

# NEW MEANS OF COMMUNICATION AND NEW TECHNOLOGIES IN DESIGN

## PARADIGMATIC CHANGE IN DESIGN

The theory, practice and teaching of design are at present in a dramatic state of upheaval. If the development of this discipline has in fact been unbroken in past decades —by this I mean the continuity of the Bauhaus through the Institute of Design in Ulm to the postmodernism, that is, neo-modernism of the present— the most marked paradigmatic change in the discipline is now clearly evident under the watchword of «digitalization».

Nevertheless, this is not entirely surprising, for in the seventies the American sociologist Daniel Bell<sup>1</sup> had already pointed out that we were in a period of transition to a postindustrial or late industrial society. He described this in five dimensions:

1. In the economic sector: a transition from a goods-producing society to a service society is taking place;
2. In the structure of work: professionally and technically qualified occupations will be in the forefront;
3. In the axial principle: theoretical knowledge as a source of innovations and a starting point for a socio-political programme will take the centre of the stage;
4. In future orientation: the direction to be taken by technical advances and the assessment of technology;
5. In alternative education: the creation of a new «intellectual technology».

## DEMATERIALIZATION AND INTELLECTUALIZATION OF DESIGN

These aspects of sociological origin are also very valid for design, which I propose to describe through certain analogies:

- The «disappearance of objects»<sup>2</sup> refers to the fact that the activity of the designer is changing more and more into that of an adviser on, for example, questions of corporate design or business culture. The products themselves are only vehicles for transporting sense and meanings.
- There is a notable increase in the separation of the tasks of planning and realization. This is becoming of special importance at the moment in the intense debates being held in different countries on questions of design management.
- It appears that in design too there are different alternating phases: until the sixties, «doing» dominated, conditioned by student movements in the USA, France, Italy or Ger-

many, but then a phase of «reflection» set in. At the end of the seventies this gave way again to activist «doing» (cf. the Memphis Movement or the «New German Design» movement). At the end of the eighties this movement ran idle and now there is beginning a new phase of reflection branded «dematerialization» or «immaterialization».

– The interdependence of project and technology has really always been evident. It seems that, through the «new technologies», «open spaces» for the designer are being formed. The «individualization of mass production» will be a central theme of the nineties.

– Because of the high degree of abstraction and lack of clarity of the electronic media access to them is not easy. Above all, traditionally formed designers have serious problems in handling them, which can reach the extreme of vehement repudiation of this new «devil's toy».

If the «new media and technologies» are specially described as intellectual technologies, then we must briefly glance at this aspect. The increasing spread of microprocessors—I once called them the «industrial guide-fossils of our outgoing twentieth century»<sup>3</sup>—is more and more determining our product-based environment. Household goods, radio, video and high fidelity equipment, do-it-yourself tools, still, cine and video cameras, public and semi-public automatic devices (tickets, banks), means of transport (cars, buses, planes, ships), communication apparatus in offices (telephone, fax, photocopiers, computers, etc.), the handling of machines in areas of manufacturing and control..., the list can be extended at will. Chips are installed everywhere. All these devices, moreover, suppose a specific use structure which the operator must learn again and again. This aspect will be elucidated in detail in the section «Interface Design». In all these products we can observe a shift from «materialist» to «spiritual» qualities, since such devices are largely identical as to their functional performance characteristics. Differentiating signs can now more and more frequently only be realized at the level of use.

## INFLUENCES OF THE NEW TECHNOLOGIES ON DESIGN

In one approach we can certainly agree with Heinz Hirdina,<sup>4</sup> who recently established that an artistic design is inconceivable without adequate means. But this entails two directions: the one that entertains and the one that solves problems. The latter is just at the beginning of its development, as the above mentioned examples show.

I shall now outline in which aspects design is touched by the «new media and new technologies». A rough review will show us the following possibilities for electronic data handling:

- Processing of text and data gathering, publications, desktop publishing.
- Preparation of technical drawings, initial drawings and constructions.
- Presentation of formal and colour variants of the product.
- Electronic screen presentation.

- Preparation of design models or short series products with CNC technology.
- Computer simulation and computer animation.
- Artistic computer graphics.
- Entry to data banks.
- Communication with other departments or companies.

By means of a few examples we can show the importance of these new technologies for design practice and education.

## CAD/CAM TECHNOLOGIES

The entry of the computer into the world of work has rapidly accelerated in the last decades. In the sixties, massive calculators were installed in centres set up essentially for purposes of bookkeeping, costing etc in companies and administration entities.

At the end of the seventies, development and construction also began to make the arrival of the computer profitable. The real breakthrough occurred, however, in the mid-eighties, when the massive spread of the personal computer made decentralized high performance calculating available, that is to say, at the place of work of the individual collaborator.

The explosive expansion of such computers also gave rise to a rapid increase in available software. Hardware and software became increasingly efficient and with today's generation of work stations extremely highly decentralized calculating power is available. Present-day development aims with this new strength at networking the individual computer not only on a local basis but also regionally, nationally and even internationally.

This rapid development was also decisive in the formation of a CAD work group in the Design Institute in Offenbach, which was one of the first centres for new media and technologies to be formed. Thus at the end of the seventies basic work in the field of screen design was already being carried out.

Our first considerations led us to the premise that, with the new generation of personal computers, we would have at our disposal efficient systems which would also be of use in the daily work of the designer. An important requisite was that we would have recourse to ready-made software programs and would not have to invent our own. For the preparation of models we went back to already existing implementations and did not begin to create these ourselves.

We have described our experiences in a succession of publications, two basic works on this subject appearing in the German Journal of Design.<sup>5,6</sup>

It is certainly important to acquire daily contact, through learning and practice, with computers. A first step is to replace the usual typewriter with a computer. The next step consists of preparing simple draft drawings, technical drawings and so on with the computer and then print them out with a plotter or laser printer. The advantages of these new technologies will become immediately evident: just in the preparation of project variants the computer is faster and more efficient. A new drawing is rapidly generated on the screen and a two-dimensional hard copy is ready within seconds or minutes. With this we can answer the frequently asked question about the loss of creativity in formal work.

The computer is obviously not creative; it only produces solutions which have been conceived and suggested by a person. At the same time it frees that person from time-consuming routine work and thus provides more free spaces which can be used for the development of alternative projects.

A further important field in the acquisition of computer techniques is that of DTP (desktop publishing). This includes the creation of printed matter, documentation and publications, which can virtually be carried out on the designer's desk (the designer as creator and producer). With a personal computer, a laser printer and a scanner the studio is ready. At the same time the use of the widespread and eminently appropriate Apple Macintosh systems can give a certain uniformity to the results of the work. One obstacle is that, for those unschooled in typography, the multiple typefaces available can be dangerous. Typographic disaster is practically inherent in the system.

In the actual process of development of an industrial design project, computers are used in two important areas: on the one hand for display and on the other for constructing and producing. This is why there exists today a highly comprehensive offer of software, whose origins in the field of engineering are not easily noticeable. This also means that the specific areas of industrial design are scarcely considered. The target group is, moreover, seen throughout the world as simply too small, with the result that the necessary funding, calculated in man-years, of the development of design-specific software, is not available, since any return on investment in the short term is virtually out of the question.

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## INDIVIDUALIZATION OF MASS PRODUCTION

At the same time the above considerations give rise to an extremely interesting series of questions which could drastically alter theory and practice. The introduction of CAD/CAM technology means above all that once the geometrical data has been entered into a computer, either on line or off line, it can be transferred to other work levels (construction, finishing work, production). Thus it is now possible to go from mass production via production in small series to the production of individual units, and still have an economic proposition. The increasing differentiation of markets means that more and more solutions for individual products are sought after. The American economist Michael J. Piore and the social scientist Charles F. Sabel —both from the Massachusetts Institute of Technology in Boston— have suggested in an impressive study<sup>7</sup> that in numerous branches of industry the vast markets for standardized products are increasingly disappearing. In the future the new technologies will play a decisive role in design, too: the designer at his computer screen will be able to intervene directly in production. A specially interesting «new technology» in this connection is represented by stereolithography. This barely three-year-old process offers the possibility of transmitting the geometrical data of a CAD project to an SLA device which divides it into single sections and then, by means of an ultraviolet laser, constructs the model out of a synthetic liquid material (photopolymer). So in a few hours design models or even prototypes can be directly created. This process will revolutionize the construction of design models.

The design theory problems lying behind these «new technologies» have till now only been discussed incidentally. The difficult situation of design in the German Federal Republic —where this question was first raised<sup>3,8,9</sup>— is due to the fact that hardly any research is being carried out. Besides, the institutions of design indulge themselves in exhibitions and colloquies and are not in a position to discourse on the questions that are really relevant to the future of their discipline.

## A FEW AESTHETIC QUESTIONS ABOUT THE NEW MEDIA

The use of new media is marked by certain curious characteristics, which should not be overlooked. Peter Glotz<sup>10</sup> has reduced these to a simple denominator: «The sad spectacle is this: the United States provides the software, the Japanese the hardware and Europe is a vast buyer market.»

This means precisely that in the field of new media we are clearly economically dependent on the USA and Japan. This is most striking in the field of software, where we are also dominated aesthetically by American products. This is all the more shocking since the USA is a country that does not dispose of a cultural tradition. Yet there, software is creating new aesthetic standards and we in Europe allow ourselves to be, as it were, colonized by them.

Umberto Eco<sup>11</sup> once spoke in this context of the propensity of America towards «iconicity», that is, towards the most realistic copy possible of reality. Whether it is Disneyland or Universal film Studios in Hollywood, everything must appear as far as possible just as it is in reality. This basic vision has stamped its influence on the software producers. The possibility of presenting shiny metallic surfaces answers a challenge of the US motor industry, which wishes to visualize its products with CAD systems.

In the first place, it deals with a preview, that is to say, a reproduction of the objects to be produced. But it is evident that in this way they will never be able to create aesthetics of the image. Computer graphics are in the same situation now that photography was in a hundred years ago. And this also needed a long time before it could develop aesthetics and a discipline of its own.<sup>12</sup>

## INTERFACE DESIGN

Different situations of daily life confront each other with electronic apparatuses. The classic paradigm of «form follows function» is archaic. The function of the product is assured through chips, that is, microprocessors. Form will therefore no longer be able to visualize function, as is habitual in the functions of signs.<sup>13</sup> The use of products is carried out more and more via monitors or display panels, or, just as the writer Arnold Schmidt said at the end of the seventies, the surface of things will be more important than their real content.

The configuration of the surfaces of things receives the name of «interface design» or «interaction design».<sup>14,15</sup> The following examples will show the increasing relevance

of all this. At present in Europe ISDN (Integrated Services Digital Network) telephones are being installed. Since the cost of these is relatively low (chip technology), new facilities are always being added to them. We can name some of these:

- Choice of a hanging receiver.
- Call.
- Change of call.
- Collection and redirection of calls.
- Alternation.
- Tripartite conversations.
- And so on.

The user then receives a thick manual to place beside his phone, which he can consult in case of necessity to see how the respective facilities are used. Whether this works in a stress situation in the usual type of office is a highly debatable point. Or take the new status symbol of the young manager, the Sharp IQ-7100M Personal Organizer. This is a calendar, telephone and address list, world time clock, calculator, planner and so on. It even looks as if the device itself has just been added on to the comprehensive User's Guide (a good 200 pages).

Common to all these small useful electronic helpers is the fact that they are all provided with an abundance of facilities which must be studied and learnt one by one. The American psychologist Donald A. Norman<sup>16</sup> has affirmed in a long study he made that:

- If the number of facilities of any product is doubled, then the complexity increases fourfold.
- If the number of facilities is increased by ten, then the complexity can be multiplied by a hundred.

The reduction of complexity has therefore been converted into a central task in the «new technologies», to which designers in particular have to devote themselves, since computer scientists and engineers tend to let the devices become increasingly complex, thereby losing sight of the user. Because this field of work is so new, there are only a few design offices that occupy themselves with it. One can choose between the California office ID TWO (Bill Moggridge), the Belgian counsellors Integration by Design or the German group Vision & Gestalt, which was founded at the beginning of 1990.

Unfortunately even schools of design have so far hardly reacted seriously to this question, much less developed appropriate syllabuses. It seems that practice is far more important than teaching.

## A LOOK AT TEACHING

The aspects I have mentioned now need commenting on in so far as they are considered as part of design education, which also represents the centre of gravity of the theme of this journal. Michael Schirmer<sup>17</sup> recently described this as follows:

Today a third category has been added to those of form and function: the computer. The industrial society has given rise to the computer society. Its means of communication are the new media, data media such as computers, telecommunications, teletext etc, with the arrival of which we are on a similar decisive threshold of time as that of the Bauhaus.

A look at the German educational «scene» reveals that consideration of these subjects has begun to only the most timid extent. So-called research programmes in past years have led to the installation of more computers in German universities and high schools. Institutes of design have also benefited from this. Many of these can today boast of really well equipped computer laboratories, in which essentially desk top publishing and CAD are carried out.

Considerable sums of money were set aside by the German cultural and scientific authorities for research but the infrastructure of personnel was practically neglected. Thus, for example, after more than ten years work in the domain of the new media the Institute of Design at Offenbach now has its first post of laboratory engineer in this field.

It is not easy to show that it is just in the traditional schools of art and design that massive difficulties exist in putting into effect progressive concepts in this field. In almost seems to me that regressive tendencies are taking over. This was especially apparent in the case of the Offenbach Institute, which has truly played a leading role in this field. Last year a leather workshop was opened which has to be tied in with the regional economic structures. Later a large part of the student body became involved in the project of individual furniture, as was the fashion in the eighties. The private hobby of teachers reaches even into education and produces simultaneously more and more unemployed designers, for these «qualifications» are hardly asked for any more as there is an enormous oversupply of them. Ex-students of this subject have at most the chance to become active as advisers in furniture shops. The «prostituted» character of this industry is evident. Moreover, the Europeanization of design has brought with it an increasing amount of transfer of designs from Italy, Spain, England or France. It is precisely the pressing and necessary aesthetic questions of computer graphics and computer animation that have hardly been examined. These could, however, be a great field for research, in which representatives of different European countries, united by a common cultural tradition, would meet to develop new forms of expression and language.

This applies equally to the fields of interface design and interaction design. Here there also exist certain deficiencies which should be made up in the short term. Both fields are, moreover, central tasks for schools of design, which could use them to honour their claims to research.

## NEW CENTRES OF ELECTRONIC CULTURE

The problem of traditional design schools in relation to the new means of communication and new technologies led in a short time to the creation in West Germany of three new centres which from the very beginning will take up the subject unencumbered by past traditions.

By far the largest project has been initiated by the city of Karlsruhe and the *Land* of Baden-Württemberg. Here stands a Centre for Art and Media Technology, which cost 100 million marks to construct and 30 million to equip initially. The head of the Centre—the former director of the Museum of German Architecture in Frankfurt, Professor Dr. Heinrich Klotz—adheres consciously to the Bauhaus tradition and to the legendary Ulm Institute of Design, in which aesthetic questions were already linked to those of industrial production. For Klotz, the question is the relation between the free and applied arts of the close of the twentieth century and digital techniques. He would like to open a new Karlsruhe Institute of Design, in which, alongside classical design disciplines, architecture, painting and plastic arts would also be taught. Then would come video, computer graphics and animation, holographs, stage design and so on.

In Cologne an institute for design and communication media was opened, whose founder and rector was Professor Manfred Eisenbeis, who for many years at the Offenbach Institute had built up the subject of new media—especially teletext. In the autumn of 1990 it opened with a two-year postgraduate programme which includes the subjects of film/video/television and the art structure of the media. In a period of four years there should be regular courses of study leading to a degree. The first appointments of teachers are already taking place.

The Cologne High School is also interesting because parallel to this a media park is being built, which will act as a multifunctional centre for computer and communications techniques. Different broadcasting stations, publishers and large printing companies have already set up in Cologne which almost guarantees an increase in the electronic media. It seems to be certain now that research, teaching and practice will be combined in one town. It remains to be seen how this will work out. The subject itself will be admitted in 1992.

There remains to be mentioned the third centre, the Institute for New Media in Frankfurt. This was originally planned as a joint venture between the Städel School (a traditional independent art academy in Frankfurt) and the Offenbach Institute (with its subjects of industrial design and visual communication). Then, because of political problems the Frankfurt Städel School went on alone: the famed versatile artist, Peter Weibel, was invited to be the founder director of the new Institute in Frankfurt. The original idea of working in a union of computer scientists, designers and artists on the questions of a new language and aesthetics of the image, which I outlined above, does not seem feasible for the moment. The Institute is dedicated primarily to the «regime of the image», as it is dubbed by art videos and computer animation. Independent work has not yet appeared but here also we must count on a period of one to two years.

Yet all three institutions in Karlsruhe, Cologne and Frankfurt have one thing in common: to create open structures which will permit unencumbered work with the new media and new technologies. To what extent design and design teaching will benefit from this still remains to be seen.

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