Kim H. Veltman

Computers and the Visual Arts

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Guest Editor's Editorial

The role of computers is changing radically. In the 1960's computers were mainly associated with calculation (number crunching). Gradually they became associated with texts until today there is an international organization, the Text Encoding Initiative (TEl), concerned specifically with entering texts digitally. Meanwhile individual projects are constantly gaining in scale. At the Vatican Library all the Reginensis manuscripts have been entered digitally and a project is underway to digitize over 9,000 incunables. In Paris, President Mitterand has been speaking of producing some 400,000 texts in electronic form for the new Très Grande Bibliothèque (TGB). In Washington, the Coalition for Networked Information (CNI) has recently begun lobbying to digitize 10,000,000 volumes. The EEC has begun a plan that calls for the eventual digitization of all the major European libraries: an estimated 2.3 (European) billion books.

With respect to scanning existing images there were several problems. Low resolution scanners produced unacceptable quality. High resolution scanners took up too much space. Michael Ester of the Getty's Art History Information Program (AHIP) made an important contribution by working with art historians to determine quantitative parameters for acceptability. It was found that most experts do not perceive tangible changes above 2000 dots per inch. Another problem lay in matching colours between original and scanned images, a problem rendered all the more difficult because photographs and even paintings tend to change colour with time. Kodak and more recently IBM have been devoting special projects to these problems.

Scanning techniques for coloured photographs were also developed. The1990's are making these technologies available in the realm of the personal computer. A number of companies have produced software forconversion of images from one format to another (e.g. TBase, Photostyler, Image Prep). GTE has produced a software program for viewing a series of images. Much more expensive systems (c.$15,OOO) by AXS permit more systematic searches of images from large databanks. The emerging Kodak Photo CD technology offers discs with one hundred images each. These were to have been available at $16 per disc but are at present considerably more. In terms of image size, BMP files in software programs such as Toolbook, requiring only 1 or 2 megabytes, provide an

acceptable quality for everyday usage. Kodak's system uses 18MB per image. ICOM's standard for scanning paintings in European galleries is 30 megabytes per painting. AXS uses c.30-50 megabytes per image. Experiments at the frontiers such as IBM's Brandywine Project use 50 megabytes per picture. At this rate an hour lecture with 100 slides would occupy as much as 5 gigabytes while a collection of a million images would require 50,000 gigabytes. Hence the CHIN collection with five million records would require 250,000 gigabytes, while the U.S Parks service with around 26 million records would require images such as the Marburg Archive would require 1,300,000 gigabytes. All this is so far beyond the scope of the average PC that it may well sound entirely futuristic. It is sobering to remind ourselves that a project is already underway, namely the catalogue of European patents being organized by CAT Benelux in conjunction with BSO/Origin, which uses 2.3 terabytes.

Until recently analysis of visual material also posed seemingly insuperable problems. In the early 1970's those at the frontiers of the field (e.g. Evans and Sutherland) developed algorithms for basic line drawings in perspective. During the 1970's and 1980's these were developed into coloured surfaces that could be animated. The production of Star Wars II (1977) and TRON (1982), the first fuII length film using computer animation, were two of the landmarks in these developments. Significantly these relied almost entirely on semi-regular geometrical surfaces rather than attempting to render the complexities of organic forms. Since the early 1980's, Pixar has been at the frontiers of creating ever more complex natural forms.

With respect to paintings and other works of art, early efforts were limited to creating digital versions of the written records describing these. The Canadian Heritage Information Network (1972-), founded by Peter Homulos, was the first organization to introduce a national standard in this domain. In Germany, the Marburg Archive thanks to the leadership of Professor Lutz Heusinger, was and remains one of the pioneers in this field. At Pisa, Professors Paola Barocchi and Laura Coni organized a first world conference on the use of computers for art history. Their second world conference, organized in conjunction with Marilyn Schmitt of the Getty AHIP division, included a catalogue of all major electronic projects. These and other bodies drew attention to the need for standardized author and place names. These developments led a branch of the Comité Internationale Pour l'Histoire de L'Art (CIHA) to conceive Thesaurus Artis Universalis (TAU) which soon proved to be a long term vision rather than a readily achievab1e goal. The Getty's projects such as the Union List of Author Names (ULAN) and Thesaurus of Places (TAP) are practical intermediary steps towards that vision. James Bower, who is working on these projects at the Getty's AHIP division, has written the first article in this special issue. In the United States, the Library of Congress developed a standardized (MARC) format for recording titles of books. In the past three years there have been significant steps to expand the scope of this format to include archival and, increasingly, visual materials: photographs, paintings, video etc. In North America there is now a Visual Resources Association concerned with the practicalities of these problems. There is also a Museum Computer Network that focusses more specifically on museum objects. They have founded a special Committee on Computerized Interchange of Museum Information (CIMI) which is considering two

formats ISO 2709 (which is used in MARC by the library world) and ISO 8879 or SGML (Standard Generalized Markup Language). An Art Information Task Force (AITF) sponsored by both the Getty's AHIP and the (American) College Art Association is another indication of a trend towards convergence.

The editor of the task force's report, Jennifer Trant, of the Canadian Centre of Architecture, is the second author in this special issue. She raises basic questions concerning the need to define what precisely art information means and introduces a concept of the virtual database. At Leiden, the late Professor Van De Waal created, ICONCLASS, a remarkable classification system specifically aimed at describing the iconological contents of paintings and other works of art. This was adopted by the Marburg Archive and aspects thereof were then translated into electronic form as part of their HIDA programme. When other major photographic archives such as the De Witt Collection in London also adopted the ICONCLASS system, it became a de facto standard. As a result CIHA decided that a multilingual version should be made. As of 1992 an electronic ICONCLASS browser allows one to search for terms electronically. This new version has been developed at the University of Utrecht by a research team that began in 1990.

One of their members, Dr. Hans Brandhorst, is the author of the third contribution in this issue. He describes some of the new search strategies that ICONCLASS makes possible and outlines their potential use in quantitative approaches to art history. Initially there were three obvious problems with ICONCLASS. First, it assumed more than a basic knowledge of art history. Second, while particularly suited to certain kinds of iconographical problems, it did not enter into an equivalent detail in other subjects such as the details of architectural forms. Third, while arranged in a series of levels, some persons felt that it was not hierarchical in an obvious way.

These and other problems led a young German scholar, Angelica Grund, to write a dissertation on the pro's and con's of ICONCLASS. An English resume of this work is the fourth contribution in this issue. Related incentives led the Getty Trust to sponsor an Art and Architectural Thesaurus (AAT) of 50,000 terms which is now also available in both book and electronic form. This system has a more obvious type of hierarchical scheme.

The fifth article in this special issue has been written by Pat Molholt and Toni Petersen, the individuals chiefly responsible for the design and development of the AAT. While he was developing ICONCLASS at Leiden, the late Professor van der Waal also conceived of another method for approaching visual materials which he termed Image-Teaching (Beeldleer). This system included eight categories: 1) general method, 2) vision, 3) form, 4) space, 5) semantics, 6) functions of the icon, 7) evaluation and 8) styles. Implicit in this approach were dynamic, multiple cross-referencing techniques linking various parts, quite different from the structure of traditional books. For this reason the system was never published. However, with the recent advent of hypertext, the system has been revitalized and there is discussion of creating a corresponding hyper-iconics (*hypericoniek*).

The sixth essay. by Gerhard Jan Nauta, who is working in the Department of Art History at Leiden, describes this project and raises philosophical questions concerning the implications of these developments on discussions of the art of memory (*ars memoriae*) as explored by the late Dame Frances Yates. The incredible developments in recent technology are constantly changing our horizons of the possible.

At a demonstration in early December (1992), given by a sales representative from Microsoft, we were told of plans for a high end workstation with 2 gigabytes of RAM and terabytes of space. Hence there is every reason to assume that within a generation even the hurdle of storage size which still seemed insuperable a decade ago will have been solved. In the past the challenge was in dealing with problems of form. In the near future the challenge will shift from form to content. For those who wonder why I chose this sequence of papers let me explain: The first two papers are by practitioners in the field with theoretical interests (Bower, Trant). The next three papers concern the two main systems for retrieval of artistic materials, van der Waal's ICONCLASS (Brandhorst, Grund) and the Getty Trust's Thesaurus (Molholt/Petersen). The sixth paper explores the structures and potentials of Van der Waal's unpublished Beeldleer (Nauta) and the final one offers some thoughts on how computers will integrate in new ways our mathematical, verbal, and visual information, changing our approaches to and even the very shape of knowledge.

Prof. K.H.Veltman, Perspective Unit, McLuhan Program, University of Toronto.

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