1993 SMPTE Advanced Television and Electronic Imaging Conference

Sheraton Hotel and Towers, New York, N.Y.
February 4 - 6, 1993

Over 300 people attended the 1993 SMPTE Advanced Television and Electronic Imaging Conference, held February 5 to 6 at New York City's Sheraton Hotel and Towers. The conference, Advanced Television and Electronic Imaging for Film and Video, offered something for everyone; presentations covered a full range of media, including film, video, and computer imaging.

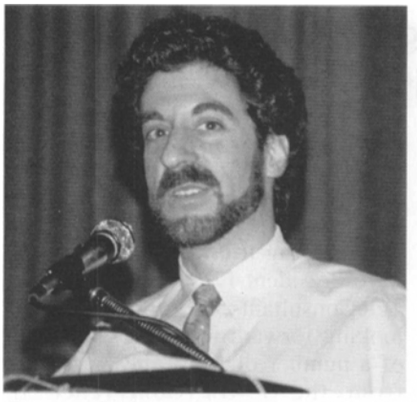
Papers presented during the two-day conference were divided into four general areas:

Digital Systems and Implementation, which outlined the areas of system design and implementation using current technology; Generation and Acquisition, which dealt with the initial steps of the production process; Image Processing, which explored the action of capturing the image for production and recording; and Storage and Transmission, which continued down the digital path to review the current approaches for data reduction and storage of the digitally captured or created images.

"It has been years since we've offered a New York program with this level of film expertise in particular," said SMPTE President Irwin Young, DuArt Film and Video. "The technical program included several papers from the developers of new or competing products to convert digital images to film, and each product is based on a different core technology.

"For the video world, the conference included a number of important papers on advanced television and direct satellite broadcast," he added. "And, for the digital imaging world, there were such presentations as the overview of the SMPTE's efforts toward an interformat exchange standard for motion imaging."

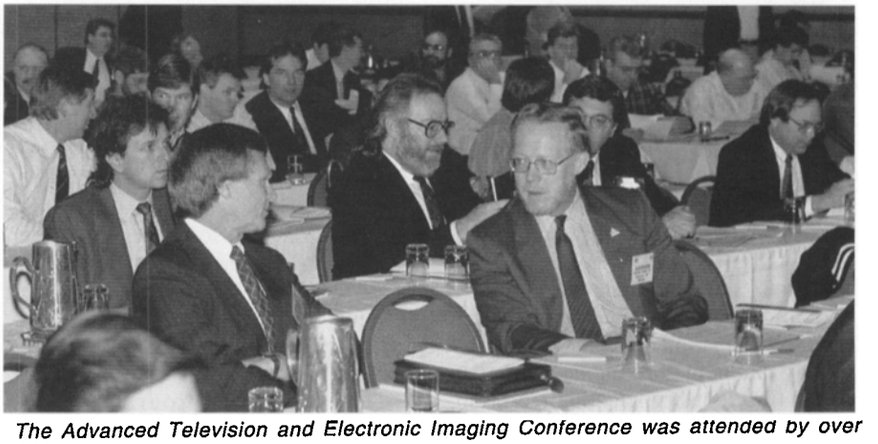
During the two-day conference a total of 30 papers were presented, addressing such topics as Implementation of a Large Digital Routing System, Design Considerations for Serial Digital Television Systems, Jitter Measurements of Serial Digital Television Systems, 1001 Questions to Ask Before Buying a Nonlinear Editing System, Real Time Image



Program Chairman Dean Winkler giving the introduction at the conference's opening session.

Bob Turner presenting his paper entitled "1,001 Questions to Ask Before Buying a Nonlinear Editing System."

Tutorial Chairperson Linda Young giving opening remarks prior to the all-day tutorial.



The Advanced Television and Electronic Imaging Conference was attended by over 300 people.

Processing for True High-Definition Imaging, Video in Computer Workstations — What the Future Has in Store, and Merging Digital Technology into an Analog World.

Speakers represented such esteemed organizations as Imagineering Ltd., Tektronix, Oxberry, Eastman Kodak Co., Fox Inc., Quantel, David Sarnoff Research Center, For•A Corp., PBS, Sony, NBC, Panasonic, Matsushita, and Sun Microsystems Computer Corp.

All-Day Tutorial

Over 250 people attended "Digital Imaging for Film and Television," an all-day tutorial led by some of Hollywood's top computer graphics experts, which took place on Thursday, February 4.

"Never before has such a respected CGI panel been brought together on this coast," said Tutorial Chairperson Linda Young, DuArt Film and Video. "This event represented a one-day encapsulation of all the basic principles and hot issues relating to the use of computer and digital imaging in motion-picture and television production. It was a rare opportunity for novice and engineer alike."

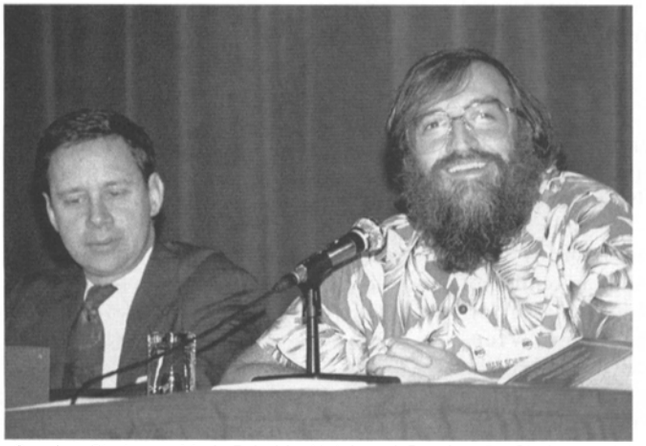
Throughout the day, speakers addressed such cutting-edge topics as A New Environment for Producing Moving Images; A History of Computers and Character Animation; Digital Visual Effects and Opticals: What is Possible in Film Today; The Fully Digital, Modular, Integrated Imaging Studio; The Meaning of Resolution for Computers; Scaling the Medium; and Video Compression Basics.

Speakers included William J. Kovacs, founder of imaging systems integrator Wavefront Technology and a member of the production staff at Santa Barbara Studios; Edwin E. Catmull, president of Pixar; Dr. Carl Rosendahl, president of Pacific Data Images, which produces animation and effects for leading advertising agencies and Hollywood studios; Robert M. Greenberg, founding president, CEO, and general manager of R/Greenberg and Associates, which provides many special effects for motion pictures, television, and print media; Charles Poynton, staff engineer, Sun Microsystems, one of the world's leading manufacturers of workstations used in digital imaging systems; Peter Owen, engineering director, Quantel Corp; and Mark Schubin, technological consultant.

The day concluded with a panel discussion and demonstration entitled "Computer Motion Graphics Created on Personal Computers," moderated by David Leitner, president of Leitmotif Productions. Leitner is an award-winning filmmaker and author of *Somewhere Over the Rainbow: Treatise on New Technologies*

SMPTE Conference Vice-President Ed Hobson (left) and SMPTE Editorial Vice-President David George at the Wine and Cheese Party.

From left: General Arrangements Chairman Ray Blumenthal, Audio-Visual Chairman Dan Fuchs, and Auditor Ed Schuller enjoying the Wine and Cheese Party.



Session Chairman Mark Schubin (right) and Session Co-Chairman Neil Pilzer at the all-day tutorial, "Digital Imaging for Film and Television."

Hiroshi Tanimura and Larry Thorpe, both of Sony, enjoying the Wine and Cheese Party, which was sponsored by their company.

SMPTE President Irwin Young opening up the Press Briefing, as Executive Vice-President Stan Baron (center) and Conference Vice-President Ed Hobson look on.

Local Arrangements Chairman Ray Blumenthal (left) speaking with Luncheon/Welcome Reception Chairman Neil Pilzer, during the Wine and Cheese Party.

Left to right: General Arrangements Chairman Ray Blumenthal, Audio-Visual Chairman Dan Fuchs, and SMPTE PR Coordinator Carol King at the Wine and Cheese Party.

The Wine and Cheese Party took place at the unique American Craft Museum.

Applied to Cinema. While technical director of DuArt Film Laboratory, he was involved in the development of the first computer system to synchronize an NTSC VTR with a Rank Cintel telecine.

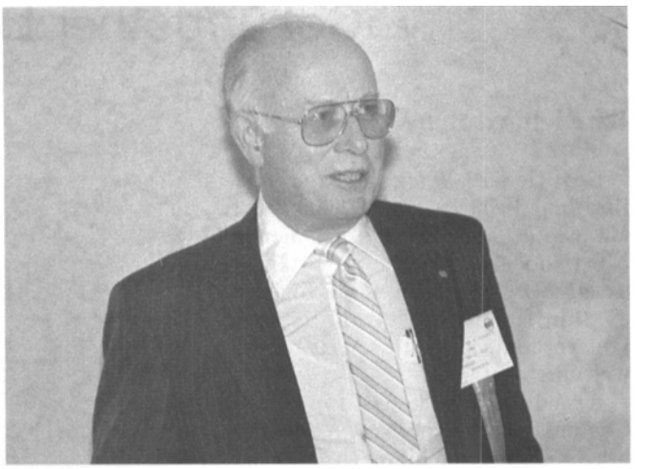
Session panelists were David Blair, whose current feature-length film *Wax, or the Discovery of Television Among the Bees*, incorporates extensive use of desktop motion graphics.; Brian Cirulnick, who creates video animation and computer motion graphics for Nickelodeon, the Sci-Fi Channel, and MTV; William Etra, who holds patents in 3-D TV and image storage, co-invented the Rutt/Etra Video Synthesizer, has consulted technically with Zoetrope, Lucasfilm, Warner/Atari, and Sun Microsystems among others, and has taught computer/video arts at leading universities; and John Spofford, an audio specialist for Harvard Industries, and the author of *TV Technology's* "Focus on Computer Graphics" column, which examines emerging graphics software, and hardware for Amiga, Macintosh, and IBM-compatible platforms.

Press Briefing

On Friday, February 5, the SMPTE held an informative press conference, which was attended by approximately 30 people.

SMPTE President Irwin Young opened the briefing with an outline of the conference's educational offerings; SMPTE Executive Vice-President Stan Baron discussed the Society's plans to co-host a workshop on digital terrestrial television broadcasting with the ITU-RCB, which is the successor to the CCIR, during the 135th SMPTE Technical Conference in Los Angeles; SMPTE Engineering Vice-President Ken Davies provided information on the SMPTE's new private area on CompuServe, the international computer information network; Conference Vice-President Ed Hobson outlined plans for the upcoming L.A. equipment exhibit; SMPTE Sections Vice-President John Carlson discussed the debut of the SMPTE Experts Seminars, which will begin this May with "Digital Motion Imaging — Putting it Together," an all-day tutorial that will be held in Los Angeles; and SMPTE Editorial Vice-President David George discussed the Society and its primary goal as an educator, as well as disclosed plans to have several specific areas be addressed by paper presentations during the 135th Technical Conference.

SMPTE Editorial Vice-President David George discussing the Society's educational role during the SMPTE Press Briefing.



SMPTE Engineering Vice-President Ken Davies making a presentation at the Press Briefing.

The conference's Coffee Club was sponsored by Quantel Corp.

Social Events

Get-Together Luncheon

The SMPTE Annual Get-Together Luncheon was held on Friday, February 5, at the Sheraton Hotel and Towers. Richard Brick, commissioner of the New York City Mayor's Office of Film, Theatre and Broadcasting, was the featured guest speaker.

Brick, who was appointed to his position on November 30, 1992, has an impressive background in the industry. He co-produced *Arizona Dream*, produced *Hangin' With the Homeboys*, and was production manager of Mike Nichol's *Silkwood* and Robert Benton's *Places in the Heart*. He is also the founder and advisory board chairman of the Geri Ashur Screenwriting Award, which is administered by the New York Foundation of the Arts. A full text of his presentation appears in this issue of the *Journal*.

Partners Program

The Partners Program was also held on Friday. The day began with a bus trip to the Guggenheim Museum for a one-hour "highlights" tour that included a special exhibit by conceptual artist Lothar Baumgartern, a view of the permanent collection, and a visit to the Frank Lloyd Wright Building, which included a presentation on the facility's restoration. Partners then journeyed to Busby's, where they were served an elegant luncheon.

Welcome Reception

The traditional Wine and Cheese Party was held Friday evening at the American Craft Museum at 40 W. 53rd St. Registrants and guests enjoyed a sumptuous buffet as well as a view of the museum's exhibits.

Sponsors

The SMPTE would like to thank the following organizations for their generous support of conference activities: Sony Corp., DuArt Film and Video, Panasonic Broadcast and Television Systems Co., and Quantel Corp.

In addition, the SMPTE expresses its gratitude to the following equipment sponsors: BTS, Hitachi Inc., Sony Corp., Symco Inc., Panasonic, and Vinten Broadcast.

—Carol King

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Get-Together Luncheon Address

By Richard Brick

I'm Richard Brick, and the very first thing I want to say to you is that I am aware that you have not met in New York since 1990. I don't know exactly *why* you haven't, but I take it as significant and symbolic that you've come back this year, and I welcome you.

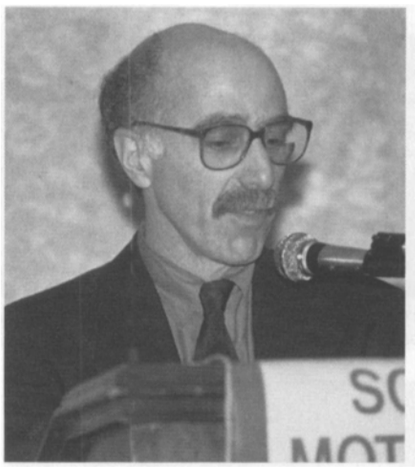
As you know, I was appointed Commissioner of the New York City Mayor's Office of Film, Theatre, and Broadcasting two months ago, and it is my mandate and my mission to revitalize these interdependent industries.

I personally feel a special affinity with the SMPTE. I myself began in 1970 as a sound recordist for film, originally as the sound man on the public television program "The 51st State" and later as part of a New York-based BBC freelance crew. I have worked as a feature-film boom operator, and in the mid-1970s was the sound department's representative to the executive board of NABET 15.

In fact, after I got my card in the Directors Guild of America as a production manager, I couldn't bring myself to sell my sound equipment. I remember it took me three years before I found satisfactory homes for my Nagra and my Scheops mikes.

I've never agreed with the artificial division between technicians and the so-called creative roles. When I started to teach at the graduate film school of Columbia University in 1984, the curriculum was comprised almost completely of writing courses. The previous chairman was a distinguished teacher of screenwriting and he had created a school in his own image. When I became chairman in 1988, I began to restore technical courses, seeking what I considered a more natural balance. Young screenwriters ought to study camera and sound and many took my nuts-and-bolts course, "Pre-Production of a Motion Picture." By the time I returned to producing in 1990, filmmaking was flourishing alongside screenwriting.

Richard Brick, Commission of the New York City Mayor's Office of Film, Theatre, and Broadcasting.



Guest Speaker Richard Brick, Commissioner of the New York City Mayor's Office of Film, Theatre, and Broadcasting.

Conference Vice-President Ed Hobson speaking at the Get-Together Luncheon.

A motion picture may begin as a screenplay, words on a page. But it is technology that brings it to life, allows it to be recorded, and to be enjoyed by millions of people for generations all over the world. Therefore, I really mean it when I say that you media engineers are a central, crucial, and vital part of this creative equation. Technology has always been important to the artist. And the working relationship between the artist and those who work in technology is becoming increasingly important.

New York is one of the greatest centers of creative talent in all areas of the arts. And so, obviously, it is essential for a center such as New York to also have the advanced technology to support these artists. Having both greatly enhances the attractiveness of New York as a center for feature films, commercials, and television production.

This is a time of significant change: not only in the development of the digital imaging technologies for film and television featured in your excellent conference, but also on the labor and economic side of the business. Today, the average cost of a studio feature film is in excess of $25 million. Just ten years ago, when I was the production manager of *Silkwood* and *Places in the Heart* in Texas, our budgets were just half of that — $12.5 million! Costs have increased dramatically, and everybody is concerned about controlling those costs.

Parenthetically, I have to tell you I really wish I could attend the technical sessions of your conference, not only to learn about digital imaging technologies, but to understand how these powerful tools might affect overall costs. I suspect that in many cases, these technologies are now, or are soon to be, highly cost-effective for the producer.

Another significant development, if I remember correctly, was at the very end of the 1980s. Theatrical ticket sales for feature films, for the first time, represented less than half of the income a movie would earn, as the income from ancillary markets collectively became the dominant half of the revenue picture. Then, in the fall of 1990, negotiations were successful in merging my old union, NABET 15, into the seven IATSE locals based in New York. This historic merger made New York a one-union town for film production for the first time since NABET 15 was founded in the mid-1960s.

Then, two years ago the feature-film industry was badly hurt here in New York as a result of a labor dispute between the Hollywood studios and the IATSE labor unions. There was an eight-month period of severe economic dislocation, primarily in the area of feature-film production, but the ripple effect certainly demonstrat-

Irwin Young making opening remarks at the Get-Together Luncheon.

ed conclusively how closely the health of the various industry segments are interrelated. Suppliers, labor, on-screen talent, media engineers — everybody was affected.

During the studios' eight-month boycott of New York, something interesting happened: In place of the $25 million studio picture, many smaller, independently financed pictures were made here under a new, flexible contract. The creation of the East Coast Council allowed the seven IATSE film locals to custom tailor, on a project-by-project basis, contracts based on the needs of the production and their members' willingness to defer some of their wages in exchange for a sweetener due when the picture passed a threshold of domestic gross income. Since then almost 30 film and television projects have been made under this progressive East Coast Council contract.

We are speaking about structural changes in the industries of television, feature, and commercial production. But this isn't just about structure: In 1990 these industries employed 75,000 people and contributed a highly significant $3 billion into the economy of the City of New York. And, by the way, the year-end statistics for calendar 1992 happily show a convincing upward swing in production of all kinds. Our recovery is clearly under way!

The development of IATSE's East Coast Council is the kind of innovation our office for Film, Theatre, and Broadcasting is committed to encourage and support. We are also committed to the development of state-of-the-art television studios. We will foster the development of HDTV and interactive technologies in New York. And we are taking a hard look at establishing a meaningful financial incentive plan.

Let me tell you a little about the operation of our office. When it was created in 1966 by Mayor John Lindsay, it was the first such office in the nation. Since then 200 other cities, counties, and states have created such offices. Yet the New York City office remains unique in many significant ways.

We provide one-stop service to the producer of feature, industrial, or commercial projects, whether originating on film or on videotape, as well as to television, music videos, and still-photography projects. Our office provides the single permit needed to work on the city streets, in our parks, and public places and in city-owned buildings. The permit allows for legal street parking of scouting and production vehicles. We offer expert advice on the whole spectrum of locations that make up this city. We also act as the liaison between the production company and the various city agencies and departments, as well as the owners of private real estate, cutting through red tape to make New York the most user-friendly large city in the country.

We love the challenge of special requests, whether it was closing a bridge to allow for the filming of a sequence of *Hudson Hawk* a few years ago, or the closing of various streets in the Times Square area for the Arnold Schwarzenegger film, *Last Action Hero*, a few weeks from now. Our office provides specialized police officers to every production, whenever there are traffic or safety concerns. And, the best part is that all these services are provided efficiently and without any charge to the producer.

In recognition of the importance of this industry activity, the administration of Mayor David Dinkins has entrusted me with a dramatically increased budget, more than doubling it, which allows me to increase my staff next week by 20% and, speaking of technology, to modernize our computer and telephone systems and to mount a new aggressive marketing campaign. I attended the Sundance Film Festival in Utah, America's preeminent gathering for the independent producer, in late January. And next week I am headed to the Berlin Film Festival where I will moderate a panel called "Shooting in New York," which will present the experiences of filmmakers ranging from Spike Lee and his producers making *Malcolm X*, to Nick Gomez and Bob Grosse making *The Laws of Gravity*.

And at the end of February and during the first week of March, I will pitch New York as the premiere urban landscape for production at Location Expo and at the American Film Market in Los Angeles. Later this year, I will attend the Cannes and Toronto Film Festivals.

The message is that the old, anti-New York mind-set is out of date and inaccurate. The cost differentials are no longer what they were three years ago. The economic playing field is not yet level, but we have made great progress. And, there is a new attitude in this city among labor, vendors, and suppliers: Everybody is prepared to make the deal, to make the picture happen.

Most recently this attitude, and a collective effort spearheaded by labor — the teamsters, Screen Actors Guild, and the IATSE craft unions — convinced MGM, the producer of Fred Schepisi's *Six Degrees of Separation*, to shoot their entire film in New York, where it belongs. This was highly significant because it broke the pattern of building the sets and shooting the interiors in Toronto and only the obligatory exteriors in New York.

We take our mission seriously and intend to work hard to build on this success and to restore all types of production to the preboycott levels.

Thank you.

Keynote Address

Brave New Images

By David George

Good morning, ladies and gentlemen, SMPTE members, and guests. Welcome to the 1993 Advanced Television and Electronic Imaging Conference of the Society of Motion Picture and Television Engineers. Welcome, also, to visitors to this much celebrated and exciting city. I'm sure you agree with me that it's nice for the SMPTE to be back in New York, even in February.

The theme of this conference is "Advanced Imaging for Film and Television," and the papers to be presented here, today and tomorrow, will, we trust, whet your appetite for even more information about the exciting advances taking place in the motion-picture and television arts and sciences.

The Papers Program Chairman for this conference is Dean Winkler, who will be speaking to you shortly, and he and his extensive committee, which includes Linda Young as the Tutorial Chairperson, along with the usual fine support from Headquarters staff, have put together an impressive program that I am sure you will find interesting. The conference was kicked off yesterday by the "Digital Imaging for Film and Television" tutorial, which was well attended, and today and tomorrow there will be sessions on the Implementation of Digital Systems, as well as on the Distribution, Acquisition, Manipulation, and Release of Digitally Based Imaging Information.

Local arrangements for this conference were organized by General Arrangements Chairman Ray Blumenthal. For the Partners Program, we thank Chairperson Diane Young, who we are led to believe enjoys an extremely close and understanding relationship with the Society's new president.

While we are now in New York, at this time of the year in several other cities, the SMPTE used to host

SMPTE Editorial Vice-President David George giving the keynote address.

the Annual Television Conference. For many years those interested in developments in television would come together at this conference to explore advances in just this field. But as television grew and matured, it also gave birth to other offspring. This conference is the Advanced Television and Electronic Imaging Conference. It now reflects the Society's interest in a wide range of motion imaging activities, including those that grew out of film and television technologies, and those that are just now contributing to them.

While this conference is about advanced imaging, what we are seeing in this industry is a range of brave new images — an explosion in imaging activities, anchored on one end by camcorders, computer imaging, and multimedia activities; extending through compressed video to what we have come to accept as our reference electronic image, that of conventional television, which was this conference's former focus, on to wide screen and other imaging improvements, and further on to advanced and high-definition television, motion-picture film, and advanced film imaging.

The SMPTE has long been concerned with interrelationships between imaging activities. Indeed, the need for interchangeability in the early days of film led to the formation of the Society. Now, however, scalability, extensibility, interoperability, and all the other abilities that simply contribute to the ability to utilize the same image as we move from one image size, generation, and format to another, in an increasingly digital domain, have taken on paramount importance in light of the wide range of digitally based image activities that are currently taking place.

Imaging can be seen as encompassing a continuum of technologies in which only some of the manifestations are electronic, and a continuum in which different media often complement each other, as well as compete with each other for resources and for attention, each providing a different viewing experience and each associated with a different set of benefits and costs (Fig.1). Imaging can also be seen as a complex continuum in which new challenges are always being met, new opportunities are always unfolding, and one in which the high-energy nature of the industry ensures that technologies are always leading edge and always changing. Being in the image industry together means that we are all no strangers to change!

This morning, in order to provide some sort of context in which the pieces might fit, I am going to touch on some of the nontechnical factors affecting this industry that are also going through a period of rapid change.

There are many types of background changes taking place within the North American imaging industry in these times. Several of them are structural and will have a profound effect on how the industry looks and feels when some of the revolutionary ideas and technologies that are now emerging have been absorbed into the system. I am going to touch on a few of these issues in a moment, and I am even going to suggest some of the potential longer term ramifications if

David George, SMPTE Editorial Vice-President, is with Imagineering Ltd., Willowdale, Ont., Canada M2H 1R4.

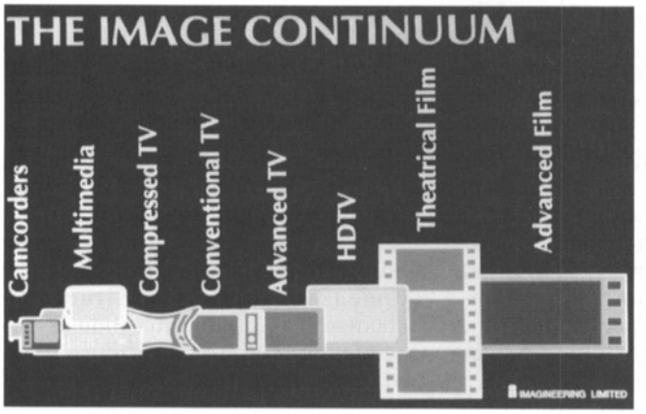


Figure 1.

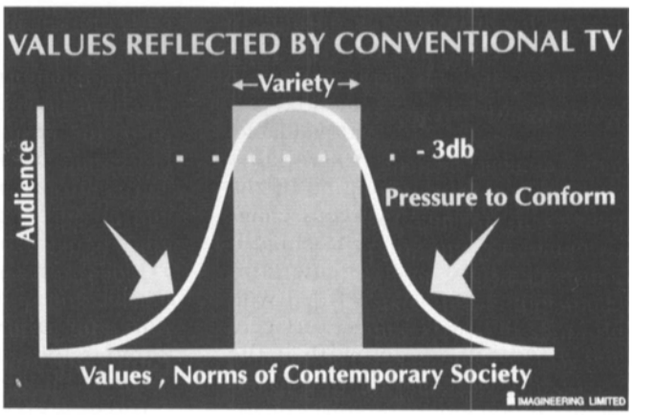


Figure 2.

those trends continue, both in this industry and in larger world terms.

While these are going on in the background, however, we know that some of the changes that will affect the outcome continue to be extensions of what are now established patterns and notions, like those of continually reducing technical costs and constantly increasing technical quality.

There is also the continued notion of technological convergence. If there was a common convergence point in today's view of electronic technology, it would be digital. But other convergences are also taking place.

There is continued convergence in the television, film, and computer industries, which we will spend considerable time exploring at this conference, involving film and television origination, manipulation, distribution, and release, along with computers and digital processing.

And recently, at the other end of the continuum, we have been combining images, text, and sound for multimedia applications.

But, some of the technologies seem to be converging at such a speed that certain elements threaten to accelerate right through the converged state and out the other side. In television, for example, we have forces promoting advanced and much improved television and attempting to develop a market for that approach; while, at the same time, other forces relentlessly pursue the savings promised by digital video compression, accepting some degradation in quality as a consequence.

Those forces argue that, from a home viewers' point of view, the de facto standard in North America for television home display has now become that of VHS home movies, which generate few complaints relative to picture quality.

Quite the opposite of ATV, this infers a minimalist technical standard back through the production chain for mass-entertainment offerings. And lower quality means less cost, and less cost equates to more services, which fuels the motor in our society, which favors quantity over quality, and leads to more individual choice in our lives.

Continuing with television, years ago one or two channels of television service, especially in Europe, would have provided a wide variety of programming to their audiences; but, in the sense that we could only choose from a limited number of offerings at any particular time, they would have offered little choice. In North America many more choices were soon offered, so that at any given time we could watch any one of several different television programs.

However, there was less variety because each of the several services offering alternative programming was tailoring that programming to attract the largest possible portion of the same audience.

Now, the proliferation of program channels that we have seen, and are seeing through cable and other means, and which will be added to by direct broadcast satellite when it arrives, and further exacerbated by digital video compression on cable, will mean much more choice and will accelerate the change from horizontal, or any variety in programming at all, in a single channel, to vertical programming where many more channels each contain more and more of just the same program fare. It will also expedite the ongoing change from program selection by media professionals for mass distribution, which is essentially broadcasting, to program selection by the viewers themselves.

These forces may eventually turn distribution into a common carrier, commodity-like activity and could make television broadcasting as we know it, obsolete.

At the same time these new services are being introduced, there is likely to be less justification for regulation because the spectrum scarcity argument, which assumed that spectrum was a limited and publicly owned resource, and which legitimized regulation in the first place, is harder to apply to additional spectrum capacity that is developed on cable, on fiber, or multiplied through the use of compression techniques where there is no public resource involved.

This suggests that we can expect a less orderly marketplace, less regulation, and less reason to protect existing systems or discourage or disallow nontraditional distribution technologies as they are developed and become available.

As a result, distribution methods will become least-cost oriented and confused.

Distribution is also a factor in a programming revenue sense. The distribution of revenues received by advertising, subscription, pay-per-view, or whatever means, from the exhibition of much more programming is likely to be greater than before, simply because there is more

programming. But more programs means more fragmentation and smaller audiences for each one, though each audience would be better defined, and thus more valuable, on a per-viewer basis. Essentially, while the economic engine of the entertainment industry keeps chugging along, it gets to pull behind it many more and smaller entertainment vehicles, each less filled with revenues for that particular service.

This notion carries with it the ominous longer term threat of less quality productions and lower quality programming, from a production point of view, not on one or on several of the system's channels, but on all of them.

As we can see (Fig. 2) in the television portion of the motion imaging industry, structural changes are happening along several dimensions. They affect not only our industry, but our community as well. In social terms, film and television play a central role in our society. One can argue about whether a program is better or worse, or if television itself is good or bad, but there is little argument about the importance of the medium to our community.

The economic size of the entertainment industry, and the fact that an average North American spends almost as many hours per week viewing television as actually working, demonstrates the important role it plays in our lives. The latest numbers I have are 26 hours and 23 minutes for American males and 22 hours and 16 minutes for Canadians. For women both numbers are higher.

During most of that time television can be seen as a mirror, reflecting contemporary life and the norms and values of the people in the community it serves. As a mass medium, television is aimed at serving the greatest audiences and the largest audiences are aggregated around the center of values and norms of our extended community, which at about 3-decibels down also establishes the range of popular variety. Popular television shows reflect popular societal values.

But television also provides a shared experience. While we are not necessarily physically together in small groups watching a particular program, we are aggregated over larger populations by watching the same program. As such, many people in our own communities have the same experience, and this shared experience is important in maintaining a sense of our own community and of our own relationship to it.

With a proliferation of separate services, however, we would move from the concept of a shared experience to an individual one, in watching television, and we would find that we had less in common with each other to share or to talk about (Fig. 3). We might also find that the reinforcement that television provides as to the social principles of the majority is also missing, and this raises a number of important questions. What happens to society if watching television becomes an individual and isolated experience much like working on your own PC? What forum would then provide feedback to society regarding the norms and values of the majority?

In a world where viewers graze across wide fields of narrowly focused program offerings, how would television then contribute to the maintenance of the social fabric of our society? And what would take its place?

Social and economic forces go hand in hand, and yet another dimension relating to structural change in the television industry is economic. Far from the glory days of television, a harried North American television network executive has lately found herself or himself caught up in the many changes taking place in their industry, facing higher administrative and programming costs, addressing smaller mass audiences, watching advertising dollars diverted to promotional activities and, even when successful, still seeing revenues flatten or erode.

One of the few bright lights on his or her horizon, and one of the more important factors in our own lives, is the continual reduction in technical costs the industry is enjoying. While all other broadcasting costs are rising, technical costs, as I indicated earlier, are continuing to come down and this has had a direct impact on the engineering end of the industry, and on many of our members, particularly here in New York (Fig. 4).

The reductions in technical costs are brought about by several factors. There is much improved reliability, longer life, and more stable, automatic operation in today's hardware than in yesterday's; and equipment is much less expensive. In simple terms, I have heard it expressed that

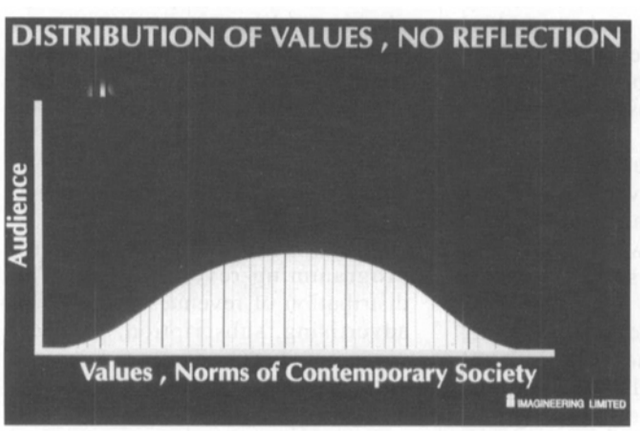


Figure 3.

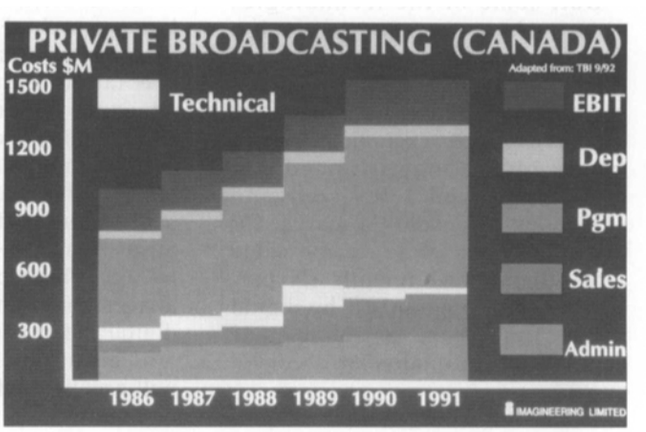


Figure 4.

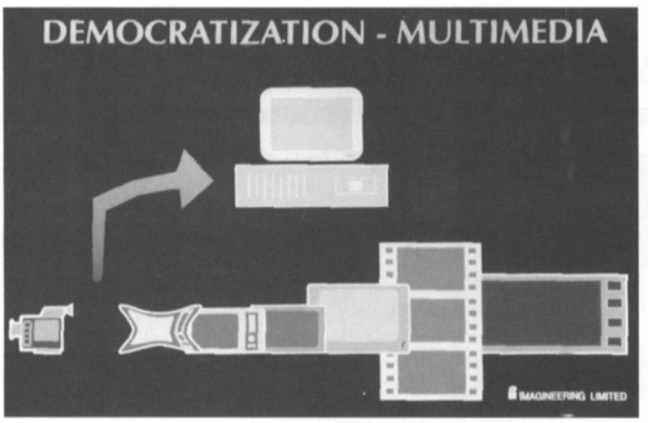


Figure 5.

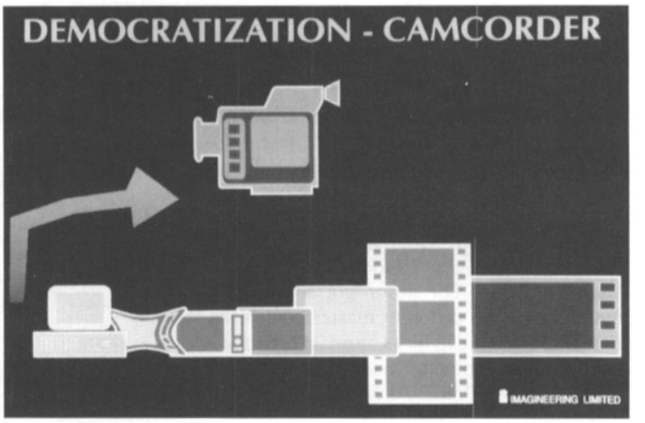


Figure 6.

we have moved from a period when an operator made $10,000 a year to operate a piece of equipment worth $100,000 to a time when a $10,000 machine is operated by a $100,000-a-year operator. While that may be overly simplistic, a significant and fairly sudden change in operating philosophy, which has manifested itself in a diminishing role for engineering persons in broadcasting operations in particular, flows from this kind of shift.

Technical expertise should not be sold too short, however, because the accelerated rate of change I have been speaking about brings with it the need to accommodate change in system designs that minimize substantial ongoing operational costs. And, thanks to technology, the art of the technically feasible is also changing.

That, then, leads us to the final, and maybe the most important, structural change now taking place that I will mention this morning. The democratization of video could have the kind of impact on our society that Gutenberg and the printing press had on books and on the dissemination of the knowledge of the world they then contained. On the one hand we have multimedia, a new medium with new promise for computer aided instruction, for operational support and for education (Fig. 5).

Multimedia also brings new power to computer-based entertainment, including interactive activities, games, and possibly even interactive drama. Holding the key to virtual reality, multimedia combines video, audio, images, and text in new ways and it is introducing motion imaging to new people, and through those new people developing new ideas.

As we heard from our last year's convention focusing on this area, the expectation is that multimedia will revitalize our industry at that end of the image continuum and the reverberations will be felt right up to the other end.

The other component of the democratization revolution is the camcorder, which takes message making out of the exclusive domain of the professional and distributes it to amateurs (Fig. 6). A forceful example of the power of new communications tools in new hands is the Rodney King footage and the social upheaval that followed it.

Camcorders have brought us low-cost drama from new artists and given us new ways to look at ourselves. And they are leading the look of documentary television to become less polished and more biting and effective.

The camcorder has taken the video magic away from the professionals and out of the realm of high costs and inaccessibility. It has given the video tool to the people who, at that edge of the image continuum, will find new ways to communicate using it and, in so doing, possibly provide some social input that we may otherwise lose.

So, in the 1990s, we are immersed, with apologies to Aldous Huxley, in an age of "Brave New Images." And was another visionary, George Orwell, ten years too early when he characterized the use of television in his novel, *1984*? Did he get it backwards in predicting that technology would have Big Brother watching us, instead of us watching Big Brother? If nothing else, his book teaches me not to be too smug about my own predictions about television and its future.

There is no doubt, however, that in the 1990s we are approaching a crossroads, where everything seems to be coming together, possibly just to blow apart again because of the variety of alternatives the new technologies support. And this does raise many questions for the imaging community.

Will the images made by the PC artist be of a different and isolated nature from the images that artists make in other media? Will we each be able to share the thoughts, ideas, and emotions of each other and contribute to our society using these new technologies and techniques? Will we be able to communicate technically and artistically along this image continuum or will we, sadly, develop a hierarchy of images, image makers, and ideas?

People like you and I must ensure that the free flow of ideas remains possible through the sharing and advancement of our knowledge and the establishment of information frameworks that encompass, not ignore, the sons and daughters of existing technologies and existing structures. These sibling technologies, just like the advanced ones that will be discussed at this conference, represent a facet of our future. A glimpse at other facets will be possible here, at this conference, over the next two days as our speakers help us gain further insights into advanced television and electronic imaging for this decade.

Thank you.