The Transformation of Design

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We experience the world we live in through action, and through action we change it. Change implies creation or design (the German word *Entwurf* connotes both) even at the level of our everyday actions. In the specialized understanding of designers, however, the concept of change usually is limited to the design of products and their manufacture; it is understood to mean product innovation, a process that, in light of the distinction our society makes between production and consumption, is considered completed when the finished product is made. This view of change, confined to the period in which the product is designed and produced, reduces the transformation of the lifeworld mostly to the creation of artifacts. Here, the "lifeworld" is viewed not so much as a process of civilization, but instead as a more or less (un)successful ensemble of physical and informational goods that are produced and consumed.

In this concept of design, the lifeworld primarily is conceived as a three-dimensional world. The temporal dimension is accorded a marginal role only. Even where the factor "time" has always been taken into account, for example with regard to issues of perception and use, the temporal dimension is subordinated to the static concept of the "finished" product, even in instances where the user interface functions as a dynamic information medium, or when air-conditioning, lights, and other equipment constitute sensitive systems that respond to the presence and absence, as well as the movements, of people and things.

The lifeworld, however, can be experienced only as a temporal process that takes place spatially. The lifeworld is something that happens: it occurs through action and it is modeled on action. The lifeworld is more than matter that has solidified as form, and in which time stands still. Its shape is defined through activity; action is its fulcrum.

By contrast, the way architecture and design grasp the environment is fixated on things. Without a doubt, this fixation on objects in the field of design is concerned with processes that take place over time. But, in this case, action usually is reduced to the object-related function of usability, and not considered as a process of change and design in itself. In practice, designers seldom break through the constraints placed on them by this mode of thought.

If we construe design as being oriented toward action, and regard action as something more than passive use, but as active intervention and creative change, then design will no longer just focus on the object as a form. Rather, designers primarily will be

concerned with how to develop and model processes: processes of interaction and change, in which objects nevertheless play an uncontested central role as a medium for action. Seen in this light, design relates to the entire physical and intellectual scope for interaction between people; between people, products, and the lifeworld; and between products, in other words, between machines.

Today, we must do more than merely refresh our awareness of these facts. Given the changes confronting our civilization, we must conceive them anew. Among the buzzwords for this process of change are globalization, economic structural change, increasing social inequality, ecological issues, changes in life and work habits, and the dissolution of traditional patterns of orientation, thought, and action. In addition to the things they actually stand for, these words suggest processes of change that neither proceed according to plan nor are completely random. Civilization changes beneath the surface of a wide variety of social, economic, scientific, and creative designs through a kind of systemic chaos, where everything relates to everything else and is in flux. This shows that design change—in other words, change that is understood in design as calculated transformation—inextricably involves uncalculated self-transformation.

Action implies grasping, doubting, negotiating, deciding, altering, and creating. Action is tied in with interests and, as such, it is characterized by ambivalence, a propensity for conflict and ambiguity. Action is a communicative process. It takes place through motion: through intellectual motion, the motion of people, and through the motion and reshaping of knowledge, substances, things, and data. Motion is a spatial process that takes place over time, although the temporal side to electronic data transfer eludes sensory perception. Given the differences in technologies and speeds, we distinguish between two kinds of motion: transport and communications; two concepts that were in no way separate until late in the nineteenth century.

The division of telecommunications from transport began as early as the age of smoke signals. However, it did not become firmly established until the Morse electric telegraph was introduced in the nineteenth century. In those days, the term “communications” still indicated any and all kinds of exchange; in other words, it included traffic and transportation systems, too. At the beginning of the nineteenth century, transport and telecommunications were still one and the same thing. Disregarding techniques such as semaphore, for example, information was transported the same way as goods and people. The interrelation of time and space still played a central role in passing on information.

In today’s telecommunications, spatial distance is hardly of any importance at all—at least on a terrestrial scale. Thanks to telecommunications, people who communicate with each other but are in separate locations are temporarily brought together. We can

move about via the network of virtual space without leaving our chairs. What we perceive as telereality, and where we are when we perceive it, are co-temporal. Space and time appear to part ways.

And yet within the sensory perception of telereality, space and time, as in reality itself, together create a space-time continuum. For example, the "Terravision" project by Art+Com in Berlin, albeit still in its infancy, is a virtual reproduction of the planet and potentially everything that happens on it, a real-time copy of the actual world. Via such systems, the individual, as a "user" with a "space-mouse," can enter the virtual space-time replica of the real world, and thereby attend a concert in Moscow or a scientific discussion in Cambridge, or watch the construction work on Potsdamer Platz in Berlin. Just as easily—and this is the other side of the coin—the user can flick through these worlds independently of their spatio-temporal context.

The expansion of the electronic network serves to transform the shape of communicative action and the possibilities for it. Buzzwords such as telework, telebanking, teleeducation, teleshopping, and telemedicine are examples of the extent to which traditional concepts of space and patterns for action have dissolved in everyday life. In the near future, we will have access to 15,000 television channels. The quantity of data available is growing, as are the data flows. Unlike the printed word, it seems as if there were no technical limits to the electronic storage and distribution of information. For quite some time now, the problem no longer is a lack of information, but rather a glut of it.

The moment when everyday life became "opaque" has long since arrived. Without orientation systems to guide us, we are lost. And not only in traffic, in the subway, or at the airport, but also—and especially—when it comes to digitized information processing. So-called "personal information management systems" are being provided to handle the flood of information; however, developing these management systems and processing information involves more than just making information available and clear. It is not enough to simply handle the technical aspects of the microprocessing network, which is growing by leaps and bounds. Rather, we also must understand the impact of this phenomenon on our civilization. Today, everyone who is logged onto the network can input or download any kind of information. A central issue here is whether or not people are capable of penetrating the information environment on their own initiative, dealing with information responsibly and competently.

By introducing microprocessors at all levels of our everyday lives, we have altered our understanding of use and the way in which we use things. Increasingly, "use" is changing from being a "hands-on activity" to teleintervention. The form of those products that we still handle directly, is conditioned by the hand or the human body, in addition to other factors, such as their function,

their technology, and how we perceive them. Teleintervention implies controlling processes via a medium instead of handling the objects directly. An increasing number of products can be equipped with features that respond to the user by implementing new technologies, from the fields of robotics, self-diagnosis, and image recognition, for example. Not only are these sensitive products capable of responding to external control impulses: they also are increasingly able to control and transform themselves. Objects and space become sensitive, interactive entities that respond on their own to brightness, color, temperature, moisture, movement, and sound, and thereby interact both with us and with each other. The intrusion of robots into everyday life—similar to developments in the media—potentially can exacerbate cultural poverty. This, although unintentionally, illustrates Nicholas Negroponte's description of the networked household, in which music follows us from room to room, lights turn on and off by themselves, and appliances communicate with each other in a fully-automated kitchen, drawing the car, the garage door, and the alarm system into a conversation in which the refrigerator tells the car that the milk is gone, and the latest stock market quotes are etched by heat into the toast at breakfast. Machines will learn to recognize individuals by their voices, gestures, and facial features, and literally learn to read their lips. Microchips also will find their way into clothing. In addition to clothing us, these "smart" garments also will function as IDs and appointment calendars. According to a study carried out by Creapole ESDI in Paris, they will, in effect, be "wearable computers" that receive, send, and process information. Furthermore, they will be able to change their color, texture, and breathability on their own. Clothing will become part of the network as a body shell. The social, cultural, and ecological problems unleashed by these developments reveal how necessary it is to rethink our concept of use and ease. The easier something is to use, the less we think about how we are using it and the "side effects" of such use. The more perfectly a product has been designed, the less we are tempted to consider any problems posed by it or its use.

As robots enter our everyday lives, design will be forced to confront the issue of processes, and how these processes take place. Products soon will have a self-transforming character, although their scope for doing so still is limited. They are acquiring the features of the machines that manufacture them. Thus, processes that were previously limited to production are finding their way into the domain of consumption. The production process is beginning to extend beyond what is normally associated with manufacturing, with no clear limits in sight. The old adage that production finds its completion in consumption takes on a whole new meaning here. Use and transformation interweave and affect one another in new ways.

Products are viewed as processes in ecology as well, but for different reasons. This applies both to the ecological cycle of a product, from its manufacture to its disposal, and to the product's function as a medium for action and economic commodity. The Wuppertal Institute for Climatology, Environment, and Energy draws up an ecological "balance sheet" for objects and processes by analyzing all the relevant equipment, raw materials, and products, and the converting, packaging, and transportation processes. Their investigation addresses all aspects of an object or a process as it emerges, during its existence, and after its disposal. This extends to tapping raw materials and energy, production, use, and maintenance, as well as all recycling, disposal, and decay processes. The materials flow that results from these processes is considered to be the decisive factor in determining to what extent a product burdens the environment. "Materials flow" here means the extraction, transport, and transformation of all substances that go into the manufacture and use of a product, as well as all subsequent processes.

The goal is to reduce materials flow and thereby lessen the damage to the environment. This can be achieved, on the one hand, by increasing material intensity in the product life cycle, in other words, by reducing the quantity of materials used while maintaining or enhancing performance. On the other hand, the hope is that, by applying service-oriented economic principles to our supply economy, with its emphasis on boosting unit sales, products will be used more intensively, thereby braking the upward trend in product quantities without sacrifices at the consumer end. Change seems to be occurring here. Not for ecological reasons, but mainly for economic reasons, service-oriented approaches are being developed in certain areas of the supply economy. In this context, a service orientation means uncoupling the use of certain products from their ownership. Rented apartments and rental cars are long-standing examples of this principle. In the transportation industry, for instance, "individual mobility" is being considered independently from private car ownership. This is conceived as a service that must be readily available as well as highly attractive for potential consumers. Car sharing and car-pooling are mere beginnings of this new concept of individual mobility as a service where products could be used more intensively. Ownership and use do not necessarily have to be one and the same. This is especially true of software. Products dissolve into services; processes come to the fore. Telecommunications forms the basis for service-oriented forms of the economy, with networking as the key factor.

In practice, interest in networked computer technology within the field of design primarily focuses on image generation; however, the radical changes that will prove decisive for the course taken by civilization are occurring on a completely different level, one that is not visual and appears far less spectacular on the outside. As the networking of computer, telephone and television tech-

nology continues to unfold with little fuss but great capital outlay, it is spawning a global arena for action that defines and incorporates individuals' actions on an economic and social level—and above all in the world of work—in a completely new way. Work, which it was possible to organize rationally in the mechanical era only in large working communities, increasingly is becoming part of the virtual network. When the work world finally is networked on a global scale, it will become a comprehensively integrated institution, not only for those on the network, but also for everyone else, provided they do not fall through the meshes. In this new, synthetic work world, every form of work that can be executed and transmitted via computer technology also potentially can be called up and carried out by anybody anywhere in the world, "just in time." Not only jobs, but also study places will no longer be tied down to central, collective workplaces.

The networking of work changes the social and spatial organization of work, and thus the social and spatial organization of the lifeworld. This presents completely new challenges for design. In organizational terms, work is being networked on various levels, one of which is called telework. In the European Union, there are, at present [1996], approximately 200,000 telework-stations. In the United States, this figure is already eight million. In Germany, according to an estimate by the National Association of German Industry (BDI), in just a few years there will be more than three million telework-stations. The traditional forms of work that are tied to common places, such as factories or offices, lose their significance. This affects human social behavior, the spatial organization of cities, and the typology of buildings, too. The traditional spatial division of cities into separate residential, work, consumer, educational, and resort areas has its roots in the principles of the industrial division of labor, and developed historically in that context. The tradition that has shaped urban space, in which people leave the residential areas in the morning to gather far away in commercial districts to work in a joint setting, and then return to their homes in the evenings, is barely 150 years old. It is a product of the principles of the industrial labor society, through which the cold wind of structural change has been blowing for a long time. In historical terms, the city divisions based on these principles certainly will not be the "ultimate" shape eventually taken by urban organization.

Work is becoming an endeavor that can be carried out independent of location. It is becoming literally mobile which, in turn, corresponds to the increasing demand for mobility in the job market. The local job market is becoming global. Not only are we able to transfer manufacturing to countries with lower wage levels; administrative, scientific, design, and cultural work also are moving on the information superhighway. Already, according to a statement made by the Institute for Economics and Society, highly qualified workers in low-wage countries such as India are writing computer

programs for multinational companies. Recently, there was a statement in the press that Mercedes-Benz is building a research and development center in India. Networked work means more than exchanging information at the speed of light—information that could just as easily be sent in printed form. The crucial difference is that, in networked work, computer-generated data and constructs are no longer processed separately in individual computers and then made accessible to everyone else. Instead, it is possible to develop them in a linked network of computers that supplement and enhance one another.

Take Otis, the American elevator company. This company owns production plants at twenty-four locations across the globe, and conducts research and development at fifteen facilities worldwide. At present, the work technology used by these development groups links them as part of a global computer network; they are then supposed to work together as a so-called "cosmopolitan development crew"—cooperation that takes place seamlessly across time zones. The research day is extended to a 24-hour workday. Shift work mutates into time zone work. Within these cosmopolitan work groups, the structures of real, local work communities are coupled with supra-local and virtual structures, and thus are less binding in social terms.

In networked work, the individual acts in real time both in network cyberspace and in real space, to which he or she remains physically tied, with everything that this implies. People speak mystically of bodies that vanish in cyberspace; yet, at the same time, the human body has never been given as much attention as a real entity as it has in our time. Even the fitness industry is booming.

The ever-expanding information networking also has an impact on the status of transportation. As machines aimed at saving time, means of transportation cannot keep pace with data transfer technologies. However, as machines for transporting people and goods, they are in no way losing importance. The Frauenhofer Institute for System Technology and Innovation Research maintains that the advent of telework will reduce professional and business traffic from thirty-four percent today to twenty-eight percent. However, there is no reason to suppose that, in this context, traffic growth will diminish. After all, it is modern telecommunications in the first place that allows people to go anywhere anytime. In addition, the new technologies also will make the workplace itself mobile. The information highway will in no way ease the burden on the real highway.

The meanings of space, time, motion, and speed are changing. Two apparently paradoxical observations summarize the present situation of the urban space. On the one hand, people are speculating that better and faster communications technology will make urban communal life superfluous, at least in communications. On the other hand, urban conglomerations are expanding at an alarm-

ing rate. When Paul Virilio says that the city no longer is necessary because people no longer require spatial proximity to each other to establish linguistic and visual contact, this merely specifies that, in purely technical terms, it would be possible to communicate without ever leaving our houses. However, we can hardly expect that communication will be reduced to this level through the development of telecommunications technologies.

The social structure is what is changing, together with the spatial organization of urban life and business. The virtual, global economic network—the "global city," as Saskia Sassen calls it—is being superimposed on real urban space. Unlike in earlier times, a city's economic importance no longer will be defined solely through its function as a regional hub for the exchange of goods and information; rather, the function it assumes in the international economic and financial network is becoming the crucial factor. Thus, a gap is emerging between a city's economic function in the international economic network, on the one hand, and the actions of the city dwellers in their local context, on the other, severing the connection between urban communal dwelling and economic action, which is what creates identity. This development has a correlation in the increasing social inequality within cities. In Germany, which certainly cannot be considered a poor country given its GNP, the bottom fifty percent of households possess only 2.5 percent of all monetary assets, whereas the top ten percent possess more than fifty percent. Alain Touraine refers to this phenomenon as the increasing presence of the Third World within the First World.

Along with the upheavals in the work world, the structures of social space also are changing. As work increasingly is a matter of microprocessors, the economic foundations for the social system that developed over the last one-hundred years, based on a form of gainful employment in which the employee is directly dependent on his / her employer, are being eroded. The social security systems of the old industrial society are unsustainable. New systems have to be invented. At the same time, communal forms of work in many fields are being replaced by workstations that are networked and not in the same physical location. As the form of collective work spawned by the industrial society vanishes, this society also loses its potential to engender communities. Customary orientation schemes, principles of behavior, and social safety nets no longer are effective. Something else arises to take their place. The question is still open, however, as to which new forms of community-oriented action could be developed on what basis, and how. On the one hand, this vacuum provides historical scope for developing new options. On the other, it provides the pretext for clinging to purportedly proven concepts with fundamentalist zeal.

With the mobilization of work (buzzword: telework) and the globalization of the economy (buzzword: separating economic processes from the workplace), the basis for the social organization

of our lifeworld is undergoing a transformation. Ways of life are changing, and so are the demands made of design. It would be more than daring to try to predict what will take their place. Instead, the crucial issue is to broaden the concept of design to accommodate new challenges, and to provide arguments that will free it up as a social, political, economic, and cultural scope of action.

Today, design must be construed as sustainable development. Sustainable development means more than environmental design with a focus on ecological aspects. According to the words of the Rio Earth Summit, "Sustainable development" claims to link "ecological sustainability" with "social equity" and "economic development." Design that intends to rise to meet this challenge is all-encompassing, tying in ecological and cultural aspects as well as spatial and temporal ones. The interdisciplinary approach, however, as it has been practiced to date, has been incapable of effectively combating the problems generated by dividing work into separate spheres of expertise. Instead of just adding disciplines to one another, there is a need to develop work principles that prove more effective to integrate them with one another. In doing so, specialist know-how will be irreplaceable. Design that is oriented toward sustainable development is a complex of activities that transcends typical images of professions. It can be neither conceived nor taught as a separate field. It must be developed by intersecting existing disciplines and individual areas, within the scope of projects and flexible groupings constituted and adapted specifically for the problem at hand. To achieve this, a new kind of institution must be established: facilities that are understood as an open, interactive field for design, science, and technology. Design must be understood as a networked activity, based on the model of specializing according to the given context. This does not mean that the various disciplines are to be done away with. Instead, the nature of specialized work must be changed by orienting it to specific problems rather than to traditional disciplinary areas. Of course, this presupposes disciplinary competence.

The question to be raised once again is what constitutes design, and which criteria will be used for identifying and questioning design issues? Design, science, and technology have to see themselves and each other as objects of creative reflection and intervention. This raises doubts as to whether or not design, science, and technology—areas of activity that, as history demonstrates, are capable of changing the lifeworld from the bottom up—are capable of transforming themselves. Thus, we must challenge the social organization of design, science and technology, a concept that is at odds with the established distinctions between spheres and disciplines, as well as their resources—particularly at universities.

The concept of superimposing various disciplines to address the problem or project in question could spawn a new hybrid category of design activity, which will emancipate itself from traditional

disciplinary concepts. It would be equally oriented toward research and practice, but in a novel way. Design that acts responsibly concerning the future—that is critical and analytical, that asks questions and develops alternatives, that discovers causes and contexts, and that develops new, comprehensive ways of identifying problems and forms of design action—demands that both scientific concepts and shaping concepts for change be developed so that each complements the other.

Design is impaired above all because many people, both designers and non-designers, see design as the creation of unquestionable answers. In this context, sociologist Ulrich Beck speaks of "the culture of certainty" and its fateful role. Undoubtedly, the search for absolutes is an age-old phenomenon. But certainty excludes doubt, and thereby turns into dogma. Doubt goes hand in hand with uncertainty. And doubting what exists, what one thinks, and what one does is the most important aspect of creative action. Doubt is a prerequisite for creativity. Design should be effective, but in its effectiveness it must also see itself as a self-created problem. It must acknowledge the fundamental doubtfulness of its own action, and create a public awareness of this. Design must be liberated from the one-dimensional mode of thought that focuses on solving tasks, and instead must be seen as the constant creation of new tasks.