J ü r g e n C l a u s

T H E E L E C T R O N I C B A U H A U S

Gestalt Technologies and the Electronic Challenge to the Visual Art

Bauhaus

The historic Bauhaus belongs to the time of the Weimar Republic, from 1919 to 1933. It was in the twenties when the school became "the catalyst of the visual revolution for the 20. century": A new vision for a new society that had to be shaped after the end of World War I. [1]

creation

Creation was, for Gropius, neither an intellectual nor a material concept, but an integral part of the life substance of civilized society. It brought together a consciously planned environment, a new scale of visual values, new forms of education, and social changes.

technology

Technology in this context, at least from 1923 on, and certainly for Moholy-Nagy and some others, emerged as the medium "by which a union was made possible between creative intuition and the severe discipline of design: techne, logos - the art of knowing how something is made, integrates ancient knowledge with the most futuristic research of the environment". [2]

the model

This text starts with the concept of an "electronic Bauhaus" as model and crystal, pointing out critical questions and the shape of some answers. Answers for the time being, of course. And yet the beginning of new vision for

... / 2

a new society. It is essential to put art into the context of this new vision. And the challenge of the visual must be defined by the participants of the cultural community.

suppositions

To do this one must rediscover three suppositions: the traditions of art; the imaginary museum of Malraux; the energy phenomenon that art is, gleaned over the centuries. It is with this artistic heritage that we must once again become familiar. On the other hand, we must also become very aware of the foundations and standards of the electronic age. This is an immense task for all of us - we haven't been trained for it. But it is only by those standards, that we can insert art into the living context of the "communication society" - art and as I call it, Gestalt technology. [3]

Gestalt technology

This term combines techne and logos with the Gestalt that is created and perceived by man as a whole. The term Gestalt (I'm completely aware of this) is a thoroughly German expression; it grew out of German poetry, philosophy and art, and cannot be translated into other languages. If I use the term, it is precisely because of this tradition. Gestalt is related to Gestaltung, an emphatic reference to the never definite, the ever emerging creation. In contrast to the machine-oriented approach of information technology, Gestalt technology embraces human perception and creation. (Art is perception and creation of Gestalt by Gestalt.)

three topics

To clarify and elaborate on this theme, I will focus on

... / 3

three topics:

- o THE ISDN FOR ART: Towards an architecture of communication
- o ECOTECHNOLOGY: Design with ecology
- o THE EXPERT SYSTEM ARTIST: Fifth generation computer culture.

THE ISDN FOR ART: Towards an architecture of communication

abstract code

In the process of increasing abstraction from the turn of the century on, art explored the fundamental meaning of signs, of symbols, of visual metaphors. But even earlier, the pointillists discovered a visual code which might be called a precursor of the digital, pixel-oriented code. [4] The artist had become aware of the single elements of visual articulation. And their significance in establishing the proper meaning of image-communication.

Examples are in the Bauhaus books "Point and Line to Plane" (1926) by Kandinsky and "from material to architecture" (1929) by Moholy-Nagy. Their focus is the meaning of primary visual elements, but at the same time their

early networks

interconnection, or networking. We must consider these historic roots in order to make an evaluation of networks and telecommunication.

carriers

On another level, they focused on the carriers: the proper technologies and media of creation. In the beginning this was centered around photography, film, light sculptures, sound sculptures and similar media. And their interrelation. Together these two levels, abstraction and carriers,

... / 4

established the early foundations of an architecture of communication.

social implications

The third level has to do with the social implications of the new synthesis, a concern which has been largely neglected by art historians. As in his other writings, Moholy-Nagy in "Vision in Motion" (1947) gives a perceptive insight into the failures of the technological revolution. Although the industrial revolution started with an enthusiastic emphasis on human values, its great metamorphosis which was ushering in the technological revolution, served mainly the accumulation of profits, an asocial ethic based on economic superiority rather than on the principles of justice.

Moholy: "These ills, with their resultant monopolistic and fascist tendencies, finally led to repeated world wars which were cruel attempts to win capitalistic competition. ... By concentrating insight, passion and stamina, we may recover the neglected fundamentals. ... By integrating this newly gained knowledge with the existing social dynamics, we could direct our steps toward a harmony of individuals and social needs." [5] This leads, as we'll see, to our present and future fight for a human-oriented approach in expert systems and artificial intelligence.

artistic networking

It would be extremely shortsighted not to take into account the historic roots of artistic networking, telecommunication, and what I call an "ISDN (Integrated Services Digital Network) for art". Moholy's concepts of a "Parliament of social design", agencies as culturally active centers

... / 5

restoring the basic unity of all human experiences, do just that. They are the nuclei, busy with the preparation of "new, collective forms of cultural and social life" and "the development of all creative capacities for individual and social fulfillment". [5]

digital code

The architecture of communication found a new structure and quality with the binary digital code, the new primary element of production, storage and transmission. A new alphabet was invented, in which the same characters served for acoustic, verbal, as well as visual communication. "Thinking in relations" (Gropius) was now, at the advent of the "electronic Bauhaus", implicit in the inner code of the digital age.

culture intercom

Because production, transmission and receiving, were all based on a single code, it was natural for the artists to pick up on the use of this code, and electronic networks. This led towards an intercommunication of culture, a "culture intercom" which had been formulated and practiced from the early sixties on by Stan VanDerBeek. At the time of the first satellite-transmissions ("Telstar", July 23, 1962) he proposed Image Libraries as a means for a nonverbal international language. He believed that via satellites and equipped with a code that probe for the "emotional denominator", it would be possible to reach any age, any culture. "There are (in 1970) an estimated 700 million people in the world who are unlettered; we have no time to lose or miscalculate." [6]

telecommunication

When telecommunication began being used in the arts com-

... / 6

munity in the second half of the seventies, satellite technology was part of it. The virtual image of an object, the body or a landscape could be beamed instantaneously to every location on earth. This was realized during the "Satellite Project" in 1977, by Sherrie Rabinowitz and Kit Galloway with NASA support, via US-Canadian Hermes CTS satellite. Four dancers, two in California, two in Maryland, joined for a dance in virtual space. "We see communication and information systems as environments people live in", explains Sherrie. "So we look at the aesthetics of that environment, the shaping of the space."

architecture

And Gene Youngblood completes: "She invokes architecture: information environments can be exalting and inspirational like cathedrals (computer networks) or squalid and dehumanizing like ghettos (the mass media). As buildings are said to be democratic or oppressive, so the architecture of electronic space determines possible relations among people, establishes the contours of desire." [7]

ISDN fo art

I introduced the model "ISDN for art" in 1984-85 as a system for universal telecommunication for art and Gestalt technologies for the 90's. The following year, I elaborated some of its aspects in the "Terminal Art"-exhibition for ars electronica [8] in Linz, Austria. I want to emphasize at this point that ISDN supports the coexistence of the different modes of communication such as speech, text, data and still pictures on one terminal with a standard 64 kilobits per sec. But with light as the medium, with optical waveguides as conductors, with chips performing the digitizing functions at a comparable speed, this will

... / 7

all change in the early nineties. [9]

Certain aspects of this emerging universal art network have been evident in the work of artists all over the world since the seventies. A good example is "The Living Museum", which matured from the Canadian ANNPAC organization and had its first colloquium the summer of 1979. Using inexpensive computer terminals and one or more time-sharing computer data services, a number of artist-run organizations initiated an art-based, interactive data network. [10]

Living museum

Another example auguring an "ISDN for art": the "Videotex-Art-Network" (V.A.N.) at the Academy of Design in Offenbach/Main. The group for media development/media research, headed by Manfred Eisenbeis, has been concerned with videotex as a graphic system for some years. The V.A.N.-project grow out of this, an international forum for the cultural and artistic utilization of the medium, to faciliate the exchange of messages, images, text, and notations between nations and continents via telephone. [11]

V.A.N.

The forthcoming "ISDN for art" is, on one hand, a data network, an image-library, a research mailbox. On the other hand, it is a sort of echo chamber for associative thinking and creation - a fluid creativity. As Roy Ascott puts it: "Computer-mediated networks offer the possibility of a kind of planetary conviviality and creativity which no other means of communication has been able to achieve. One reason may be that networking puts you, in a sense, out of body, linking your mind into a kind of timeless sea." [12]

echo chamber

fluid creativity

... / 8

pilot projects

To summarize: It is important for the art community to develop pilot projects in the field of networking. Wheter they are called Telematics, Telecommunications, The Living Museum, or "ISDN for art" is not important. What is important is that the art community itself articulates the foundations of visual, image communication in the framework of information technology.

ECOTECHNOLOGY: Design with ecology

AI - fluid thinking

For the 1986 ars electronica and within the "Terminal Art" exhibition I focused my contribution on the topic of "Artificial Intelligence - Fluid Thinking". Manipulative intelligence confronted with fluid intelligence. My metaphor for this: four glass containers filled with water dyed different shades of blue, a symbol of the fluid. The lesson of artificial intelligence is a despairing one - the confrontation with the natural - water, sand and light. This laboratory was entitled "Stake of Artificial Intelligence", an unfinished, even chaotic map between knowing and not-knowing. "The real is not rational, it is intelligent", said Michel Serres.

sky and ocean

For the first Sky Art Conference in 1981 I contributed some thoughts about sky and ocean, reading: "Both the inner and the outer spaces of the earth are mirrors of our contemporary experience. They release us spiritually as well as physically. The inner and outer spaces have changed our visual conception of this planet and the planet system as a whole." [13]

From the fourth and last Sky Art Conference in 1986 a

y art
anifesto

manifesto emerged and was slow-scan-telecommunicated to artists at the University of Sao Paulo, Brazil. Written by sky artist Otto Piene, who inspired and shaped sky art, it reads like a manifesto for "design" with ecology: "Our reach into space constitutes an infinite extension of human life, imagination and creativity. The ascent into the sky is mirrored by the descent into inner space as it reflects the cosmos." And: "The artist as frontier poet with the artist's sensory instrumentarium goes into space to widen human perspective on the 'new world' - sky and space."

expansion

This manifesto shows the expansion of the new vision for a new society. In the 50's, dialectic relations between technology and the energy forces of the widest spaces - heaven, sea, desert, started to develop on a new level. The age of the first satellites engendered a new awareneness: The need for a new expression of our appreciation of nature.

ecotechnology

The frightening consequences of high technology and the threat to our environment, force me to raise the issues of "ECOTECHNOLOGY: Design with ecology". Implicit is an intentional reference to the notion of "comprehensive design" (Buckminster Fuller) and to design as "the conscious and intuitive effort to impose meaningful order (Victor Papanek). [14]

> Ecotechnology means the application of tools, materials, and technological processes in such a way as to truly harmonize them with nature; with habitat of plant, animal, and man; with the wider zones of our ecological home; indeed, with the entire globe and the cosmic space beyond.

... / 10

photovoltaics

A good example of ecotechnology is photovoltaics, the use of sunlight as a source of energy. To use light as creative medium came more naturally to older civilizations. But if we strip such conceptions of their mythical and religious content; we find them absolutely up-to-date. They portend the feasible, and perhaps the inevitable solar age.

energy

All energy events are closely related to each other, because we don't have sources of energy, we have transformations of energy. Energy became the carrier in the continuum of space and time which entered pictorial art in the beginning of the century. (The early Italian and Russian futurism.) Energy is probably the link between the spheres of natural and artistic phenomena. Heinz Mack, the former "Zero"-artist: "The inner, cosmic constellation of our existence, of which the artistic existence appears to be a bright star, is at the same time an immense system of energies of inconceivable abundance. We are not lost within this cosmic supply of energies as long as our mental and spiritual energies remain active." [15]

THE EXPERT SYSTEM ARTIST: Fifth generation computer culture

spirit of initiative

In a recent paper about the interface with the machine René Berger invited the intellectuals to regain a spirit of initiative by intervening in the processus of daily decisions. "This would be the real innovation." [16] It is in exactly this sense that I understand the last topic. Next I want to define some opportunities of art and Gestaltung within the framework of expert systems and artificial intelligence (AI).

... / 11

image

Basically, the questions lead towards a new definition of the image within a rich tradition of art as well as within today's complex cultural, social and art network. So far we have many experts, but what about the expert systems (XPS) founded on knowledge concepts that no visual art expert can agree on.

experts in Chelm

Sometimes I feel as if I am living in the legendary Jewish town of Chelm with its amiable fools. When the rabbi of Chelm came to the prison, he heard all but one of the inmates insisting on their innocence. When he returned, he held a council of the wise men and recommended that there be two prisons in Chelm: One for the guilty and another for the innocent. The Chelm of today's experts would also like two systems: One for the experts, and another for the expert system community.

expert system artist

To come out of this jungle of definitions, let me talk about the expert system artist her/himself. Figuratively, this means a living system, not a machine-oriented one; the artist who is expert of sensual perception, visual pattern creation and recognition; the artist who gives Gestalt to the known and unknown, be it with or without electronic media, processes and results; the artist who creates the visual, intelligible and intelligent coordinates with which we perceive Wirklichkeit als Gestalt, reality as Gestalt.

... / 12

intelligent image

The intelligent image promotes our perception and knowledge, and articulates them. That is not a privilege of the synthetic, electronic image. Only the genuine intelligence of the artist-created image can be a product of the seen and the felt, with forms as well as colors, being "objective" and "subjective" at the same time. This intelligence is distinct from verbal, text-based "knowledge".

If knowledge includes the kind of fundamental visual perception which the German language calls Schauen (a state of experience that precedes the visual pattern by "looking at) than it is unlikely that we ever can store this knowledge. We can store and retrieve "pattern", items that might be important to the data archives of art history. But that's not to the point of "Intelligent art: Expert system artist", as I named the final chapter of my latest book "The Electronic Bauhaus: Creating with Environment".[17]

new paradigms
new techniques

In his contribution to the 1987 ars electronica symposium on the arts in the age of AI, Mihai Nadin wanted the intelligent machine to have ("contain") some sense of history and to display an awareness of it. The established AI-techniques are actually, as he put it, "ill suited to handling such problems of the visual because, without exception they are based on paradigms originating in language use and on logic along a synchronic axis. Consequently, we have to either establish new paradigms or to develop techniques which will also allow for the handling of qualitative properties of images and of dynamics (diachronic axis) implicit in an image."[18]

As an example, Nadin compared the CAD-representation of a future product (a computer graphics problem) with the abil-

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ity to identify the relevant elements of a problem to the designers present task and to generate solutions using rules emodied in a program which are issues of AI. What we are calling today image machine can claim to have this kind of intelligence only if it takes into account human perception as well as creation of Gestalt. As this is inseparably bound to more than just a machine approach, a basic notion of such an image machine must include the interaction of the human-oriented and the machine-oriented. This indeed is the new paradigm of the responsive environment where reality is not purely fabricated but where, once again according to René Berger, "the machine, the whole technology and therefore the computer join with us to elaborate a new vital environmen."

image machine

As I see it as a practitioner of media and environmental art, the possible interaction lies within the process of creating, or more precisely "cutting" preselected realities (film, video, sound, dance, space) into the digital processor, or simply allowing reality to interfere with interactive technologies in real time and in real life.

interaction

> Neither the reality itself nor the tools are deemed intelligent. It is the interference of a human "creator" who establishes the image as intelligent, because it is her/his knowledge which gives rise to the never final, ever changing Gestalt. Yes, this is common sense! Or at least it should be.

As I said, I am on my way out of the jungle of experts, expertise, and expert systems as constrained by the image based on Fifth generation - with a Sixth generation optical neural computer already on the way. [19]

... / 14

each the
onkey

A king, old and eccentric, called the chief rabbi and told him: "Before I die I want you to teach my pet monkey how to talk. And do it within one year, or your head will be chopped of!"
"But your majesty", said the rabbi, "to do this I need more than a year - I need at least ten."
"I'll allow you five and not a day more", said the king.
The rabbi went home, related the king's demand to the people and all asked him what he would do.
"Well", said he, "in five years, many things can happen. The king could die. Or, I could die. Or - the monkey could die. And besides, in five years, who knows - maybe I can teach that monkey how to talk."

intelligent image producer

This might be the case as we move from expert graphic system to the by-far-more-difficult intelligent image producer. For the 1985 Third Annual Conference on "AI for Society", organized by the SEAKE Centre at Brighton Polytechnic, Graham J. Howard prepared a paper on art and design towards AI, concerned with the nature of image understanding, image use and the social and political implications of images.

Whereas expert graphic systems will only enhance the ability of the visual expert to manipulate visual elements within a configurational and sequential format, an intelligent image producer will have to be an intelligent image consumer as well. "It would have to be capable of understanding images in order to intelligently produce images. Image understanding", continued Mr. Howard, "would involve the location of the image in the context of knowledge and belief structures; it would require the specific elaboration

... / 15

of its context and at least some of its potential contexts."[2]

symbols

If Fifth generation knowledge information processing systems will be specifically designed to handle symbols and not just numbers and if the actual expert systems, are the pilot projects for them, then art and design may contribute their rich heritage in visual languages. But a greater oppotunity lies ahead in the development of optical neural computers, where optical elements will be arranged in the same way as neurons are arranged in the brain, either electronically or with holograms.

holograms

The "electronic Bauhaus" will participate in developing art-and-design-specific software. Again, this should happen in the context of the tradition of our social and cultural demands, the Moholy-Nagy kind of "Parliament of social design". It reinforces my own beliefs to know that I'm standing on the shoulders of many practitioners of a new vision for a new society, some of them gathered around the Bauhaus, first in the German context then later, after emigration, in the American context. History here validates the practical experiment of today.

Notes

1. Sibyl Moholy-Nagy, Laszlo Moholy-Nagy: Ein Totalexperiment (Mainz, Berlin: Florian Kupferberg, 1972), p. 41. American original: Moholy-Nagy. Experiment in Totality (Cambridge, MA: M.I.T. Press, 1969).

2. Ibid., p. 13.

3. Jürgen Claus, "Gestalt-Technologie. Die Expansion der Medienkunst in den achtziger Jahren", Kunst und Technologie (Bonn: BMFT, 1984), pp. 9-13. English version:"Expansion of media art", in ars electronica (Linz: 1984), pp. 177-179. Gestalt technology had been incorrectly translated here as design technology. - In a broader context, the idea of organic forms was especially well suited to Gestalt psychology, "whose cardinal precept was that perception of the whole preceded apprehension of the parts". Philip C. Ritterbush in his book The Art of Organic Forms (Washington, DC: Smithsonian, 1968), p. 87.

4. "McLuhan and Harley W. Parker note in their extremely interesting 'Beyond the Vanishing Point' (1968) that 'Seurat, by divisionism, anticipates quadricolor reproduction and color TV', but this echoes Moholy's perception that 'Seurat, for example, with his pointillis art, intuitively anticipates the science of color photography." Richard Kostelanetz, A Mine of Perceptions and Prophecies" in R.K., Moholy-Nagy (New York: Praeger Publishers, 1970), p. 214.

5. Laszlo Moholy-Nagy, Vision in Motion (Chicago: Theobald, 1947), pp. 13-16.

6. Stan VanDerBeek, in Stewart Kranz, Science & Technology in the Arts (New York: Van Nostrand Reinhold Company, 1974), p. 240.

7. Gene Youngblood, "Virtual space. The electronic environments of mobile image", in Computer Culture (Linz: 1986), pp. 351-352.

8. Jürgen Claus, ChippppKunst (Berlin, Frankfurt: Ullstein Materialien, 1985), p. 123; idem, "The electronic screen", in ars electronica (Linz: 1986), pp. 353-370.

9. An optical waveguide can have a transmission capacity of about 100 times that of a copper line. Compared with the 64 kilobits per sec. you would need 144 megabits per sec. to transmitt moving color pictures. - 64 kilobits per sec. = 65,536 bit storage capacity. It is built with 150,000 elements on a silicium crystal of 25 mm^2 chip space. - Kilobits means a measure of how many electric pulses (bits) a computer "reads". One kilobit is 1,024 pulses. It would take about one kilobit to put this definitions into the computer. - Megabit is a million bits.

10. cf. "The Living Museum" in Spaces by artists ed. Tanya Rosenberg (Toronto: ANNPAC, 1979), pp. 107-154.

11. cf. Programm Mosaik. Handbuch für die Gestaltung von Bildschirmtext ed. Manfred Eisenbeis (Nürnberg: Verlag Müller, 1985); idem, "Viedotex Art Network", ars elec-

... / 17

tronica (Linz: 1986), pp. 354-356.

12. Roy Ascott, "Art and Telematics" in Art-Telecommunication ed. Heidi Grundmann (Wien, Vancouver: 1984), pp. 29-30.

13. Sky Art Conference '81 (Cambridge, MA: M.I.T., 1981), p.50.

14. Victor Papanek, Design for the Real World (London: Thames and Hudson, 1984), p.4.

15. Heinz Mack, "Kunst als Ausdruck von Energie" (Art an expressi of energy), a talk with J.C. in "kunstreport" (Berlin: 1, 1981), p. 11.

16. René Berger,"Changements technologiques et nouvelle dimension esthetique: l'interface avec la machine", working paper for the International seminar and workshop "Visual Arts and the New Media", Offenbach/Main, 1987.

17. Jürgen Claus, Das Elektronische Bauhaus. Gestaltung mit Umwelt (Zürich, Osnabrück: Edition Interfrom, 1987).

18. Mihai Nadin, "Image Machine and Artificial Intelligence", working paper for ars electronica, 1987.

19. The first public conference about neural computers was held in San Diego, June 21-24, 1987. I want to quote here from an article about "Optical Neural Computers" by Yaser S. Abu-Mostafa and Demetri Psaltis, both members of the faculty at the Caltech, Pasadena (Scientific American, March 1987, pp. 66-73):
"Is there another technology from which computers could be built that does not suffer from this limitations in data communication? The operation of the eye's lens suggests one. The lens takes light from each of millions of points in the entrance pupil of the lens and redistributes it to millions of sensors in the retina. It is in this sense that the lens can be thought of as a highly capable interconnection device: light from every point in the image focused in the retina. Moreover, multiple beams of light can pass through lenses or prisms and still remain separate. Indeed, two beams of light, unike a pair of current-carrying wires, can cross without affecting each other. It is the ability to establish an extensive communication network among processing elements that primarily distinguishes optical technology from semiconductor technology in its application to computation."

20. Graham J. Howard, "Art and Design: AI and its consequences" in ed. K.S.Gill, AI for Society (Chichester: John Wiley & Sons, 1986), pp. 125-139.

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