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Introduction:

The Challenge of Tools for the Architect

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1. Introduction

Most of the studies concerned with what we call here 'the architect's tools' focus essentially on architectural drawings. These studies have prefered looking at the most spectacular drawings, considering them the expression of an architectural idea. Thus, for instance, the central perspective at the beginning of the Renaissance and the axonometry of some Modern Movement protagonists have been understood as a "manifest". The role of such drawings in the development of a project has rarely been considered.

At the same time many exhibitions of architectural drawings stress a taste for the "spectacular" or for the "great ability of the master". Drawings are thus dismissed as being mainly a tool for developing a project, while scale models show its final stage. These models seem to be there only to bring animation into the exhibition and they rarely show how several tools might be important for the development of a project. Exhibited as autonomous artistic objects, drawings and models do not contribute to explaining the development – and thereby the contents – of an architectural project.

Fifteen years ago, most architects and laymen concerned by architectural production considered that drawings and small-scale models were sufficient as a basis on which to discuss a project. In the last few years, a new tool – the computer – seems to have irresistibly replaced the traditional tools. There now seems to exist a split between "artistic" drawings that no longer serve the development of a project and computer drawings, which are considered to be the foremost "technical" tool during project elaboration. "Artistic architectural drawings" fill exihibitions in galleries and museums but, nowadays, it is on computer drawings that most academic seminars dedicated to the architect's tools focus. The more fundamental questions, concerning as much the use of the computer as the utilisation of other tools, are mostly ignored by architectural exhibits and academic discussions.

The purpose of the colloquium "The Architect's Tools", from which some contributions are published here,[1] was to broach such questions and to open a debate that

[1] *The colloquium was organized during the* "4th European Full-Scale Modelling Conference" at the Swiss Federal Institute of Technology in Lausanne, September 4-12, 1992.

may interest more than specialists of one single tool. The colloquium was organized around the three following themes:

- characteristic steps and problems in the development of an architectural project;
- characteristics, adavantages and disadvantages of different tools used separately or in combination;
- obstacles associated with the choice of tools and their match with architectural intentions.

Most of the participants to the colloquium are involved either with computer or with full-scale modelling.[2] We are convinced that their contributons will open a debate. Indeed, as they are both relatively new and very different from each other, these two tools raise a great many questions.

2. The Computer: Is the Latest Tool the Best One?

The computer has brought new opportuinities that are very impressive and more far-reaching in terms of innovation than have other tools. The productive and evolutive capabilities of this new tool are incomparably greater than those offered by previous ones. The computer contributes to the increasing performance of architectural tools, which is fascinating, albeit controversial. The rapid and massive use of computers in architectural practice has provoked a debate that can be summarized by two questions:

- Does the computer represent a suitable tool for the development, discussion and assessment of an architectural project?
- Does the facility of using numerous and performant tools contribute to a qualitative improvement of architectural production?

The computer, by providing a numeric model of a project, unquestionably influences the orientation of important sectors in today's architectural production.

On the one hand it reinforces the tendencies towards standardization and uniformization of construction and equipment. It encourages some rules, such as repetition, symmetry, juxtaposition of volumes, etc., this contributing to an impoverishment of the architectural production.

On the other hand, some of the avant-garde trends find in the computer a formidable ally; for instance, they use the mathematical modelization of fractal geometry, and thus take advantage of this new image-making technique.

A great number of projects rely essentially on the computer. When guided by such image-making techniques, they appear very contestable in terms of their contribution to the architectural field.

At the same time, however, these projects exploit a very performant media. Beyond its strictly quantitative productivity, the computer may be used to manage abundant and complex databases. The quality of modelling is more and more sophisticated and, for instance, some programmes will show the texture of surfaces or the impact of light. Further, computers - like movies - are able to integrate movement.

[2] Researchers from several full-scale laboratories participated in the colloquium. These laboratories make it possible to set up easily and quickly a full-scale model of part of an architectural project. A list of existing laboratories is published in this issue.

What is more, the computer is capable of improving its interactivity with the user: indeed, "virtual reality" can record the movements of the user himself, enabling him to "physically" explore the project. Some people go a step further in affirming that "virtual architectures" are a more interesting environment that "real" ones!

3. Is Full-Scale Modelling a Realistic Tool?

Even though full-scale modelling laboratories are relatively recent and quite a new tool, they have not been noticed much by academia. Most were created near the end of the sixties or at the beginning of the seventies, in the context of the debate concerning the participation of users in the design of their living and working places. Nowadays, these laboratories are developing an enlarged range of activities concerning the participation of users, but they also offer general assistance in conception, behavioural research, research on the spatial organisation, the dimensions and the detailing of working and living places, project and theory teaching for future architects, etc.

In the post-68 years, one could have hoped that full-scale modelling would help solve the problem of communication between architects and users. It seems obvious that it is easier for a "non-specialist" to "read" a full-scale model and to give his opinion. He can move inside it. However, it is also clear that the particular conditions in a laboratory remain an artificial environment with its own restrictions (temporal, material, dimensional and light conditions). The visitor has to make an great mental effort to distinguish the aspects that correspond to the building modelled from those that mainly concern the conditions in the laboratory. When confused with a real building, full-scale modelling may play the same demagogic role as the nice drawing or the pretty small-scale model presented by an architect or a property developer.

The particular architectural environment of a full-scale model offers an opportunity to make direct experiences, which could not be made by any other tool. Nevertheless, the full-scale model must not be understood as a "realistic simulation" of an architectural project.

In general full-scale laboratories are supposed to offer only this type of modelling, given the fact that this tool is considered to provide a high degree of realism. Nevertheless, one notices that, in these laboratories, full-scale modelling requires the simultaneous use of other tools: photography, video, drawings, small-scale models, computer, etc.

Quite often the space available for full-scale modelling experiments do not allow the juxtaposition of several simulations of the same study. Simulations will thus have to made one after the other and comparison will require successive records (generally drawings, photographs, quite often video and more rarely computer). These records are indispensable during the experiment itself but also as a link between the preliminary data of the problem (often in the form of plans) and the period of improvement and integration of the experimental results.

At the same time the interdependencies involved in an architectural project require that questions elaborated by full-scale modelling must simultaneously be studied by means of other tools. For instance, a supporting structure can be studied both for its impact on the inner space of a room and as a structural element of the building or of the façade.

Finally, we are steadily confronted with the following question: is full-scale modelling really relevant to the problem under scrutiny? By making comparative ex-

periments with different tools, we must and we can assess the specific contribution of full-scale modelling.

The need for complementary tools reveals the partial and even "partisan" character of full-scale modelling. It privileges local perception over global perception. On the other hand, full-scale modelling is highly ambiguous because of its closeness to real buildings.

4. A Better Understanding of Tools is Urgently Required!

Nowadays, the architect is confronted with the mastering of a continually widening variety of tools. The possibilities opened by these tools are more and more powerful. Given the fact that the architect is surrounded by a dense and very sophisticated media world, is he not in danger of forgetting that the architectural project requires from him a critical attitude towards the tools that he uses?

While describing the possibilities opened to the architect by today's tools, the texts published in this issue focus on the difficulties related to their use. These are new important challenges for architects.