THE NIGHT OF THE NAB '96 OPEN STUDIO ROUNDTABLE

BY CHRIS ALLAIN

It takes an event such as the annual NAB conference to provide the impetus for so many like-minded people to gather in one place at one time. Such an occasion presents an excellent opportunity for any number of special-interest groups to assemble, and assemble they do. One group in particular—the Open Studio Roundtable—got together for the fourth time in as many years at NAB on the evening of Tuesday, April 16.

This Roundtable, gathered to promote standards and cooperation among the developers and users of digital production media, began as an informal discussion among a small group of QuickTime users and developers. It has since grown in size and scope, and if you're a frequent VIDEOGRAPHY reader you know it's sponsored not only by this magazine, but also by a list of companies at the very core of the kind of industry changes reflected in the event. Co-sponsors include Adobe Systems, Apple Computer, Macromedia, Matrox, Microsoft, Promax Technology, Scitex Digital Video, and Silicon Graphics' Silicon Studio.

The Roundtable has become an event not to be missed, with a turnout that increases each time it meets. (Its next get-together is in August, during SIGGRAPH '96.) This article is a combination of reporting, research, and advocacy of topics discussed at the Roundtable.

Although a Macintosh- and QuickTime- centric crowd has previously characterized the Roundtable, its agenda—to improve the media production tools we use—has progressed, with Roundtable organizers making a conscious decision to broaden the event's focus to include all platforms. To highlight this broadened mission, its name was changed from last years' designation, the Digital Video Rountable.

The mission of the Open Studio Roundtable is to improve the media production tools we use and to promote cross-platform standards as teleproduction evolves from digital islands, towards networked media work groups. (See "Digital Islands" The User Interface, 5/96). We believe production solutions for all platforms will become increasingly connected, and that it's in our common interest to promote standards—open studio standards, that is. If we can avoid the reinvention of the wheel, we'll progress further as an industry.

At last year's SIGGRAPH, in Los Angeles, we began to solicit the participation of the "Wintel" (Windows/Intel) and SGI media-tool builders and users. We realized some success, as we heard from proponents of Open DML, but at NAB '96 things truly opened up. This time, we actually discussed Open DML and SGI related issues in some depth. Attendance at the NAB '96 Roundtable was approximately 200 participants.

One might have felt a bit of animus between the QuickTime and WinTel crowds, but the SGI folks were remarkably warm to QuickTime. SGI has licensed this Apple media technology, and, based on the attitudes of those who spoke at the Roundtable, the alliance is exciting many of our UNIX brethren.

The role of providing a QuickTime discussion group has, to some extent, been picked up by Apple with a meeting it calls the QuickTime Open Technology Forum. Although Apple stresses that QuickTime is a

VIDEOGRAPHY's standing room only Open Studio Roundtable at this year's NAB provided a forum for frank discussion on a number of important topics.

multi-platform technology, for now their meeting focuses primarily on QuickTime for Mac-related issues.

Hopefully, backers of all platforms will see the benefits of this effort. We can continue to progress and compete without developing exclusive, proprietary, incompatible solutions. To achieve maximum progress, we should borrow, license, adapt and standardize. Don't we all want the best possible tools we can produce? This is what open systems and the Open Studio Roundtable are all about. Admittedly many, in this group at least, have a bias toward QuickTime. Perhaps, if the Wintel proponents looked more closely at what QuickTime has to offer, they'd understand why.

By the same token, Macintosh users should remember that Wintel totally dominates most markets, if not our own, and clearly has much to offer as well. Mac users and developers can realize tremendous benefits from tapping into a market of that scale. They would love to have the option of tapping powerful video boards, such as those offered by Matrox, for their Macs—were they compatible. Look at the cost-performance advantages already brought by the PCI bus standard

In the past, we've tried to identify problems and propose solutions for a tiny subset of the video production community, the so-called desktop video people. It doesn't seem overreaching to say that we are now proposing solutions and standards for the future of the entire teleproduction industry.

What do we see as the future of the industry? We see networked production workgroups sharing on-line media resources with multiple users to build a broad range of media content.

Who can deny the rapidly approaching transformation with such evidence as the Sphere family of editing products introduced by Scitex Digital Video, a company formed after the digital pre-press leader acquired Abekas and ImMix. Scitex has built the Sphere product line around an Appleshare Media Server. Lest you think that the Sphere represents under-powered desktop video, consider that the top-of-the-line model, the Stratasphere, provides dual video streams with full-motion alpha channels. Scitex offers DveousFX as an option, bringing the power of the Abekas DVE inside the workstation.

Many would probably agree that Scitex has lived up to its pre-NAB ads, which promised "Cool Things. Very Cool Things." And it seems undeniable that their approach represents the future of our industry.

Contributing Editors Chris Allain (top) and Craig Birkmaier jointly organized the Roundtable, which was a lively, interactive discussion.

QuickTime Version 2.5

At the first full-fledged Roundtable, held during NAB '94, attendees expressed a need for portability of compressed video. We proposed the idea of an M-JPEG software codec, and we've discussed the issue at each meeting since.

Proprietary digital video compression cards limit the use of video clips on systems that do not contain the hardware codec. We asked vendors to supply a software codec that would allow users to share media files with systems not equipped with the hardware codec. Although some vendors have developed these products, others have not, and sharing files remains problematic.

At NAB '96 Apple announced that QuickTime 2.5, due in June, would allow video professionals to work with M-JPEG files, regardless of the hardware solution originally used to capture the media. Through a QuickTime Open Forum working group, Apple and leading digital video solution vendors including Adobe Systems, Avid Technology, Data Translation, Radius, Truevision, and others— have agreed to a fully interchangeable M-JPEG file format. QuickTime 2.5 will support this new format and include a software-interchangeable M-JPEG codec allowing users to view and process M-JPEG compressed files on any Macintosh with no additional hardware required.

The Apple solution will support two M-JPEG formats, M-JPEG A and B. The M-JPEG chip makers fall into two major categories, those that are ISO-JPEG compliant and those that are not. The Apple standard will support both. The Open DML standard will only support the ISO-compliant chip sets.

Apple has addressed the problem with a fundamental solution that benefits all users. Although a software-only solution may not allow you to view files in real time, it opens up a world of possibilities for media work groups needing to share files. Along with viewing and editing files, this technology facilitates network solutions such as servers and "render farms."

The new QuickTime version will use Apple's QuickDraw 3D engine for rendering 3D objects in real time within a QuickTime movie. Workstation-class 3D objects become another QuickTime media type that users can composite and animate in sync with other media types such as video, audio, and music.

Apple also announced that the

new version of QuickTime would support multiprocessing hardware such as the Genesis MP from DayStar Digital. At the QuickTime Open Forum meeting held during NAB, Apple demonstrated various QuickTime functions accelerated through multiprocessors. The performance gains were dramatic. Hopefully, we'll soon see support in a broad range of applications.

Active Movie and The Open DML Partners

Organizers seeking to broaden the focus of the meeting were pleased to see the participation of several Windows product developers including Microsoft and Matrox, two of the most important players. In the February issue of Videography, Matrox's Alain Legault and Janet Matey reported on the development of Active Movie, then called Quartz. They presented the details of what sounded like a solid approach to their problems. The enabling technology they described included standards in several areas including an M-JPEG codec, audio file format, controls for digital video and audio effects, 422 serial VTR Control, and others. Vendors showed a variety of products at NAB '96 running under Windows NT that supported the M-JPEG file format

To those who waited patiently for years while QuickTime took shape, it sounds very familiar. Certain comments in the article describes the shortcomings of QuickTime as though they were insurmountable. Although some of the criticisms are legitimate, Apple has repeatedly demonstrated QuickTime's extensibility. They understand, for instance, the problems with media synchronization, and you can expect improvements.

The more likely scenario leading to the Microsoft and Matrox reinvention of QuickTime was that they felt they needed to own the technology to control it and to count on it. They could legitimately make that case. A developer can also find advantages in starting with a nearly clean slate. But it's inaccurate to imply that QuickTime is simply not up to the task. Microsoft, Matrox, and their partners face a formidable job. Ask the QuickTime team. Several years into a shipping standard, they have already fought many of these battles.

Many believe that QuickTime's extensibility represents its greatest advantage. The Microsoft and Matrox solutions simplify many problems by imposing what some might consider rigid standards. Standards are valuable, but extensible standards are more valuable. Clearly strict adherence to interlaced displays with rectangular pixels, for instance, simplifies the jobs of software and hardware developers trying to build tools for video production. But, what happens to users looking to produce content for other applications like 30 fps, square pixel, progressive scan displays?

QuickTime handles these variables nimbly. If we know anything about the future of media, we know that new formats such as CD and Internet delivery systems will take many shapes other than ITU-R 601 video.

Perhaps those at Microsoft standardizing on the 601 specification don't realize that their company is a member of the Computer Industry Coalition on Advanced Television Service, a group that recommended to the FCC that all ATV formats use progressive scanning and square pixels. (see "The Sharper Image," 2/96)

Specific Open DML points that came up at the Roundtable included the Open DML partners' abandoning efforts to develop a digital effects description standard, and the issue of audio synchronization. It was also mentioned that

the Open DML standard for M-JPEG accommodates only ISO-compliant M-JPEG. This excludes a large percentage of the compression chip sets built today. Note that Apple has accommodated both forms in its interchangeable M-JPEG file format.

An Effects Description Standard

Another perennial topic at the Roundtable—the issue of standardizing descriptions of the parameters of digital effects—provoked a spirited dialog. The Matrox representative and other open DML folks said that they had tried to develop one, but no reasonable standard had emerged. The Open DML partners seemed to believe that they would reach no consensus regarding an approach.

Others at the roundtable believe that developers can create a standard for describing effects if they abandon the approach of traditional broadcast equipment manufacturer. Clearly, a standard that named specific effects and defined parameters for them could not easily accommodate innovation or the independence of developers. For success, an effects-description standard would have to virtualize the entire process. This approach requires that the standard's designers consider the issue more broadly. The resulting standard would provide a file format for effects description, perhaps a digital effects-description language. Interesting: the acronym could be D-EDL. (D-EDL italicized)

Apple's QuickDraw 3D and 3D Metafile format (3DMF) demonstrate the approach. These technologies now deal with many of the issues involved in the description of effects. Apple QuickTime team members at the Roundtable alluded to the fact that they were making progress on the issue. Later in the week Apple showed off some of the technology at the QuickTime Open Forum, a meeting they hosted for QuickTime users and developers. Apple engineers demonstrated the real-time mapping of QuickTime video onto a moving 3D object. QuickDraw 3D was animating the object and rendering it in real time. It delivered a resolution and frame rate lower than what we usually required for broadcast, but a stock Power Macintosh performed the effect.

This approach, putting a control layer between the interface and the effects processors, allows the most flexible open-systems approach. Effects processors and controlling software would declare their presence to the intermediate layer and could work together, even though they had not directly supported one others' products.

Adherence to this principle has made QuickTime a remarkably robust and open standard. Apple has made QuickTime available on multiple platforms, and it continues to gain momentum. SGI, Netscape, and IBM are currently licensing QuickTime.

Randy Ubillos, of Macromedia, once again served as moderator *par excellence* of the Roundtable.

DV And Other New Formats

The DV format is becoming more relevant to users of digital video workstations due to the broad base of support it is getting from traditional video manufacturers. And, with the announcement that Truevision will build a DV codec version of the Targa 2000, the prospect of shooting, editing, and distributing in a DV format is looking very real. The DV system records 4:1:1 component digital video at a 5:1 compression ratio.

Let's begin by reducing the format confusion. DV is a compression codec and a consumer recording format that uses that codec. DVCPRO is Panasonic's professional tape format; it uses the DV codec too. DVCam is Sony's "industrial" version of the format. Industrial is Sony speak "for not good enough for broadcasters." Consumer DV uses a 10 micron track width. DVCam uses a 15 micron track width. DVCPRO uses an 18 micron track width see (DV Compatibility," Editor's Corner 5/96).

Panasonic states that DVCPRO will play back all three. Sony wasn't saying at NAB. The DVCPRO format uses metal particle cassettes with no memory chips, while DV and DV Cam use the more expensive metal evaporated cassettes with memory chips. The memory chips allow storage of scene locations, but Panasonic used the cheaper cassettes with no memory chips because they wanted to keep media cost down for broadcasters. But then Panasonic changed a $4,000 format into a $20,000 format because they found that DVCPRO's larger track width was needed to stand up to the rigors of professional editing. Is Sony's industrial DVCam three microns less hardy?

Bear all of this in mind when you hear that the Roundtable crowd groaned when someone mentioned the Betacam SX format. Who knows if it happened because of a disapproval of MPEG compression, used in Betacam SX, or general exasperation at the proliferation of incompatible tape formats. We've probably heard enough whining about the tape format wars, but can't one at least hope for a truce?

Other discussions covered the compatibility of DV formats at the bit stream level. All of these formats read and write the same bit stream to tape. DVCPRO writes 41.85 Mb/sec of data to tape, including video, error correction, and audio, and the video rate is only 24.948 Mb/sec. Audio adds about five Mb/sec to that. A FireWire (IEEE 1394) digital copy of a DV tape to one of the other formats would be a clone. That FireWire link would carry approximately 30 Mb/sec with audio and video. The transfer would not include the error-correction data.

Someone also reported that, due to fear of piracy, the motion-picture industry was blocking consumer DV recorders, and allowing only the distribution of camcorders. Could it be that, once again, the wishes of the few are outweighing the wishes of the many?

The Timing of Digital Audio to Video in DTV

Let's call this the Chris Meyer Digital Audio synchronization issue. Chris and Trish Meyer are long-time fixtures of the desktop digital video and audio scene. Chris works for Roland Audio Development as Technical Research Manager. He also works with Trish at CyberMotion, where they produce animation and digital media. For some time now, Chris has been a lone voice in trying to bring the DTV industry to grips with its mishandling of the timing of digital audio to video. In E-mail following the Roundtable, I asked Chris for his thoughts on the subject. In response he practically wrote this section of the article.

The problem is that 44.1kHz audio cannot be synchronized to 29.97 fps video without calculating the rate of samples per frame out to several decimal places. The audio sample rate of 48kHz synchronizes more easily, but is still a bit tricky. In 1994 SMPTE published a document to standardize the timing of digital audio, SMPTE 272M-1994. The same prescription for dealing with the problem is explained in AES Recommended Practice AES11-1991 (ANSI S4.44-1991.)

For NTSC, 48kHz is packed with 8,008 samples per five frames, 44.1kHz is packed with 147,147 samples per 100 frames, and 32kHz is packed with 16,016 samples per 15 frames.

SMPTE Document 272M, section 3.15 (synchronous audio) states:

"Audio is defined as being clock synchronous with video if the sampling rate of audio is such that the number of audio samples occurring within an integer number of video frames is itself a constant integer number, as in the following examples:

Sample Ratev	Samples/Frame, 29.97 FPS VIDEO	Samples/Frame, 25 FPS VIDEO
48.0kHz	8008/5	1920/1
44.1kHz	147147/100	1764/1
32.0kHz	16016/15	1280/1

NOTE—the video and audio clocks must be derived from the same source since simple frequency synchronization could eventually result in a missing or extra sample within the audio frame sequence.

We would need more detail than this to fully explain the issue. But make no mistake, vendors' lack of compliance with the standard creates problems. Most DTV vendors have found their own, non-standard, solutions. Others seem to have virtually ignored the issue. And, because most vendors won't say publicly what they are doing, users can't even develop good workarounds.

Two recommendations seem appropriate: Comply with the SMPTE 272M standard and begin the migration to 48kHz audio. Comply with SMPTE for the obvious reasons, and begin moving to the 48kHz sample rate because it synchronizes much more easily with NTSC video and it provides compatibility with the digital audio portion of digital video recording formats. This last point becomes increasingly important as digital tape formats such as DV and its derivatives proliferate. How, for instance, will the DV codec version of the Truevision Targa 2000 RTX deal with audio synchronization? For many of these companies, an improvement in audio synchronization may require new hardware. Although hardware changes will take time, digital audio hardware and software developers should publish the details of how their products deal with the issue.

Oh, and while we're at it, let's also get those ATV folks to give us true 30 fps video. Perhaps then we won't have so many of these problems in the future! I wonder if they'd come to future Roundtables?

Matrox says that Open DML, which calls for 48kHz sampling, synchronizes audio according to SMPTE specification.

Resolution and Field Dominance

One of the most enduring discussion topics at all the Roundtables has been resolution. Commonly used resolutions include 720 x 486, 648 x 486, and 640 x 480. The first results in rectangular pixels, and the latter two result in square pixels. (For background on the issue see: The Digital Video Roundtable," 5/95 and "A Night at the Digital Video Roundtable," 5/94.)

The issue has settled down for many of us. We have a solution: Adobe After Effects. This program deals so elegantly with the problem that it rarely becomes an issue. But there are still some thorny situations that occur when moving between the various resolutions.

The Meyers describe a problem they deal with in their work at CyberMotion regarding field ordering when importing an image with 486 vertical lines into a 480-line system. To determine the number of lines that they must crop off, they have to determine their relative field order. If the source and destination have the same field order, upper field first for instance, they trim an even number of lines to maintain the field order. If the 486-line image has the lower field first, as most Abekas transfers do, and the 480 destination has the upper field first, as most desktop JPEG cards do, they trim an odd number of lines off the top. This, in essence, reverses the field order of the source.

They have asked for a standardized tag in all QuickTime movies that notes the field order. With this information, software could make an intelligent guess at how to crop, or at least provide users with the information so that they can make the decision.

Asset Management

Those focused on the vision of the networked digital media work group see asset management as one of the next major milestones. Dawn Danaher, of SGI's Software Manager for Silicon Studio, spoke about digital assets, their attributes, and the subsystems and applications that store and retrieve them. Content assets can include a script, a movie, a soundtrack, a frame, or a contract. (see: "What is a Digital Assest?" 5/96). In her work at SGI, Danaher has studied the problem extensively.

WEB SITES OF INTEREST

Roundtable participants suggested these Web sites as valuable locations to keep vital discussions going:

- Charles A. Poynton: **http://www.inforamp.net/≈poynton/**
- QuickDraw 3D home page: **http://www.info.apple.com/qd3d**
- SMPTE: **http://www.smpte.org/**

We must consider several factors when looking for solutions to the management of these assets. Work groups need to share assets, but how do you tell who is using a file? Who owns it? Who can change it? An asset-management system attempts to provide solutions to these problems.

At its booth, Apple was showing the Cinebase asset-management software for Macs. Cinebase developed their software originally for SGI computers, and major studios and facilities nationwide are using it. (see "Digital Islands,"5/96). Cinebase will offer Mac OS client version soon and a server version will follow. SGI, Apple, and others are collaborating on a project called Studio Central in which QuickTime media architecture will provide asset management resources for SGI, Mac, and PC computers.

Technologies such as QuickTime's interchangeable coded architecture helps to open up access to media assets encoded with M-JPEG as well as DV and Betacam SX. Text tag information in compressed video files and in DV format recordings will help to build the databases of asset attributes. As facilities install fast networks and servers, we're sure to hear much more on this subject.

Thanks to...

Several people deserve thanks for their help with the Roundtable and this report. Chris Meyer helped by generating several lengthy pieces of E-mail dealing with audio synchronization He even researched a couple of points, (in back issues of VIDEOGRAPHY, of course). Without his help, I'd have had trouble pulling together the facts. Chris and Trish also took the time to explain the field-dominance problem they are experiencing.

Contributing Editor Craig Birkmaier helped with both. He and I worked together to organize and stage the Roundtable. His extraordinary mastery of these topics and passion for his work has heavily influenced the Roundtable's agenda and this article.

Thanks to Letrosonic for loaning us one of their great wireless microphones; Birkmaier's white hair made him the perfect digital Phil Donahue.

The Roundtable advisory committee included: Chris Allain of Vidox Image and Data; Steve Banfield of Microsoft; Craig Birkmaier of PCUBE LABS; Allen Brown of Cinebase Software; Joyce Chung of Adobe Systems; Dawn Danaher of Silicon Graphics; Alain Legault of Matrox; Michael Piper of Scitex Digital Video; Tim Schaaff of Apple Computer; and Randy Ubillos of Macromedia.

Thanks to Adobe, who arranged for the Roundtable's venue, to the OSR Advisory committee for their willingness to help direct the event, to all the sponsors who are willing to get behind the work, and most of all to the participants: Without the enthusiasm they contribute, we would accomplish very little indeed!

Next stop: SIGGRAPH '96 in New Orleans! But bring some blue jeans because you can't eat crawfish in a suit. □