses of machines and media. The form of transmissions is still improving, signal, picture, writing, sound, moving picture, live sound and live picture, sense and action, polysensitivity, interaction, presence, telepresence.....Architecture has for the long time been only a silent participant in extending of reality to virtuality /non space reality/. There were no such technologies that would be able to transfer space and place. Some improvement came with movies and TV images, but only still as a passive reflection of objects. It is still not possible to reach the freedom of choice, so typical for reality. Recently a cinematographic picture has become interactive and ‚habitable‘. In this way the borders have been broken.

Not only conditions for existence of virtual community without localisation were created, but we are also able to distribute space and place : Transmitting architecture. Now we are not only able to create in real physical environment, but also moving to the virtual space, ‚architecture starts to inhabit cyberspace‘.

### **Virtual possibilities.**

It is necessary to realise, that important change of virtual architecture in comparison with architecture in real environment is substitution of economy of timbers and bricks by the economy of bites.

Cyberarchitecture is in the position, where gravitational attraction, weight, measure and geografic rules are not valid /effective/. The point is to change position and /or/ quality. Interactivity of 3D modelling in connection with effect of image, sound, motion and light makes a possibility of origination of new environment, volatile environment, different from the physical one.

With gradual improvement of cyberspace to the parallel reality, it is possible to reach the environment of ‚matrix‘ type, where virtuality is able to substitute reality up to 100%.

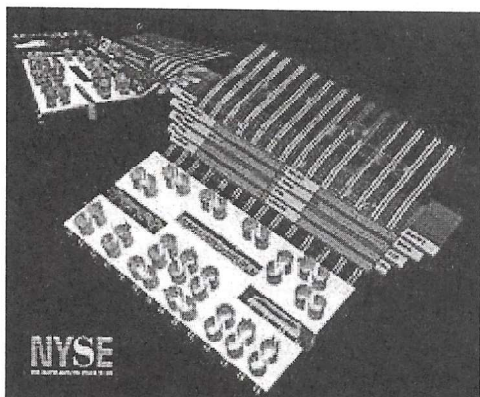
Architecture and architects are using virtual environment in 3 ways:

1/ by transporting ideas into 3D space of software,  
2/ by using of more progressive access of computer simulations that imitate and substitute conditions in the real world, and  
3/ by placing of architecture into cyberspace as an individual environmental system which is formed by flowing of information in real time.

The first way is the easiest one, and in the meantime most used. Software uses virtual space as a pure empty 3D (or more) environment, in which the user models the architecture. It, in principle, transfers the model from physical environment into the electronic form of virtual environment of the software. By adding time dimension, videosequences of virtual models, virtual animations, are created. The well-known presentations, from this point of view, are created by dutch studio MVRDV. Projects like Pig City or Brabant Library are presentations and demonstrations of the real architecture (architecture assigned to real environment) through modelling in 3D software environment.

The second way is oriented to the virtual environment as a simulator of certain conditions in the real environment. It means that architecture is tested in simulated environment (conditions) in order to get as much as possible of information for physical realisation in the real conditions of physical environment. In 1997, the group FOA worked on development of virtual house for purpose of uncovered impacts of physical construction system to the specific (given, existing) facts and forms of living. To create virtuality meant to break complicated social customs, organisation of space and character of materials, which are used for creation of what we usually call a house. They characterise virtuality as something what can find or also solve a lot of connections (points, contexts). The third way is creation of architecture exclusively for its existence in cyberspace as an individual /independent/ environmental system. This space is today the most fascinating and investigating place of virtual architecture and not only for architects but also for mathematicians, physicists, philosophers and last but not least for media and business corporations.

## PROJECT DATA

**3-D TRADING FLOOR, NYSE, NEW YORK, NY****Client:** New York Stock Exchange.**Architect:** Asymptote Architecture, New York, NY. Hani Rashid, Lise Anne Couture (principals-in-charge)**Animation Code:** RT-SET **Operating System and Hardware:** Silicon Graphics**Information Display Solution:** PixelVision3-D TRADING FLOOR, NYSE (Source: <http://www.asymptote.net>)3-D TRADING FLOOR, NYSE (Source: <http://www.asymptote.net>)

The New York Stock Exchange (NYSE) began, seven years ago, to integrate its myriad of computer data into one easy to use system. In the process of developing the 'design' of the new virtual stock exchange system, the NYSE contracted the New York based architectural firm, Asymptote. Asymptote was founded in 1989 and is well recognized in architectural circles for competitions and installations that explore the relationship between the digital and physical worlds. This commission was for Asymptote a unique opportunity to build what they have been experimenting for almost a decade.

'The idea was to create a visual environment through which traders can navigate, analyze, and act upon at-a-glance. Trade actions are very dynamic' said Rashid and Couture.

What happens on the trade floor, gets immediately broadcast through the media, information on which the market reacts, and then quickly translated into orders on the floor.' (RASHID, Hani 2000) In the real trade floor, it is impossible to see and analyze the complex dynamic of these interrelated events. However, in the 3D virtual representation it is possible to manipulate, even to do instant replays for quick analysis of the activities that occur on the exchange. 'It is incredible to see how engaged operators get in the 3DTF when the market has drastic changes during they day', expressed the architects. (RASHID, Hani 2000) From cyberarchitecture point of view the project NYSE is as it were 'just' transfer physical form of architecture to the electronic form. In fact

it is electronic image physical form however virtual real estate is infinite in some ways. The Virtual Trading Floor was the first business application of an interactive virtual architecture.

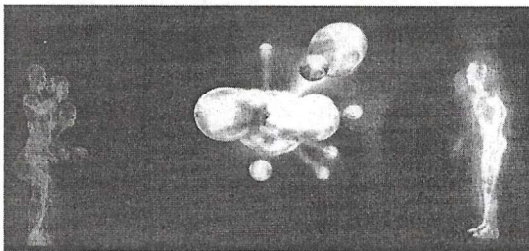
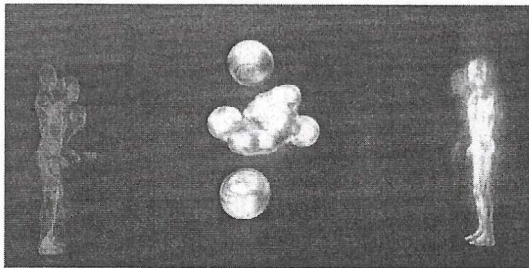
#### PROJECT DATA

##### GENERATRIX

**Architect:** team e-area - el checo, murphy, tren, geo, michelangelo

##### GENERATRIX

(Source: team e-area: *Generatrix*. In: *Zlatý Řez*, 22 p.74-79)



Generatrix are static sequences of the metablob, unfolding in real time, in which the deformations and their motions are caused by the human voice. Coloured spectra in the visualisation respond to individual sound frequencies. The human body/form, as reflected in the blob, is likewise teleported in real time by camera. Hidden behind this description is a physical and visualisation-generating 'engin', serving for the calculation and modelling of the implicitly defined metaspace. From the point of view of mathematics, metaspace is the infinite sum of points in space characterised by intensity of force. The visualisation engine depicts it in 3D space and the motion of particle is controlled by audio-input. The system is interactive and reacts very dynamically to inputs. (e-area 2000)

The architecture of cyberspace, in this case, is the symbiotic relation of human being and hypernetworks. This relation is not identical to the space-time of the real world.

Generatrix is therefore a self-generating architecture.

#### Genesis

Cyberspace Architecture as an augmentation of 'Physical Architecture' offers the opportunity for unique spatial experiences. It is the challenge to our definition and understanding of 'real' experience and 'actual' space. (RASHID, Hani 2000)

Cyberspace Architecture enables far more opportunities to experiment than any other form of architectural art. The architects become less concerned with differentiating between physicality and virtuality. The genesis of spatial, formal and aesthetic concerns at the system of cyberspace redefine space, architecture and event.

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