

## **Incompatible Pencil - Chance for Changing in Design Process**

**Alexander Asanowicz**  
Technical University of Bialystok  
Poland

*The existing CAAD systems limit designers creativity by constraining them to work with prototypes provided by the system's knowledge base. Most think of computers as drafting machines and consider CAAD models as merely proposals for future buildings. But this kind of thinking (computers as simple drafting machines) seems to be a way without future. New media demands new process and new process demands new media. We have to give some thought to impact of CAAD on the design process and in which part of it CAAD can add new value. In this paper there will be considered two ways of using of computers. First - creation of architectural form in an architect's mind and projects visualisation with using renderings, animation and virtual reality. In the second part - computer techniques are investigated as a medium of creation. Unlike a conventional drawing the design object within computer has a life of its own. In computer space design and the final product are one. Computer creates environments for new kind of design activities. In fact, many dimensions of meaning in cyberspace have led to a cyberreal architecture that is sure to have dramatic consequences for the profession.*



## Incompatible Pencil - Chance for Changing in Design Process

„... how fast can the design process go?  
As one architect recently put it, we can draw faster with CAD, but it can't help us think faster.”

Thomas Fisher

Progressive architecture 4/95

### Designing

The primary goal of design is to give shape to an artefact - the product of design. This artefact is the result of a complex of activities - the design process. But the artefact is a concrete form that does not manifest this process of creation. It does not give evidence for motivations that initiated its creation. „What is creation ?” Architectural creation included three connected with oneself areas:

- intellect (intuition and mind),
- emotions (intuition and imagination),
- logic (mind and imagination) (Araujo I., 1976).

The search of idea and its materialisation, links together imagining, concentration, evaluation and choice of variants, later on several times checked. In that process possible are contradictions, doubts and unexpected solutions. In the first stage of the creative act the subjective factors become visible, and only later on tendency for objectivisation arrives.

Creativity is a not linear deterministic process. It is activity in which the sequence of particular functional components is of no crucial importance. The creation activity is multiplanar. (Asanowicz A., 1996) One of the most important aspects of this activity is that it is usually conducted with incomplete information. It means that either the specification are not completely defined when the designing starts. In this respect design can be viewed as an exploration action, which has two elements: **the activity** and **the state** (Murdi L., 1994) The state is the sketch itself . All type of activity, there may be in architectural design, the result of the activity is generally a sketch described the form.

### Traditional Design Tools

The sketch is usually perceived as the most important element of the process of creation. Sketches best correspond to the specifics of the future object search form, due to quick materialisation of the idea

invented. Sketching could be considered to be the creative search. During it, the creator gradually fulfils picture of a form. Defused, unprecise object image, expressed by pictograms transforms into more and more defined drawing of a form. The whole process is individual, it evolves differently at each architect's mind. Even same architect designs each next project a different way. Each time an eye and a hand materialise the designer's concept differently. Also differently carried out is a process of visual evaluations of drawings and its transformation. The history of architecture provide evidence that graphics technics used in creative process of design, were inseparable component of the whole process itself. A drawing has always been a very important communication tool.

An idea practically does not exist unless it is communicated. It needs to be expressed through some medium for it to be of any use. A design solution is the communication of an idea. The act of communication, its nature, its style, are deeply linked with design. The art of communication is inseparable from visual thinking, which is an attribute of creative thinkers. The natural and obvious medium for expressing visual thinking is graphic communication.

With people inclined to concrete visual thinking a drawing plays role of catalyser. With its help a visual pictures formed within architect's mind change and become more precise. Simultaneously as a feedback, drawings reflect our memory, complementing spatial pictures already conceived in it.

On the other side, designers inclined to abstractional thinking prefer to present their ideas through scale models. Such method of design influences character of a form in more degree that using of a drawing. The image of the designed object (formed within our memory as a sequence of visual pictures) is immediately preserved as a scale model. That influences character of a form and shapes it out.

## **Computer as a design tool**

In our consideration we would concentrate on graphic means of communication in view of computer use in creation of spatial forms. Although its worth to admit, that the scale models method linked with computer technics could open a new perspectives.

The architectural drawing has always been considered to be the best in presentation of a project. That is why implementation of computers in architecture began from elaborating of automatic drafting procedures. Computers were introduced to the architecture profession as „automated drafting machines”. However, architects can reinterpret the computer as a tool for processing and communicating information about buildings. Architect can use computer to simulate building itself and produce better and more complete information, including animation, virtual reality scenes, interactive facilities management models, sum studies, real time cost analyses, as well as working drawings.

Traditionally, CAD software development has mimicked the hardware tools (pencil, paper, paint brushes) used in the practice of architecture.

Many designers think, that a computer is a tool, just a piece of charcoal is. Using computer as traditional tools would be used, they feel disappointed. If they are doing conceptual work, it is more difficult to make just a hint or suggestion of something with computer than to do it by hand. A computer wants to render real things. It is extremely difficult to create a drawing that hints at a basic form or idea. A computer drawings is too finished to use at this stage. Though respecting use of a computer in design (they think of design office) they have a hope that some of the work being done by hand now will be done on computer by architects in software that emulates charcoal. Compatible CAD software and rendering techniques will make possible to merge the architectural quality of hand-made drawings with computer generated images and photographs.

Such point of view is very naive. Comparing computer to a pencil or technical pen is a mistake. Of course, that when we make a drawing of a project, we use a computer as technical pen. We draw lines, arches, curves ... . Thanks to that we are able to produce technical documentation a lot faster than before. Without any doubt it is an Added Value - created by computer in a design process. But it is not enough that one could expect from such an advanced technology.

### **Digression 1**

Most of designers known to me use computer as a technical pen. They use AutoCAD software, and resist very much using of complementary software permitting to produce technical flat drawings as well as 3D computer models. Such designers claim that drawings created by those programs are resistant to further modifications. AutoCAD used as an intelligent technical pen allows to change cross sections or faces drawing while still elaborating of the technical documentation. What I write about is by no means an AutoCAD complement, but only a statement that it is a good technical pen.

On the other side, produced using computers photo-realistic renderings of objects are nothing less than colour pictures, just like in the XIX century were washed drawings, or later the hyper-realistic paintings. The washed drawings from the beginning of the century are as much communicative, and for sure at least as much beautiful.

### **Comparison**

If we consider use of computer the traditional means of visualisation point of view it would be appropriate to say, that such comparison not always has a sense. Allegations appear, that a computer is incompatible - it can not be used as a pencil for sketching. The computer can only produce technical drawings, or renderings similar to washed drawings. So it is capable of doing, what very well could be done without it. In the chart below an attempt of computer and traditional tools comparison was undertaken.

Traditional tools	New tools
Pencil, technical pen, brush, scale model	Computer
<p><b>Description:</b></p> <p>There are many traditional tools of design. Each one of them is different, and their good point is that they can be used at any stage of design. Efficiency of those tools is different, and varies from the individual skills of designer.</p>	<p><b>Description:</b></p> <p>The computer is being treated as it was a pencil, a technical pen and a brush simultaneously. Attempts to use it in all stages of design usually end up with failure. The efficiency of a computer is related to an operator skills only in a small degree.</p>
<p><b>Difference:</b></p> <p>We shall not claim from a pencil to display renderings.</p>	<p><b>Difference:</b></p> <p>We complain that a computer can not be used as a pencil</p>

**Conclusion:**

A pencil is a pencil.  
 A computer is a computer.  
 A computer isn't a pencil.  
 A pencil isn't a computer.



*This is just an example of what you can do with a new program that adds life to computer drawings (?)*

## AVOCAAD

According to the above a question about AVOCAAD arises. Could use of a computer create the Added Value in a design process? What sort of conditions must be created for an effective use of computer technics in a design process as a whole? A design process consists of three phases: 1) the drawing on the back of envelope, 2) production of documentation, 3) presentation. Changes in faze 2-nd and 3-rd have created a new quality, but faze 1-st poses a lot of problems. It requires revolutionary changes both in the process of creation, as well as in computer technics.

The computer could start a new art form, which would create a new way of doing things. Computers, originally intended as fast calculators, are now recognised as the primary tool to access, understand, and

communicate the main design ideas through images, text, and sound, through the media of television, telephone, compact disc, and the Internet.

The time for a synthesis has come. The time for a formation of the new art in which traditional disciplines - painting, graphics, sculpture, architecture would join with the latest achievements in CAAD, VR and cybernetics. Use of computer technics and its specific ability to dynamic creation of design idea should permit the increase of intellectual capacity of a designer. The insufficient flexibility of the contemporary software and hardware in space modelling requires implementation of new technics - not only the computer ones. CAAD systems should be transformed into CAAC (Computer Aided Architectural Creativity) environment, which could assure the possibility of dynamic transformation of conceptual space and visualisation of creation processes. Such the activity should be based upon two principles: 1) Dynamic development of idea - creation of abstractional visual models and their transformation. The transformation procedures come to use when a model does not conform to architect's concept. 2) The dynamic perception of creation process - memorising of the consecutive stages of transformation and creation of a topological sequences of idea.

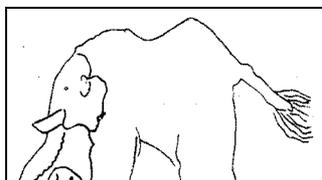
The process of creation begins with the preliminary composition of an object's form within architect's imagination. Ideas are born in the intellectual space of our mind. In such a composing a designer uses different tools: genetics algorithms.

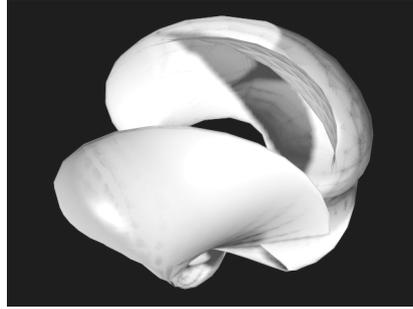
Produced forms are than subjected to further transformation in virtual space. The architect as a cybersculptor defines direction of changes and interactively transfers the primal forms.

Such an application of a computer determines a necessity of new forms arrival in the process of creation. Lets forget about a pencil. A pencil is incompatible. That will be the Added Value created thanks to computer use in a design process.

## Digression 2

The visual, clearly spectacular character of changes, which found it place in visualisation technics of architectural form could be explained only by the analysis of change in perception process itself. Considering specific type of perceptual consciousness, we would also get a specific type of visual art. Each type of a perceptual consciousness requires matching it means of expression. Each perceptual phenomenon expresses itself only through some, being able to express it components of a form. Each new set of means of expression is simultaneously a new set of formal means. Transformation within processes of architectural visualisation derive form transformation of perceptual consciousness. In order to see a new meaning of a new subject we ought to change a method of observation.





*Evolution of drawing from neolithic age to age of informatics*

## References

1. Araujo I., La forma arquitectonica, Ediciones Universidad de Navarra (EUNSA), 1976
2. Asanowicz A., The new output of traditional design methods, EAAE Conference - „Doctorates in Design and Architecture”, Delft, 1996
3. Frazer J.H., Frazer J.M., The evolutionary model of design, in Asanowicz A. and Jakimowicz A. (Des) - Approaches to computer Aided Architectural Composition, Technical University of Bialystok, 1996
4. Glanville R., Creativity and Media in Architecture, 2nd European Architectural Endoscopy Association Conference in Vienna, 1995
5. Jakimowicz A., Towards affective architectural computing: an additional element in CAAD, IV Conference Computer in Architectural Design - „CAD Creativeness”, Bialystok (PL), 1996
6. Murdi P., Perny P., Chauvel P., An approach to design support using fuzzy models of architectural objects, in Gero J.S. and Sudweeks F. (eds.) - Artificial Intelligence in Design 1994, Kluwer Academic Publishers, Dordrecht, Boston, London, 1994
7. Rychter Z., Mathematical Architectural Synthesis, III Conference Computer in Architectural Design - „CAD Space”, Bialystok (PL), 1995
8. Streich B., Computer Aided Architectural Composition by media experimental design work, in Asanowicz A. and Jakimowicz A. (eds.) - Approaches to computer Aided Architectural Composition, Technical University of Bialystok, 1996