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avec un microfilm — afin d'étudier la figure représentée sur le film. La photocopie de cette figure est évidemment possible.

Il s'agit donc d'une bibliothèque-microfilm permettant tout agrandissement du volume d'information et s'adaptant ainsi continuellement au niveau du savoir. L'ampleur d'un tel système étant gigantesque, Wachsmann propose le procédé suivant:

Des feuilles standardisées sont distribuées aux étudiants. Certains thèmes — selon un certain programme — sont déterminés. Les études et analyses sont enregistrées; elles font partie du programme des écoles et universités. Une centrale internationale s'occupe de l'organisation de ce vaste travail d'équipe. Toutes les administrations, instituts, laboratoires et autres s'occupant de construction peuvent collaborer. La centrale confectionne les cartes perforées déjà citées selon un code international. Ces cartes originales peuvent être copiées à volonté pour le monde entier.

Le travail en équipe demande une information impeccable: matériaux, méthodes, machines, systèmes de contrôle, procédés de production, analyses scientifiques, calculs statiques, expériences de laboratoire, en un mot, toutes les possibilités de notre époque sont indispensables. Ce système, il est vrai, n'est pas encore organisé de cette manière. Le manque de temps, d'une part, et le manque d'aide, d'autre part, ralentissent l'évolution d'un tel principe d'information.

Les quelques exemples «d'étude en équipe» de ce cahier suffiront — nous espérons — à illustrer les considérations précédentes.

Jacques Uffholz

Salle de spectacle ambulante

(pages 385—390)

Projet 1958

Considérations générales

Qui n'estime pas le cirque, allant son chemin de ville en ville? N'est-ce que le côté romantique de cette forme de spectacle qui nous captive? N'est-ce pas également le spectacle palpitant de l'organisation déployée, capable d'installer une tente pour 5000 personnes et une arène, et ceci tout en se déplaçant de localité en localité sans jamais interrompre le programme journalier, qui nous séduit? Ou encore s'agit-il de la fascination que dégage en nous l'idée de l'habitation et lieu de travail pouvant être déplacé selon l'humeur du propriétaire et les besoins du public? Le bâtiment-véhicule, la parfaite mobilité?

Pour qu'un théâtre ambulant soit utilisable il faut que ses dimensions et son aménagement soient approximativement les mêmes que ceux d'un bâtiment à lieu fixe. Mais pour qu'il soit transportable il faut, de plus, que ses dimensions soient telles qu'il puisse être plié ou réduit à une grandeur notablement différente de la grandeur d'emploi. De plus, le théâtre ambulant ne doit pas être uniquement véhicule de trafic, il faut aussi que le changement véhicule de trafic — salle de théâtre s'opère avec rapidité et facilité.

Un tel véhicule est-il une œuvre d'architecture? Ou plutôt le produit de l'ingénieur-mécanicien? Le projet en question est l'œuvre d'un architecte; plus exactement, il s'agit du travail de diplôme d'un candidat-architecte de l'Ecole polytechnique de l'Université de Lausanne. Encore plus: les professeurs de la section d'architecture de l'Ecole ont accepté le travail en question et le candidat a été promu architecte! Ainsi «l'objet bâtard» entre machine et maison est devenu ex cathedra «œuvre d'architecture».

Nous sommes persuadés qu'une part de l'activité architecturale se développe en majeure partie dans une direction qui est celle des ingénieurs et constructeurs, où l'idée de profession «d'architecte» comme nous la comprenons aujourd'hui n'est plus valable, où l'architecte d'aujourd'hui perd sa place et où les œuvres faites sans lui restent tout de même «architecture».

Summary

Konrad Wachsmann

Group Study

(pages 351—384)

The ever-increasing rate of industrialization and the discovery of new materials and new working methods are contributing more and more to the creation of new needs, on the one hand, and to the enlargement of the gulf between manual production and mechanized precision production, on the other. Industrialization makes a complete revision of the ideas and methods employed in building necessary.

There can be no question here of discussing these facts, which have already been demonstrated so many times before. Above all, we shall attempt to portray the general insecurity and the means that are suitable to combat it, without however bearing ethical considerations in mind that could falsify the problem as a whole.

It is comparatively easy to discover the causes, both technical and economic, that are giving rise to evolution in society. It is, therefore, at this level that we shall begin with our remarks. The problems that concern us stand out clearly in the following little anecdote:

When I asked an American architect what he was doing, he replied, "I'm doing what many others are doing as well; I'm trying to make the others believe that architecture is a product of technology and industry while all the time making use of conventional construction methods, just as if my work were not thought out in advance but was the simple and straightforward result of scientific study."

This little story may seem exaggerated, but it does express the position as it is very clearly. Twenty years the state of affairs was diametrically opposed to it. At that time the question of aping industrial architecture could not arise. People were satisfied with the materials and technical means at hand. For this reason it cannot be doubted that things may change very rapidly, which excludes any speculation concerning the twenty years to come.

Grasping and mastering the possibilities before us is no easy matter. The best will in the world and the finest talent are not enough when it comes to the interpretation of contemporary ideas about architecture as having to stem from some general evolutionary process in society. This interpretation demands the employment of highly complex technical means and new scientific disciplines, and any modern building presupposes a knowledge and utilization of new techniques; conventional methods are not sufficient. A "modern" building will not justify its name if the materials employed are conventional, i. e., if they do not correspond. The British Prime Minister, Macmillan, has said, "Tradition is not a sofa, it is more of a springboard" and we could add, "Design is not arbitrary, it is conditioned by the epoch." And it is just this that is involved: having the courage to study this design means studying the possible and the necessary. It is perfectly true to say that man's knowledge is greater than his powers of action. Owing to his nature man is not always able to surmount a certain passivity and slowness in his reaction to what is new; conception and execution are two separate things. Moreover, the mind often concentrates on the few great discoveries of our age whilst neglecting the essential features of the body of knowledge as a whole. In this way a certain lassitude arises and makes us lose sight of the importance of the other problems. It is, therefore, necessary, to fight against a certain spirit of torpor and to rewaken in us a feeling for relations and the critical spirit, to cultivate the useful instrument that architecture is.

These demands are vitally important. They constitute the task of anybody or any institution that is concerned with architecture: industry, professional men, planners, scientists, professors, students, in a word, the man in the street even.

In so far as information alone is concerned our schools and colleges suffice. But in spite of this, it should be forgotten that these institutions deserve to be criticized, for often the "aim" of these schools—the main element in any form of instruction—is lacking or is badly defined.

It is true that the industrial epoch gives us a glimpse of some possibilities of application, but as these are not carried into execution, it is difficult to discern the real goal. Slow and painstaking progress alone will lead us to success.

The complexity and the range of the practical and scientific scope of our activities are such that only a combination of different disciplines can give us a new path to follow and, so to speak, an additiona instrument of instructional information.

For more than ten years we have been able to show that the complex problems of our civilization when established as a unit upon a generally recognized base can lead to ideas and concepts that are perfectly able to be utilized.

As in every other age our own has problems that are infinitely complex. It is quite evident that this complexity can only be grasped by complex tools. For this reason men in isolation are not able to notice the relations and bonds obtaining in these complex networks; only teamwork makes this complicated work possible and worthwhile. It should be added that this teamwork is only possible if each member of the team abides by certain norms and working methods. Certain personal ambitions must be suppressed to make way for a higher-level form of will. Just as in the case of an orchestra, a certain rhythm and unity of expression must be maintained; nothing can be left to chance. Architectural knowledge is not just the result of certain ideas of genius, a secret known to the talented alone. Building demands an accurate and certain stabilization of working methods. We need a valid and impersonal foundation and this by itself represents an immense amount of work.

Before passing on to the consequences of such a method, it would not be superfluous to examine the conditions of its existence. What are the conditions of training and team study; what stages of growth are to be found in such work?

The first difficulties are to be found in a general cultural lack, taking this to mean overall views about civilization, and this principally when it comes to a team of students badly prepared as regards this point of view. True, there are schools where this general preparation of the student is excellent, where the critical spirit is developed, and where the student learns to think for himself without having recourse to prior conventions. This distinctive state of mind is absolutely essential if an effective team is to be formed. One should, perhaps, cultivate this more at a tender age? This touches on sociology, which is a field that we are not considering in these observations.

Let us come back to the conditions of teamwork and its organization. The precise definition of the "goal to be achieved" alone allows for teamwork. This goal must be planned with great care; quite obviously, this way of going about things does not correspond with "liberty of thought." The responsibility resting upon each member of the team is very great and it is the character of each that will bring about the success desired. The head of the team must also be seized with the same intense desire to collaborate and to adapt himself; his responsibility is even greater.

The "mechanics of collaboration" depend on the number of work groups and the number of problems and sub-problems dealt with. The working rhythym is of considerable importance. The number of members in a team should not exceed 21. 18 seems even more effective, so long as the complexity of the problem posed is respected. These two numbers—both divisible by 3—are the most advantageous. In fact, it has been proved that a "discussion cell" of 3 is most favourable, both for discussion and work in the laboratory. This cell appears to give the best guarantee for continuity of information, work and discussion with the context of teamwork. The choice of problems is limitless. Above all, it is important that all the problems handed out to the groups should be of the same importance. It is clear that the time allotted to each group should be the same for all at all times. This condition is absolutely necessary for each member should have the time to observe the fascinating process of "auto-evolution." Each group studies one solitary problem and then exchanges it for another. In this way each group will influence the problem as a whole and this whole will shape the evolution of the work done by the groups. The work topics are varied: energy, materials, method, complex statics, geometry, organization, modular coordination, assembly and construction, elements, mechanics, environmental surveying, transport, planning, economics and sociology. As these themes are centred around the principal problem of construction and architecture, they will influence the principles of architectural composition, aesthetics, harmony and the disposition of buildings. Whereas design and planning are of secondary importance within the context of such work, aesthetics, philosophy and ethics play a vital and autonomous part.

To facilitate individual supervision of each group it is important that each of these should have the same time at its disposal. This time factor is of primary significance as it allows comparisons between groups to be made, as well as supervision, revision, discussion, the definition of the line of conduct to be pursued and consultation.

The head of the team must see that all participate and avoid too much falling on individual speakers. He must see that all the topics are discussed and studied to an equal extent and he should endeavour to maintain a working spirit that is both responsible and sure.

In no case must the team adapt itself to the head, for otherwise the "raison d'être" of the team would be lost. The head must never dare to criticize. He must content himself with giving a better definition, a more exact interpretation; he may influence the work process and, above all, intensify the spirit of self-criticism of the team's members.

The task of the assistant lies in seeing that the work done is perfectly coordinated. He must be present at all times, which does not apply to the head, who only takes part in discussions.

He must have a thorough grasp of industrial problems. His work is limited to a form of collaboration and has nothing to do with supervision or orientation. Moreover, it is recommendable to call in individual specialists, who, by giving certain courses, can enliven the work of the team.

After seven intensive discussion meetings the groups reassemble to share their results. Under the direction of the assistant the results are discussed, diagrammed and calculated. Where necessary certain models are carried out and photographed.

Once all the work has been finished, the head of the team criticizes the results and the working methods of the various stages. This criticism must be very full, severe and detailed. The analysis of other themes can be necessary and this opens up new avenues.

The various stages of the work must be "rethought" once more so as to "relive" the paths which led to the solution. The sources of information and what has emerged must be revised. The head of the team must endeavour to point out the emotional factors so that they can be replaced by absolutely logical considerations. There is no such thing as waste matter in this way of working. No text, no sketch may be destroyed while work is in progress. Each point of view may, in fact, influence the final result. The work rooms of the teams do not possess waste paper baskets.

Like the head of the team, the specialist experts may only pass their criticism at the end of the work. Their point of view is extremely important, as it may have considerable influence on certain work factors.

It is vital to stress that the results achieved by a team are often secondary. Success is not always apparent. The value of the work is often methodological in nature. Thus the result of a discussion group at the University of Yale was that certain methodological paths had to be followed to estimate certain secondary problems in a primary problem! It is interesting to note that repeated team study leads to astonishing results. Progress from the point of view of work and mastery of the subject is sure, the continuous exercise stimulates the imagination and spirit of scientific research. The work climate thus created is absolutely unique and fertile. The physical and psychological difficulties described at the beginning of our remarks may be reduced to a minimum.

It is the way of going about things that conditions the success of any enterprise. Industry and the new laws of energy condition the life and structure of our epoch. Thus, electricity, in so far as it produces light, influences, determines and alters the human conception of darkness. The same thing cannot be said for electric lights. The cause is electric energy and not the light itself. Similarly in the case of architecture, cause precedes effect.

Nevertheless, "causes" in the technical and scientific sense of the word are no longer comparable to "laws," evolution being far too rapid. Thus, a study book can only have very restricted range. It is necessary to use dynamic means of information, adapting oneself perpetually to scientific, technological and sociological evolution, taking into account all objects, ideas, materials and uses. Quite obviously, any student, whether by himself or in a team, requires sources of information. But the knowledge of the past that is set in the present—for example, in the form of a book—is not sufficient, for the possession of the totality of information necessitates the ideas and knowledge of the present—and of the future, perhaps.

It is for this reason that about ten years ago Wachsmann formed a study group of several students with the intention of creating a tool for dynamic classification at the Illinois Institute of Technology in Chicago with the help of the Federal Housing Agency in Washington. In this case the aim envisaged is to catalogue all information possible in any field that touches upon architecture and construction in general whether from near or afar, and to do this in such a way that the registration can always be kept up to date. An information machine of this nature seems to be the only really effective means for any form of scientific research. The use of microfilm and punched cards is indispensable in this field. It leads to the "system of modular coordination classification."

The principle of this system consists in registering no matter what datum—information, texts, designs, symbols and others on microfilm. The data from these films are then punched on appropriate cards. These cards allow for all the combinations of information desired. Moreover, it is possible to place the punched card in a projector—this being combined with microfilm—so as to study the figure shown on the film. It is possible, obviously, to photocopy this figure.

What is involved here is a microfilm library that can be enlarged to take in any amount of information and that can be adapted continually to the level of knowledge. Since the range of this system is vast Wachsmann has suggested the following plan: Standardized sheets are distributed to students. Certain topics—according to a specific programme—are fixed upon. The results of study and analysis are registered and then become part of the programme of schools and universities. An international centre is to be charged with the organization of this vast form of teamwork. All the forms of administration, institutes, laboratories and other bodies having to do with building can collaborate. The centre will produce the punched cards already mentioned according to an international code and these originals can be copied at will throughout the entire world.

Teamwork demands faultless information: materials, methods, machines, systems of supervision, production processes, scientific analyses, static calculations, laboratory experiments, to put it in a few words, all the possibilities opened up by our age are indispensable. True, this system is not yet organized in this way. A lack of time, on one hand, and a lack of help, on the other, are slowing down the development of such a principle of information. The few examples of "teamwork" given in this issue will suffice, we hope as illustrations to the foregoing remarks.

Jacques Uffholz

Mobile Theatre (pages 385—390)

Project 1958

General Remarks

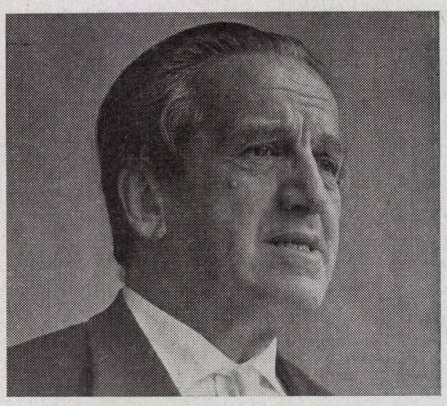
Who is there who does not like the circus making its way from town to town? Surely it is the romantic aspect of this particular type of spectacle that captivates us? Equally well, isn't the entrancing element to be found in the enthralling sight of the organization deployed, which is capable of setting up a tent for 5,000 people and a ring, and all this while it moves about from place to place without ever interrupting its daily activities? Or what is involved perhaps is the fascination aroused in us at the idea of a home and place of work being moved about according to the whim of the owner and public demand. Is it the idea of vehicular and mobile housing?

If a mobile theatre is to be utilizable its dimensions must be approximately the same as those of a building with a fixed site. But if it is to be transportable its dimensions must be such that it can be folded or reduced to a size very different from that which it possesses in use. Moreover, the mobile theatre must not simply be a vehicle; the change from a vehicle to a theatre must be capable of being made rapidly and easily.

Is such a vehicle a work of architecture, or is it more a product of a mechanical engineer? The project in question is the work of an architect. To be more precise it is the work done for a diploma by an architectural student of the Polytechnic at the University of Lausanne. Furthermore, the professors in the department of architecture at the Polytechnic have accepted the work in question and the candidate has been raised to the status of architect! In this way the hybrid machine-house has become a work of architecture ex cathedra.

We are certain that to a large extent part of what is done in architecture will move along the lines followed by engineers and constructors where the idea of the profession of "architect" as we understand it today is no longer valid, where the architect of today has no part to play and where, nevertheless, the works that are done without him remain "architecture" all the same.

Konrad Wachsmann



Das Resultat der ersten welthistorischen Periode war die Ablösung des Menschen von der Natur. Der Begriff der klassischen Materie, auf den sich das Weltbild dieser Zeit aufbaute, ist heute vollständig aufgelöst. Unter dem experimentellen Zugriff des Physikers verschwindet die physische Realität dessen, was wir bisher Natur zu nennen pflegten, in einem unentwirrbaren Netz immaterieller Relationen, deren Sinn zu assimilieren gänzlich außerhalb der Kapazität unseres bisherigen Bewußtseins liegt.

Gotthard Günther, Schöpfung, Reflexion und Geschichte (Merkur Nr. 7, 1960).

Le résultat de la première période historique est un détachement de l'homme et de la nature. Le concept classique de la «matière», sur lequel était basée cette période, a disparu. Sous le scalpel du physicien la «réalité physique» de «notre» nature s'évanouit, faisant place à une multidude de réseaux de relations immatérielles que notre cerveau n'est plus à même d'enregistrer.

Gotthard Günther, Schöpfung, Reflexion und Geschichte (Merkur No. 7, 1960).

The result arising from the first world-historical period was the separation of man from nature. The classical concept of matter, which underpinned the general views held about the world at the time, has today been completely broken up. Beneath the probing fingers of the experimental physicist the physical reality of that which we once called nature is losing its solidity and merging into a forever tangled skein of immaterial relations, the significance of which is quite beyond the grasp of our former awareness.

Gotthard Günther, Schöpfung, Reflexion und Geschichte (Merkur No. 7, 1960).

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