

Communication and Code

# Code

## Synergize

Communication

## Graphic Design : Towards Digital Applications

Towards Digital

The Synergism  
Between Visual  
Communication  
and Code

Mary Jones

**The disciplines of Graphic Design and Computer Science interact synergistically; the computer is used by the designer as a creative tool while the scientist benefits from the designer's contribution concerning the best use of the visual potential of the medium. The graphic designer is urged to become computer-literate not only to take advantage of current technology in the design workplace or to seek new professional opportunities in the computer field, but to participate in the development of software that will best serve the designer's needs without restricting the dynamic nature of the design process.**

In 1979, when I was a design director at a university press, I noticed that more of our suppliers were switching to computer typesetting. I was intrigued with this new method of typesetting for several reasons, it not only allowed me more latitude in book design, but the quality I was used to specifying, wasn't compromised by the new technology. The more I learned about digital composition, the more I wondered if this technology could be expanded to include other elements of the book such as graphics and even layout of text and graphics.

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Author's address: 12 Old Forge Road, Greenwich, Connecticut USA 06830

Initially, I wanted to learn more about digital composition so I could apply it in my work as a book designer. My growing interest led me to the Visible Language Workshop at M.I.T. There I became more convinced of the potential benefits of digital technology for my own field and I began to realize that the computer industry is greatly in need of the skills of graphics designers.

Until recently, the quality of computer graphic images have simply not kept pace with the technical achievements in computer graphics. The needs of graphic designers, their creative thought processes, and their approach to problem-solving can and should be implemented into the design of better digital tools. An equitable balance between graphic and technical expertise is needed. Graphic designers can contribute to this development by being computer-literate users and also by assuming more responsibility in creating digital design interfaces.

problemsolving

Effective visual communication is becoming more important to computer graphics because of the growing capabilities of the computer, especially the micro-computer, and because computers have been expanding out of the laboratories and into our daily lives. Additional memory and more powerful processors are transforming the micro into a computer capable of simultaneously processing large and diverse amounts of complex data. PC's are evolving from 8 bit to 16 bit interactive, multi-task workstations connected by communication networks, linking numerous users and providing diverse applications. Some of these systems will serve our present needs for faster financial, management, and communication abilities, especially in corporate and educational environments. Other systems will contribute to the design and implementation of new concepts, such as electronic books, electronic curricula, and expert systems.

Though many companies are not yet making the best use of graphics in their products, the recent trend is toward systems that are well suited to use graphic possibilities. For example, technology has encouraged a move away from alphanumeric monitors (in which objects on the screen are limited and their flexibility of movement greatly restricted) to bit-mapped screens in which individual pixels can easily be manipulated to represent greater varieties of objects anywhere on the screen. The *Apple MacIntosh* is an example of a bit-mapped/graphics oriented personal computer. A mouse is used to point to the screen for selecting, creating, and manipulating objects. Screen icons as symbols of objects are used in place of menus and keyboard commands; the

user moves around in graphic space instead of having to remember the names of things he is looking for. In addition, the use of windows allows the user to call up multiple and diverse kinds of information simultaneously on the screen for comparison or reference. This process not only duplicates the natural motor abilities and perceptual skills of humans, it also expands the need for clear, logical graphics.

### **Graphic Designers as Collaborators**

If, as I believe and as industry trends indicate, graphics oriented systems are the wave of the future, graphic designers and computer scientists will work closely together. The relationship is valuable to both disciplines. While the graphic designer and the computer scientist may appear to speak different languages, there are essential similarities in work-style. These similarities provide a natural bridge for collaboration.

Both graphic designers and computer scientists are planners, involved in a team approach to problemsolving. The computer scientist, whether a programmer, system designer, system analyst, graphics guru, or hardware specialist is part of a modular team whose common goal is to create and assemble all the necessary components in computer and software design.

The graphic designer hardly creates in isolation, but is accustomed to working closely with people of various skills and knowledge, in identifying, defining, and analyzing problems from conception to completion of the project. Historically, graphic design has had a symbiotic relationship with prevailing technologies. The graphic designer acquires sufficient technical expertise to understand tool capabilities and to influence the development of technology toward more flexible uses and higher quality output. The scientific and humanistic attributes of the design profession provide the bridge for the designer to become a technically literate and equal collaborator in future tool and process making.

Both computer science and graphic design are process oriented, applying analytical and synthetic principles to generating and organizing information. But the methods employed and the end results are different. The computer scientist processes information for machine comprehension. Application of abstract constructs such as trees, lists, and transactions, maximizes machine efficiency and performance. Software designers are concerned with developing a means by which results can be attained automatically and consistently.

The graphic designer, as an interpreter and contributor to human communication, develops a clear and concise visual transmission between sender and receiver. By exploring, analyzing, and systematically coordinating structural, aesthetic, and semantic relationships, the graphic designer is concerned with achieving effective human communication.

The two fields come together in the discipline, computer graphics. Computer graphics use the technical capabilities of the computer (such as optimum speed and processing ease in organizing and disseminating large, complex amounts of data) with the potential for effective expression of visual communication. A synergy between the two disciplines, computer science and graphic design, is essential to the future development of computer graphics as an effective visual communication medium. What role will graphic designers have in the future of computer graphics? How will their influence and expertise become a guiding factor in making better digital graphics, better electronic design procedures, and in making better digital design tools for other designers?

The impact of graphic design on computer systems can be extensive. Points of entry for the designer include the images that the computer system produces, on-line and off-line vehicles of information through which a system is learned and operated, and the internal make-up of the system through its software structures.

The most apparent and immediate need for graphic design expertise is in the area of documentation. Vast quantities of instructional data must be organized and presented clearly, concisely, and logically, on-line and off-line. As graphics capabilities migrate from mainframes to micro workstations, the needs of less literate users must be met. Improved documentation will be needed and self-training features will become more frequent. One of the challenges to software designers is to make software systems accessible to more people. This means paying closer attention to what attributes relate to successful use, such as improved user interfaces for both novice and experienced users. A beginning would be to build into the system extensive on-line help and tutorial facilities that are visually organized and visually referenced.

There are several interesting characteristics involved with this design task. If designers are creating both the on-line and off-line versions of the documentation they face the task of organizing the data into two different final media forms. The data will be printed on paper and distributed in a binding, or remain in electronic form residing in a HELP file or a

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TUTORIAL program. The former assumes traditional print production attributes and linear form, while the latter dialogue is accessed randomly or by interactive dialogue. Different design limitations are imposed for the on-line documentation; typographic selection is limited and the information is observed in screen chunks of different determinant lengths rather than pages of specified lengths and *guides* such as page numbers and running feet. As the next generation of software moves away from the traditional keyboard input to easier-to-use alternatives such as touch-sensitive screens, mice, voice actuation, and direct input from other data sources, graphic designers will have new design challenges.

As experts in the organization of visual communication, designers have been instrumental as consultants to computer scientists in a variety of graphic areas, selection and application of type-face design, selection of appropriate color systems for commercial software packages, and coordination of graphics systems for statistical purposes. Graphic designers also contribute to computer graphic research by relating their own experience to those who design expert systems. By describing how they create and visualize their ideas, they assist the computer scientist in making machines that draw on and respond to this judgmental process.

To the designer, the computer represents the newest and fastest tool for conceiving, developing, and reproducing printed output such as books, magazines, posters, and brochures.

The skills of the designer can be divided into two general categories: judgmental and mechanical. The judgmental, or decision making stage, is characterized by experimentation and change. Decisions made and remade concern not only how something should look, but whether it is communicating effectively. This requires extensive thought and visual exploration. The second category, mechanical functions, involve putting the elements together to produce the communication.

Both skills are integrated on computerized systems and can be implemented with speed and ease if the user's needs are properly met. Designers can experiment with visual elements such as size, shape, color, and typography; explore visual relationships, and see the immediate results of their decisions, and then implement those decisions. A designer has more control of the complete design task because the computer is a comprehensive design tool. On some com-

puter graphics systems, the designer assumes responsibility for color separating and typesetting, two tasks traditionally sent out of the studio for completion; the computer becomes a kind of multi-purpose assistant.

Computers can be more than tools for helping with various aspects of the design task; they have the potential for altering our work process. The objective is to go beyond mimicking past media and to continue to develop processes that utilize and exploit the unique capabilities of the computer.

### **Graphic Designers as Software Developers**

Graphic designers have an important role to play (if they choose it) at the most critical conceptual stage of the process, by transferring their expertise directly into the development of graphic software that enables other designers to work in more comfortable and natural ways. As Karl Gerstner said "graphic designers will design processes, not just products." By developing programmatic approaches to software design, the designer creates the process in which design takes place. When the software has no embedded visual biases or values and the basic visual elements are manipulable, then the design environment is changing and dynamic. The computer is restricted to useful mechanical functions while the designer retains full freedom to experiment, select, and rearrange visual elements, information, and make the visual decisions.

*dynamic*

Creating an interactive design system begins with a task analysis. This involves establishing and understanding the goals of its users, what information they will need for performing their tasks, what data they will generate, and what methods they will use. From training and first-hand experience, a designer intimately understands the type of system most suited to the designer's abilities and methods of working. Making the needs of graphic designers, the way they think, and their approach to problemsolving an integral part of software design is the key to creating useful tools.

The expanding capabilities of computers are contributing to the formation of new non-print related concepts, processes, and methodologies for disseminating information and instruction. Some of these totally electronic processes involve analyzing the way we learn, teach, intuit, understand, and perceive things. By simultaneously organizing and displaying multiple pieces of information from diverse sources for the user, who is engaged in a multisensory way—with sight, voice, touch and hearing, computers become truly conversational.

More colleges and universities are requiring incoming freshmen to purchase their own PCs. Most students use these machines to complete individual homework assignments, but in some universities these micros are being connected by electronic networks. Students attend a live lecture with a professor teaching a particular subject, simultaneously, each student uses a micro to reference the lecture as it is being given. For example, a computer science student can listen to a teacher explain how a sorting algorithm works, simultaneously see the source code on a micro and a real-time animation performing the specific task. Classwork is accomplished interactively; the student electronically sends assignments to the teacher who checks and returns them electronically. The task for developing an electronic curriculum such as this falls to the educator, the software programmer, and the graphic designer, who orchestrates the visual material.

In my position as Manager of Digital Support, I'm putting together a system for total in-house electronic delivery of design and production functions. As many magazine and book publishers move toward integrating their in-house processes for designing and producing print products, a designer's specialized skills are vital to analyzing these publishing functions and designing the configuration of electronic tools necessary to serve them. The tools facilitate the following functions: design/design workstations; copy-editing/wordprocessing; production/scheduling; and telecommunicating authors' manuscripts. In addition, selection of an electronic network to connect the system components is part of the total task. This network with the proper telecommunication software can interface with college bookstore networks to electronically deliver textbooks and electronic course notes for distribution. This is a deeper look at the steps that will lead to an electronic curricula.

Concurrent with the development of electronic curricula is research and development in electronic books and video disk instruction processes. These forms of electronic instruction involve organizing information in non-linear ways and integrating visual elements from diverse sources such as text, digitized halftones and illustrations, and animation to create an interactive approach to instruction. I've watched bored chemistry students come alive when they pour different colored solutions into beakers, make mistakes (and *explosions*), and then try to figure out what went wrong. Students gleefully *experiment* ignoring the tutorial in favor of discovery. The student explores the topic being taught and in the process of learning, creates a personal form of instruc-

tion. Graphic design makes this a fascinating learning experience as well as a personally satisfying form of instruction.

### **Artificial Intelligence**

Future systems will understand how an expert in a particular profession would approach a problem and use that expertise to solve a similar problem. Some future systems will even have artificial graphic design intelligence. These systems will know how to do some layout, especially chart and statistical layout. They will follow basic rules for good design imbedded in software or in silicon chips. Others versions of expert systems will serve as intelligent aids for graphic designers to use in conceiving and completing design-related tasks. In both cases, graphic designers will be instrumental in creating and implementing these future systems.

### **Conclusion**

There are dramatic changes occurring in the visual communication environment. The increasing use of computers is altering the context of graphic design. We need to be more vigorous in examining the changing patterns of communication, in recognizing our specific design needs and processes, and in influencing the future of visual digital systems.

Traditionally, graphic design has been a field that demands pragmatic performance. The future requires us to go beyond this superficial emphasis. Graphic design must analyze the more complex issues that will enable us to define our profession and visual communication with more precision.

Visual Communication