Going back in History

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This paper combines an acknowledgement of the influential work of Tom Maver with a personal retrospective view of the early experimentations and developments in Computer Aided Architectural Design and related art and design fields.
1. Introduction
I first met Professor Maver many years ago and I believe that his ability to create, develop and support the ABACUS Research Center over many years, reveals a most intelligent strategy that has maintained ABACUS as a centre for research and associated studies for the optimization of building design procedures at the top of the rankings in Europe.

His work is well known through the many articles published around the world and I feel I do not need to go into detail here about the extent of the publications. The CUMINCAD archive (see the paper in this issue by Martens) records the Maver publications very well. Instead I prefer to focus on the nature of the computer environment for art and design during mid sixties and the beginning of the seventies which is the period when Professor Maver started his own work on computer applications.

2. Cybernetic serendipity
I believe that Professor Maver has been a principal player in the process of pioneering actions in the field of design computing. He played an important part in establishing the field of CAAD through his work concerned with the computer environment for design in the mid sixties and the beginning of the seventies. That initial period was exciting and presented a continuous challenge, despite the difficulties of developing graphic routines and obtaining the proper digital tools to do so.

It will be helpful here to remind people of the state of the art in computer generated graphics at the time I refer to. The images shown in Figure 1 and Figure 2 are from the exhibition “Cybernetic Serendipity” organized in London by the ICA, the Institute of Contemporary Art in 1968. The record of these early experiments in computer based graphic work are reported in the book “Cybernetics, Art and Ideas” edited by the art critic Jasia Reichardt in 1971 [1]. Reichardt was also the organizer of the exhibition.

The exhibition and the book showed how computers may be used to produce 2d images in black and white and in colour, as well as how to make animated films and drawings of sculptures. The catalogue describes many of the key achievements in the first decade of this activity.

Computer generated drawings was an interest area amongst people from a wide variety of disciplines. Though artists generally had to rely on collaboration with computer programmers, increasing number started to learn computer programming and special computers languages were being devised that could better meet the requirements of architects, engineers and artists.

In Figures 1, 2, 3 and 4 Michael Noll’s work at this time is represented. Noll describes the first experiments as follows: “The computer was programmed to produce a series of three-dimensional pictures for a three-
Figures 1, 2, 3 and 4:
Computer generated art by A. Michael Noll (1967).
dimensional movie. The procedure is to define mathematically the three-dimensional coordinates of the points in a line. The projection program computes the corresponding points and generates instructions for the microfilm plotter to draw a single frame of the movie. He also represents a “A computer generated movie of a rotating hypercube”. Noll also describes using a concept of density referring to “ Gaussian density” that generate a sequence of random numbers which tend to cluster about an average. And finally he produced a computer composition with lines based that was a statistical approximation of a Piet Mondrian painting, called “Composition with lines”.

The self controlled machine developed by the British cybernetician Gordon Pask [2], the Greek-French architect and musician Ianis Xenakis composing music with computers using a random pattern and the American artist Michael Noll using the computer as a creative medium were the most conspicuous and thought provoking work of the exhibition reported by Reichardt.

3. Artists, Fortran and Algol

For those researchers involved in computer programming it was necessary to use high language programming systems as Fortran IV or Algol to define a set of coordinates X,Y which enable to draw lines using predefined drawing routines that were defined by each type of plotter. It is interesting to mention in relation to hardware for graphic procedures during the mid sixties, that the plotters were from different origins, from Great Britain, Germany and United States.

But the digital tablet also appeared for the first time in 1967. In Great Britain the first one was the “D-Mac Follower pencil” and in United States the “Grafscan tablet” was developed by the Rand Corporation.

The digital tablet was regarded as a very useful tool because it enabled the architect, the designer, the engineer, the geographer to record free hand sketching and then transfer the drawing to a computer graphic system to adjust the final digital representation. British digital computers were made by Elliot Automation, Ferranti and ICT (Imperial Computers and Tabulators) and in the United States the Digital was developed, one of the faster machines of that age, and IBM developed the 360 series.

It is interesting to notice that at the end of the sixties the first interactive Cathode Ray Tube, the 2250 was launched by IBM, which allowed the user to design with a “light pen” directly on the screen; this was inspired by the early interactive computer and CRT system that was part of the Sketchpad I technology developed by Ivan Sutherland at MIT in 1963 [3].

4. Systems

The concept of “systems” that appeared at that time had a wide impact, leading to one of the most influential bodies of that period named the
“Design Research Society”. For the first time we heard about “Design Procedures” coming from engineers from different fields, architects and designers and even cyberneticians.

Sometimes the meetings of the Design Research Society were at the School of Architecture of University of Portsmouth and were led by Geoffrey Broadbent, sometimes at the Royal College of Art in London where they were led by Bruce Archer. Other meetings were hosted by John Christopher Jones from The Building Department of the Manchester Institute of Science and Technology.

What was the common objectives in those meetings...? It was to allow key figures talk from the viewpoint of their own fields but with an “open minded” attitude. For the first time the speakers talked about how computers and systems were interrelated and applied in several fields and disciplines. In this way I believe that the concept of “interdisciplinary procedures” in the design disciplines were born, during mid sixties. Also, from a pragmatic point of view computers appeared as a tool to “bridge the gap” between several design technologies.
But why did the concept of “systems” appear in that period?

From a theoretical point of view, the concept of “systems” also appeared in other research areas; from the biology side similar ideas were introduced by the Austrian born biologist Ludwig von Bertalanffy who in the fifties developed the “General System Theory” defining a system as set of components with different qualities and specifications that behave according certain laws.

But taking into consideration the strong influence of the American pragmatic procedures, it was Herbert Simon from the Carnegie Mellon University in the sixties who crossed the boundaries of several disciplines. His seminal work resulted in the famous theory “the Science of the Artificial” in which he said: “You don’t have to be in computer science to be deeply involved with exciting applications of computers. As a matter of fact, you’re going to have a hard time finding a field in which you’re not.”

Following the strong influence produced by Herbert Simon theory, Fred Bortz Director of Special Projects for Engineering Education at Carnegie Mellon University wrote the book “Mind Tools: The Science of Artificial Intelligence” to introduce the concepts of artificial intelligence to young researchers and enthusiasts [4]. He suggested that “Mind tools are the things that man has created over the centuries which make it possible to preserve information and spread it throughout the world.” Bortz explains that books and other written materials are mind tools which allow us to reach far beyond the limitations of memory. “Today, as computer systems can hold and process more and more information faster and faster, people are developing new classes of mind tools through a new science called ARTIFICIAL INTELLIGENCE. These new mind tools promise to enhance the capabilities of our minds as much as the tools and mechanical devices of the Industrial Revolution extended our physical capabilities.”

Continuing in the mid sixties and following this interdisciplinary pattern the systems approach in the architecture field became first, to be used for managed building construction. Although it is no longer a core research and theoretical tool in digital design research it still gave us some of the key points in how to deal with architectural and building design and construction procedures.

5. Conclusion

In this point Professor Maver position was extremely important because he envisaged the future developments with enough anticipation as he stated in his paper published in the SIGRAADI 2002 Conference in Caracas-Venezuela named “Predicting the past, remembering the future”. This paper is for me one of the most inspiring papers by Professor Maver. In it he took a retrospective view looking at work in the field since 1965 and also looked at predicting the future. He wrote:
We shall discover how best to exploit our most important amplifier, that of the intellect. The more we know the more we can figure; the more we can figure the more we understand; the more we understand the more we can appraise; the more we can appraise the more we can decide; the more we can decide the more we can act; the more we can act the more we can shape; and the more we can shape, the better the chance that we can leave for future generations a truly sustainable built environment which is fit-for-purpose, cost-beneficial, environmentally friendly and culturally significant.

and later he added:

“what is certain is that the next 30 years will be every bit as exciting and challenging as the first 30 years.............”.

As a conclusion, these are, for me, prophetic words that only a true pioneer can propose. Tom Maver has been such a pioneer, and that has been demonstrated by his own work during the last 30 years.

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References


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