

Cybernetics: Integration of type and topos

Today more than ever, residential architecture is bound to a multitude of value systems within a complex network of interdependencies. Therefore, typology can never be examined isolated from other factors. Rather, typological examinations form a platform displaying the many interdependencies that need to be considered. A systematic catalogue of building typologies such as this book might be of help for the designer. However, providing a practice-oriented mind with an architectural recipe book is very risky. On this note, it is necessary to integrate typology into the overall complex of contemporary creative thinking, in order to encourage an awareness of one's own doings.

The events and processes on our planet are extremely complex. At the threshold to the third millennium we are confronted with demanding challenges. Environmental changes, resource shortages, new economic phenomena and an ever-increasing world population are only a few of today's and future hot topics. In the face of these challenges, scientists demand that progress should not only be pushed on a technocratic and materialistic level, but that we also pioneer our structures of thinking and acting. The limitations of the classic methods of perception, based on the principle of dissection, become apparent. Expertise and atomisation of knowledge in ever smaller and specialized sub-areas alone will not be viable in the future.

The zeitgeist of timidity has taken hold of us all -of architects even more than of others. Enviously, we look at Buckminster Fuller, who left us gawping at his visions for living spaces in the Dymaxion House in the 1950s. An architect, who, 50 years ago, already gave us a telling-off about the influence of nature as a continuously systematic effect due to economic principles! For most of us he was a hopeless oddball. His patented geodesic cupola burnt down during the World Fair 1967 in Montreal: a signal heralding a long time without visionaries.



At the beginning of the 1960s, a few British architects founded the group Archigram, wanting us to believe that we could better live in bubble-shaped, air-conditioned flats with wall-integrated information systems than with Chippendale imitations. In Japan, visionaries also awoke around that time. Kenzo Tange created his design for the Tokyo Bay, Kurokawa designed cities lost in and resurged from the ocean. They called themselves metabolists, borrowed from the Greek word for change and vicissitude, based on the thoughts of Zen Buddhism.

In Germany, Frei Otto - his first name meaning "free" and seemingly no coincidence - experimented with soap suds and bellows to detect the secret of the structures of thin bubbles. In 1964, he founded the Institute for Lightweight Plane Load-bearing Structures (IL) at the Technical University at Stuttgart, whose prototype became the model for the German pavilion at the World Fair in Montreal. All these people researching and designing on an experimental level were bound by the idea of creating new life styles and forms of society as well as by an irrepressible confidence in the future. America was competing for the moon; outer space was everywhere, in home movies, residential design and in the children's rooms. What was this strange syndrome that afflicted us 50 years ago, and that no longer exists?

At the turn of the millennium our hopes still soared; giant domes, space labs and science centres were to paint our future. Computer-generated design bends lines, planes, spaces, distorts walls, and shreds rooftops. However, the new promises increasingly seem like formative self-admiration and a loquacious addiction to shape. A new millennium website on the Internet is filled with the most diverse contributions by politicians, authors, philosophers, sociologists, artists of all kind; architects, however, are mostly not represented.

Architecture has difficulties developing fundamentally new definitions. The established self-conception of the architect as a generalist can no longer be maintained when more and more detailed knowledge is required. Other disciplines have reacted to this situation by starting to rethink their approach. The goal is to think within a diverse network or use a system-oriented approach. This is the basis for cybernetics, which is applied in many scientific areas. The architect - in the traditional definition a mediator between different disciplines - already plans in a more or less networked environment. However, the term cybernetics has not yet been introduced to the field of architecture even though this particular strategy comprises many opportunities to develop sustainable architectural concepts.

The individual organisation of living spaces was unproblematic in the context described here as long as no more resources were used up than could grow again. The industrial revolution and subsequent decades, however, have led to a fundamental change of our way of living. The impact on the environment has increased dramatically and the human being has become the primary factor influencing the climate. Since 1950, the world energy requirement has almost quintupled. Currently, we use up as much fossil energy per year as nature produced over 500,000 years in the form of coal, crude oil and natural gas. At the beginning of the 21st century, saving energy and reducing CO₂ emissions are the most critical tasks, not only for architecture.



Building societies, developers and the clique of the real estate industry are often conspiring ignoramuses, who hide behind the so-called doable and the alleged desires of the user. The results are evident everywhere: in endless urban expansions and on the boundaries of grown villages. As dignified houses and our memories rot away in the village centres, detached houses in new residential developments in the shape of prefabricated houses called Chalet, Lifestyle, Ambience, Future, Residence or Metropolitan are booming. Unfulfilled longings and desires, identified by these names, in this context remain without perspectives; future demands or changes are not considered or, if

modifications of size or combinations with other units are possible, these are designed for growth, not for downsizing. Behind all this, paradoxically and abruptly, lies an undefined and nebulous quest for authenticity even though nobody really knows what this exactly means. Germany's population, for example, has long since reached a level at which we can question the entire system of detached and row houses. The share of singles has risen to 36%, the number of couples with two children stagnates at 7.7% (source: Federal Statistical Office 2003). Who then will live in these flats, specifically designed for small families?

At the same time, the dynamics within medical science, genetic engineering, neurology, and information technology are breathtaking. Life can be prolonged more and more. The pharmaceutical industry promises longer life spans, youth, potency, and eroticism at any age. We have to fear that the application of genetic engineering is determined by our new global religion - which for some time has been known as science. The psychosocial, cultural and social effects are unforeseeable. And we wonder why there are no visions for future living! Torpor would be too limited a term to describe the dynamics in the area of residential living.

To architecturally cope with the task of residential living, we need a change of perception that leaves behind our linear mechanistic view of the world, coined by western culture, and embraces a circulation model based on communication and integration. The cybernetic principle can support a paradigm shift in this direction within architectural theory - a theory that no longer works off current practices in a backward-oriented fashion, but prospectively, forward-looking, opens up new perspectives. The principles of cybernetics shall lead to a new perception that will influence the structure and appearance of architecture. Such a change in perspective will have an impact on methodological approaches and prerequisites of design as well as on the definition of goals for future-oriented building.

Building means nothing more than to interfere with an ecological, sensitively balanced system, with the objective of the creation of a new balance and extensive self-regulation of the installed systems later on. Not only the data of the immediate surroundings should be included in the concept; rather, an encompassing analysis of the different interferences with the global ecological balance is necessary. Cybernetic building methods are based on a networked system of functional elements that interact with each other. The goal is to integrate all elements - including structural, passive and active elements such as the use of daylight, sun protection, artificial light, glare protection, activated building components, controlled ventilation as well as the use of rainwater and wind - into an all-encompassing overall concept.

From this perspective, visions can no longer be limited to being of technical nature. In only a few years, it will be possible to develop buildings that can create a balance with nature. And the amount of technology necessary to achieve this goal will ultimately be irrelevant. New materials can store and insulate, are translucent and strong, and offer more structural stability than all materials we have ever used in construction. In a broader perspective, hydrogen and electrolysis will make us independent of today's energy suppliers; cars will be exhaust-free, running on hydrogen, and the remaining crude oil will be processed into precious plastic products. Communication technology will globally network every participant with everything. This is the main difference compared to the visions of the 1960s. Then, in the 1970s, there was an unshakeable belief in technology. We believed that we could only control technology if we kept everything separate. In the cities, we separated pedestrian traffic from car traffic on different levels - even encompassing buildings - and in overpasses and underpasses. We separated living space from workspace, we invented centres for administration and banking, we separated old people from young people, etc. Today, we know better.

Current visions are different. Architecture can provide us also with dreams of movement. It is the movement of changed life styles and savoir vivre that cannot be described by floating architecture with slants and curves. In a time of de-separation of individual and collective living patterns, our familiar images have lost their validity. Society offers multi-optional patterns everywhere. A multifaceted division of different psychological worlds, the complexity of different and changing living conditions that last ever shorter and therefore become more fragmented (work and partnerships), lead to numerous experiential relations. A "multiphrenic" situation has evolved, which is so present today that we experience it as an everyday phenomenon.

We have to comprehend our living spaces in the same multifaceted way. One of the fundamental insights must be that a building not only uses up but also generates energy. This does not only relate to the thermal comfort, but also to the individual bodily sculpture and the satisfaction of psychological and social parameters such as feeling comfortable and at home.

Residential structures today hardly accommodate these factors at all. If we want to transfer the social situation to dwellings, we need to consider certain transformations of "movement". We need to combine nomadism and settledness, as well as the individuality of a private urban retreat and lively interactive alliances. Instead of segregation of any kind, integration on all levels is the main criterion for current

visions. After a millennium of specialisation and inventions but also segregation, the new millennium is all about integration.

Building structures of the future will be able to offer this kind of interconnectedness. Living spaces will form a spatial network arranged in small and large units of different density. Figures (positive volumes) create grounds (negative volumes) which can serve as open or interactive spaces. Differentiated building levels and volumes create spaces of varying privacy and publicness; some can be utilised at the user's discretion, some are fixed. This system allows enclosed flats as well as an open weave of spaces for interactions and private spaces of different size and zoning density. The size of the overall building structure is designed to accommodate changing group sizes with different needs and orientations - socially, culturally, and sociologically. The system offers work and exchange of services as well as options for participatory organised sections within the housing development.

Today's building technology can fulfil all these requirements. What is missing is an integrated social and architectural model that is no longer based on segregation. Future ways of living will have to return to relying more on self-organisation of communities and groups. Work will be part of life up to old age because its definition has changed. Patchwork families will become multi-generation patchwork families of varying productivity and activity within a network of affinities and multi-relationships.

Architectural reality clearly lags behind our sociological reality. This is not only caused by the architects' capability to persist alone, as he or she deals much more with shapes than with context. The awareness that a stronger consideration of the overall energy budget of a building is necessary has fortunately increased in the minds of planners, users and manufacturers. However, the process is still mostly uncoordinated; individual measures are simply added to each other and they only relate to the physical energy budget of a building. When, today, we talk about ecologic construction, we think of sun collectors on the roof, thick thermal insulation packages, maybe of a cistern for grey water use. In the end, all these measures are saddled onto the existing image of a house rather than integrating it typologically. The method is not only ineffective from an energetic standpoint, since this additive approach does not produce any synergy effects.

As little as one century ago, the pragmatic strategy of a more or less direct translation of contextual conditions and necessities led to authentic house types; authentic, here, meaning that interior structure, way of living and user habits as well as the exterior shape have melted into one entity. Today, we bemoan the lack of authentic structures. Technical and mechanical innovations have allowed us to largely ignore all contextual conditions. If the image of a corporation or institution requires a high-rise building with a glass facade, this wish can be fulfilled. The question of how user-friendly and liveable a building is has been reduced to the question of how much performance the technical equipment can offer. The value of being able to recognise one's environment as well as the personal sensation of comfort has suffered from this "anything is possible" attitude. This is because the complex interaction of type and topos is part of our inherent knowledge. We intuitively sense the congruence of type and topos; reciprocally, we also sense the lack of this concordance. As a conclusion of the interrelations outlined herein, we can say that the cybernetic planning process aims at the integration of type and topos.

The main issues that will lead to a continuous transformation of the house types are:

- social interaction and adaptation to individual sociological demands across all stages of life,
- the changing working conditions,
- the issues of energy, resources and ecological balance,
- the change of the topos considering embedding and adaptation to the historical and urban context,
- the individual perception of phenomenon such as atmosphere, light, materials and memories.