

Information at Early Design Stages

ASANOWICZ, Alexander

Faculty of Architecture, Technical University of Bialystok, Poland

This paper concentrates on information at the early stages of the design process. However those do not concern all the information regarding the task available to the designer or the already existing solutions, but the information generated by the designer during the process of problem solving. The creative nature of architectural design and the lack of complete information during the process determine the role and the place of the information system in the design. It is necessary that the information system correspond to the raw form of expression of the designer as it appears at the early design stages. In the traditional creative activity, an image of the architectural form is developed through graphic expression such as sketches, words and sentences. Changing the design environment from analog to digital does not solve the design problems at all. IT creates new possibilities for generating design information thanks to new tools as well as new software. The multiplicity of methods only makes the problem of the amount and accessibility of information more complicated.

Keywords: Early design stages, hybrid design environment.

Creation

Processes involving organising and structuring perceptual information are invaluable helpful in higher-level mind processes, such as design activities. The creation of inner representations of outward events is a basic requirement of the thought process, and consequently, our ability to solve problems. Newell and Simon (1972) believe that man is an information processing system. The first question to be asked while considering the problem of managing information during a design process is: "What should be done to solve the problem?" Problems may belong to one of two classes: well-defined or ill-defined. A well-defined problem consists of a clearly formulated target, for example "How should the technical documentation for an architectural project be designed". These problems have well specified attributes, a specific target and a specific means to determine whether the process of problem solving is heading in the right direction. Ill-defined problems are dealt with during the creation process, when the target

is most often ambiguous and fuzzy – "Create a beautiful form". Reitman (1964) believes that a detailed idea concerning design objectives, as well as methods that may be used, does not exist in practise in architecture because the structure of the design process is ill-defined.

The complexity of the design process is perfectly illustrated by two statements, formulated 35 years apart from one another. The first one is an excerpt from a lecture given by R. Ingarden in 1960. It is the story of a woman painter, author of a series of paintings depicting flowers. Ingarden received a very funny answer when he asked her about the process of painting. "I am lying in bed, by a small electric lamp (in a totally inappropriate conditions, without natural light) and I have a piece of cardboard in front of me, and now, just like that, I draw a small spot on the right side corner, and when I see this spot I feel like drawing another one, but different, using a different colour. Eventually a whole painting is created from those spots." (Ingarden, 1980).

Go contents 05

In conclusion, Ingarden states that no general thesis regarding the way that process is, or is supposed to be taking place should be proposed. It is also not certain whether a creator should begin with general ideas and then realise them later during the process, or the opposite, the idea should be created as was the case with painting a bouquet of flowers. However, analysis of creation enables us to draw attention to three different components of creation process: production, processing, and perception connected with either correction or development of the primary idea.

The other statement is a thesis by R. Coyne (1995) that says: "Design can be characterised as generation within a "play of metaphors." In connection with this, a basic problem emerges: how should the metaphors be managed?

Information

This paper concentrates on information at the early stages of the design process. However, this does not concern all the information regarding the task available to the designer or the already existing solutions, but the information generated by the designer during the process of problem solving. Gathering and processing such information is crucial to the design process. During the process of creation the designer gradually gathers the information about the problem, applying appropriate rules and strategies. He performs operations on his initial knowledge, adding to it the statements relating to the problem. All the information about the problem makes up the "state of knowledge". Each time he applies a certain operation to a specific new fact his "state of knowledge" changes.

During the analysis of design information – processing system, its three basic attributes should be discussed:

Information generation – takes place on the basis of long-term memory resources. If the resources are insufficient the designer refers to books, drawings, surveys, standards, etc. When both internal and external sources of information are inadequate, the designer is forced to generate new information.

Information representation. From the point of view of information processing there are two forms of representation: a verbal-conceptual and visual one. Verbalisation of an idea by means of text plays an important role at the early conceptual stages of designs. Graphics, however, are used for spatial description of objects.

Information transformation. Having a set of representations (images), the architect transforms them in order to reach the final form. (Akin, 1986)

Visual information is non-linear, graphic and spatial, i.e. multidimensional, as opposed to verbal, which is linear. It is the natural and obvious medium for expressing oneself. Since it is the direct transfer of a mental picture or image, very little information is lost during such a transfer process.

In designing, if it is understood as a process of information transformation, new information emerging in consecutive steps of the design process requires visualisation and linking it with the information created in the earlier steps. The first stage of creative thinking is formulating an idea determined by the information possessed by the designer. Usually a couple of competitive ideas can be formulated. As a result of preliminary browsing from the point of view of compliance with the conditions of the task, one idea is selected. The next steps lead to the detailing of the idea and the transformation into its final form.

Graphic communication

"A design solution is the communication of an idea. It is the way in which the idea is communicated. The act of communication, its nature, its style, and the very level of its involvement, are deeply linked with design. Such a design solution is a statement made by the architect in this own personal way of communicating. It is an expression of the designer's creative communication. The art of communication is inseparable from design." (Faruque, 1984)

The creative nature of the architectural design and the lack of complete information during the process

determine the role and the place the information system in design. It is necessary that the information system correspond to the raw form of expression of the designer as it appears at the early design stages. In the traditional creative activity, an image of the architectural form is developed through graphic expression such as sketches, notes. Verbal expression by means of words and sentences may be included.

Graphic representations are one of the most important media by which an architect develops a design idea. "... Graphic representations are and can be used as a medium for knowledge representation of the design object." (Achten, 1997) It happens not only when we work out the drawings of an already finished design, but at all of the stages of a design process. The sketches provide the information regarding "what is done to the architect's design" and illustrate the state of the design. "By consulting the drawing, the architect knows what the design is about." (Achten, 1997)

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 realises a picture of a form. A defused, unprecise object image, expressed by pictograms transforms into a more and more defined drawing of a form. The whole process is individual; it evolves differently in each architect's mind. Even the same architect designs each new project a different way. Each time 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 provides evidence that graphics techniques used in the creative process of design, were an inseparable component of the whole process itself. A drawing has always been a very important communication tool.

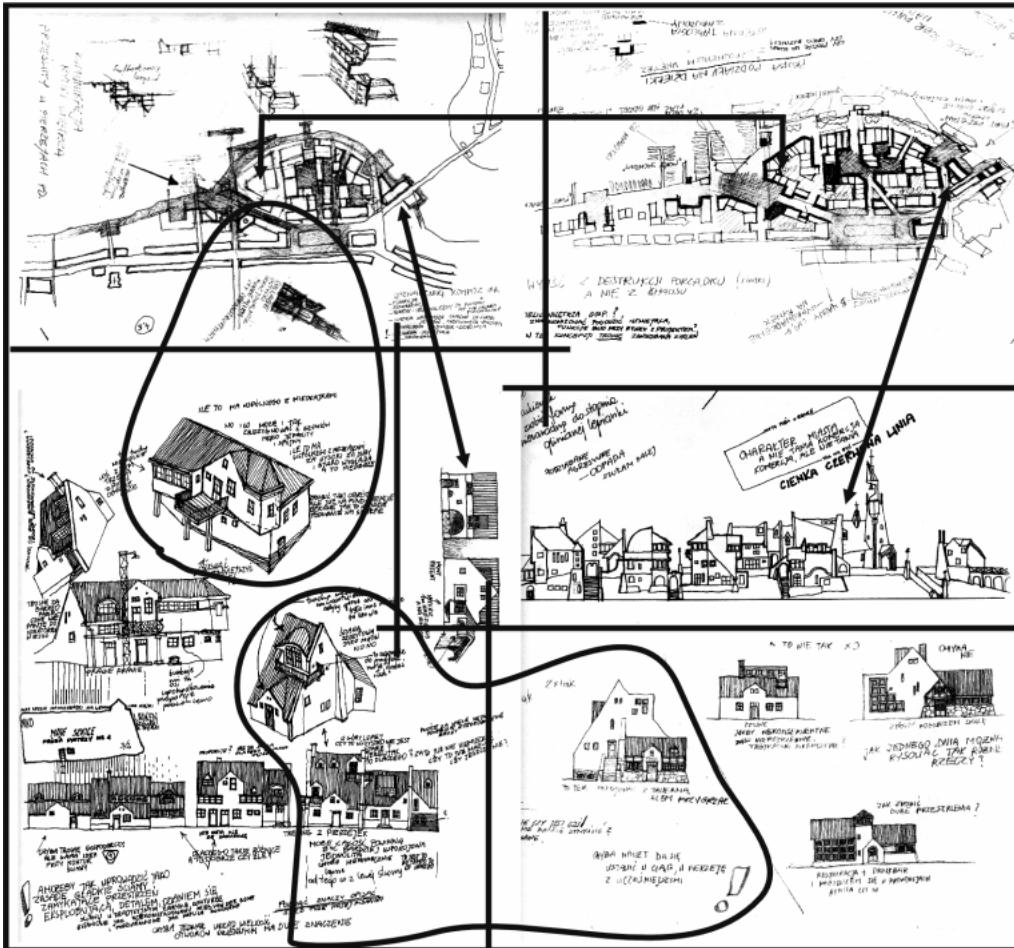
Analog or digital

Organisation and chaos are the main problems in the presentation of information at the early stages of the design process. It is extremely important because the selection of the means of representation determines the methods of problem solving.

I would like to present the traditional way of information gathering and transformation, using a M. A. thesis as an example. (Fig. 1) During the process of searching for an idea a student used both visual methods – sketches – and verbal methods – text, as means of expression. Something like a comic book was created. Each page of the "comic" was created as a sequence of transformations. This does not mean, however, that the content of the pages was ordered into logic, determined sequence of images. It is possible, of course, to read such a comic page by page. Non-linear reading, as in a novel "Rayuela" by Cortazar, is possible as well. Returns, stops and sudden leaps or runs forward are also possible. The reason for this is the fact that designing is an activity in which the sequence of particular functional components is of no crucial importance. The creation activity is multiplanar. (Asanowicz, 1996). This causes the well known difficulties in managing information and using it efficiently.

IT creates new possibilities of producing design information thanks to both new tools (2D and 3D scanner, rapid prototyping) and new software (genetic algorithms, random function). Gery uses the digitiser to transcribe the formal surface qualities of handmade models directly to the computer. 2D scansketches (Fig. 2) were repeatedly used by the author of hereby paper as a resource for design ideation. During the search for an idea of a town square ("Squares and Spheres" design for EAEA Conference in 1997) over 30 scansketches were created, reflecting in a better or worse way the main idea of the project. It allowed a deeper exploration of space of solutions (Asanowicz, 1988). On the other hand, when we consider the information generated by means of genetic algorithms, as done by C. Soddu (www.celestinoddu.com), we

Figure 1. Analog data base.



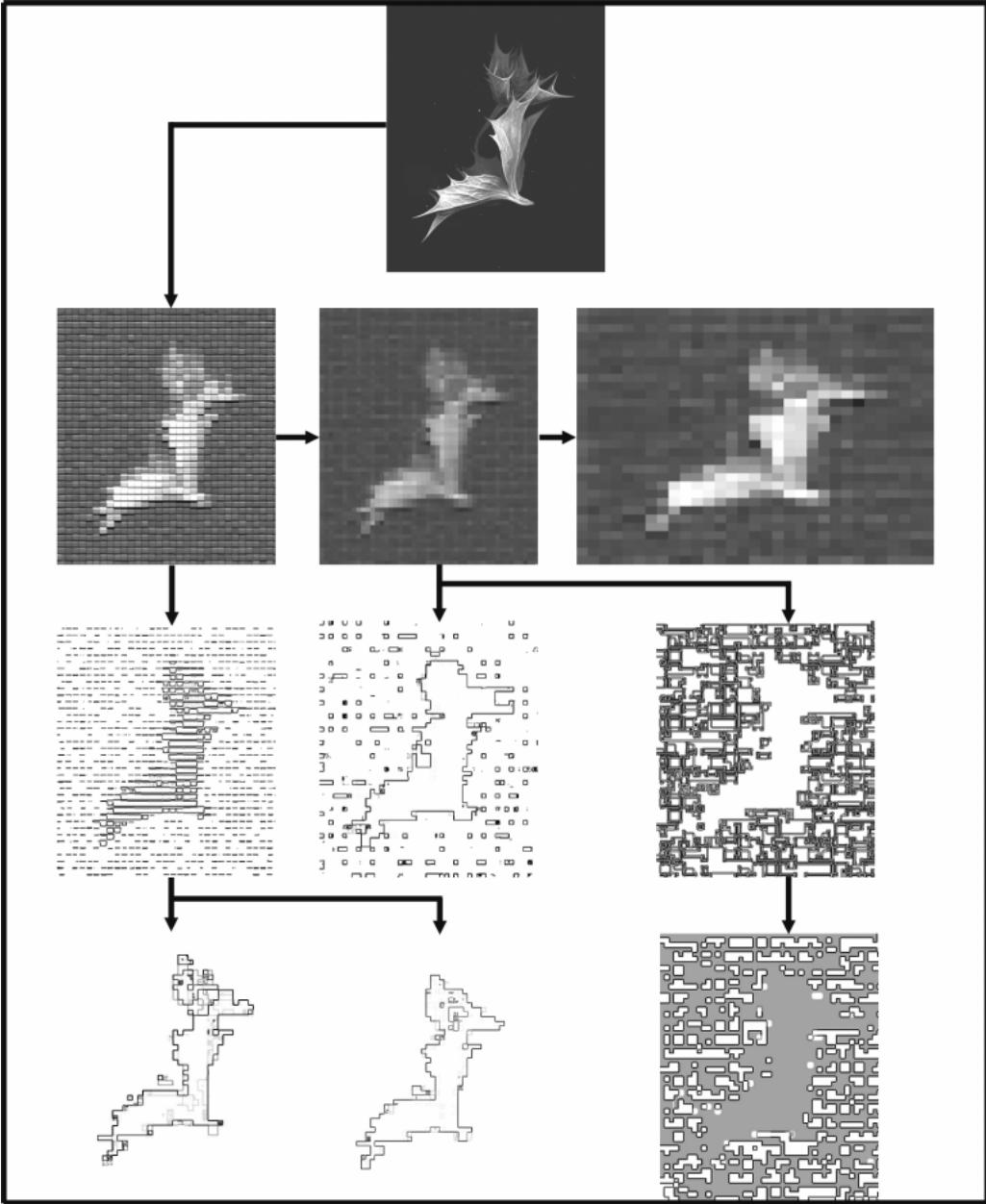
obtain a sequence of images and sounds, and our task is to interpret them properly, similarly to during watching a movie. We try to find a sense in what is happening, second by second.

Graphic information created on a drawing board is not logically connected. It is very often difficult to recall the order in which the individual sketches were created. However, it has the advantage of simultaneous perception of all the drawings. This situation results in the possibility of more chaotic work,

which, paradoxically, is an advantage in the case of creation.

Digital sketches may be easily ordered by the date of production. The analysis of the design creation process is, or rather would be, simple if not for the fact that we do not have the possibility to browse all the sketches simultaneously. It makes the feedback operation and changing the direction of a search more difficult.

Figure 2. Digital data base.



Go contents 05

The solution to this problem could be creating something like an electronic drawing board that we could attach drawings and notes to, and that would allow us to regroup them or bind them into hierarchical structures. Presentation of new ideas would be still performed by means of graphical images, but those images would appear in digital space.

Analog and digital

“The Computer is communication medium which allows us to communicate, select, and share information.” (Oxman, 1998) Changing the design environment from an analog to a digital one does not solve, however, the problems with information that arise during the creation process. Most of the media used in creation complicate the problem of the information amount and availability on one hand, but on the other hand they indicate the necessity for creating a hybrid work environment which would put all the media on an equal footing. There is no point in discussing the superiority of one medium, in a similar fashion to the debate over relative merits of painting and photography, which took place in the XIX century. The problem is to properly apply the medium that will enable a full description of the idea to be given, its development and an exploration of potential alternatives.

Our passive contact with information is already over. Computers have introduced a completely new means of connection between man and the screen that displays information. Along with using the computers, we have relocated the information processing from our brains onto the screens that are in front of, not behind our eyes. The border between the inside and the outside has begun to fade. The visions of our mind are shaped, and those shapes are changed at our request, almost simultaneously with the thought.

The problem is to access the information in the same way as in traditional techniques. Displaying all the information necessary for designing on a computer screen is not possible. Creating a VR-room, whose walls would display design information is an

interesting, and a technically possible option. But then the question arises of whether the amount of information provided by a VR-room will not exceed the perceptual abilities of the designer. Do we really want to efficiently use a computer at the early stages of designing? Affective use of a computer at the early stages of designing seems to be a much more architectonic solution.

This paper is the result of the Rectors Grant for the year 2001.

References

Book:

- Achten, H.: 1997, *Generic Representations*, TU Eindhoven.
- Akin, O.: 1986, *Psychology of Architectural Design*, Pion, London.
- Coyne, R.: 1995, *Designing Information Technology in the Postmodern Age*, The MIT Press, Massachusetts.
- Faruque, O.: 1984, *Graphic Communication as a Design Tool*, Van Nostrand Reinhold Company, N.Y.
- Ingarden, R.: 1981, *Wyk_ady i dyskusje z estetyki*, PWN, Warszawa.
- Newell, A., Simon, H.A.: 1972, *Human Problem Solving*, Prentice-Hall, Engelwood Cliffs, N.Y.

Chapter or other contribution to a book:

- Asanowicz, A.: 1996, *Design, Creativity and CAD*, in A. Asanowicz, B. Sawicki (eds), *CAD Creativeness*, Bialystok, 13-20.
- Asanowicz, A., Asanowicz, K., Bartnicka, M., 1998, *Squares and Spheres*, in J. Van der Does, J. Breen and M. Stellingwerff (eds), *Proceedings of the EAEA Conference*, Delft University Press, Delft, pp. 184-185.
- Oxman, R.: *Thought, Representation and Design in the Electronic Design Studio*, in H. Neuckermans, B. Geebelen (eds), *Proceedings of the EAAE – eCAADe International Workshop*, Leuven, pp. 123-129.
- Reitman, W.R.: 1964, *Heuristic decision procedures, open constraints and structure of ill-defined problems*, in M.W. Shelly, G.L. Bryan (eds), *Human Judgements and Optimality*, John Wiley, N.Y, pp. 282-315.