NCGA expands role to keep pace with industry

Ware Myers, Contributing Editor

"In 1982, when NCGA was last in Anaheim, the market was about $3.4 billion," Ellen M. Knapp reported in her president’s message to Computer Graphics 84, the annual conference and exhibit of the National Computer Graphics Association in May. "Estimates for this year are as high as $4.5 billion."

"The computer graphics industry has experienced growth in every measurable way: number of users; breadth of applications; range and quality of goods and services; development of compatible standards; and number and size of professional societies, users groups, and trade associations," Knapp said.

The NCGA itself has grown from a small group of 80 founding members to 6500. Attendance at its annual conference and exhibit has grown from 1700 five years ago to 33,967 this year. Further evidence of growth is the establishment of Computer Graphics Today, a new monthly publication, and the addition of specialized conferences this year. NCGA’s board has also approved programs in graphics standards and productivity.

New publication. Computer Graphics Today will premiere in July as a monthly news and feature tabloid newspaper covering computer graphics equipment, systems, programs, and applications. It will be published by United Business Publications, a division of Media Horizons, Inc., in cooperation with NCGA. The editorial office is in Fairfax, Virginia, and the advertising and subscription departments are in New York City.

The new publication will be guided by an editorial advisory board of 11 members representing different application areas: Carl Machover, chairman, CAD/CAM; Alfred Bork, education; Charles Csuri, video technology/animation; Henry Heffernan, medical applications; James Foley, human factors; Perry Jeffe, printing and publishing; Robert MacLean, military applications; Aaron Marcus, visual arts and design; Alan Paller, business graphics; Jerry Schneider, architecture and engineering; and John Sibert, mapping/cartography.

Specialized conferences. In addition to its five-year-old annual conference, NCGA is sponsoring a series of conferences in graphics application areas. The first is BP 84, Computers/Graphics in the Building Process. Cosponsored by the World Computer Graphics Association and 18 cooperating organizations in the building industry, BP 84 will focus on the impact of automation on the building process. It will convene August 19-23, 1984, in San Francisco.

A few weeks later DCG 84, Defense Computer Graphics, will meet in Washington, DC (September 10-13). It will have four tracks: war-fighting; programmatic decision-making and management; technology; and training, logistics, and support. Keynote speakers will be Bobby R. Inman, president of the Microelectronics and Computer Technology Corporation; Edith W. Martin, deputy undersecretary of defense for research and advanced technology; and Grace M. Hopper of the US Navy. DCG 84 is also cosponsored by WCGA.

Computer Graphics 84 in Anaheim, California, May 14-17, set new attendance records: 33,967 registrants for the exposition and over 2700 for the concurrent technical conference. There were more than 260 exhibitors.
At Computer Graphics 84 Knapp announced NCGA's 1985 conference schedule. Computer Graphics 85 will take place in Dallas, April 14-18. It will reflect the entire spectrum of computer graphics technology and applications. NCGA is adding two regional conferences and expositions, one in Anaheim in June and the other in Boston in August. Both will focus on applications in business graphics. Also, NCGA and WCAG will cosponsor a new regional show and conference in Atlanta in October 1985.

Graphics standards. During the past year, NCGA has been clarifying its position on graphics standards. In a series of meetings of the corporate board, the corporate advisory board, and the technical research and standards committee, it was agreed that a primary goal is to foster development and use of computer graphics standards. Resolutions were adopted by the board of directors of NCGA to support the development of graphics standards under the rules and procedures of the American National Standards Institute, to speak for the graphics industry in current standardization activities, and to help ensure that standards are quickly and broadly accepted by promoting efforts to have them widely disseminated and appropriately understood. In particular, NCGA endorsed the adoption and widespread use of the Graphical Kernel System as the first of a family of compatible standards for computer graphics.

Several standards are already in effect: IGES (Initial Graphics Exchange Standard) and NAPLPS (North American Presentation-Level Protocol Syntax). IGES provides a standard file format for transporting CAD/CAM design data between different systems. NAPLPS is a compact code for encoding the graphical and textual content of a picture for transmission and storage.

GKS is close to attaining official status. Balloting at the International Standards Organization is closed. In the United States, GKS is now in the public review stage of the ANSI procedures.

The ANSI public review stage of VDM—Virtual Device Metafile—closed May 6, 1984, and the corresponding stage at the international level is in progress. VDM is intended to be a graphics picture file standard concerned with the transfer of sufficient device-independent information to enable a picture to be drawn on a broad range of graphics devices.

VDI—Virtual Device Interface—is somewhat behind VDM. The first letter ballot began in April 1984. VDI is a two-way communication protocol that takes place at the lowest level of device independence.

The Programmer's Hierarchical Interface to Graphics (PHIGS) is in the early stages of development. At a high level of generality, all of these efforts attempt to standardize interfaces, and consequently they all sound similar. IGES operates at the level between the object database and the application program. GKS and PHIGS interface between the application program and the graphics utility system. VDI and VDM are positioned between the graphics utility system and device drivers, and NAPLPS functions between a NAPLPS device driver and a videotex device.

"Important gains will be achieved with the adoption of universal standards," Knapp declared.

The Human Factors Society is developing a standard under ANSI procedures for visual display terminals. It expects to have a first draft for public review by mid-1984, according to Gene Lynch, a member of the drafting group.

"The intent is to produce a document that is based on sound scientific research," Lynch said during a session on standards. "This (standard) will then be available to legislators for their consideration, if they feel that legislation is necessary, and for unions and management to form the basis of informed discussion on ergonomic issues."

Productivity: Knapp feels that the impact of computer graphics on productivity in the workplace needs to be more widely understood. NCGA's technical research and standards committee has also begun a study of methodologies for accurately measuring and testing productivity.

It is communicating with the American Productivity Center and the Manufacturing Productivity Center in an effort to reach a consensus on a standardized methodology that can be applied within a number of different computer graphics user organizations.

NCGA has approved a grant of $10,000 to the National Association of Broadcasters' Broadcasting Industry Council on American Productivity. This group's function is to bring the importance of productivity to the attention of the public.

Panel looks at the next 10 years in computer graphics

Bob Carlson, Assistant Editor

With the diversity of applications that already exist, many of today's students will be able to find niches in the expanding field of computer graphics, predicted John Kerwin, president of Kerwin Communications, during a panel discussion at Orange Coast College in Costa Mesa, California.

Kerwin advised his listeners, who packed the Fine Arts Lecture Hall to capacity, not to focus exclusively on creative and technical issues but to understand cost factors too, because one of the first questions clients ask is "How much?"

The program, which brought together four other specialists, with Kerwin as moderator, was scheduled to coincide with the opening of Computer Graphics 84 in Anaheim. Many people in the audience had, in fact, been to the NCGA conference and exposition earlier in the day.

The four panelists presented slides and videotapes to illustrate their recent work in computer graphics. The examples covered a wide range of applications, including 2-D pant programs, architecture, realistic scene simulation, film animation, and TV commercials.

Artist Darcy Gerberg, a painter and printmaker before turning to computer graphics in 1978, cited a trend toward computer graphics as a medium for aesthetic design of manufactured goods. Individually styled carpet and tiles were two prominent examples. She said that manufacturers and software houses are combining their efforts, and costs are coming down.

NCGA is taking an active role in two new areas, Ellen M. Knapp, president, announced at the association's annual meeting. One is the promotion of standards; the other is the encouragement of productivity increases through the use of computer graphics.

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Phillip S. Mittelman, president of MAGI, a pioneer in computer scene simulation, stressed the importance of the artist/designer on the computer graphics team, which he sees gradually taking on the role of the special effects man. Costs are beginning to favor computer graphics over the construction of models and miniatures in films and commercials, he said.

"Computer graphics and television have tremendous resonance," said Judson Rosebush, president of Digital Effects. He noted, however, that only 30 percent of the commercials identified by viewers as examples of computer graphics actually employed computer graphics techniques. Whether this means that computer graphics has a large share of the market still to capture, that the techniques are indistinguishable from and easily integrated with other video techniques, or that the average viewer simply doesn't know much about computer graphics is an open question. Perhaps all three statements are true.

The panelist whose work delves farthest into the realm of future possibilities was Alvy Ray Smith, computer graphics project leader for Lucasfilm. His description of production methods made it clear that the number of man-hours involved in computer animation is still very high. Nevertheless, the overriding need is for faster machines and lower computation costs. "We have the algorithms... we're getting ready to go," Smith says optimistically, but he estimates that a 90-minute feature film created entirely by computer would take 278 years to compute on a Vax machine and six years on a Cray 1, and 1.75 terabytes of storage would be required.

Other foreseeable developments mentioned by the panelists were life-size holography displays (Gerbarg) and pressure-sensitive projections that can be touched and felt (Rosebush). Smith spoke of film editors who would someday perform spatial editing the way they now perform temporal editing.

After the program, the audience was invited to visit the Orange Coast College computer graphics lab. The community college offers a variety of specialized courses leading to a certificate of achievement in computer graphics.

**Consultant Carl Machover pinpoints developing areas in computer graphics**

*Ware Myers, Contributing Editor*

Solid modeling, an increase in system software content, flat panel displays, computer-aided digitizers, and NAPLPS are among the areas to watch in computer graphics, according to Carl Machover, conference chairman for Frost & Sullivan's Sixth Annual Conference on Computer Graphics, held March 28-30 in Miami Beach. The computer graphics consultant also predicted growth in process control applications, workstation applications, intelligent peripherals, and use of color.

Machover's comments in the wrap-up session came after 21 speakers had considered turnkey, mainframe, and personal computer CAD, software tools, health and safety issues, engineering workstations, digital paint systems, and other topics.

**Software content.** "My expectation is that the software content of computer graphics will increase," Machover told the 125 participants. At present, about 10 percent of the industrial market in computer graphics is software, not including the software content of products sold as systems, he estimated. If the 1984 computer graphics market is $4 billion, the software services part would thus be about $400 million. In addition, the systems market is about $1.8 billion, about 30 percent of which is software. That adds another $540 million. So the total is roughly $1 billion in software for 1984, or 25 percent, a proportion that will increase in future years, according to Machover, as the cost of equipment comes down.

**Process control.** While Machover deems process control systems "a not very visible area of computer graphics," he estimates that their use probably represents a $600-million market at present. Perhaps this segment is less noticeable, he speculates, because its growth rate is only about half that of other market segments. For comparison, the overall computer graphics growth rate averages more than 30 percent per year, with parts of the industry growing at 80 percent per year.

**Solid modeling.** Machover believes that most solid modeling systems have much greater functionality than is being used. On the other hand, he sees some pressure from the user community to increase this functionality. As this increase materializes, it should lead to broader applications of solid modeling.

It takes about five years for people to learn to use a new technology of this complexity, Machover noted. That process has already been under way for several years. "Solid modeling as a business area is going to come into its own within the next two or three years," he thinks. "Over the next couple of years solid modeling will represent—in terms of income volume—about three to five percent of the mechanical portion of the CAD market."

**Workstations.** Machover emphasized the workstation, not just as part of a CAD turnkey system, but as a "window" on every engineer's desk. This window would give the engineer access to electronic mail, reference manuals, design functions, and nearly everything else he needs to do his work. Machover feels that this window market may be 10 times larger than the CAD workstation market.

The trigger price at which the workstation will become ubiquitous is in the $5000 to $10,000 range. "In that range we suddenly have a very interesting ball game," he predicted.

This kind of workstation may be near at hand. One example that Machover gave is the IBM C9000, which grew out of the Instrument Division of IBM. The C9000 is based on the Motorola 68000, unlike the IBM Personal Computer, which uses the Intel 8086. Machover thinks it could be put in place in the

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Carl Machover is president of Machover Associates Corporation, a consulting firm; project director for Frost & Sullivan's reports on computer graphics; and a member of the editorial board of *IEEE Computer Graphics and Applications.*
specified price range. It is currently being tested in at least one major corporation. However, it may not become a formal product.

"The point is," Machover emphasized, "we are on the threshold of a major explosion in the engineering workstation area."

At the same time vendors are increasing the functionality of workstations.

"We are now moving into the era," Machover said, "of extremely high functionality, even to the real-time handling of realistic images." Today, that job takes a flight simulator at a cost of about $5 million. But the Iris workstation from Silicon Graphics does "some spectacular real-time solid-image manipulations," Machover said.

Its "secret" is the Geometry Engine, developed by James H. Clark of Stanford University. The Geometry Engine is a 75,000-transistor chip that can be configured to do the three basic operations of computer graphics: matrix transformation, clipping, and scaling. Iris has 12 of these specialized chips in a geometry pipeline.

One of the first efforts to get higher performance was Lexidata's Solidview, which allows a fairly complex solid image to be generated 10 to 20 seconds after the software has defined the image in polygon form. Later, several other companies, including GTI, Witeck, and Phoenix Data Systems, showed products that rotate a solid image about one-tenth of a second after the software has defined the image.

Companies are beginning to bring out systems in the $20,000 to $100,000 range that approximate low-level flight simulator performance. "The cost of special-purpose VLSI is coming down dramatically," Machover noted. "I suspect that over the next three to five years we'll see a tremendous explosion of very high-performance systems."

Flat panel displays. Displays based on plasma, electroluminescent, and fluorescent technologies continue to attract interest. IBM has announced a 1000-line plasma display for OEM use, and Photonics has shown a large unit measuring one meter diagonally. The Japanese have incorporated LCD technology in the Casio TV set. The US Department of Defense is supporting development in this field not only because the products can be flat but also because they are more resistant to radiation.

"The cathode ray tube will not disappear," Machover noted, "but the flat panel technologies are making whole new areas of application affordable."

One question that keeps coming up about future display technologies, according to Machover, is 3-D display—in particular, true holographic images. It is possible now as a demonstration, but he does not expect it in the near term as a major product. The potential market doesn't appear to justify the venture-capital investment, he judges.

Digitizers. There is the possibility in the next few years of a substantial market in semiautomatic or computer-assisted digitizing. The area has been rather dormant in spite of a residue in most large organizations of thousands of old but still useful drawings that haven't been converted to digital form.

"Over the years we've had this image of putting a sheet of paper in some kind of scanning device and converting it into a form that could be handled by a computer," Machover observed. Solving that problem would require artificial intelligence. A more practical approach at present puts a person in the loop. Machover expects companies such as Skantek, Metagraphics, and Optigraphics to move in this area. (Since this forecast, Skantek has demonstrated a working system at NCGA's Computer Graphics 84 in Anaheim.)

NAPLPS. The American National Standards Institute and the Canadian Standard Association have adopted the North American Presentation-Level Protocol Syntax, a standard for economically coding graphics information and storing it in that form in computer-type equipment or transmitting it over communications channels. NAPLPS is an implementation of level 6 of the International Standards Organization reference model. One of its applications is videotex. It can also be used for other computer graphics purposes.

"The application of NAPLPS in the computer graphics environment deserves more emphasis than we had the chance to give it at this conference," Machover said. "In all probability in the near future the major method of delivering business information will be videotex."

He doesn't believe, however, that videotex will be very successful as a consumer venture, because consumers have not historically paid for information. It will be more successful with businesses, which are accustomed to paying for information.

Intelligent peripherals. "We didn't have the chance (at this conference) to explore some of the areas in which we might expect substantial Japanese competition," Machover admitted. "From what I have been able to see, the Japanese are beginning to significantly increase the intelligence of their peripherals. For example, we are beginning to see plotters that contain the firmware to do the job we have hitherto put in an external microprocessor."

More color. The Japanese are beginning to reduce the incremental cost of adding color to systems. "American manufacturers are going to be forced to follow them," Machover pointed out. "Ultimately the added cost of color is going to be zilch." This means that color will be a major market trend.

"The second element that will make color more pervasive will be the increasing use of low-cost color reproduction techniques," Machover continued. "Right now the problem with a color plot (in a display) is that there is no good way to reproduce it." Existing color copiers are relatively expensive.

The trigger points will be a price of $10,000, a copy cost on the order of one to five cents, and a time per copy of not much more than 15 seconds. "We are about two years away from something like that," he thinks.

"Enhancing Creativity" is theme for NCC 84

The 1984 National Computer Conference, to be held July 9 through 12 at the Las Vegas Convention Center and Hilton Hotel, will offer over 90 technical sessions organized into 10 tracks.

"The availability of computers has evolved from time-shared mainframe systems to minicomputers to personal computers. Today's technology is migrating away from the center and toward the individual. Creative uses by individuals in the office, factory, and home is the theme that ties together the diverse NCC program topics," explains Program Director Dennis J. Frailey.

Alan Paller of AUI Data Graphics/Isso is chairman of the computer graphics and entertainment track. The focus will be on management and business graphics, offering an overview of current hardware and software and taking a look at the future as well.

Other tracks in this year's program will cover the automated office, computer hardware and architecture, software, personal computers, educational and societal issues, information processing management, database management, artificial intelligence, and computer communications.

NCC is sponsored by the American Federation of Information Processing Societies, the Association for Computing Machinery, the Data Processing Management Association, the IEEE Computer Society, and the Society for Computer Simulation.
US exhibit at New Orleans world's fair features computer graphics

The United States Geological Survey will demonstrate how it monitors 14,000 American waterways with the aid of a satellite, computers, and computer graphics at its theme exhibit at the 1984 Louisiana World Exposition, which opened May 12 in New Orleans.

Computer graphics images, generated by Issco's Disspla software and projected on screens in five theaters, end a long—but lightning fast—journey of stream-flow data. The data is collected by remote sensors monitoring 51 rivers and streams, transmitted via satellite to a USGS telecommunications network, and then forwarded to two computers at the exhibit, which reflects the theme of the fair: "The World of Rivers: Fresh Water as a Source of Life."

During normal year-round operations, the USGS Water Resources Division collects stream-flow data through constant manual and remote sensor measurements. The data is fed via satellite transmission to 60 computers located at district offices throughout the United States. Each office analyzes the data with the aid of Issco graphics.

For the fair exhibit, the agency selected one river in each state and Puerto Rico to let visitors learn about their local waterway. The stream flow at each river is monitored by remote sensor. The data is sent via satellite to receiving stations in Denver, Colorado, and Columbia, South Carolina. From there, the USGS telecommunications network passes the data to Prime computers located behind the scenes at the exhibit.

The computers, Prime 850 and 2250, store a database that includes a 50-year history of each river's stream flow and current data updated every three hours through the remote sensor measurements and satellite transmissions.

The computer graphics show begins when a visitor uses a stylus to select a state name appearing on a computer digitizer. Then the state outline, river site, and capital city location appear on a projection screen. The images are drawn on a Tektronix 4113 color graphics terminal and projected in five mini-theaters at the exhibit.

After the opening graphics, visitors see images showing a sequence of stream-flow data from the past 48 hours, the past two months, the past year, and the past 50 years. They also see a computer-generated pie chart comparing their state's river with the Mississippi River. The images are presented in a variety of formats and colors, including riverbed cross sections and bar, line, and pie charts with text annotations.

Film students explore computer graphics

Bob Carlson, Assistant Editor

A recent program at UCLA on the use of computers in filmmaking revealed a wide variance in the awareness of computer graphics by film students.

Alvy Ray Smith, computer graphics project leader at Lucasfilm, Ltd., was called on to answer such basic questions as "What is a paint system?" and at the same time to respond to sophisticated comments on ray tracing and other computer graphics techniques.

Using a question-and-answer format backed up by slides and film clips, Smith explained just what computer graphics can and can't do in terms of current technology.

Most of today's computer pictures are just too slow and too expensive for sophisticated animation.

Actual film production is only a small part of the work performed by the Lucasfilm computer graphics project; greater emphasis is placed on R&D. One ongoing project is to put a sound library on magnetic disk. The occasional release of commercial products is also planned. And yes, there is a games department.

There was no waning of interest or questions during the break, and several students hearing about Siggraph for the first time jotted down specifics on the upcoming conference. Although they may have lacked the technical understanding of how the systems work, the film students did not need to be convinced of the important role computers can play in film production.

Smith's presentation was one of five seminars in the UCLA Encounter Cinema series on aspects of the avant-garde film.

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Selective Update covers topics of current interest in computer graphics research and application. It also features conference previews and reports as well as short technical news stories. We welcome contributions from readers.

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