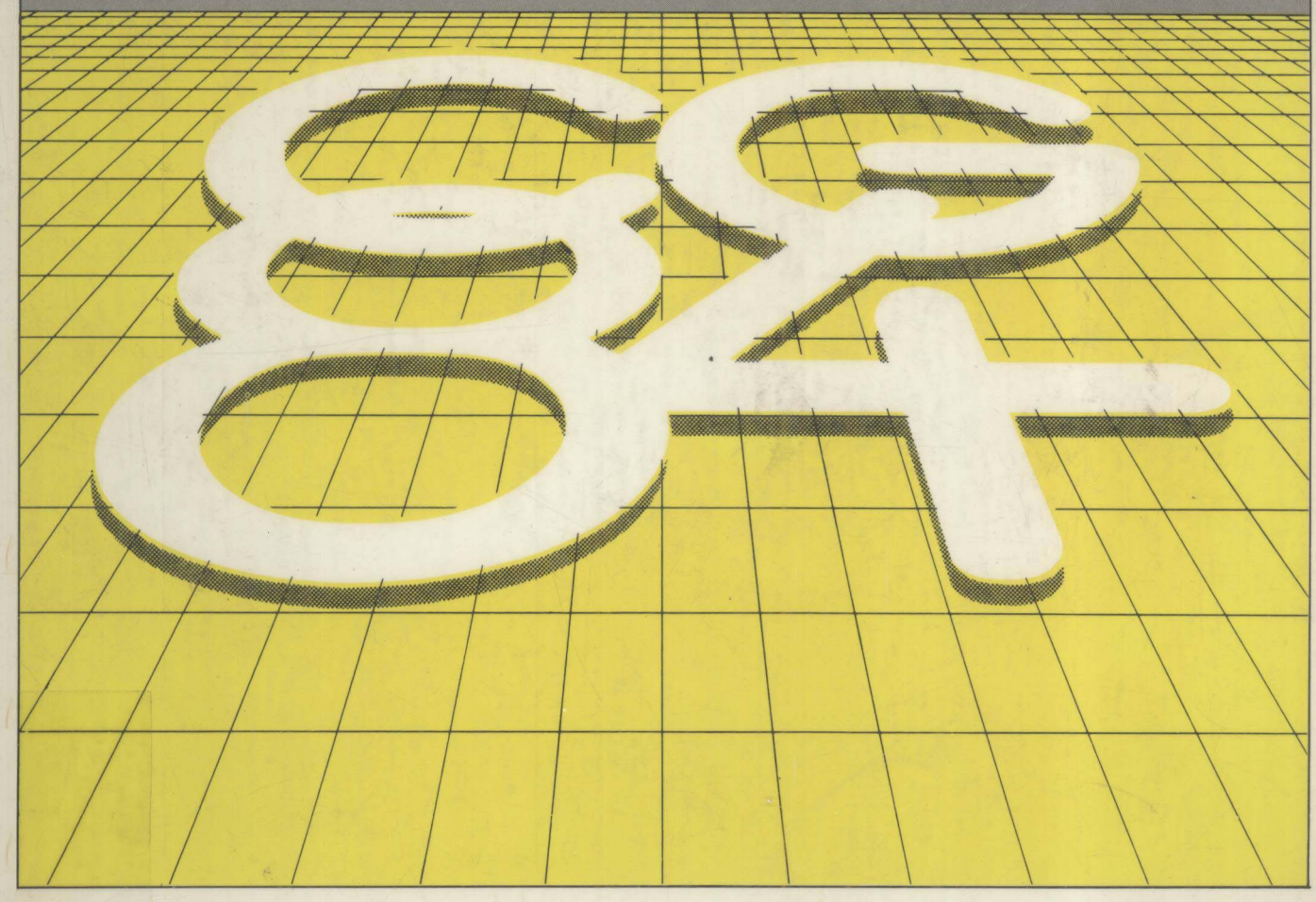
Computer Graphics '84

Proceedings of the international conference held in London, October 1984



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British Library Cataloguing in Publication Data

Computer graphics '84.
1. Computer graphics
I. Online Conferences
001.64'43 T385

ISBN 0-86353-012-5

BSDCS7

© Online 1984

ISBN 0 86353 012 5

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Online Publications
Pinner Green House, Ash Hill Drive, Pinner, Middlesex HA5 2AE, UK.

Introduction

It's time for action in the computer graphics industry. The important technologies are here, ready to be adopted. With computer graphics penetrating a widening range of application areas, new groups of end users are brought into the fold every day, with their expectations and demands posing different challenges for the CG industry.

On the technical horizon, new developments are appearing in graphic image creation, display, storage and output technologies: these will capture the imagination of end users and revolutionise the way computer graphics is put to work.

On the one hand the industry must grapple with the end user's demands for integration, high performance and low cost. On the other, the industry must come to grips with its own efforts to set standards for graphics in a way that will maximise growth and minimise confusion. And through it all, the competitive positions of the major players are being challenged by important changes in the commercial structure of the industry.

So whether you are considering adopting computer graphics or have some years' experience, whether you are a manufacturer needing to keep up to date with developments or a supplier needing to expand your market, this volume, containing papers presented at the Computer Graphics '84 conference and associated seminars, will prove invaluable as a guide and as a reference.

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Has computer graphics fulfilled its potential?

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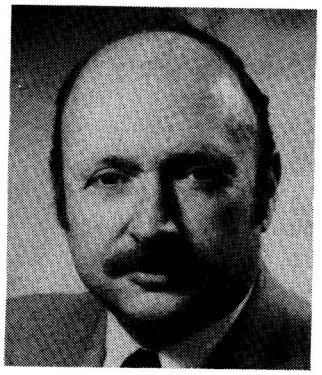

Carl Machover is President of Machover Associates Corporation: a consultancy which provides a broad range of management, engineering, marketing and financial services to computer graphics users, suppliers and investors. He is on the Board of several Companies including Panelvision and Fingraph Corp.

Presented at COMPUTER GRAPHICS '84: Online Publications, Pinner, UK 1984

The answer to the question "Has computer graphics fulfilled its potential?" is a resounding yes and no! ... with a dash of maybe thrown in for good measure!

Coincidentally with preparing this paper, I was going back through some old files, dating from the late '60s to the early '70s ... files which included collected papers, speeches, seminar notes and programs, an old book draft ... items which represented the computer graphics environment of fifteen years ago! Also, in conjunction with some potential patent litigation, I was reviewing computer graphics documents from the early '60s.

In total, these documents spanned an era when the number of graphics terminals could be measured in the 100s, to the late 60s when the numbers grew to 1000s, to the day when the numbers are literally in the millions ... from an era in which sales volume was a few millions of dollars per year to today when probably 8000 millions of dollars ($8 billion) will be delivered in 1984. Major computer graphics shows like SIGGRAPH and NCGA now draw 20,000 to 33,000 attendees. So, from a commercial standpoint, the answer to the "fulfillment" question must be a resounding yes! We now sell about $1 of computer graphics hardware, software, systems and services for every $10 worth of computers sold. We no longer ask, as we did at the Keydata Symposium in 1969 ... "Why is computer graphics always a year away?". Computer graphics is here ... now ... healthy ... and growing at more than 30% per year. Where just a few years ago it was difficult to find a dozen companies who sold more than $10 million worth of computer graphics equipment a year, a brief scan of the 1984-85 Edition of the S Klein Directory of Computer Graphics Suppliers reveals that there are now about four dozen companies selling $10 million to $50 million worth of computer graphics equipment and another two dozen companies selling more than $50 million worth of computer graphics per year!

Like any industry, we have our periodic recessions, and company failures and consolidations ... but, as an industry computer graphics is now a force to be reckoned with. Today, we spend about twice as much on computer graphics per year as we spend on cinema admissions.

In some applications, computer graphics is ubiquitous ... military applications for computer graphics began in the late 50s and early 60s and today virtually all command, control and communication systems depend on graphics as the man (person)-machine interface!

Design automation issues pervaded the computer graphics literature fifteen years ago, and today virtually all IC and VLSI designs depend on graphics-based design automation systems.

Management information systems (MIS) issues were discussed endlessly fifteen years ago and today graphics is becoming an increasingly necessary part of any business oriented system. Graphics as part of process and utility control, computer aided education, graphic arts, technical documentation, mapping, drafting, design, manufacturing, instrumentation, and analysis has been discussed in the literature over the past decade and a half. And, indeed, cost effective applications in these areas are now common.

As with the entire computer industry, price barriers have been broken. Graphic oriented personal computers selling for a few thousand dollars can perform tasks that required $100,000 or more systems just a few years ago. Where a few years ago, graphics systems could only be purchased by giant organizations, governmental agencies and universities (if a grant could be obtained), today even the smallest one-or-two man architecture office can afford a limited capability CAD system. Graphics based CAD has become so critical in some industries that a company can not expect to stay in business without it! As Gordon A. McAlysine of Time Engineering, Troy, Michigan said in an October 1982 "Manufacturing Engineering" article, "Get into it now, or get into it in the next two or three years, because in the next five to eight years ... if you don't have it ... you'll be out of business."

So, that's the good news. But, how about the bad news? Are there areas in which computer graphics may not yet be fulfilling its potential? There appear to be. For example, while computer graphics is embraced by the younger, computer literate individual, it still may threaten the older, less computer literate professional and lay person. There are at least two problems when that happens ... we may lose the knowledge-base that the older professional has ... and many times the older person holds a more responsible decision-making role in an organization and may resist the adaption to computer graphics.

This problem appears particularly acute in CAD and business graphics. Certainly the situation is improving, but we may need to do more.

While computer graphics are becoming increasingly important in a variety of engineering and architectural areas, we still have a long way to go. With the exception of IC and VLSI design (where perhaps 90% of all new designs are done on CAD and CAE equipment) computer graphics has probably penetrated less than 10% of the potential applications. Cost barriers are rapidly diminishing, but some performance issues still need to be resolved ...

- more goal seeking capability
- better dynamic performance in lower cost systems
- improved data based management capability
- solving distributed processing issues including data base integrity
- inexpensive, color hard copy suitable for distributing engineering drawings
- refinement of man-machine interface to satisfy the needs of both the casual and dedicated user
- understanding of the users' needs and biases
- greater integration into the manufacturing process
- cost justification on a project rather than task basis
- belying the fears of the computer illiterate.

The comment about engineering and architecture applies also to many of the other areas in which computer graphics can potentially make a larger contribution than it has. In my opinion, computer graphics has a long way to go to fulfill its potential in such areas as:

- computer aided education
- decision support systems
- graphic arts, including publishing
- engineering and scientific workspace "automation"
- white collar "office automation"

We must continue to identify needs as opposed to fads, and document results while understanding failures. Of course, computer graphics does not operate in isolation ... realistically, it is a tool to accomplish application oriented results. The real measure of potential fulfillment will be when the user need not be a graphics maven at all, but will simply take computer graphics for granted!

When we consider USA statistics which suggest about one or more automobiles, telephones and television sets per household, we can get some sense of where we might go with computer graphics.

In New York City, our mayor, Ed Koch, keeps asking his cónstituency, "How am I doing?"

If computer graphics were to ask the same question, the answer would be ...

"Not bad ... but there's a lot we can still do!"

Intelligent peripherals & computer graphics

Trevor J. Lee
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The computer graphics market is reviewed and on overview of graphics peripherals provided. More specific details of devices are discussed including the status of current technology in the areas of pen and electrostatic plotters digitizers and displays.

Trevor Lee is Product Line Manager for CalComp with responsibility for marketing 1070 and 9X5 plotters. After design engineering and marketing experience with ICL (1966-74) he moved into graphics marketing with with CIL (1974-80) and CalComp Europe (1980-83). He was European Product Manager for plotters and digitizers before relocating to California.

Presented at COMPUTER GRAPHICS '84: Online Publications, Pinner, UK 1984

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