# DVD '99 WORKSHOP

## Standards, Applications, and Technology

**November 30 - December 1, 1999**
**Gaithersburg, MD**

NIST

DVD '99 WORKSHOP

OSTA

NISO

**Sponsored by:**

U.S. Department of Commerce
Technology Administration
National Institute of Standards and Technology (NIST)
Information Technology Laboratory (ITL)

Optical Storage Technology Association (OSTA)

National Information Standards Organization (NISO)

www.nist.gov/dvd99

# DVD '99: Standards, Applications and Technology

Green Auditorium
National Institute of Standards and Technology
Gaithersburg, MD
November 30 - December 1, 1999 (Tuesday & Wednesday)

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## PRELIMINARY AGENDA (subject to change):

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TUESDAY, NOVEMBER 30th

Morning Session

Overview and International Efforts

| | | |
|---|---|---|
| 08:45 - 09:00 | **Dr. Victor McCrary**<br>*Group Leader Information Storage and Integrated Systems Group, NIST* | **Welcome to DVD '99 - The Challenge for the Industry** |
| 09:00 - 09:30 | **Koji Hase**<br>*Vice President, DVD Planning Toshiba* | **DVD: An Update Report from the DVD Forum** |
| 09:30 - 10:00 | **Jim Taylor**<br>*Author, "DVD Demystified"* | **DVD-Video for the Industrial and Education Markets** |
| 10:00 - 10:30 | **Sandra M. Benedetto**<br>*Director of Product Development, Pioneer New Media* | **Introduction to DVD Technology** |
| 10:30 - 11:00 | Break | |
| 11:00 - 11:30 | **Graham Sharpless**<br>*General Manager, Special Products Disctronics UK* | **DVD Production in Europe** |
| 11:30 - 12:00 | **John Barker**<br>*Editor-at-large, Inside Multimedia* | **The Role of Europe in the Deregionalisation of DVD** |
| 12:00 - 12:30 | **Brand Niemann**<br>*Environmental Protection Agency* | **Closely-coupled Web-connected DVD's** |
| 12:30 - 1:00 | **Tony Jasionowski**<br>*Director of DVD Technology, Panasonic DVD Office* | **DVD-RAM...Stargate to the Future** |

| | | |
|---|---|---|
| 1:00 - 2:00 | LUNCH | |
| | Afternoon Session - Applications and Writable Media | |
| 2:00 - 2:30 | **Mark Ely**<br>*Director of Product Marketing, Sonic Solutions* | **Next Generation DVD Tools and Technology** |
| 2:30 - 3:00 | **Monsong Chen**<br>*President, Infovalue Computing* | **DVD Streaming Over Broadband Networks** |
| 3:00 - 3:30 | **Ralph Labarge**<br>*Managing Partner, Alpha DVD LLC* | **Adding Internet Features to DVD Titles** |
| 3:30 - 4:00 | Break | |
| 4:00 - 4:30 | **Bob Zollo**<br>*President, Software Architects* | **Disk Interchange for Re-Writable DVD - Myth or Reality?** |
| 4:30 - 5:00 | **Tom Held**<br>*President, Thomas H. Held Associates* | **DVD-ROM Design to Delivery - A Case Study "What Now Lieutenant?"** |
| 7:00 pm - 10:00 | **Evening Reception and Exhibits,** at the Gaithersburg Holiday Inn<br>For those interested in exhibiting their products or services, please visit the NISO website for DVD'99 or contact Pat Harris at the National Information Standards Organization (NISO) at 301-654-2512. | |

WEDNESDAY, DECEMBER 1

Morning Session

| | | |
|---|---|---|
| 09:00 - 09:30 | **Paul Bader**<br>*President, Multimedia 2000* | **DVD-ROM Distribution: Lessons Learned** |
| 9:30 - 10:00 | **Bernie Mitchell**<br>*National Market Development Manager, Philips Professional DVD* | **Making Professional DVD Work** |
| 10:00 - 10:30 | **Jim Weldon**<br>*Chairman & Chief Technical Officer, Hide and Seek Technologies* | **Copyright Protection for DVD** |

| | | |
|---|---|---|
| 10:30 - 11:00 | Break | |
| 11:00 - 11:30 | **Chuck Kucinski**<br>*Vice President of Engineering, RMSI* | |
| 11:30 - 12:00 | **Marshall Goldberg**<br>*Director of Product and Marketing, Sigma* | **Standardization Issues for Progressive DVD Playback** |
| 12:00 - 12:30 | **Chris Buma**<br>*Manager for A/V Disc Recording, Philips* | **DVD+RW: Two-way Compatibility for Video and Data Applications** |
| | **Rainer Brodersen**<br>*Chief Technology Officer, Spruce Technologies* | **Web DVD and DVD Authoring** |
| 1:00 - 2:00 | Lunch | |
| | Afternoon Session - Calibration, Measurement and Standards | |
| 2:00 - 2:30 | **Gary Shapiro**<br>*President, Consumer Electronics Manufactures Association (CEMA)* | ****** KEYNOTE SPEAKER ****** |
| 2:30 - 3:00 | **Dana J. Parker**<br>*DVD Pro Workshop Chair, Emedia Professional* | **DVD Writables: The Facts and Frictions** |
| 3:00 - 3:30 | **Karl Schneck**<br>*President, Optical Disk Manufacturing Association (ODMA)* | **DVD Calibration - Reducing the Variation** |
| 3:30 - 4:00 | Break | |
| 4:00 - 4:30 | **Jim Taylor**<br>*Author, "DVD Demystified"* | **WebDVD: Enhancing DVDs for PCs and the Internet** |
| 4:30 - 5:00 | **Xiao Tang**<br>*Project Manager, Advanced Digital Data Storage Laboratory, NIST* | **Microscopic Image Analysis for Physical Characteristics in Optical Disks** |

# *DVD'99 Workshop*

## *Standards, Applications, and Technology*

**Dr. Victor McCrary**

*Group Leader*
*Information Storage and*
*Integrated Systems Group*
*National Institute of*
*Standards and Technology*

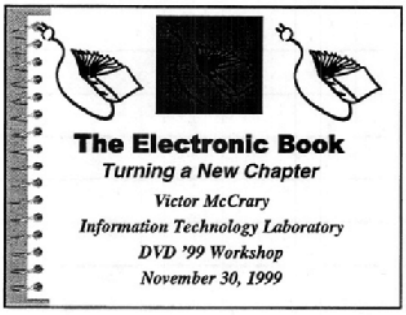
100 Bureau Drive, Stop 8951
Gaithersburg, MD 20899-8951

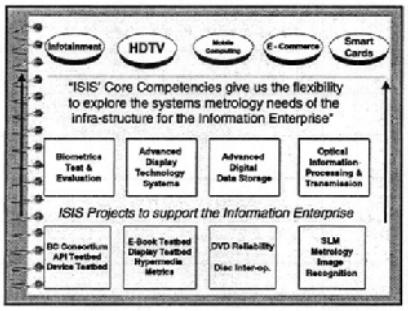
Phone: 301 975-4321

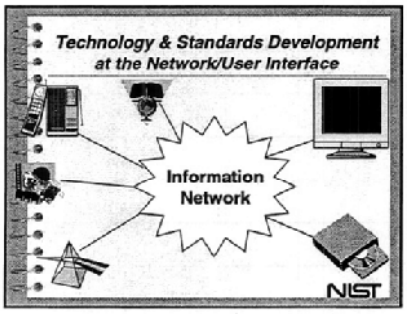
**www.nist.gov**

Dr. Victor R. McCrary is currently a technical manager at the National Institute of Standards & Technology in Gaithersburg, Maryland. In his current position, he leads a group of researchers in NISTs' new Information Technology Laboratory. The research in his group covers flat panel displays, optical disk (DVD) storage and reliability, biometrics, electronic books, and image recognition. Dr. McCrary organized the world's first conference on electronic books in October '98, and his research group also presented a NIST prototype of the electronic book. Dr. McCrary was also employed as a program manager for the Advanced Technology Program (ATP), where he managed over $45M in technical cooperative agreements between the Federal Government and industry in materials and optoelectronics. With American industries, ATP projects seek to develop pre-competitive, generic, high-risk technologies that will provide future growth to the U.S. economy in terms of jobs, revenue growth, and market share for new products that evolve from these research efforts. Dr. McCrary was formally employed for nine years by AT&T Bell Laboratories in Murray Hill, New Jersey where he held various positions in semiconductor research and project management. Concurrently, Dr. McCrary is an adjunct professor in the Executive Masters of Technology Management Program at the University of Pennsylvania. The program is jointly administered by the Graduate School of Engineering and the Wharton School of Business. Dr. McCrary's interests involve the reshaping of U.S. research and development, multimedia technologies, technology and public policy, new paradigms for the management of technology, and marketing strategies for creating technology winners in the global marketplace. Dr. McCrary received his doctoral degree in 1985. He received an Executive Masters of Science & Engineering from the University of Pennsylvania in May 1995.

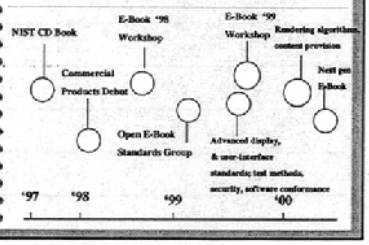
Dr. McCrary has authored or co-authored over 40 technical papers in refereed journals and co-edited two books. In 1990, Dr. McCrary received the "Most Promising Engineer of the Year Award", presented by U.S. Career Communications and Mobil Oil Corporation, for his efforts in the field of semiconductor crystal growth. In March 1992, he received the "Pioneer of the Year Award" from the National Society of Black Engineers (NSBE) & the Motorola Company, also for his efforts in the filed of semiconductor crystal growth Dr. McCrary was selected in 1996 to the College of Distinguished Lecturers by Sigma Xi, The Scientific Society.


The Electronic Book
Turning a New Chapter
Victor McCrary
Information Technology Laboratory
DVD '99 Workshop
November 30, 1999


Infotainment
HDTV
Mobile Computing
E-Commerce
Smart Cards
"ISIS' Core Competencies give us the flexibility to explore the systems metrology needs of the infra-structure for the Information Enterprise"
Biometrics Test & Evaluation
Advanced Display Technology Systems
Advanced Digital Data Storage
Optical Information Processing & Transmission
ISIS Projects to support the Information Enterprise
BO Consortium API Testbed Device Testbed
E-Book Testbed Display Testbed Hypermedia Metrics
DVD Reliability Disc Inter-op.
SLM Metrology Image Recognition


Technology & Standards Development at the Network/User Interface
Information Network
NIST

## *Electronic Book Industry: Industry Timeline*




## Electronic Books: Customer Base

- ✓ SoftBook
- ✓ Rocketbook
- ✓ Microsoft
- ✓ Adobe
- ✓ Simon & Schuster
- ✓ R.R. Donnelly
- ✓ Franklin Press
- ✓ Random House
- ✓ FX Xerox
- ✓ American Assoc. of Publishers
- ✓ OverDrive Systems
- ✓ IBM
- ✓ Hitachi
- ✓ Nokia
- ✓ Vadem
- ✓ Time-Warner
- ✓ Compaq
- ✓ EveryBook
- ✓ National Information Standards Organization
- ✓ CEMA

## Electronic Book '99 Workshop: *Discussion Topics*

- ✓ End-users -what do they want ??
- ✓ Business case for e-books - what is it ??
- ✓ Displays - where are now, where do we go ?
- ✓ Content - integrity, security -- free ??
- ✓ Distribution & storage - multi-path or restricted?
- ✓ Standards or dominant design - free market?

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## Open E-Book Standards Group

- ✓ Initiated at NIST E-Book '98 Workshop
- ✓ Goal is to develop a standard for electronic content for e-books
- ✓ Members include Softbook, Microsoft, Harper & Row, Lucent, Adobe, Nokia, Hitachi, Nuvomedia

**www.openebook.org**

## Open E-Book Standards Group

- ✓ OEB Specification 1.0 debut 9/21/99
- ✓ Scope of specification: electronic content for e-book reading systems
- ✓ Well-formed HTML & XML
- ✓ Many have signed on: Microsoft, OverDrive Systems, Consolidated Graphics
- ✓ Possible future areas of interest: digital rights management, hypermedia – video, pictures, accessibility

## *Electronic Books: Future Industrial Outreach*

- ✓ Continue to facilitate industry group towards a version 1.X open specification,
- ✓ Open Electronic Book Charter Meeting, December 14-15 in San Francisco
- ✓ CEMA meeting in Las Vegas 1/5 – 1/8; section on e-books
- ✓ **E- Book 2000 Workshop September 2000**

## *Electronic Books & Japan*

- ✓ MITI Electronic Book Consortium of 200 companies; NIST invited to join
- ✓ Japanese e-book industry favors portable storage model (DVD) vs. U.S. Internet model
- ✓ Japan favoring image-based standard (e.g. PDF) vs. U.S. XML/HTML model
- ✓ Japanese companies looking in U.S. for encryption software

## Advanced Display Technology Systems:
## Electronic Book Testbed & Applications

**Goals**

Support the electronic book industry through the development of an electronic book reference testbed for conformance testing of standards developed by the Open Electronic Book Standards Committee, and to evaluate novel software enhancements (e.g. voice activation, video clips) for next generation electronic books for usability (e.g. Braille Reader) and new applications.

**Benefits**

Interoperable protocols supports all electronic publishing platforms for e-books, web-based media, & PDAs.

**Customers**

Softbook, Nuvomedia, Microsoft, Librius, Everybook, Glassbook, Random House, Xerox, McGraw-Hill, Harper-Row, IBM, Simon & Schuster, R.R. Donnelly, Adobe

**Schedule Milestones**

2/00 Using NIST-developed test files; evaluate download times for e-content for commercial devices

5/00 OEB standard 1.0 implementation on NIST prototype

8/00 Demonstrate new applications on NIST prototype and commercial devices

9/00 E-Book 2000 Conference

## Electronic Books:
## *A New Tool for Learning !!*

**Advantages**

- Store many books in one portable device
- Integrate multimedia; e.g. video
- Convenient software features aid the reader
- Time-sensitive information easily accessible
- Conserves paper

**Applications**

- Enterprise management
- Education
- Document management
- Infotainement

## *NIST CD Book: Scope of NIST R&D Efforts*
***Integrated System for Information Display***

» •Demonstrate a prototype electronic book; integrating display, storage, and rendering of text

•Features include touch screen capabilities to access word definitions, annotation, voice recognition - *information ergonomics - usability & applications*

•Reference implementation for new technology & standards for portable electronic storage and display of information 3-5 *years into the future*

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## Electronic Books:
## *NIST CD-Book*

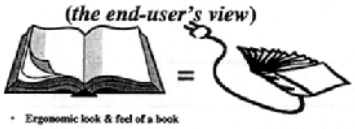
- Hard-disk storage/optical disk storage
- Touch sensitive, two screen color display
- PC Host
- Visual Basic/ Windows 98 OS

> Font re-sizing
> Word search
> Dictionary
> Highlighting
> Underlining
> Page turning at-a-touch
> *Voice Activation*

## E-Books: *Comparisons*

| | NIST | Softbook | Every Book | Rocket Book | Librius |
|---|---|---|---|---|---|
| CPU | PII | Mot. 64K | Alan Sc400 100MHz | ARM RISC | Mot. 68K |
| display | 11 x 8 color (2) | 11 x 8.5 bw | 11.5 x 9.5 color (2) | 7.125 x 4.875 bw | 7 x 6 bw |
| capacity | 4.7GB | 4 MB | 540 MB | 4 MB | ?? |
| file format | RTF | HTML | PDF | HTML | HTML |
| OS | W98 | propr. | WinLight | propr. | propr. |
| wgt | n/a | 2.9 lbs | 3.65 lbs | 1.6 lbs | 12 oz |

## The Electronic Book: Functional Requirements
## (*the end-user's view*)



- Ergonomic look & feel of a book
- Page appearance equal or better than paper (all environments!)
- Software features: dictionary, high-lighting, font-resizing
- Voice activated
- Low power consumption and low power dissipation
- Portable and lightweight
- Multi-path distribution of content - wire, wireless, portable media

## The Electronic Book: Technical Specifications
### (*the technology provider's view*)

- Display reflectivity ratio
- Total weight
- Power requirements
- Power dissipation
- Content format
- Storage media format
- Voice recognition error rejection ratio
- Display aspect ratio
- Software platform
- Content security, and integrity

NIST ***Opportunities for new metrology, standards, and test methods !!***

## Electronic Book Data Transmission Project

**Issue:**

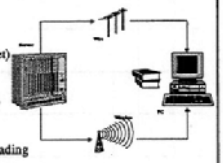
Down-loaders (Internet)

vs.

Inserters (DVD, etc)

**Question:**

Realistic time for downloading multimedia content ??



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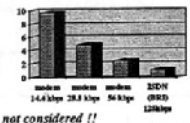
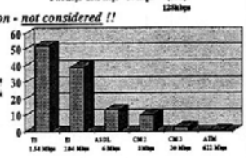
## Download theoretical times

"Minutes" downloads (For a 1MB file)




*Security and network congestion - not considered !!*

"Seconds" downloads (For a 10 MB file)

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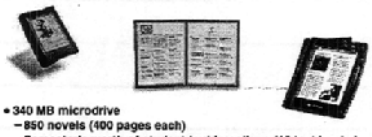
## IBM HDDs in E-books

IBM



- 340 MB microdrive
  - 850 novels (400 pages each)
  - Semester's worth of student text in college (10 text books)
  - Legal / medical textbooks (with graphics)
- 12 GB Travelstar
  - 12 million pages of text
  - 50 magazines (with color and photos)
  - .5 million web pages (with graphics)

## *E-Book Braille Reader*

- Electronic Book '98 Workshop
  - National Library Service for the Blind & Physically Handicapped
- Need to improve accessibility of e-books to the visually impaired
  - tactile display with (or instead of) visual display or "talking book"
- Low cost and reliable Braille reader
  - present readers very expensive and not very reliable

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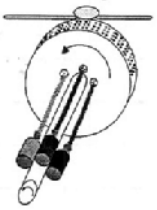
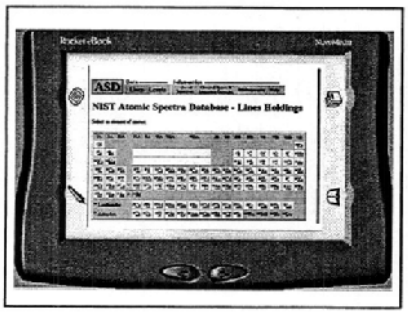
## *Internal actuators on shaft*

- 12 actuators ( 2 cells) placed on rotating shaft
- Same pattern on every 2 cell group
- Text updates as wheel rotates
- User feels string of Braille characters with ***one finger*** !



## Why Usability and Applications? Databases for *e*-Books?

- Early adopters of the *e*-book are currently asking for more features such as, support for tables, embedded scripts, and color displays.
- Presentation of both graphical and tabular numeric data would support technical, scientific and business communities.
- Currently, NIST has 11 databases on-line that could serve as testbeds and marketing tools for the development of these advanced *e*-book features.
- Creation of a technical publishing standard that supports the incorporation of data would provide an invaluable resource to the scientific community.



## *Electronic Books: Future R&D Directions*

- Migration of file format to HTML or XML; ready prototype for reference implementation of OEB 1.0 specification
- Full multimedia: text, pictures, video, DVD storage media, hyper-links, voice synthesis
- Complete Braille reader development for rotating wheel prototype

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## *Electronic Books: It can happen if...*

- No Beta vs. VHS

- *"There is enough to go around for everybody"*

NIST

# *DVD'99 Workshop*

***Standards, Applications, and Technology***

**Koji Hase**

*Vice President*
*DVD Planning, Toshiba*

100 Westinghouse Circle
Horseheads, NY 14845

Phone: 607 796-3500

**www.toshiba.com**

DVD '99
Workshop

# DVD

# (Digital Versatile Disc)

## An Update Report from the DVD Forum

Toshiba Corporation
(Chair-company, The DVD Forum)

November 30, 1999, Honolulu

# Agenda

1. The DVD Forum
2. The Authorized DVD Formats
3. Expanding DVD Market
4. A Guide to DVD-Related Licenses
5. DVD Copy Protection
6. Future Prospects of DVD Formats
7. Contact Information

# The DVD Forum

(http://www.dvdforum.org/)

# DVD Forum - Objectives -

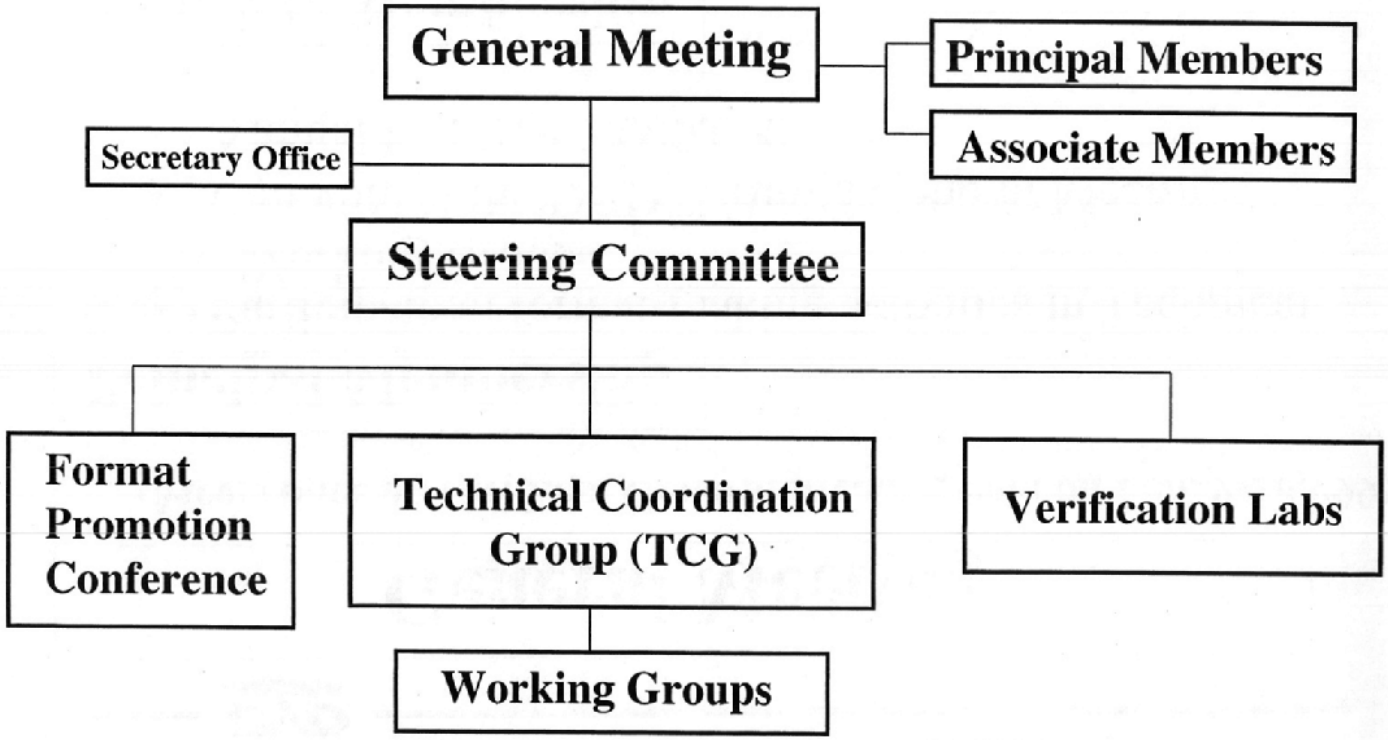
Objectives

- Establish **"single, best"** DVD formats.
- Promote broad acceptance of DVD products on a worldwide basis, across entertainment, consumer electronics and IT industries.

The Forum will

(1)Define DVD-Video, ROM, R, RAM, Audio, ...
(2)Publish DVD Format Books
(3)License DVD Format/Logo
(4)Administer DVD Verification Labs
(5)Hold worldwide DVD Conferences and operate Forum Homepage

# DVD Forum Organization



# General Meeting

**(Meets once a year. Last General Meeting held on Feb. 9-10, '99)**

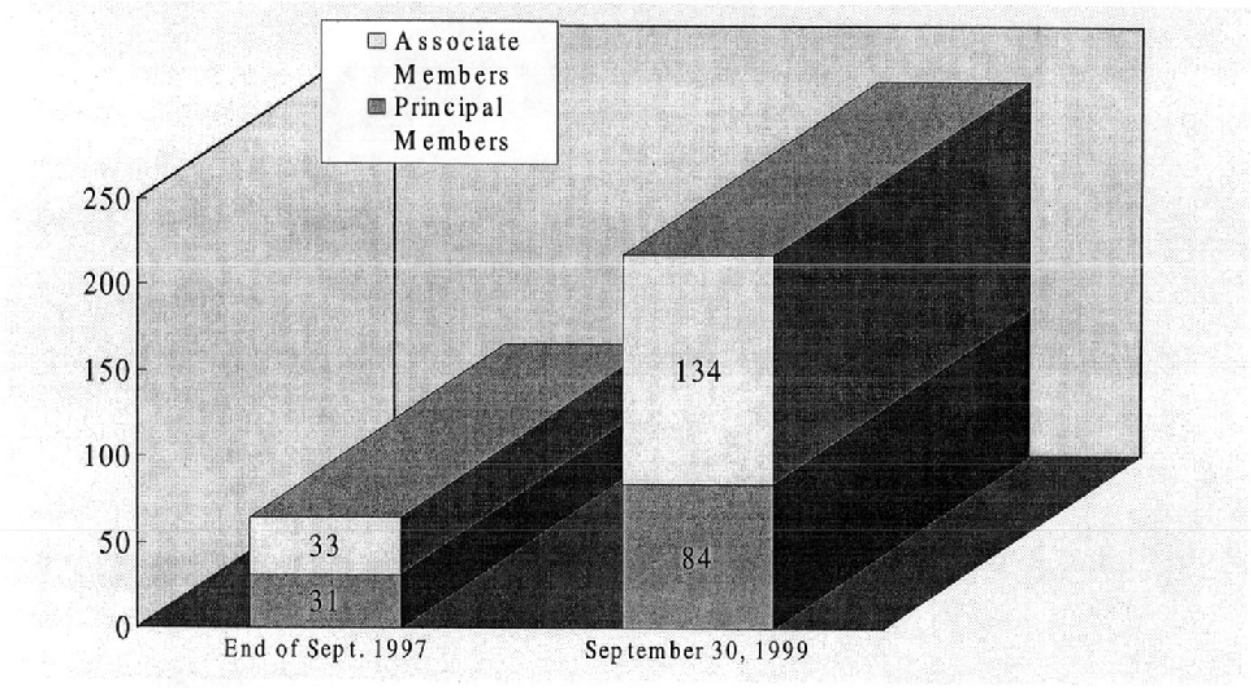
## Principal Membership

- Participate in format-making activities in Technical Working Groups
- Can vote at the DVD Forum's General Meetings
- Annual fee: Yen 1,000,000

## Associate Membership

- Access to Working Group activity reports
- Annual fee: Yen 300,000

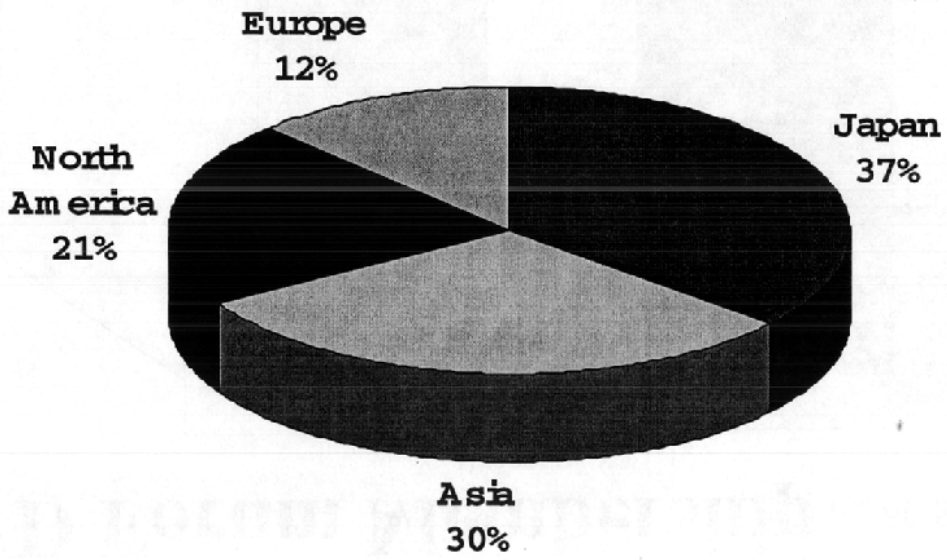
# DVD Forum Membership (as of Sept. 30, 1999)




Total • 64

Total • 218

# DVD Forum Membership (as of Sept. 30, 1999)



# Steering Committee

(Meet Quarterly)

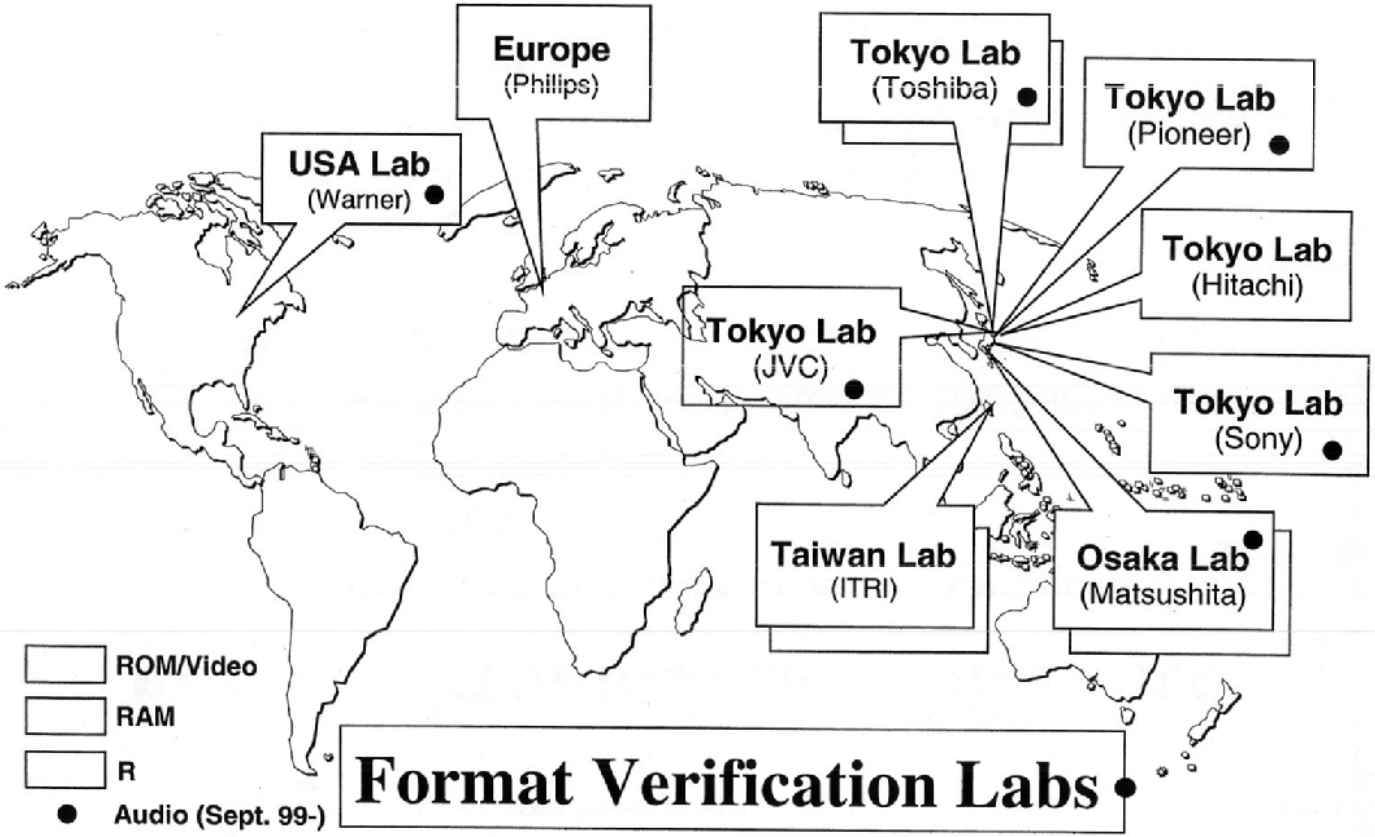
Hitachi
IBM
Intel
ITRI (Industry Technology . Research Institute)
JVC
LG
Matsushita
Mitsubishi
NEC
Philips
Pioneer
Samsung
Sharp
Sony
Thomson
Time Warner
Toshiba

# Technology Coordination Group

(Consists of Chairmen of the Working Groups below)

(Member companies: cumulative 323)

| | | |
|---|---|---|
| Working Group 1 | (49) | Video |
| Working Group 2 | (35) | ROM |
| Working Group 3 | (30) | File Format |
| Working Group 4 | (48) | Audio |
| Working Group 5 | (46) | Rewritable (RAM) |
| Working Group 6 | (46) | Write-Once (R) |
| Working Group 9 | (39) | Copy Protection |
| Working Group 10 | (30) | Pro-use Application |




# Format Verification Labs

# Format Promotion Conference

**(Organized by Steering Committee Companies)**

- Japan Conference
  (April 27, '99, Tokyo, Japan)
  ★ **DVD-Audio Conference** (August 23, '99, Tokyo, Japan)
- Asia Conference
  (May 27-28, '99, Taipei, Taiwan)
- Americas Conference
  (August 29-30, '99, Palm Springs, California)
  ★ **DVD-Audio Conference** (July 29, '99, Los Angeles, U.S.A.)
- European Conference
  (October 12-13, '99, Lisbon, Portugal)
- Milia DVD Award (Software Promotion)

# The Authorized DVD Formats

# Naming of the DVD Format Family

- Simple but distinct. Readily identifiable.
  (Ex. CD-ROM, MMVF, ASMO, MD, DVD-Video)

A prefix of "DVD-" (hyphenated) followed by a word expressing the nature of the disk format:

| | |
|---|---|
| DVD-Video | DVD-R |
| DVD-Audio | DVD-RAM |
| DVD-ROM | |

# Maintaining Quality of DVD Names

Never use:

DVD=ROM
DVD ROM
DVD ROM
DVD+ROM
DVD±ROM
DVD/ROM
DVD • ROM
DVD ROM
DVD@ROM.COM
DVD ROM
DVD ROM, • etc...

Rule of Fair Competition

No attempt should be made to unilaterally use "DVD" prefix to knowingly and intentionally exploit the reputation of the DVD Format Family.

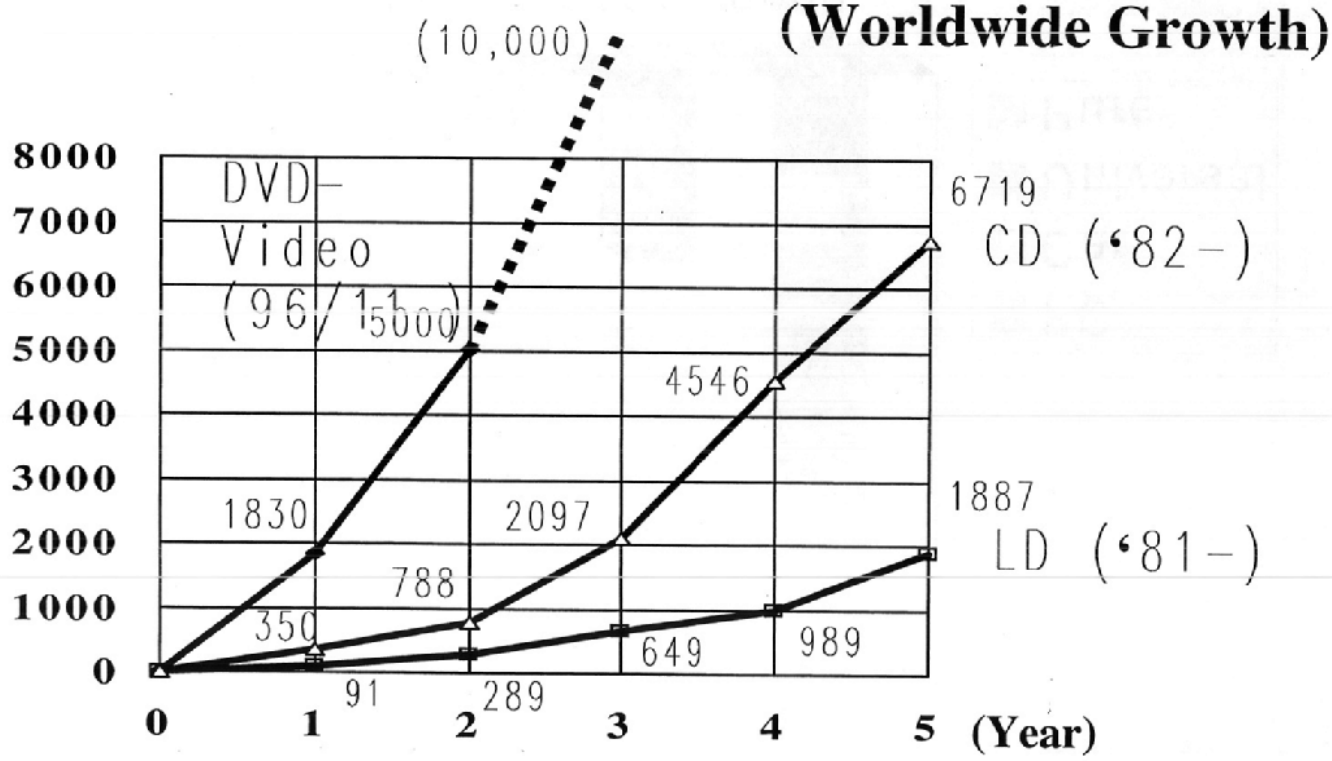
Do not confuse consumers!

# DVD Format Books and Issue Dates

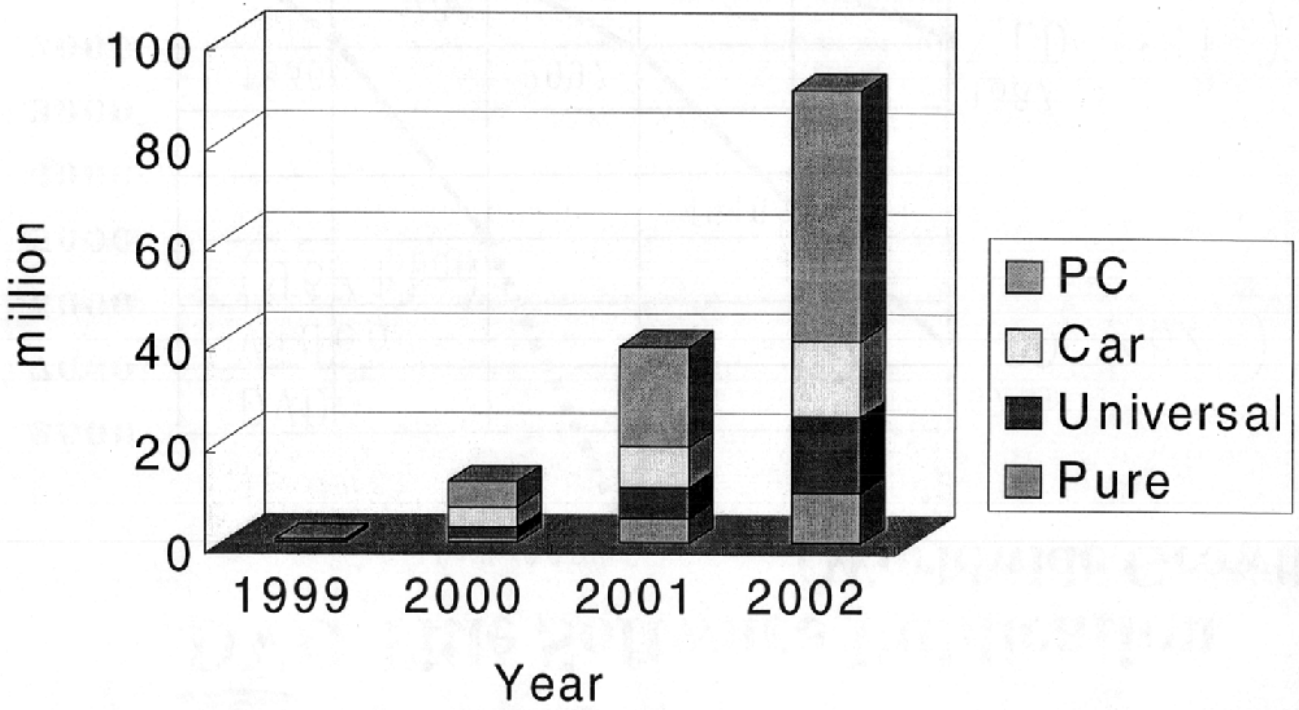
| | | |
|---|---|---|
| 1. DVD-Video | Ver. 1.11 | Aug. '96/Dec. '97/May '99 |
| 2. DVD-Audio | Ver. 1.0 | Apr. 1999 |
| 3. DVD-ROM | Ver. 1.02 | Aug. '96/Dec. '97/Sept. '99 |
| 4. DVD-R | Ver. 1.0 (3.9GB) | Jul. 1997 |
| 5. DVD-R | Ver. 1.9 (4.7GB) | Nov. 1998 |
| 6. DVD-RW | Ver. 0.9 | Oct. 1999 |
| 7. DVD-RAM | Ver. 1.0 (2.6GB) | Jul. 1997 |
| 8. DVD-RAM | Ver. 2.0 (4.7GB) | Oct. 1999 |
| 9. DVD Video Recording | Ver. 1.0 | Oct. 1999 |

# DVD Title Software Publication

## (Worldwide Growth)



# DVD-Audio Road Map



# A Guide to DVD-Related Licenses

## - to Safeguard Your Rights -

# To Obtain DVD Format Books •

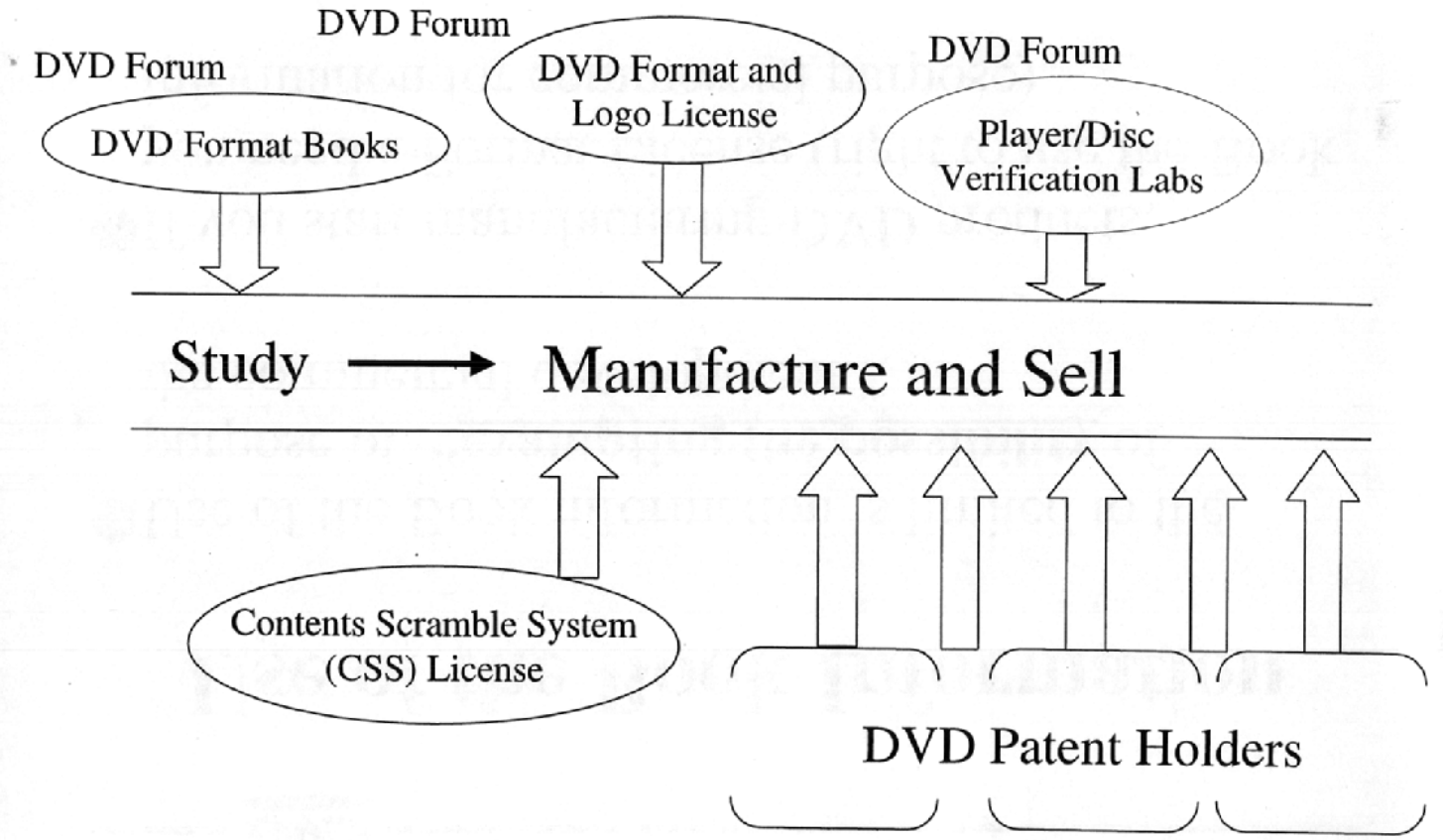
1. Requirement:
   - to sign **Non-Disclosure Agreement**
   - to pay **US$5,000** for the first Book (and **US$500** for each additional Book)
2. Contact: Toshiba

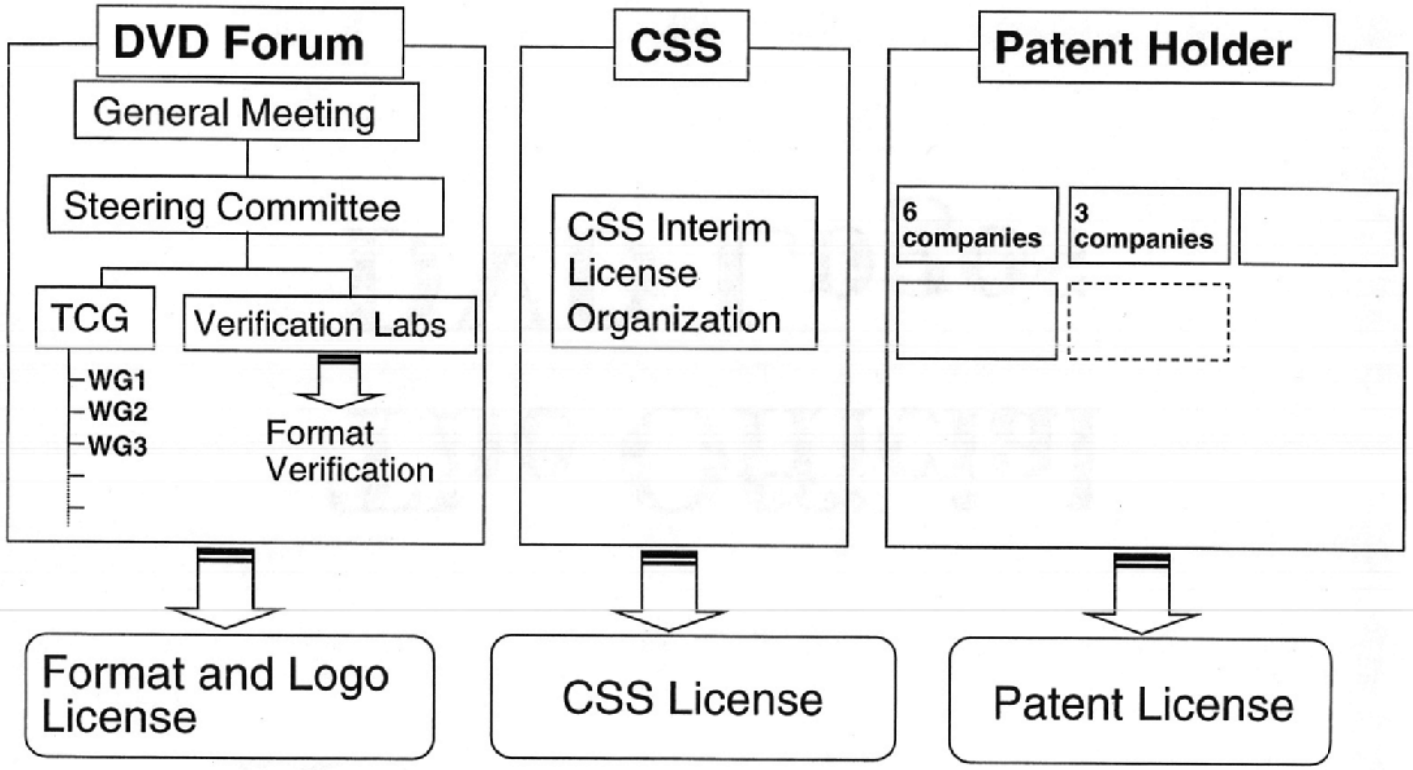
   Tel: 81-3-3457-2643  Fax: 81-3-5444-9430

# Use of the Book Information

- Use of the Book information is limited to the purpose of "**evaluating the possibility** of the commercial development."

- If you start manufacturing DVD products, you need a Format License (right to use the Book information for commercial purpose).


DVD Forum
DVD Format Books
DVD Forum
DVD Format and Logo License
DVD Forum
Player/Disc Verification Labs
Study
Manufacture and Sell
Contents Scramble System (CSS) License
DVD Patent Holders


DVD Forum
General Meeting
Steering Committee
TCG
Verification Labs
WG1
WG2
WG3
Format Verification
CSS
CSS Interim License Organization
Patent Holder
6 companies
3 companies
Format and Logo License
CSS License
Patent License

# The Official DVD Logos

# Authorized DVD Logos

DVD

DVD ROM

DVD VIDEO

DVD RAM

DVD R

DVD AUDIO

# DVD Logo

- DVD Logo is a symbol that **products bearing the Logo meet the specifications** specified in the DVD Format Books.

- DVD Graphic Standards Manual
  - -Version 0.9 is now available by:
    (Tel: 81-3-3457-2643 Fax: 81-3-5444-9430)
  - -Version 1.0 is now under discussion.

# DVD Format/Logo License

## - to Maintain Quality Technologies of DVD Family -

# DVD Books

| | | | | |
|---|---|---|---|---|
| Part4 (Audio spec.) | | | Part4 | Part4 |
| Part3 (Video spec.) | | Part3 | | Part3 |
| Part2 (File system spec.) | Part2 | Part2 | Part2 | Part2 |
| Part1 (Physical spec.) | Part1 | Part1 | Part1 | Part1 |
| ***Specifications for DVD Read-Only Disc*** | Need to make DVD-ROM | Need to make DVD-Video | Need to make DVD-Audio* | Need to make DVD-AudioV |

*** If you want to make Visual menu in DVD-Audio, Part3 is necessary.**

# Format/Logo License

- **Definitive Format and Logo License** (July '99-)
  - License fees: US$10,000 per each Format Book for each product category
  - Verification is mandatory.
- **Format/Logo license does not cover patent license.**
- Please contact:

  Toshiba as an (interim) license agent

  Tel: 81-3-3457-2643

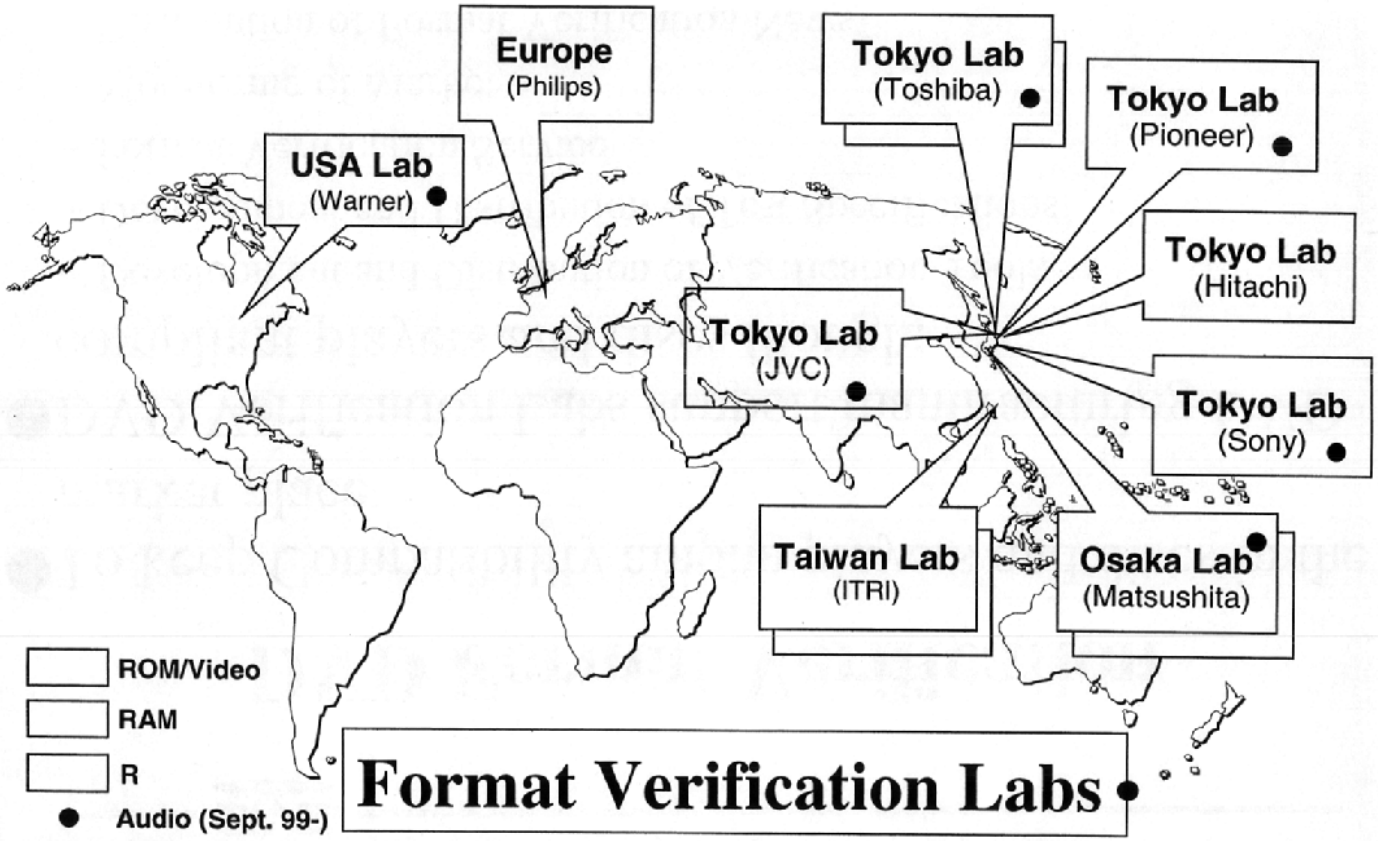
  Fax: 81-3-5444-9430

# Verification of DVD Discs & Players

## - DVD Logo is a Mark of Quality -

# DVD Format Verification

- To keep Compatibility among players and discs in the market place
- DVD Verification Labs support manufacturing DVD compliant players and discs though:
  - -- Development and Distribution of Verification Tools
  - -- Development and Distribution of Test Specifications
  - -- Format Verification Service
  - -- Monitoring of Market
  - -- Distribution of Format Verification News
  - -- Investigation & Analysis of Market Claim




# Format Verification Labs

DVD Forum

# DVD Copy Protection

**- Key Benefit of DVD Technology Supported by Related-Industry Groups-**

# Patents

- Certain patent groups include:
  - 6C Group (Hitachi, JVC, Matsushita, Mitsubishi, Toshiba, Time Warner)
  - 3C Group (Royal Philips, Sony, Pioneer)
  - Thomson
  - MPEG LA
  - Dolby
  - Other patent holders/groups
- **Patent users should contact individually.**

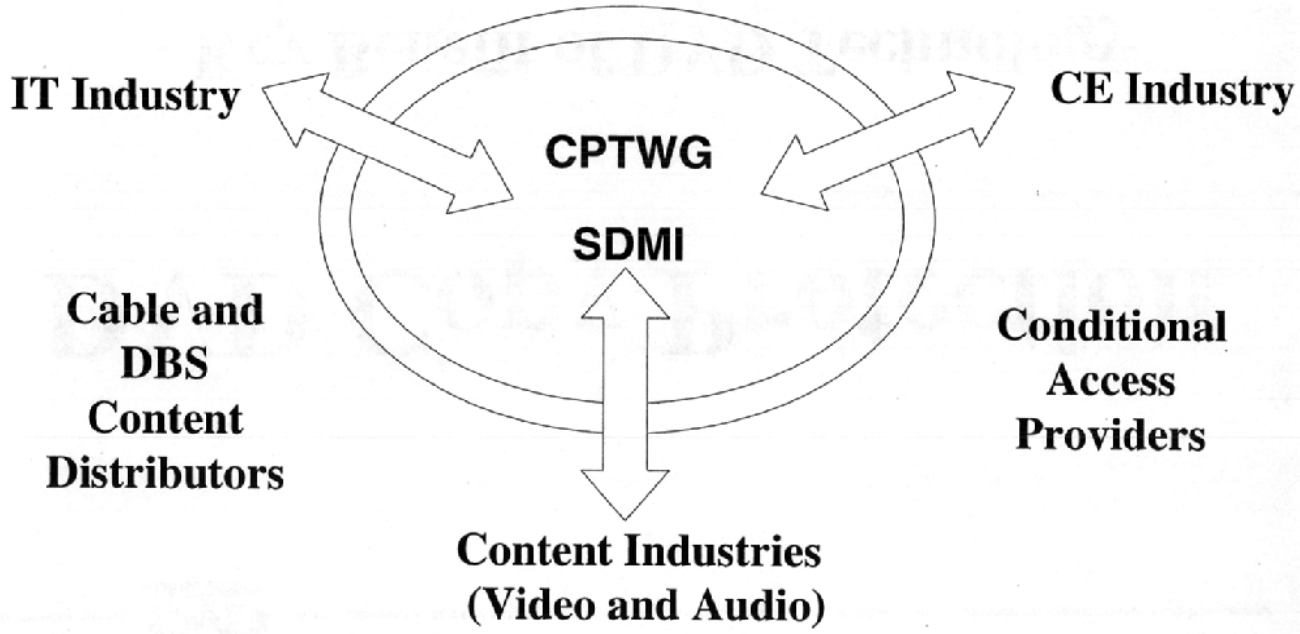
# Copy Protection Discussion

| | |
|---|---|
| **DVD Forum Working Group 9** | To assist CPTWG to create secure copy protection system for DVD family<br>Chaired by Toshiba<br>Monthly meeting at Tokyo |
| **CPTWG**<br>(Copy Protection Technical Working Group) | Voluntary Working Group Chaired by IBM<br>Monthly meeting at Burbank to discuss CP<br>Attendees: CE, IT, Movie and Music Industries, CEMA, MPAA, RIAA, etc. |
| **SDMI**<br>(Secure Digital Music Initiative) | To establish Copy Protection Scheme for audio content transmission<br>Twice a month meetings |

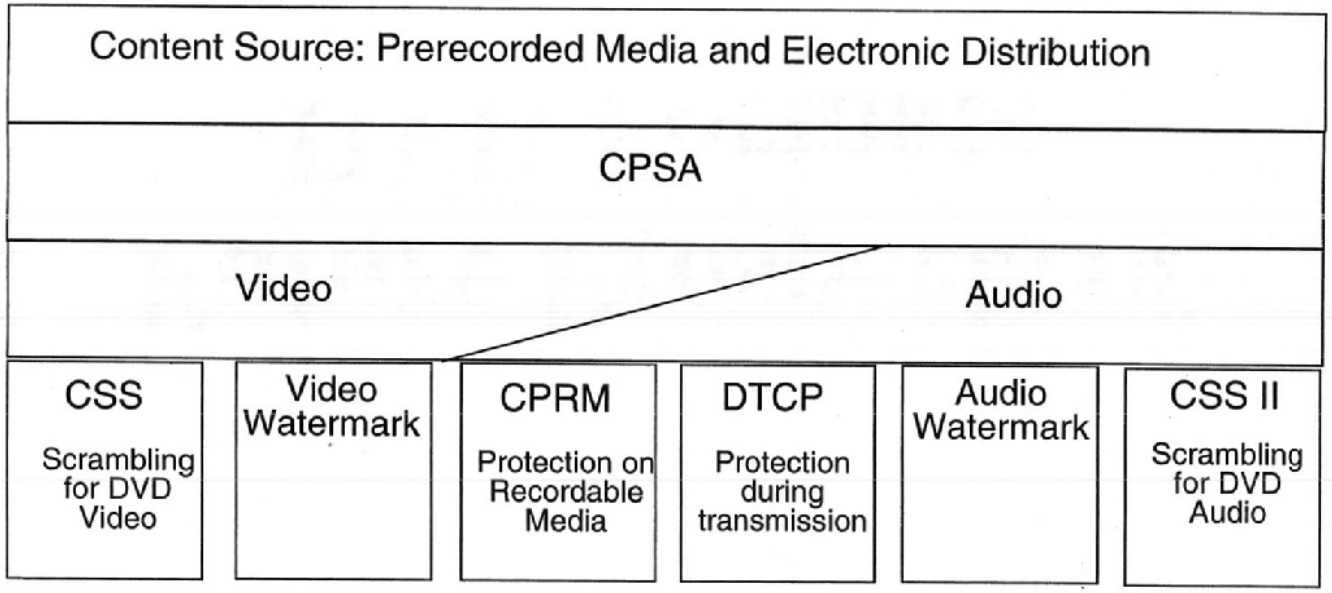
# Consensus

**Government**

- FCC -- DTV mandates
- DoC, FBI, NSA -- Export Control



# Relationship Between Technologies



# Copy Protection Programs

| | |
|---|---|
| **CPSA**<br>(Content Protection System Architecture) | Total CP Architecture<br>Establish overall system architecture for protected content<br>(Proposed by 4C) |
| **CSS**<br>(Content Scramble System) | DVD-Video Copy Protection<br>Interim License Agent: MEI<br>→**DVDCCA** after Oct 1, 1999 |
| **DTCP**<br>(Digital Transmission Content Protection) | IEEE1394 CP Licensed by DTLA |
| **CSS II** | DVD-Audio Copy Protection |
| **CPRM**<br>(Copy Protection for Recordable Media) | Provide effective protection against unauthorized casual consumer copying of audio/video entertainment content (Proposed by 4C) |
| **Content Protection Framework** for DVD-Audio | DVD-Audio CP system<br>(Proposed by 4C) |
| **Galaxy** | Proposed Video Watermark for CSS<br>(Proposed by 5C) |

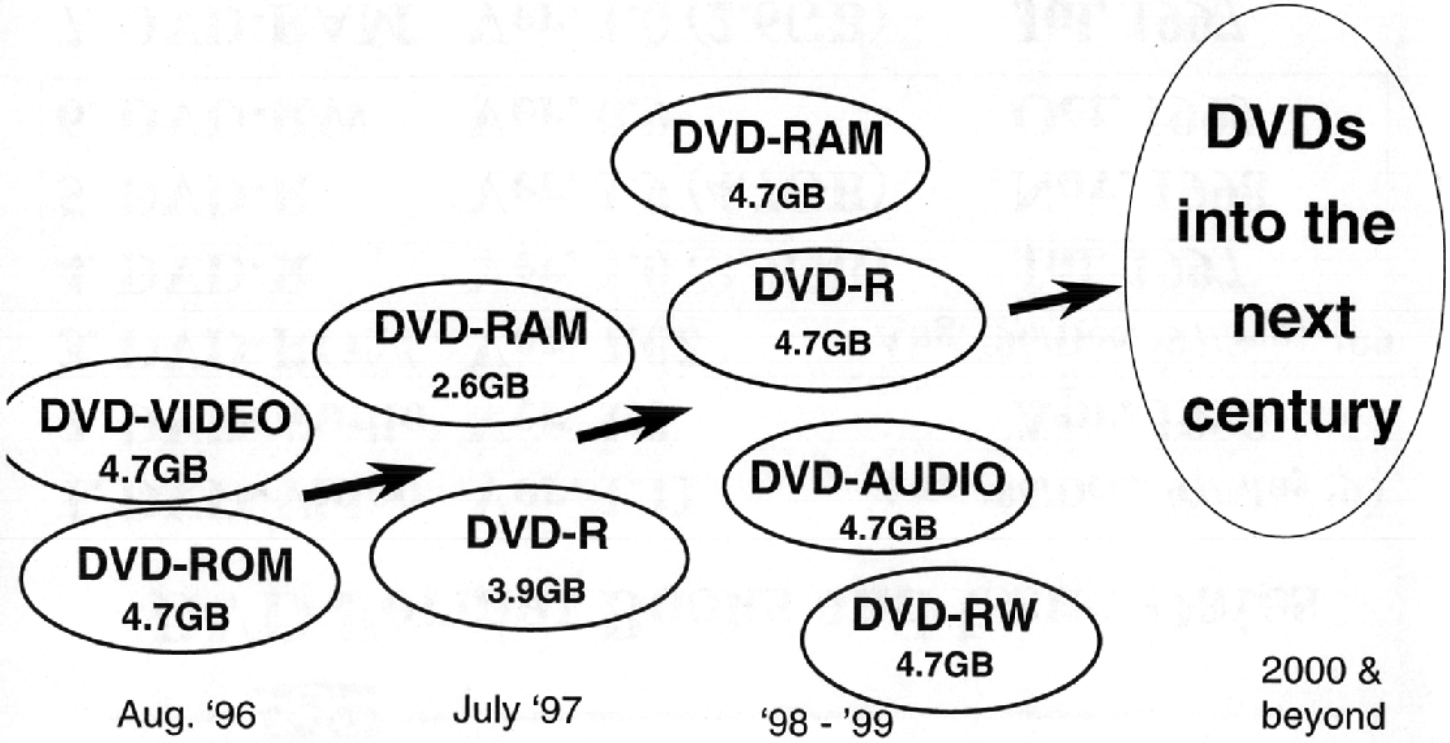
# DVD Format Books and Issue Dates

| | | |
|---|---|---|
| 1. DVD-Video | Ver. 1.11 | Aug. '96/Dec. '97/May '99 |
| 2. DVD-Audio | Ver. 1.0 | Apr. 1999 |
| 3. DVD-ROM | Ver. 1.02 | Aug. '96/Dec. '97/Sept. '99 |
| 4. DVD-R | Ver. 1.0 (3.9GB) | Jul. 1997 |
| 5. DVD-R | Ver. 1.9 (4.7GB) | Nov. 1998 |
| 6. DVD-RW | Ver. 0.9 | Oct. 1999 |
| 7. DVD-RAM | Ver. 1.0 (2.6GB) | Jul. 1997 |
| 8. DVD-RAM | Ver. 2.0 (4.7GB) | Oct. 1999 |
| 9. DVD Video Recording | Ver. 1.0 | Oct. 1999 |

# Future Prospects of DVD Formats

# Contact Information

# The DVD Evolution Roadmap



# Class A Verification Labs. (Contact)

| | |
|---|---|
| Hitachi (Format Verification Lab.) | FAX: 81-3-3506-1614 |
| ITRI (DVD Format Verification Lab.) | FAX : 886-3-591 7531 |
| JVC (DVD Verification Lab.) | FAX: 81-45-450-1639 |
| Matsushita (DVD Verification Lab.) | FAX: 81-6-6909-5027 |
| Philips (DVD Verification Center) | FAX: 31-40-273-8267 |
| Pioneer (DVD Verification Lab.) | FAX: 81-42-943-0395 |
| Sony (DVD Verification Lab.) | FAX: 81-3-5769-5890 |
| Toshiba (DVD Verification Lab.) | FAX: 81-3-5444-9430 |
| Warner Advanced Media Operations (DVD Format Verification Services) | FAX: 1-717-383-0328 |

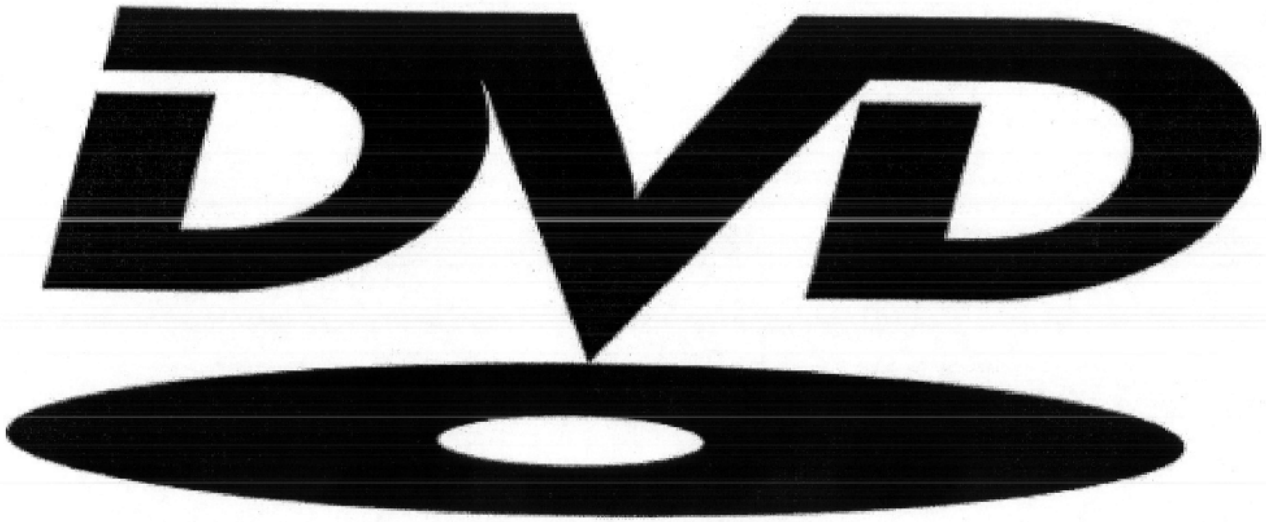
# DVD Forum: Summary of Contacts

DVD Forum (Secretary Office)
TEL: 81-3-5444-9580 FAX: 81-3-5444-9436

DVD Format Book (Toshiba)
TEL: 81-3-3457-2643 FAX: 81-3-5444-9430

DVD Format/Logo License (Toshiba)
TEL: 81-3-3457-2643 FAX: 81-3-5444-9430

CSS License (Matsushita)
TEL: 81-6-6905-4155 FAX: 81-6-6901-9299



# DVD Forum Homepage

- For more DVD information, visit the DVD Forum homepage.

http://www.dvdforum.org/

# *DVD'99 Workshop*

## *Standards, Applications, and Technology*

**Sandra M. Benedetto**

*Director, Product Development*
*Pioneer New Media Technologies, Inc.*

600 East Crescent Avenue
Upper Saddle River, NJ 07458

Phone: 201 327-6400

**www.pioneerusa.com**

As Director of Product Development for Pioneer New Media Technologies, Sandra Benedetto is responsible for industrial DVD-Video application and product development. She works extensively with product design engineers, system integrators and developers to ensure Pioneer's industrial DVD-Video products offer features that meet the needs of the business, industry and education markets in North America.

With more than twelve years of experience in the interactive technology and multimedia industries, Ms. Benedetto has worked in hardware, software and content development for LaserDisc, CD-ROM and now DVD technologies. In addition to her work at Pioneer, Ms. Benedetto has worked in multimedia production management at The Voyager Company and Scholastic New Media. She is a former educator and founding director of a national award-winning post-secondary, electronics training program for women.

Ms. Benedetto speaks about the benefits of DVD technology at various technology conferences throughout North America.

# DVD 99

## Industrial and Educational Applications for DVD-Video Technology

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# DVD Industrial Applications

## What are Industrial Applications

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# DVD Industrial Applications

What are Industrial Applications

Business & Industry

Education & Training

Anything that's not home entertainment

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# DVD Industrial Applications

Business & Industry

- Kiosk, Point of Purchase, Retail Sales
- Museums, Public Learning Environments
- Video Wall, Public Exhibits
- Corporate Presentations, Communications
- Tourism, Theme & Amusement Parks
- Video Simulation & Training
- Closed Circuit Television

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# DVD Industrial Applications

What Does DVD Offer the Professional, Business & Education Markets?

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# Business & Industry General Market Needs

- Applications are "*technology driven*"
- Judged on ability to meet application objectives
- High Performance Standards
- Hardware & Software developed together as complete system
- DVD Titles are unique & proprietary (discs not for sale)

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# Why DVD-Video?

- Superior quality video and audio
- Greater Storage
- Flexible
- Interactive
- Simple and reliable to use
- Portable

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# DVD Video Offers Best *Quality* Video & Audio

Studio quality video delivered on an inexpensive player platform

- Very high value equation

Spectacular multi-channel sound

- Completely equal, discrete channels i.e. SMPTE time-code signal to control external devices

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# DVD Format Offers Greater *Storage Capacity*

4.7 Gbytes (SSSL) -17 Gbytes (DSDL)

Hours of superior video and audio

Disc can contain many segments and the only the segment or segments required can be activated to play

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# DVD Video is *Flexible*

Video: MPEG 2, MPEG 1; variable or constant bit rate; 5 minutes to *several hours on one side*

Audio: 8 Mono Aural to 5.1 surround audio streams, 2-8 channels PCM

- multiple languages, audiences, grade levels

From simple start & play programs to sophisticated, menu-driven titles

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# DVD Video is *Interactive*

Menus allow easy navigation, sophisticated presentation of video

Powerful features like multiple angles and sub-pictures allow for sub-titles, graphic overlay, multiple choice Q & A, and multiple scenario presentation based on user input

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# DVD Video is *Simple* and Reliable

Turn it on, drop in a disc, and the program plays

Easy to use - near zero training costs

All you need is a player and a monitor

Stable format - no "version upgrades"
lower QA and Technical Support costs

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# DVD Video is Simple and *Reliable*

Industrial players are built to last in the field - high MTBF, long life motors, etc.

No device drivers, screen freezes - No operating system conflicts or hard drives failures

Does one thing and does one thing well: *play DVD Video discs*

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# DVD VIDEO IS
## *Portable*

- DVD VIDEO DISCS WILL PLAY ON BOTH PLAYERS AND PROPERLY CONFIGURED PCs
- DVD DISCS CAN BE "MIXED FORMAT" - CONTAIN VIDEO PARTITION & ROM PARTITION

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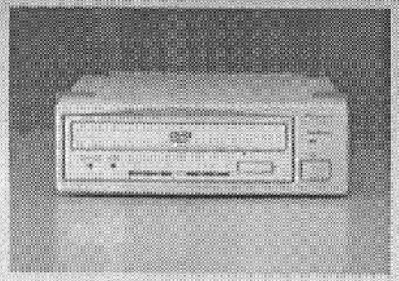
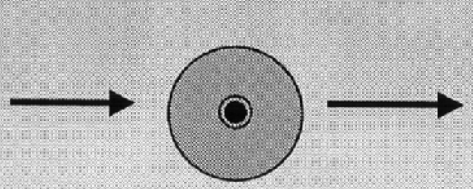
# DVD Video One-Off Discs Can Be Recorded

- DVD Authoring systems support DVD-R drives and create one-off discs
- Small runs, no need to master & replicate if you only need a few discs



Pioneer DVR-S201



Pioneer DVD-V7200

Pioneer

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# Challenges for Manufacturers

- Industrial strength DVD players for the professional, high end market
- Hardware Flexibility, to take full advantage of DVD Video format
- High performance devices with capabilities like frame accurate search, external sync & user input tracking

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# Challenges for Manufacturers

Multiple hardware interfaces for mouse, keyboard, barcode, touch screen, computer and button activated controls

*GOAL:* Allow producers and developers to create elegant user interfaces & deliver highly interactive solutions for professional applications

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# Industrial Applications

## Kiosks: Point of Purchase & Retail Sales

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KENMORE APPLIANCES, SEARS

DVD

# Industrial Applications

## Kiosks: Point of Information

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KENMORE APPLIANCES, SEARS

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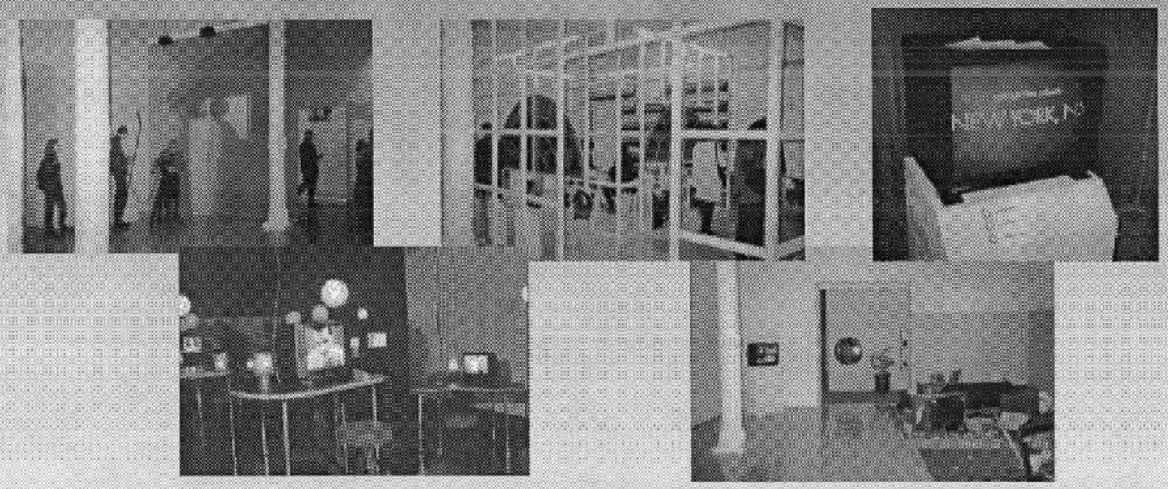
# Industrial Applications

- FINE ARTS MUSEUMS: GUGGENHEIM, SF MOMA




PREMISES EXHIBIT
OCTOBER 1998 - JANUARY 1999

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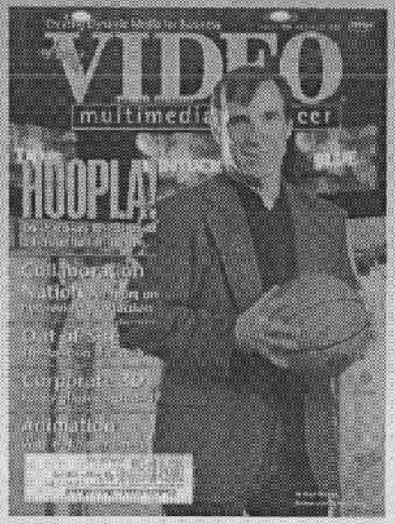
# Industrial Applications

## Theme Museums: UK Basketball Museum

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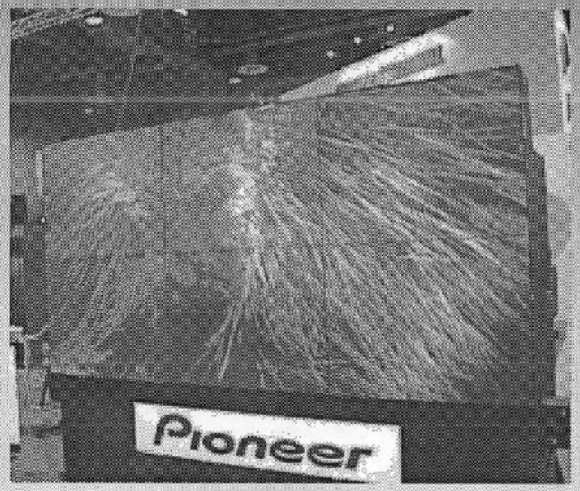
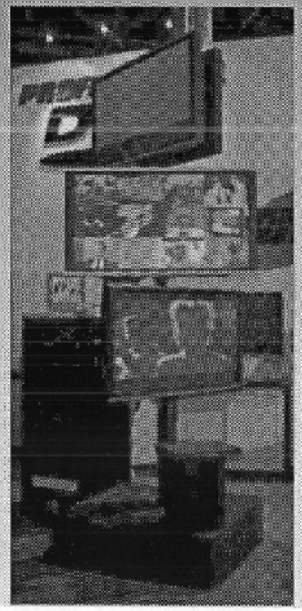
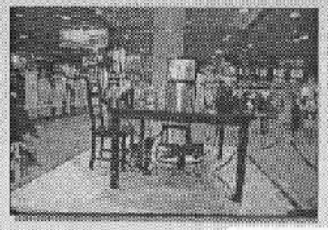
# Industrial Applications

## Video Wall and Public Displays



MIAMI INTL AIRPORT



NAB 99

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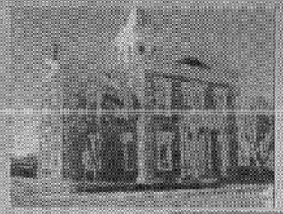
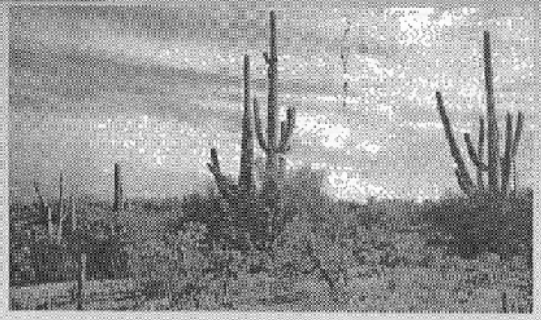
# Industrial Applications

## Tourism & Visitor Information



City View Hotel Room TV
Multiple Video Segments,
One Disc

Monterrey Scenic Bus Tours
Multiple Languages,
One AC-3 Stream



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# Industrial Applications

- Offer Opportunities for 3rd Party Development
  - Touch Screens
  - Button Controllers
  - Synchronized Multiple Player Control
  - And More

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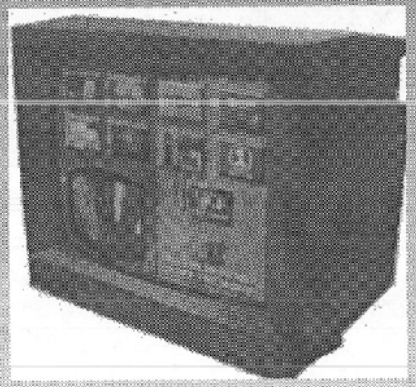
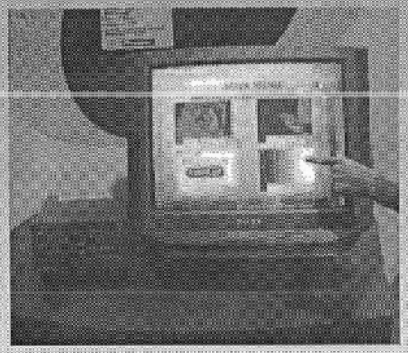
# 3RD PARTY DEVELOPMENT

- TOUCH SCREENS: CRTs & LCDs



QUESTA CORPORATION



NEUROLOGIC SYSTEMS

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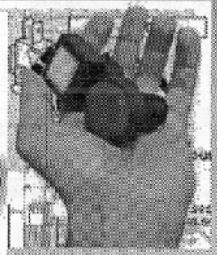
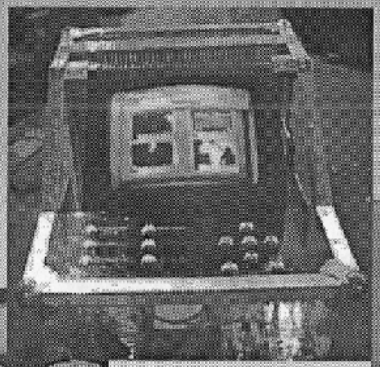
# 3RD PARTY DEVELOPMENT

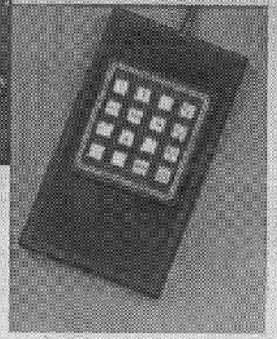
- CUSTOM BUTTON CONTROLLERS

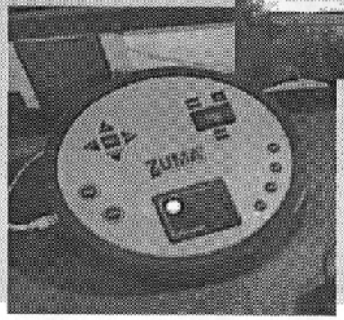


TECHNOVISION



PIONEER






ZUMA DIGITAL

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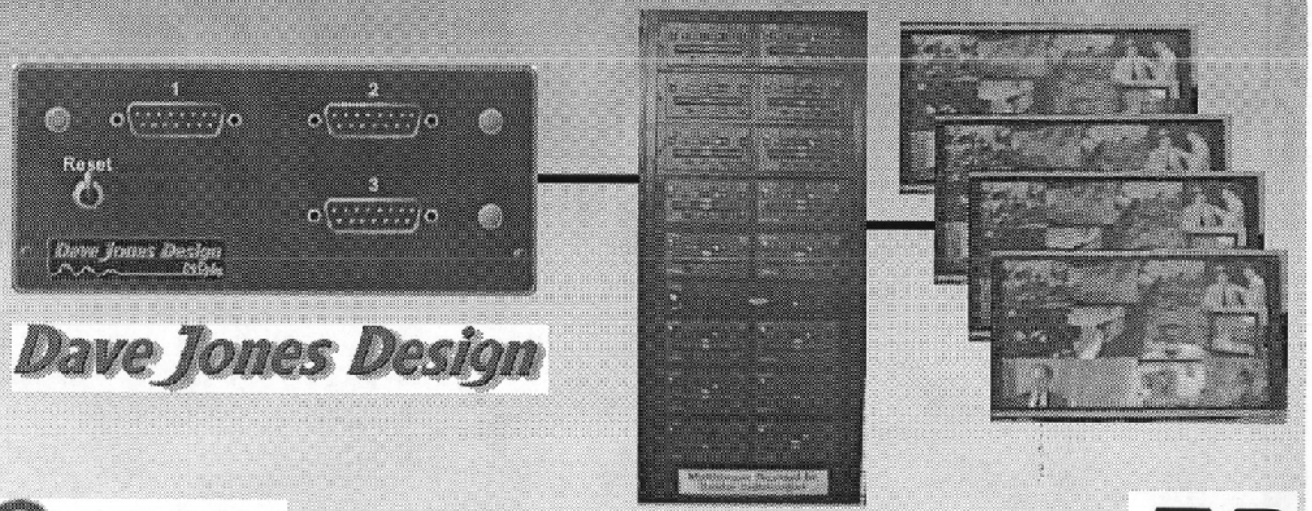
# 3RD PARTY DEVELOPMENT

- MULTIPLE PLAYER, SYNCHRONIZED CONTROLLERS




Dave Jones Design

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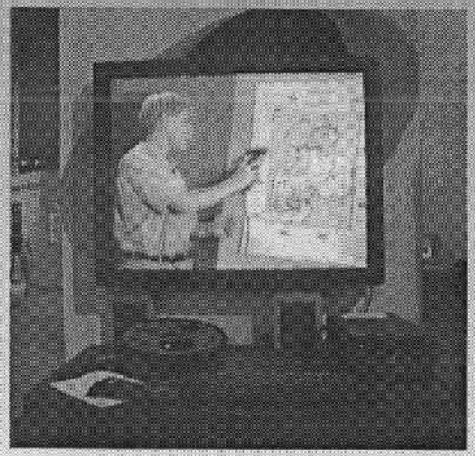
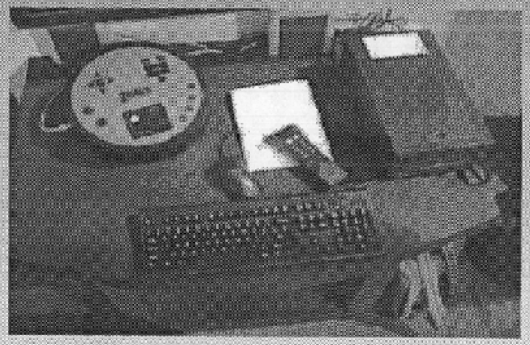
# Educational Applications

## Education & Training





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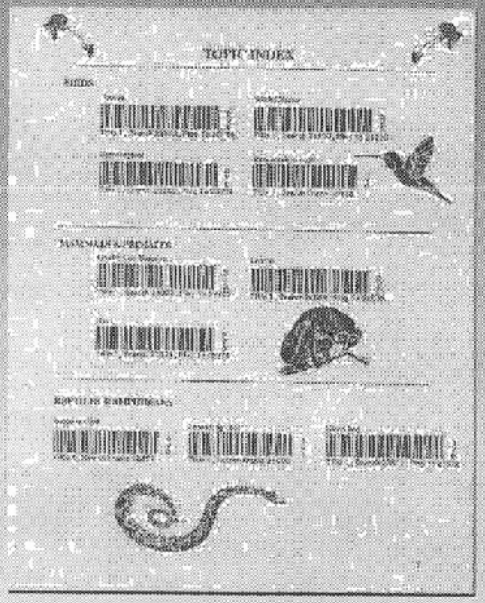
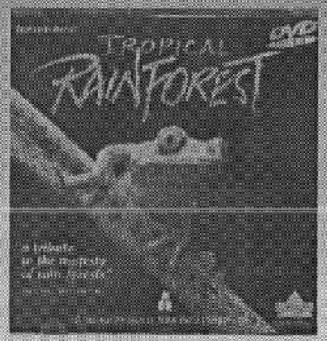
# Educational Titles

## DVD Bundle for Schools



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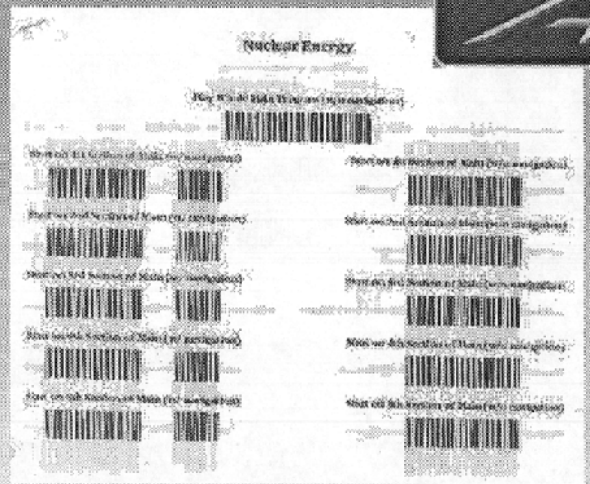
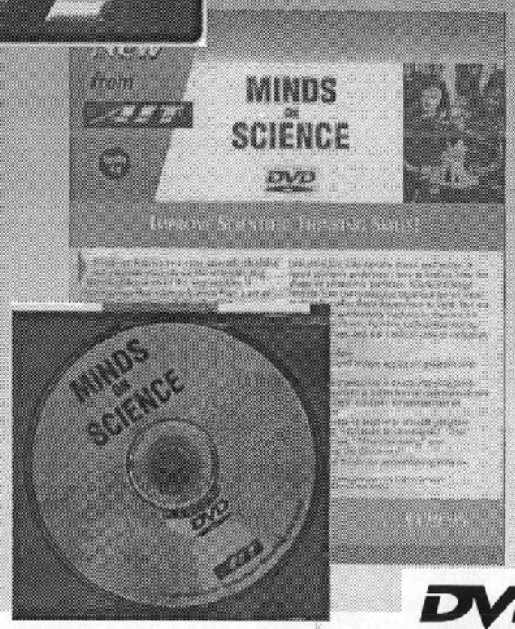
# Educational DVD-Video Titles

## Subject Based DVD Title



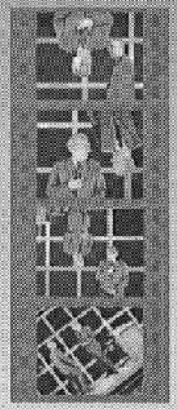

SCIENCE - MATTER & ENERGY

Pioneer

DVD

# Educational DVD-Video Titles

Ztek Co.
*Multimedia For Physics Education*



PHYSICS

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South-Western Educational Publishing

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PINE RIDGE PRODUCTIONS
Multimedia Programs for Social Studies

THEMATIC LITERATURE

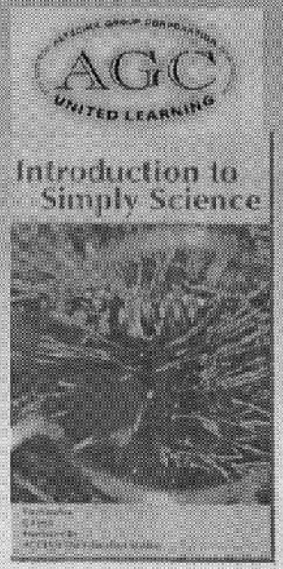
Phoenix Films/BFA Educational

SCIENCE

Pioneer

DVD

# Educational DVD-Video Titles



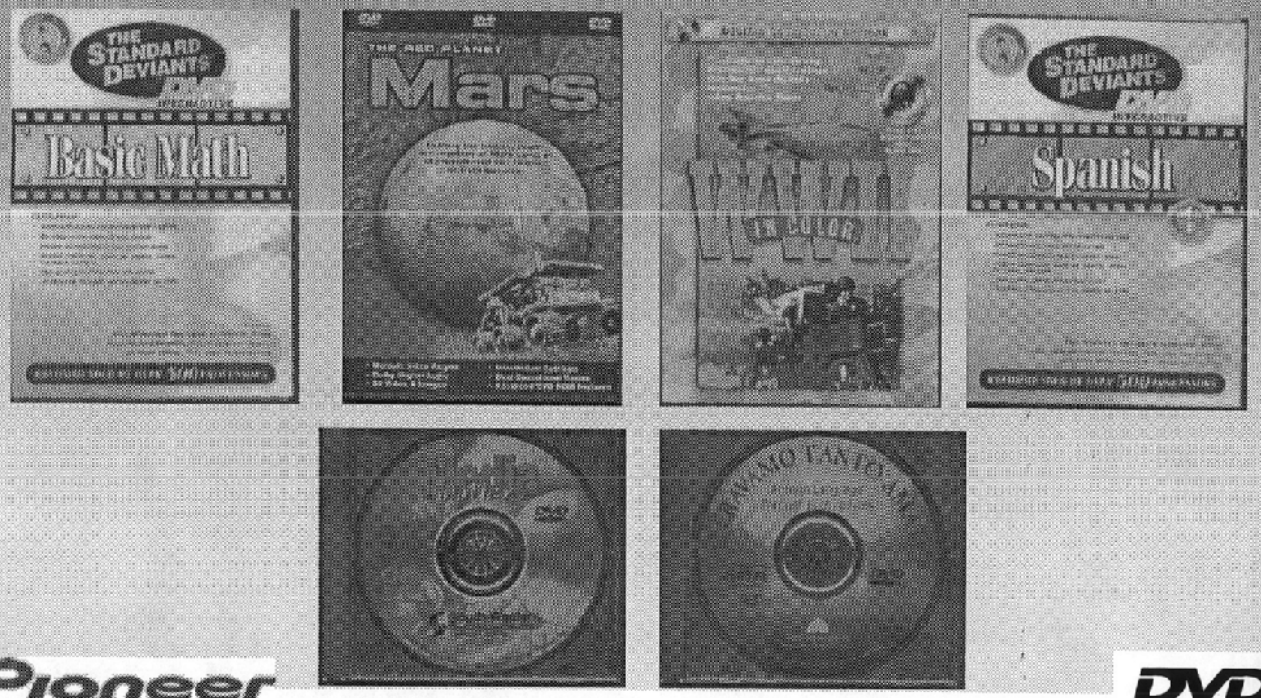
PIVOT POINT

DECISION DEVELOPMENT CORPORATION

Pioneer

DVD

# Educational DVD-Video Titles




Pioneer

DVD

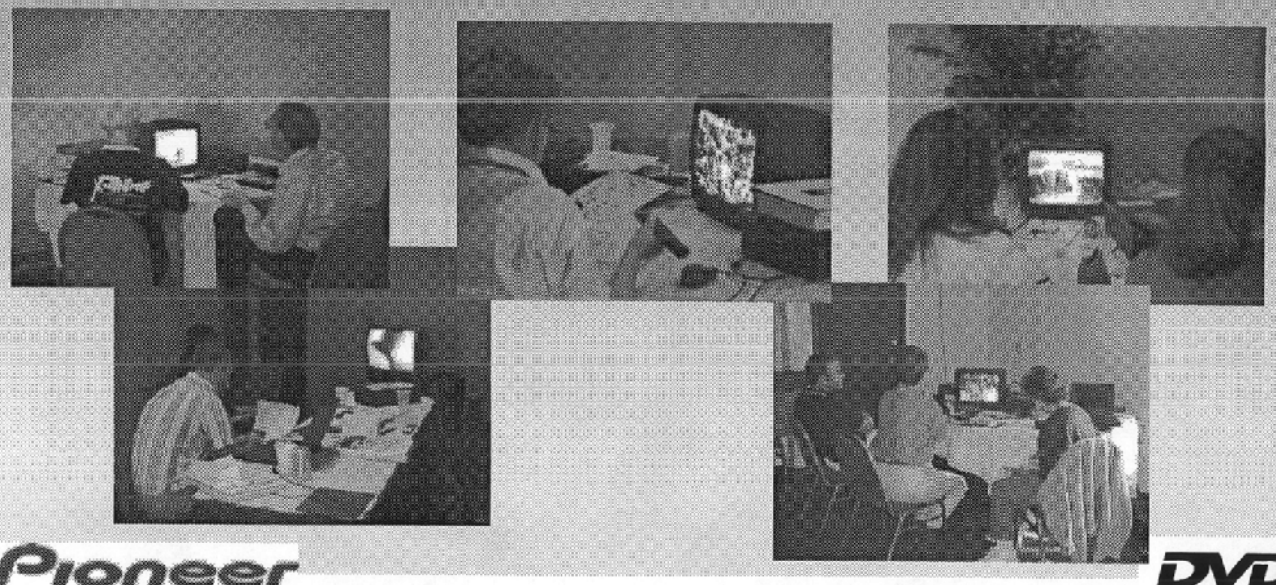
# General DVD-Video Titles

Pioneer

DVD

# DVD in Education

## Staff Development: Preparing DVD Lessons

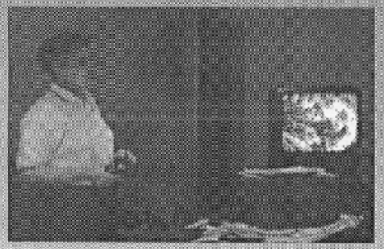


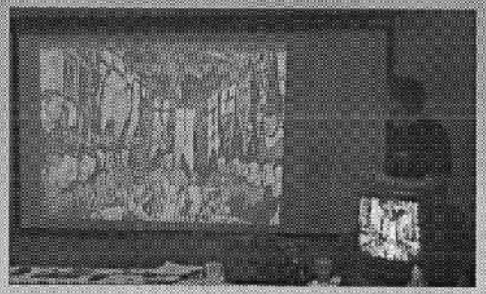
Pioneer

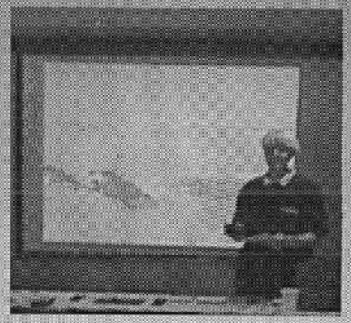
DVD

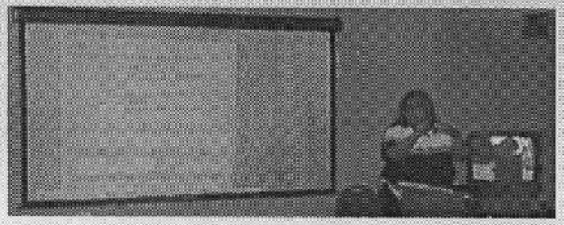
# DVD in Education

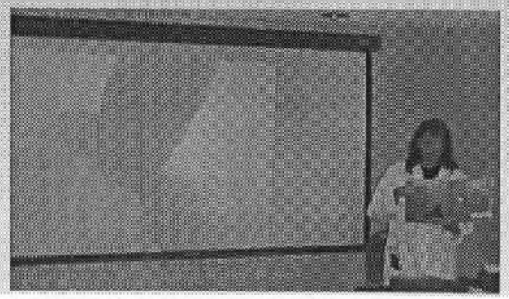
## Teaching with DVD-Video









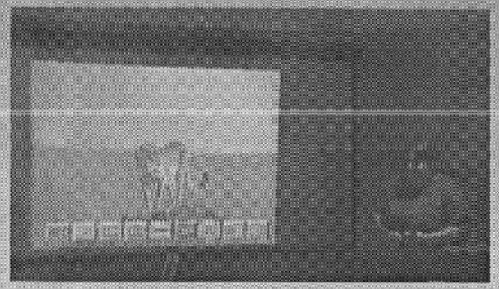


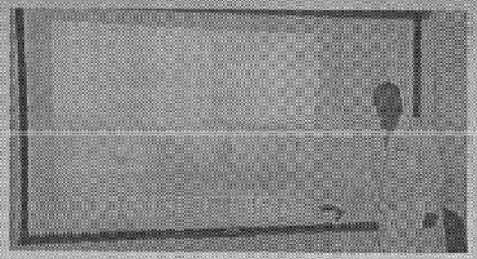
Pioneer

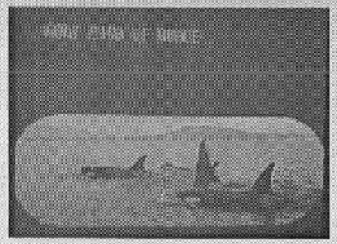
DVD

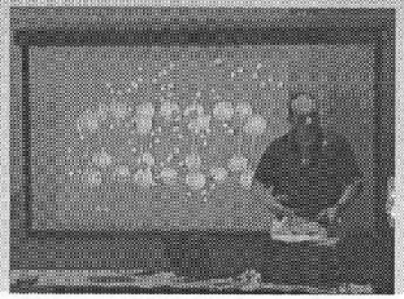
# DVD in Education

## Teaching with DVD-Video









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DVD

# DVD Industry Participants

- Content owners
  - *Hollywood companies & strong independents*
  - *publishers of TV videos*
  - *DVD-ROM publishers*
  - *non-consumer title publishers*
- Authoring studios
  - *in major European cities*
  - *increasing in number*
  - *bottlenecks delaying titles*

# DVD-ROM Disc Shipments

| | Disc Sales (m) |
|---|---|
| 1998 | <1 |
| 1999 | 4 |
| 2000 | 30 |
| 2001 | 100 |
| 2002 | 200 |
| 2003 | 360 |

# *DVD'99 Workshop*

## *Standards, Applications, and Technology*

**Dr. Graham Sharpless**

*General Manager Special Projects*
*Disctronics*

Southwater Business Park
Southwater
West Sussex
RH13 7YT
England

Phone: +44 1403 739600

**www.disctronics.com**

Graham Sharpless is responsible for the application of new technology within the Disctronics Group including overall co-ordination of DVD activities. He joined the company in 1993, after working for Philips, both in the UK and Holland, and for a multimedia company in London.

After gaining a BSc (Hons) in Physics and PhD at Durham University, Graham joined the UK Philips Research Laboratories. Following a period as project leader for research into home information systems, he moved to Philips Consumer Electronics, where, as Advanced Projects Group Manager, he was responsible for various consumer electronics R & D projects including optical discs, home communication systems, data broadcasting and personal computers. From this background Graham moved to Philips' headquarters in Eindhoven to work on the CD-i Green Book, in partnership with other companies in Europe, Japan and the USA.

Returning to the UK, Graham became Technical Director of New Media Productions in London, developing CD-i and CD-ROM applications for educational, entertainment and information purposes, some for blue chip companies. During this time he also co-authored the CD-i Designer's Guide.

In 1993, he joined Disctronics UK to set up the CD-ROM division and was responsible for authoring some of the first Video CD titles to be commercially available. This led in 1995 to heavy involvement in the development of DVD and, in late 1997, to the introduction of DVD manufacturing at Disctronics UK plant.

# DVD-Video Market Survey

- Main reasons for buying DVD:
  - *picture/audio quality*
  - *home cinema*
- 97% satisfied or very satisfied
- 52% also own widescreen TV
- Average use 3 times per week
- But more software needed

# Contents

- Are there opportunities for DVD in Europe?
- How is DVD-Video doing in Europe?
- How is DVD-ROM doing in Europe?
- Is there a DVD Industry in Europe?
- What about Eastern Europe?

# European DVD-Video Disc Sales

| | Disc sales (m) |
|---|---|
| 1998 | 4 |
| 1999 | 21 |
| 2000 | 51 |
| 2001 | 94 |
| 2002 | 140 |
| 2003 | 204 |

# European DVD Markets vs USA

- DVD-Video market forecasts by end 1999

| | *USA* | *Europe* |
|---|---|---|
| Titles available | 5,000 | 1000 |
| Players in use | >4m | 1m |
| Disc sales | 200m | >20m |

# DVD in Europe

- DVD sales growing significantly
- But one year behind USA
- Faster growth than CD and VCR
- Player prices falling as in USA
- Driven by home cinema ownership

# Home Cinema Ownership

| | Penetration % |
|---|---|
| 1998 | 8% |
| 1999 | 11% |
| 2000 | 15% |
| 2001 | 19% |
| 2002 | 24% |
| 2003 | 28% |

# DVD Production in Europe

Graham Sharpless
General Manager Special Projects
DISCTRONICS

# DVD-ROM Markets

- 8 to 10 times more DVD PCs than players
- DVD gaining momentum in PCs
  - *30% penetration in Europe by 2003*
- Will grow faster than DVD-Video
- CD-RW has delayed DVD adoption
- Few DVD-ROM titles available

# *DVD'99 Workshop*

## *Standards, Applications, and Technology*

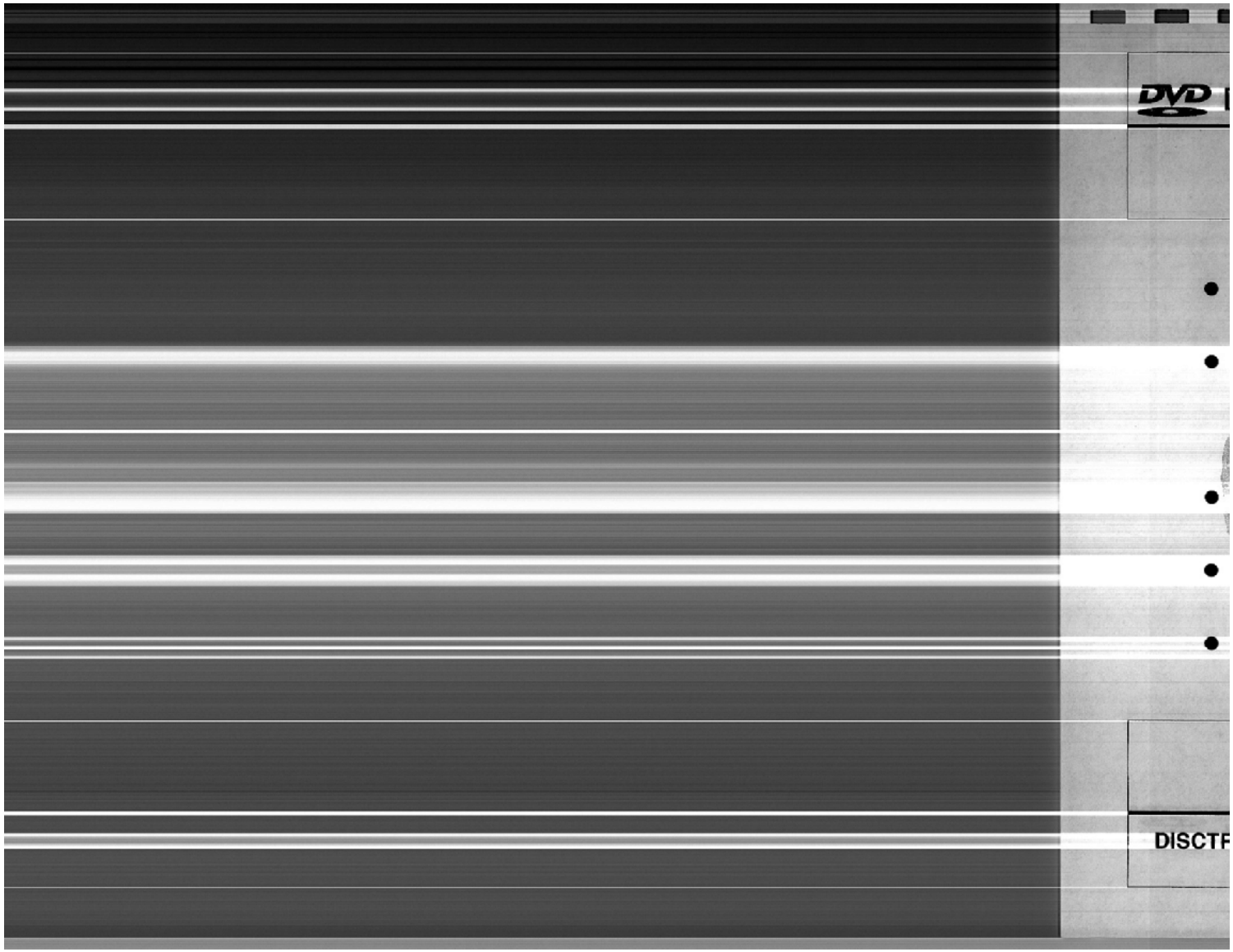
**Jim Taylor**

*Author*
*DVD Demystified*

www.dvddemystified.com

Jim Taylor is the author of DVD Demystified, the best-selling book about DVD technology, published by McGraw-Hill. Jim created the Internet DVD FAQ, writes articles and columns about DVD, serves as Technical Director for the DVD Association, and is considered one of the foremost experts of the industry. Jim has worked with interactive media for 20 years, developing educational software, laserdiscs, CD-ROMs, Web sites, and DVDs.

Formerly VP of Information Technology at Videodiscovery, an educational multimedia publishing company, Jim is now lecturing and consulting on DVD technology and is serving as the DVD Evangelist for Microsoft.


DVD
DISCTF

# DVD '99

END OF PRESENTATION

www.pioneerusa.com

www.tools4teachers.com

sbenedetto@pnmt.com

Pioneer

DVD

# DVD Industry in Europe

- Now able to support European needs
- Strongest in France, Germany & UK
- All sections of industry active in DVD
  - *Content owners*
  - *Authoring studios,*
  - *Replicators*
  - *Distributors*
- Supported by industry organisations

# Industry Issues in Europe

- Europe comprises different countries/cultures
- Rights ownership
  - *often different for each country*
- Language
  - *multi-language audio & subtitles needed*
  - *at least 3 language versions needed*
- Classification & censorship
  - *no single standard*
  - *governments not keen to harmonise*

# DVD Industry Participants

- Replicators
  - *major CD replicators now DVD*
  - *DVD-5 & DVD-10*
  - *some replicators now offer DVD-9 replication*
- Distributors & Retailers
  - *consumer electronics retailers*
  - *video & CD disc retailers*
  - *department stores*
  - *budget stores & supermarkets*
  - *rental outlets*

# DVD in the UK

- Soft launch Spring 1998
- Full launch October 1998
- Had to compete with digital TV
- First year growth 4x USA
- >150k DVD-Video players sold
- >2m discs sold (800 DVD-Video titles)
- 4,000 retailers & rental outlets

# European DVD Association

- EU's *Audiovisual Eureka* initiative
- Formally established in October 1999
  - *Disctronics one of 8 founder members*
- Open to active DVD companies
  - *authoring studios, content owners etc*
- Promote co-operation in Europe
  - *title rights across national boundaries*
  - *classification issues*
- Address technical & legal issues

# DVD in Eastern Europe

- DVD-Video also started in CEEC
  - *but at lower level than Western Europe*
- Some active companies eg in Czech Republic
- Low incomes (<$300 per month) inhibit sales
  - *aggravated by higher prices*
- Piracy a problem but is being tackled
- European DVD Association
  - *supporting industry in CEEC*

# UK DVD Industry Organisations

- British Video Association (BVA)
  - *actively promoting DVD-Video*
- DVD Committee
  - *setup by BVA to launch & then promote DVD-Video*
  - *website: www.dvd.org.uk*
  - *sample DVD as magazine covermount*
  - *leaflets, demonstrations, market information*
- BIVDA
  - *independent video companies moving into DVD*

# Conclusions

- DVD is growing fast, but 1 year behind USA
- Consumer satisfaction is very high
- The industry is able to support DVD in Europe
- DVD organisations helping promote DVD
- Eastern Europe progressing more slowly

# Sample CEEC Countries

- Czech Republic
  - *low sales but potential growth*
  - *Czech anti-piracy unit*
- Hungary
  - *very low sales*
- Bulgaria
  - *DVD unlikely while incomes remain low*

# About Disctronics

- DVD premastering & replication all formats
- Largest independent CD replicator in UK
- Plants in UK, France, Italy & USA
- Disctronics Fulfilment Services in UK
- Email: DVD@disctronics.co.uk
- Web: www.disctronics.com
- Disctronics Manufacturing (UK) Ltd
  Southwater Business Park, Southwater, West Sussex,
  RH13 7YT Tel: 01403 739600 Fax: 01403 732313

# *DVD'99 Workshop*

***Standards, Applications, and Technology***

**John Barker**

*Editor*
*Inside Multimedia*

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Smalley, Derby DE7 6EFUK

Phone: +44 1332 881779

**www.dvdsummit.com**

John Barker is editor of *Inside Multimedia*, a leading European newsletter for the interactive media industry which he founded in 1985. He also chairs the annual DVD Summit conference for Europe which is held in Dublin, Ireland.

# Closely-coupled Web-connected DVDs

DVD'99: Standards, Applications and Technology

National Institute of Standards and Technology

November 30 – December 1, 1999

# *DVD'99 Workshop*

***Standards, Applications, and Technology***

**Brand L. Niemann**

*Digital Librarian, Computer Scientist*
*U.S. Environmental Protection*

2822 US EPA Headquarters
401 M Street, S.W.
Washington, DC 20460

Phone: 202 260-2570

**www.sdi.gov/diglib.htm**

Brand Niemann is a digital librarian and computer scientist with the *U.S. Environmental Protection Agency.* He has been with the agency for 19 years and has received awards and recognitions from EPA, Computerworld-Smithsonian, the U.S. Department of the Interior and the U.S. Geological Survey, and the President's Council on Sustainable Development. His Digital Library of the State of the Environment is found at www.sdi.gov/diglib and on the new Web-connected CD-ROM "Science for a Changing World" from the USGS.

He is a member of the Board of Directors of the SIGCAT Foundation where he has been involved in organizing sessions for the annual meetings since 1994 and in the SIGCAT Directory of Federal CD-ROMs. He has been involved in the recent GPO/NCLIS study of Government Information products for EPA and an invited presenter at the Federal Depository Library Annual Conference the past two years on Web-connected CD-ROMs with government data and information. His recent article on Web-connected CD-DVDs is found at ww.PlanetIT.com/docs/PIT19990714S0011

# Web-connected CD/DVDs

- Web-Enabled CDs Mean Fast, Current Data
  http://www.PlanetIT.com/docs/PIT19990714S0011
  - Microsoft Encarta Reference Suite 99 – Best of Show at DVDPro'99
  - Creating DVD Hybrids, Ralph LaBarge, DVD Pro '99
  - HyperDVD from Hyperlock Technologies
  - "Window on the World" CD in the London Sunday Times (1.5 million)
  - "NIMA in a Box" (static geospatial data on CD-ROM with URLs to dynamic data on NIMA Web site)

# Contributors

- Peter Gattuso – U.S. Environmental Protection Agency, Office of Chemical Emergency Preparedness and Prevention
- Norm Gunderson, U.S. Geological Survey, Mapping Division
- Ralph LeBarge – AlphaDVD, Managing Partner
- Paul Manka – U.S. Bureau of the Census, Products and Services Staff
- Jerry McFaul – U.S. Geological Survey, Geologic Division, and President of the SIGCAT Foundation
- Brand Niemann, U.S. Environmental Protection Agency, Office of Environmental Information

# LandView: Brief History

- LandView I – TIGER/Line Data Viewer
- LandView II – 11 CD-ROMs (3/1995)
- LandView III – 11 CD-ROMS (12/1997)
- LandView III – About 6 CD-ROMs for special applications (1997-present)
- LandView III – One DVD with additional databases (12/1998)
- LandView IV – One DVD (mid-2000)
- LandView 2000 – One DVD (2001?)

# LandView

- A geographic reference like an atlas
- Provides Federal environmental and Census data on maps
- Provides information about the reactivity of 4,300 chemicals or mixtures of chemicals
- Calculates vulnerable zone distances based on the Risk Management Program Guidance for Offsite Consequence Analysis

# Closely-coupled

- LandView III Y2K (7/9/1999)
  - Y2K Compliant
  - Run on >=100 MHz PCs
  - Querying EPA's EnviroFacts database on the Web
- LandView III on DVD
  - New setup.exe for querying EPA EnviroFacts and linking to Census and USGS Web sites
  - Addition of data layers

# LandView: URLs

- AlphaDVD – http://www.usaondvd.com
- Census Bureau – http://www.census.gov/geo/www/tiger/landview.html
- EPA – http://www.epa.gov/swercepp/cameo/what.htm
- SIGCAT – http://www.sigcat.org/usaondvd.htm
- USGS – http://cdserver.er.usgs.gov/lviii.htm

# LandView IV

- Use File Maker 4 for same new 32-bit interface on both Windows and Mac
- Internet connectivity to Census, EPA, and USGS
- Improved color ramps for thematic mapping
- Updated road layer based on TIGER/Line 1998
- Redesigned radius calculation based upon 5 million Census blocks
- Shapefile format import and export
- Video tutorials

# Web-connected

- CAMEO (Computer-Aided Management of Emergency Operations) – http://www.epa.gov/swercepp/cameo/
- Technical Documentation and Tutorials
  - http://www.census.gov/geo/www/tiger/lv3tech.html
- Metadata and Databases
  - http://cdserver.er.usgs.gov/lviii.htm
- Distribution on the Right-To-Know Network
  - http://www.rtk.net/landview/

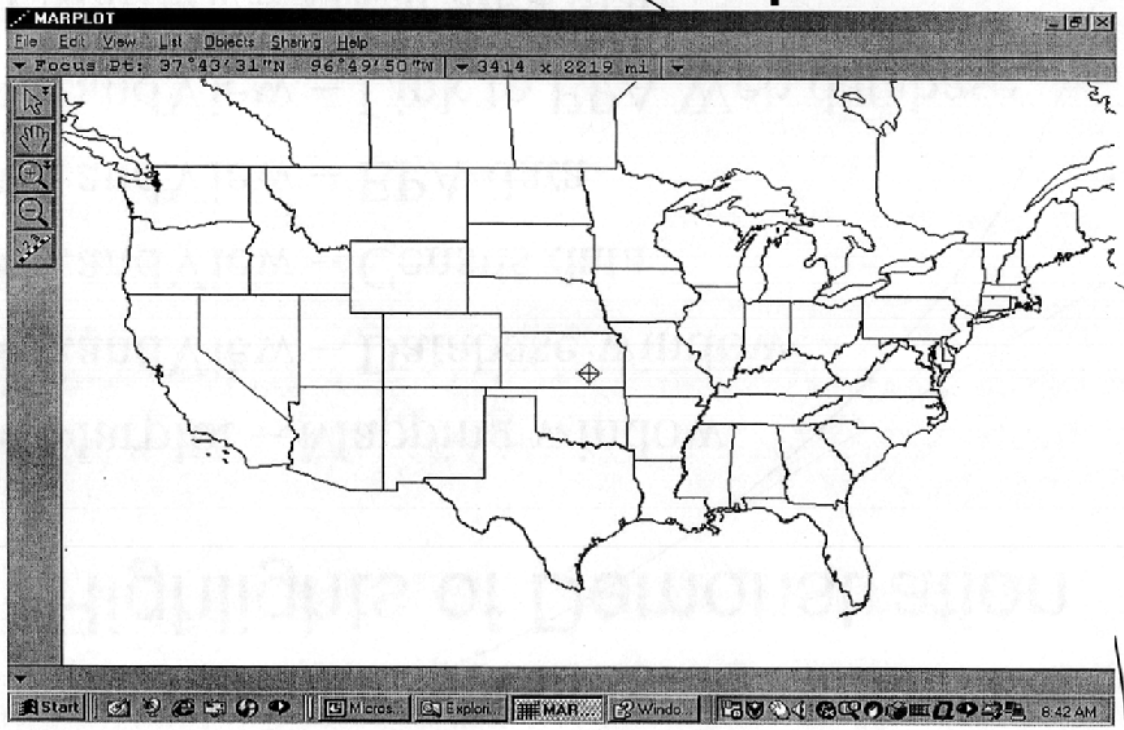
# Some Uses of DVD

- Multiple CD-ROM Products
  - Multimedia Lab: 9 CDs (some with multiple versions)
  - Toxics Release Inventory: 2 CDs
- CDs and Web Content
  - LandView Warehouse
  - FedStats Warehouse
- Environmental Data Integration
  - Collect, manage, disseminate and archive
  - E-journal record of reproducible results

## Re-engineering EPA Data and Information

- Office of Environmental Information
  - Collection (and archive)
  - Management
  - Dissemination
- The right information in the most efficient way for quality integration and access

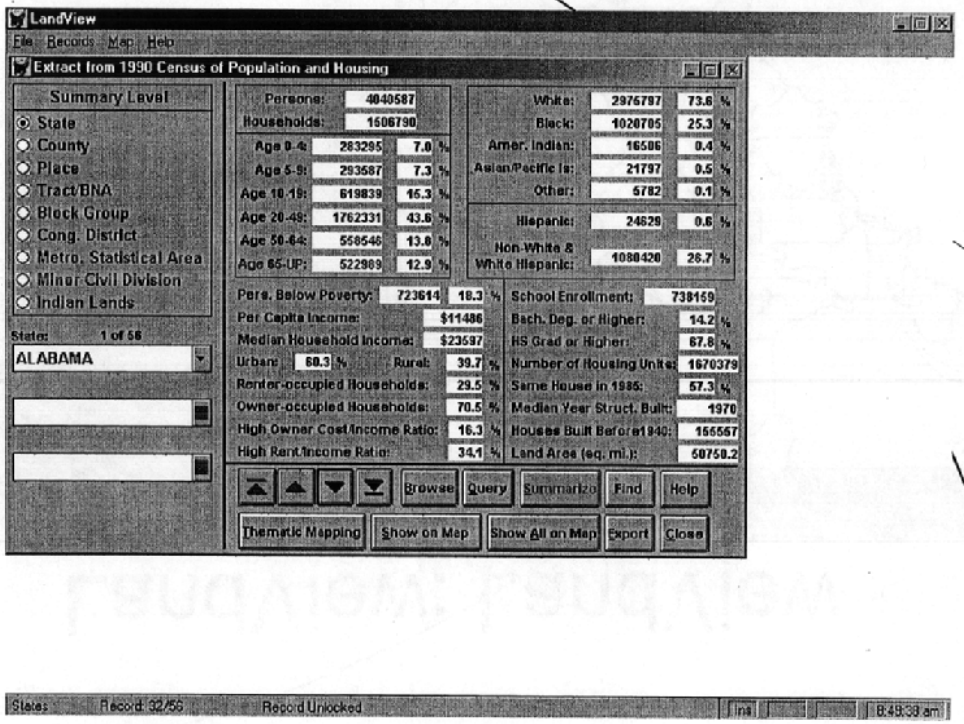
# LandView: Marplot



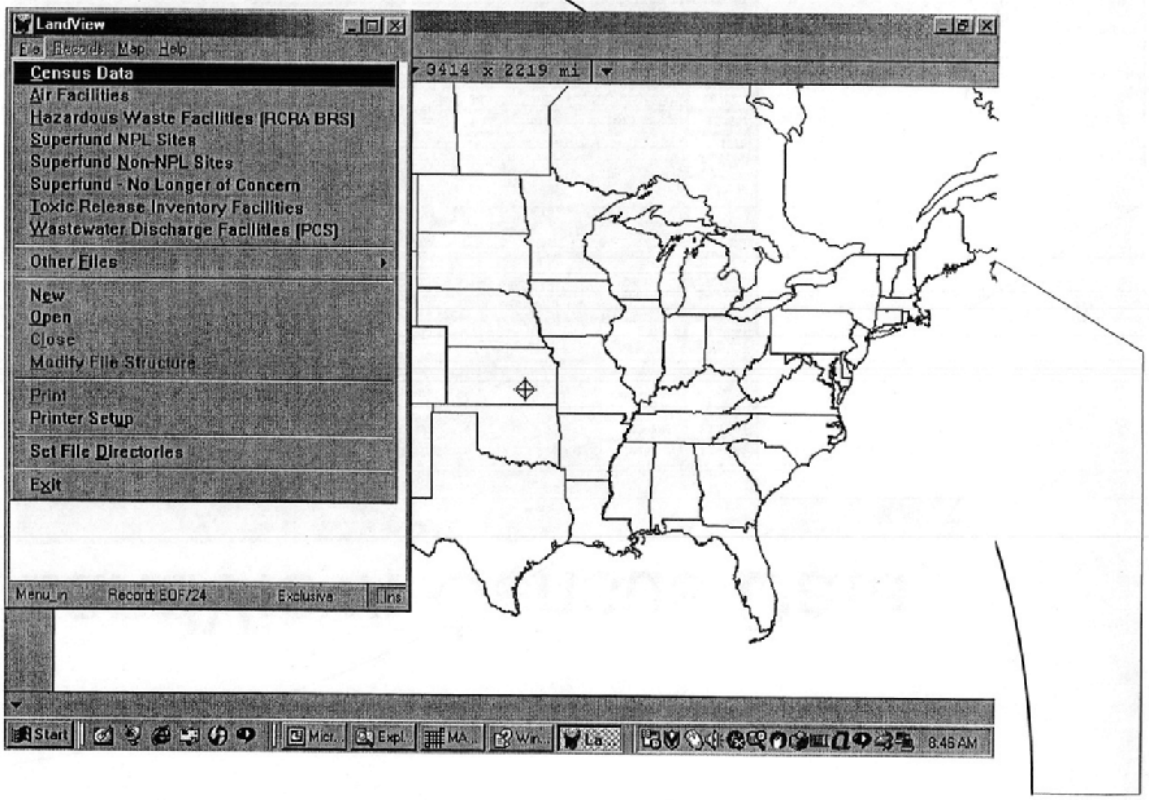
# Highlights of Demonstration

- Marplot – Mapping window
- LandView – Database window
- LandView – Census data
- LandView – EPA data
- LandView – Link to EPA Web database
- Marplot – Local area map

# LandView: Census Data



# LandView: LandView



# LandView: Link to EPA Web Database

FII Query Results - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Forward Stop Refresh Home Search Favorites History Mail Print Edit Discuss Translate

Address http://www.epa.gov:9966/envirodcd/owa/fii_web.report?facility_uin=NED981713837 Go

Links Customize Links Free Hotmail My Freserio MyAltaVista MyCity Search Service and Support Shopping

Hotmail - The World's FREE Web-based E-mail
http://www.microsoft.com/isapi/redir.dll?...

EPA United States Environmental Protection Agency

Envirofacts Warehouse — Facility Information

Overview | EZ Query | Query | Model | Feedback | EF Home

## FII Query Results

**Page No. 1**

EPA FACILITY ID: Equal To: **NED981713837**

---

**Note:** Click on the underlined EPA Facility ID value to view a detailed multisystem report for the facility. Click on the underlined SYSTEM ID to view a detailed facility information report for the Program Facility.

Go To Bottom Of The Page

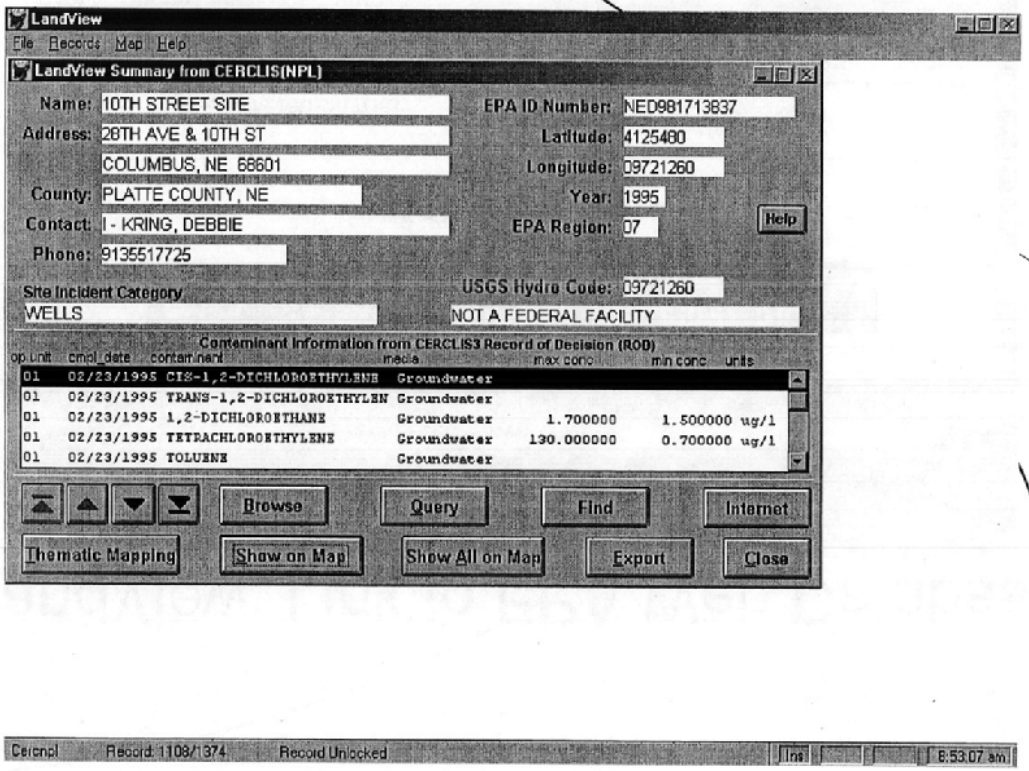
---

EPA FACILITY ID: Click NED981713837 to view detailed environmental information for the facility.
FACILITY NAME: 10TH STREET SITE

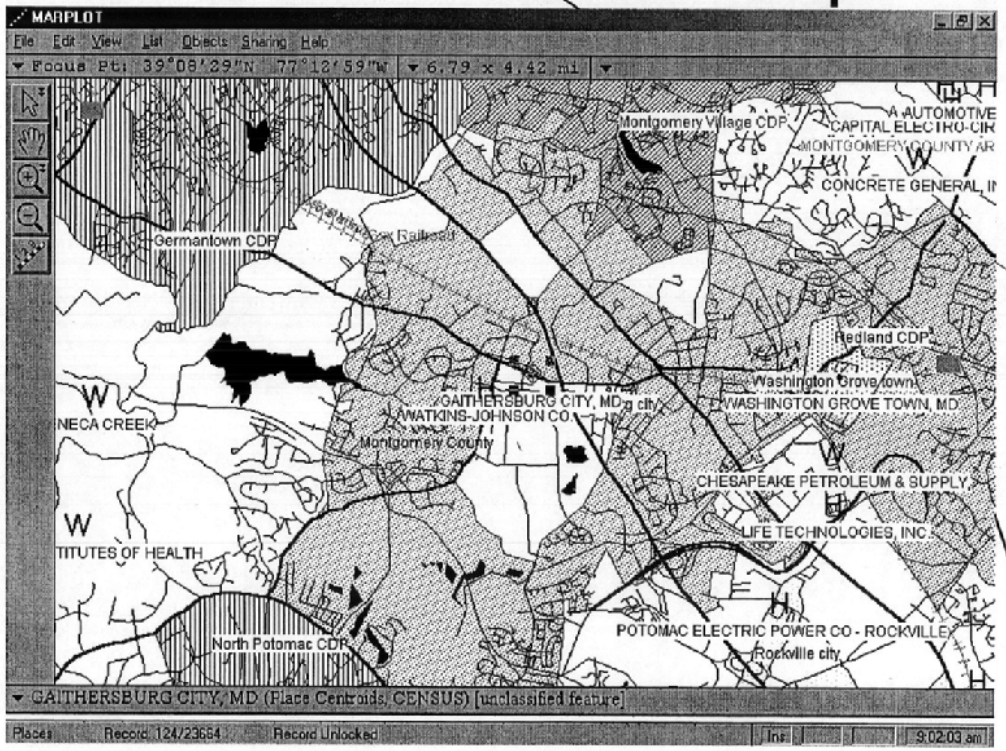
List of National System Records

Cercnpl Record: 1108/1374 Record Unlocked Ins 8:54:49 am

# LandView: EPA Data



# LandView: Local Map



# *DVD'99 Workshop*

***Standards, Applications, and Technology***

**Tony Jasionowski**

*Director of DVD Technology*
*Panasonic DVD Office*

2 Research Way
Princeton, NJ 08540

Phone: 609 734-8800

**www.panasonic.com**

## The Development Standard

Hollywood Advisory Group

Leading computer manufactures - Apple, Compaq, Dell, Fujitsu, HP, Hitachi, IBM, Intel, Intergraph, Microsoft, NEC, SGI, Sun, Unisys, others

Tested by 20 different system, drive, media manufactures -- prior to adoption

Adopted by JIS, ECMA

Standards supervised by 6 different testing labs around the globe

Panasonic

## What is the Standard?

Must allow random write/rewrite

Must be backward read-compatible with earlier technologies - CD-ROM, CD-R, CD-RW, CD-Audio, CD-Video

Must be forward read-compatible - DVD-ROM, DVD-Audio, DVD-Video, DVD-R, 2.6GB DVD-RAM

Defect management must be included

Use of cartridge/caddy optional

Must provide for copy protection

Must provide high transfer rates

Must be extensible for the future

Panasonic

## DVD-RAM Features

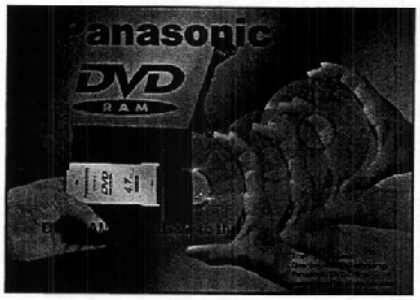
| 2.6/5.2GB DVD-RAM | 4.7/9.4GB DVD-RAM |
|---|---|
| Huge Rewriteable Capacity | Huge Rewriteable Capacity |
| - 2.6GB single-sided disc | - 4.7GB single-sided disc |
| - 5.2GB double-sided disc | - 9.4GB double-sided disc |
| 11.08 Mbit/sec transfer rate | 22.16 Mbit/sec transfer rate |
| | Writes/reads 2.6/5.2GB DVD-RAM |

PLUS

**Broad Media Interchangeability**
- Reads DVD-ROM, DVD-Video, DVD-R media
- Reads CD-ROM, CD Audio, CD-R, CD-RW and video CDs
- New DVD-ROM drives read DVD-RAM discs

**Ideal for Video, Robust Multimedia Applications**
- Fast, random access
- A single solution for storing, editing, updating, rewriting
- More than 100,000 write/rewrite cycles
- .008¢/MB storage cost
- DVD titles won't deteriorate over time

Panasonic



## DVD-RAM...The Standard for Tomorrow's Storage

The random-access rewritable storage standard established by the DVD Forum

Supported by:

- 215+ DVD-Forum Members
- 150+ Software, System Products
- 2000+ Content Developers

Available from - 3 drive manufactures, 5 media producers, 25 subsystem producers, major computer manufactures

Tested, proven compatibility, growth path for tomorrow

Panasonic

## The Growing Need

Storage requirements are out of control--document imaging, e-banking, education, science, e-medicine, video and digital security

Killer App #1 - audio & video in e-mail

Killer App #2 - the Internet--growing at 10%+ per month, reaching 300 million users by 2002 who will drive at least 2PB (2,000TB) of traffic ... per month

Panasonic

## Increasing Demand for Storage Capacity

**Multimedia Content**

- Storage-intensive
- Internet is a source of content

| | |
|---|---|
| 1 page ASCII text | 3KB |
| 1 page Fax | 50KB |
| 1 page Color image | 5MB |
| 1 min. CD Audio | 30MB |
| 1 min. MPEG-2 Video | 50MB |

exchange
publish
distribute
record
archive
backup

Panasonic

## Applications

**DVD-RAM Drive Applications**

- Multifunctional storage device
- Backup/secondary storage
- Internet data storage
- Small software distribution
- Archive/personal archive
- Video conference, message storage

**DVD-RAM Player**

- Video playback
- DVD recorder
- DVD camcorder
- Car navigation

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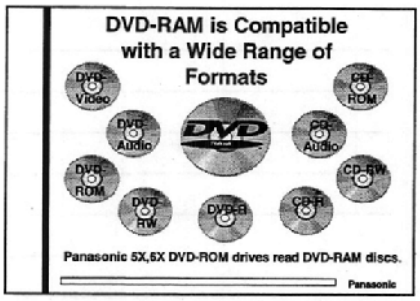
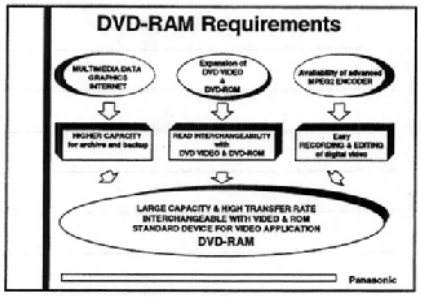
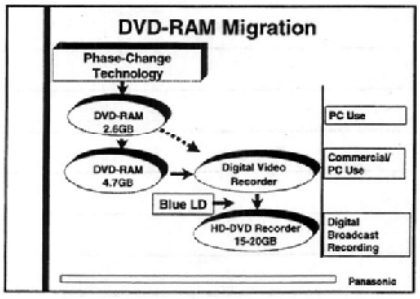
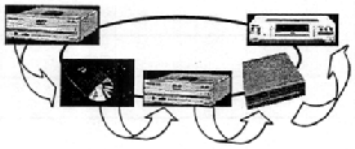

DVD-RAM is Compatible with a Wide Range of Formats
DVD Video
CD ROM
DVD Audio
CD Audio
DVD ROM
CD-RW
DVD RW
DVD-R
CD-R
Panasonic 5X,6X DVD-ROM drives read DVD-RAM discs.
Panasonic

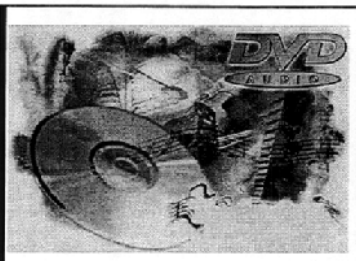

DVD-RAM Requirements
MULTIMEDIA DATA GRAPHICS INTERNET
Expansion of DVD VIDEO & DVD-ROM
Availability of advanced MPEG2 ENCODER
HIGHER CAPACITY for archive and backup
READ INTERCHANGEABILITY with DVD VIDEO & DVD-ROM
Easy RECORDING & EDITING of digital video
LARGE CAPACITY & HIGH TRANSFER RATE
INTERCHANGEABLE WITH VIDEO & ROM
STANDARD DEVICE FOR VIDEO APPLICATION
DVD-RAM
Panasonic


DVD-RAM Migration
Phase-Change Technology
DVD-RAM 2.6GB
DVD-RAM 4.7GB
Digital Video Recorder
Blue LD
HD-DVD Recorder 15-20GB
PC Use
Commercial/ PC Use
Digital Broadcast Recording
Panasonic

## DVD Solutions for Mac, Wintel, TV



Panasonic

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DVD AUDIO

- DVD-Audio standard approved Q3 1999
- Every content developer is preparing offerings
- Drives from multiple suppliers in stores by end of Q1 2000
- Annual drive sales should exceed 1.5 million units by end of 2000

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## Translating Today's 4.7GB* Capacity

- 4,700 full-color pictures (640x480, 24 bit/pixel)
- 210 minutes of compressed MPEG-2 DSS satellite-quality video
- 120 minutes of compressed MPEG-2 theater-quality video
- 7+ hours of CD-quality audio
- 400,000+ documents or 8 four-drawer filing cabinets

* per side

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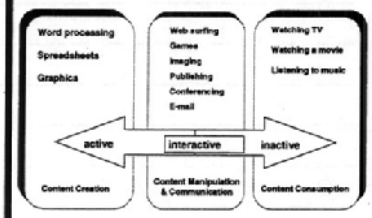
## The Changing Computing Environment

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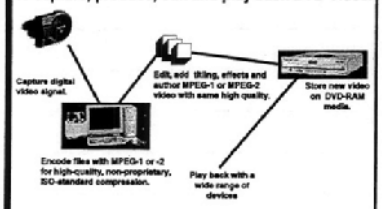
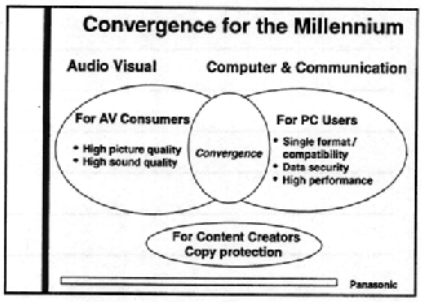
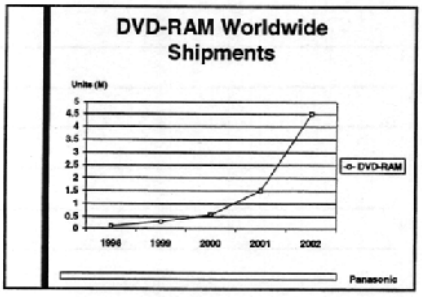
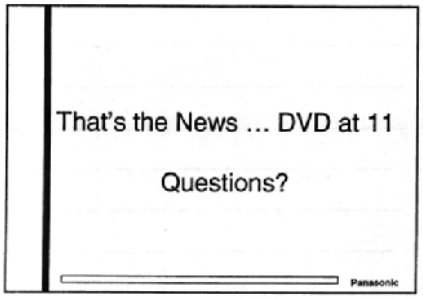
## With DVD-RAM, almost anyone can afford the tools to capture, produce, edit and play back DVD-Video.

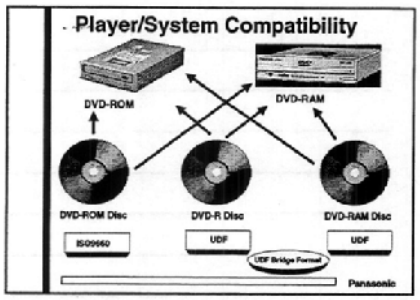


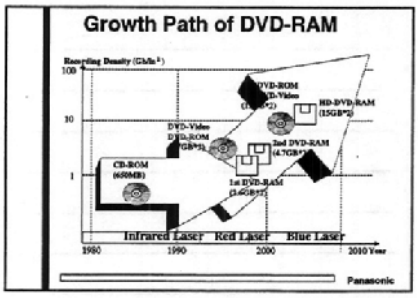

Panasonic

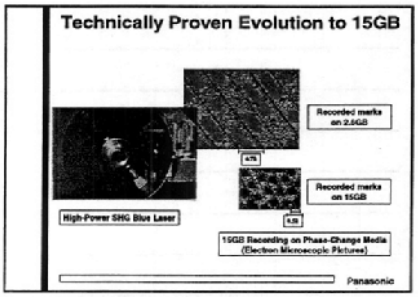

Convergence for the Millennium
Audio Visual
Computer & Communication
For AV Consumers
• High picture quality
• High sound quality
Convergence
For PC Users
• Single format/ compatibility
• Data security
• High performance
For Content Creators
Copy protection
Panasonic


DVD-RAM Worldwide Shipments
Units (M)
5
4.5
4
3.5
3
2.5
2
1.5
1
0.5
0
1998
1999
2000
2001
2002
DVD-RAM
Panasonic


That's the News ... DVD at 11
Questions?
Panasonic


Player/System Compatibility
DVD-ROM
DVD-RAM
DVD-ROM Disc
DVD-R Disc
DVD-RAM Disc
ISO9660
UDF
UDF
UDF Bridge Format
Panasonic


Growth Path of DVD-RAM
Recording Density (Gb/in²)
100
10
1
DVD-ROM
HD-DVD-RAM
(15GB*5)
DVD-Video
DVD-ROM
2nd DVD-RAM
(4.7GB*1)
CD-ROM
(650MB)
1st DVD-RAM
Infrared Laser
Red Laser
Blue Laser
1980
1990
2000
2010 Year
Panasonic


Technically Proven Evolution to 15GB
Recorded marks on 2.6GB
Recorded marks on 15GB
High-Power SHG Blue Laser
15GB Recording on Phase-Change Media
(Electron Microscopic Pictures)
Panasonic

# *DVD'99 Workshop*

***Standards, Applications, and Technology***

**Mark Ely**

*Director of Product Marketing*
*Sonic Solutions*

101 Rowland Way
Novato, CA 94945

Phone: 415-893-8000

**www.sonic.com**

Mark Ely is Director of Product Marketing for Sonic Solutions. He is responsible for bringing Sonic DVD Creator, the first commercial DVD Production system, to market. With a background in digital video, digital audio, and high-speed networking systems, Mr. Ely has been working to develop the tools and techniques required to create dynamic interactive content for the DVD medium

Since its founding in 1994, InfoValue has achieved many outstanding milestones, including shipping the world's first Windows NT-based video-on-demand software in January 1995 and receiving Byte Magazine's Best of PC Expo 97 Finalist Award. During this time, InfoValue also began providing comprehensive video solutions to Army and Navy for their high-tech training, and partnered with Intel to achieve a record-setting 600Mbps or higher video streaming throughput with an Intel PC server.

InfoValue's flagship product, QuickVideo Suite, is a comprehensive suite of products that leverage vindows NT capabilities for video-on-demand, video multicast, video Intranet, video library, video simulcast, and video distribution.

# *DVD'99 Workshop*

## *Standards, Applications, and Technology*

**Dr. Monsong Chen**

*President & CEO*
*InfoValue Computing, Inc.*

4 Westchester Plaza
Elmsford, NY 10523

Phone: 914 345-5980

**www.infovalue.com**

Dr. Monsong Chen founded InfoValue Computing, . in 1994 to pursue the rapidly expanding markets of network video computing.

Prior to founding InfoValue, Dr. Chen worked for IBM in various roles, ranging from Research Staff Member at IBM T. J. Watson Research Center to Senior Manager at IBM Networked Applications Services Division (NASD).

During the nearly 10 years he was with IBM, Dr. Chen developed the architecture and the advanced servers for collaborative business services using real-time video conferences and shared applications over high-speed, packet-switched networks. He also developed an early model desktop video conference-based collaboration system, and carried out leading-edge research in computer networking, including network architecture, performance analysis, optimization, protocol engineering, optical networking, and parallel processing of large communications software.

Dr. Chen holds five international patents in computer network and multimedia technology. He has also published more than 40 technical articles in books, journals, and conference proceedings in the areas of application systems, multimedia technology, and computer networks.

Dr. Chen received his Ph.D. in 1985 from Polytechnic Institute of New York, Brooklyn, NY; an MSEE in 1982 from University of Washington, Seattle, WA; and a BSEE in 1978 from National Taiwan University, Taipei, Taiwan.

# DVD Hybrids

November 1999

Ralph LaBarge
Alpha DVD

Alpha DVD
3109 Arrowhead Farms Rd, Gambrills, MD 21054

# *DVD'99 Workshop*

***Standards, Applications, and Technology***

**Ralph LaBarge**

*Managing Partner*
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Ralph LaBarge is an independent DVD-Video, DVD-ROM and Hybrid DVD title developer based in Gambrills, Maryland. His recent projects include "AVIA Guide to Home Theatre", "Earthlight Special Edition", "Mars: The Red Planet" and "USA on DVD". Mr. LaBarge, who writes a DVD column for DV Magazine, can be reached via email at rlabarge@alphadvd.com.

# DVD Technology Overview

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# Agenda

- DVD Technology Overview
- DVD-Video Overview
- DVD-ROM Overview
- Hybrid DVD
  - Overivew
  - Hybrid DVD Sample
- WebDVD
  - WebDVD Overview
  - WebDVD Sample
- Questions & Answers

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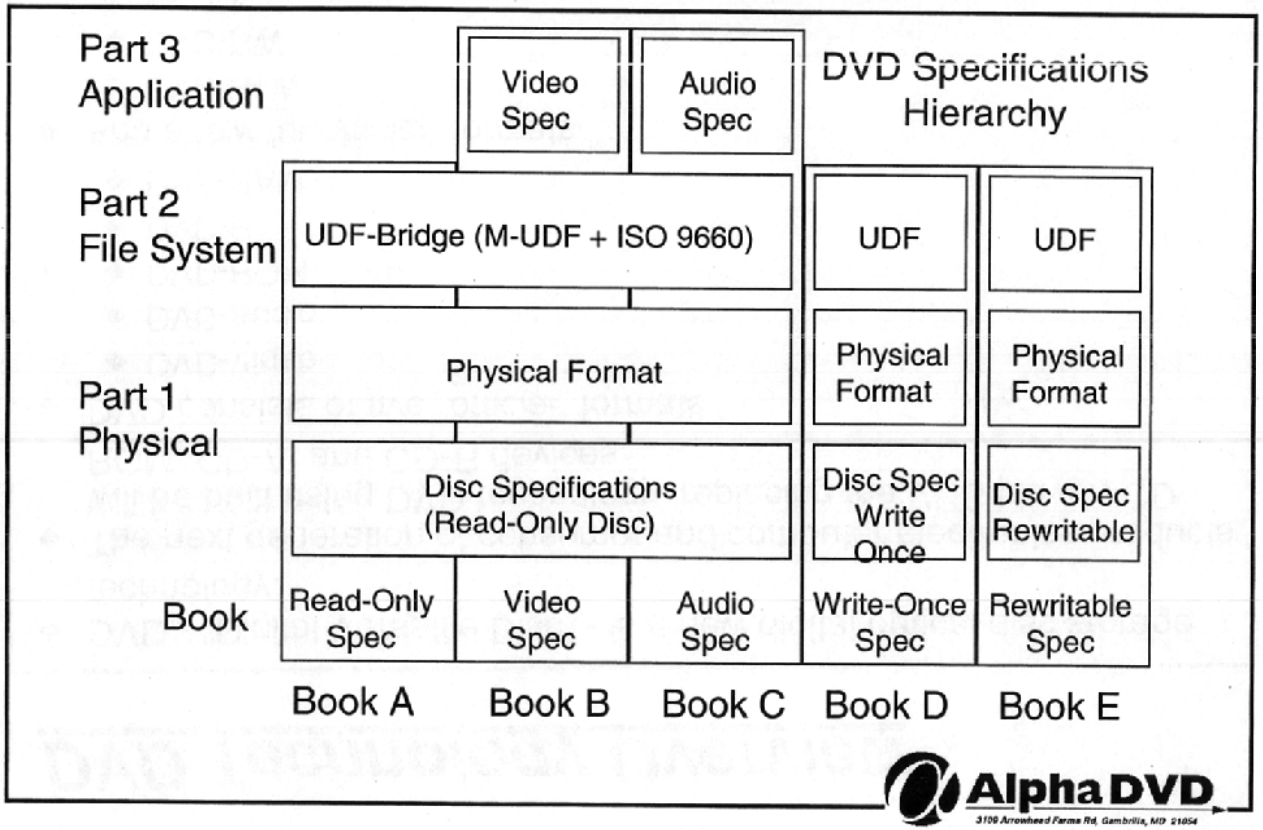
# DVD Technology Overview



# DVD Technology Overview

- DVD - "Digital Versatile Disc" - is a new digital optical disc storage technology.
- The next generation of consumer and computer electronics products will be built using DVD technology, replacing the VHS player, CD-ROM, CD-A, and CD-R devices.
- DVD consists of five "official" formats
  - DVD-Video
  - DVD-Audio
  - DVD-ROM
  - DVD-R
  - DVD-RAM
- And a few "unofficial" formats
  - DVD R+W
  - DVD-RW
  - SACD

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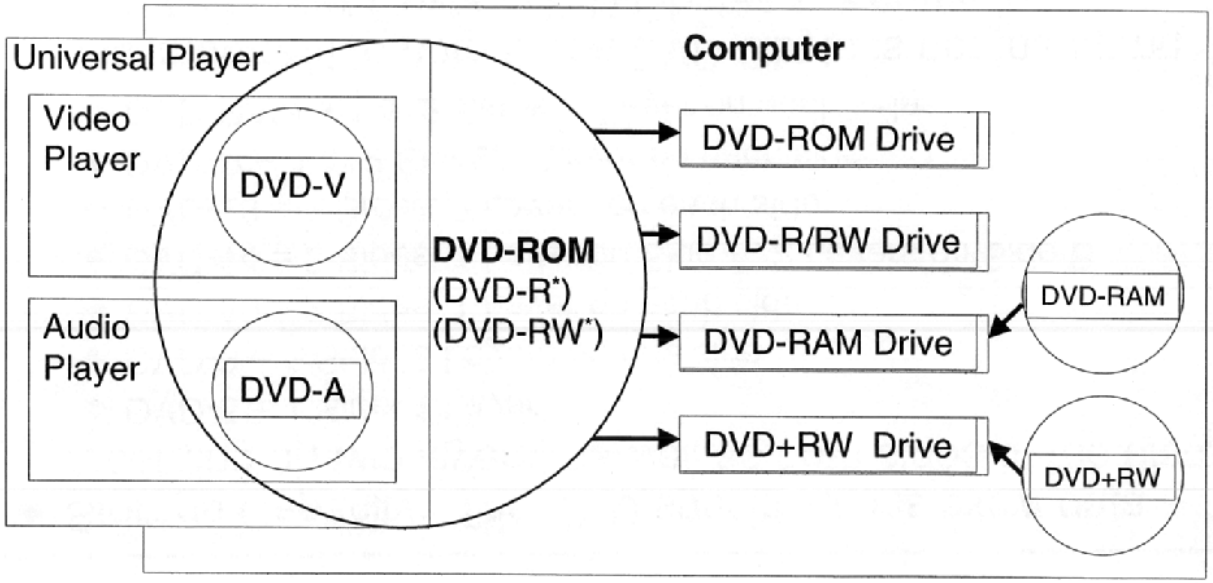
# DVD Technology Overview

- DVD Player Compatibility

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# DVD Technology Overview

- Storage Capacity: The DVD specifications allow data recording on two layers, as well as both sides of the disc.
  - DVD-5 = 1 Side, 1 Layer
  - DVD-9 = 1 Side, 2 Layers on one side
  - DVD-10 = 2 Sides, 1 Layer on each side
  - DVD-14 = 2 Sides, 1 Layer on Side A, 2 Layers on Side B
  - DVD-18 = 2 Sides, 2 Layers on each side
  - DVD-R = 1 or 2 Sides, 1 Layer on each side
  - DVD-RAM = 1 or 2 Sides, 1 Layer on each side
- It is important to note that a DVD Gbyte is not the same as a computer Gbyte. DVD Gbytes are equal to 1,000,000,000 Bytes, while a computer Gbyte is equal to 1,073,741,824 Bytes, a difference of more than 7%.

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# DVD-Video Overview

- DVD-Video Features
  - High Quality Digital Video
    - Video is compressed using MPEG
    - Support for multiple camera angles
    - Support for normal, pan-scan, letterbox and widescreen aspect ratios
  - High Quality Digital Audio
    - Linear PCM, Dolby AC-3 and MPEG-2
    - Support for multiple audio tracks
  - High Quality Still Images
    - MPEG-1, Half D1 MPEG-2 or Full D1 MPEG-2 I Frames
    - Support for Still Shows and Slide Shows (still with audio)
  - Moderate Quality Graphic Overlays
    - Support for multiple subpicture streams
    - Run Length Coded Bit Maps Limited to four colors at a time
  - Parental Control and Multiple Story Lines
  - Extensive Interactivity and Navigation features

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# DVD-Video Overview

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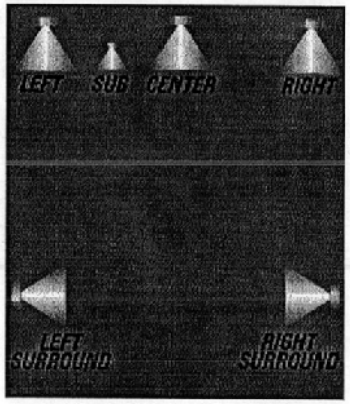
# DVD-Video Overview

- High Quality Audio
  - Linear PCM used for highest quality (high bandwidth) audio
    - Up to 96 Kbps sample rate
    - Up to 24 bit sample size
  - Dolby AC-3 used for high quality (moderate bandwidth) audio
    - Wide variety of modes
      - 1:0, 2:0, 3:0, 3:1, 5:0, 5:1, etc
      - 48 Kbps sample rate
      - Total data rate depends on number of channels. Typical 5:1 is 448 Kbps
  - MPEG-2, DTS, and SDDS audio can also be used, although not all players will support them
  - Up to 8 full surround sound tracks are supported

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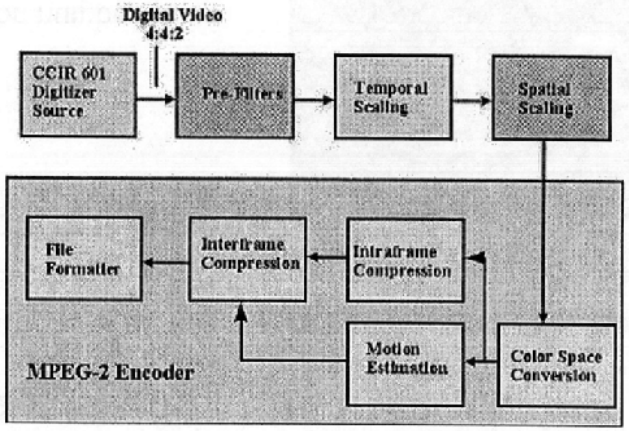
# DVD-Video Overview

- High Quality Digital Video
  - MPEG used for compressing video
    - MPEG-1, Half D1 MPEG-2, and Full D1 MPEG-2
    - Constant or Variable Bit Rate Compression
    - Minimum bit rate of 1.4 Mbps
    - Maximum bit rate of 9.8 Mbps
    - Frame rates of 24, 25 or 29.97 fps
    - Support for NTSC and PAL formats

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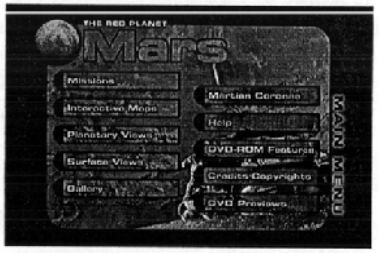
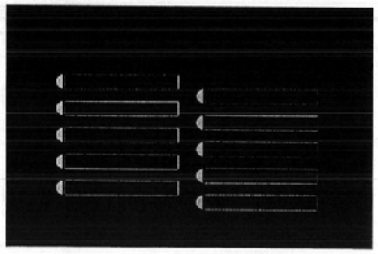
# DVD-Video Overview

- Moderate Quality Graphical Overlays
  - Used for menu highlights as well as subtitles
  - Can be used for text or graphics
  - To a limited extent they can be used for animation, although some players can only update subpictures once every 0.5 seconds
  - Limited to four colors
    - Background (BG)
    - Primary (P)
    - Emphasis 1 (E1)
    - Emphasis 2 (E2)
  - Stored as Run Length Coded Bitmaps, usually only require about 20-30 kbytes per graphic



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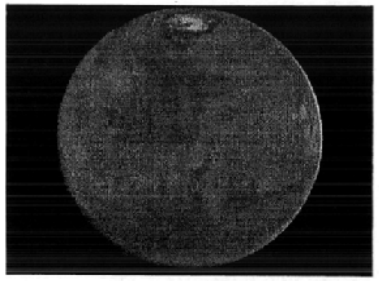
# DVD-Video Overview



- High Quality Still Images
  - Still images are stored as MPEG I frames
    - MPEG-1, Half D1 MPEG-2 and Full D1 MPEG-2
  - Stills are used for background graphics of menus
  - Stills can also be used in
    - Still Show
    - Slide Show (with audio and subpicture streams)
  - Stills can be displayed for 0.5 to 254 seconds, or indefinitely waiting for user input.

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# DVD-ROM

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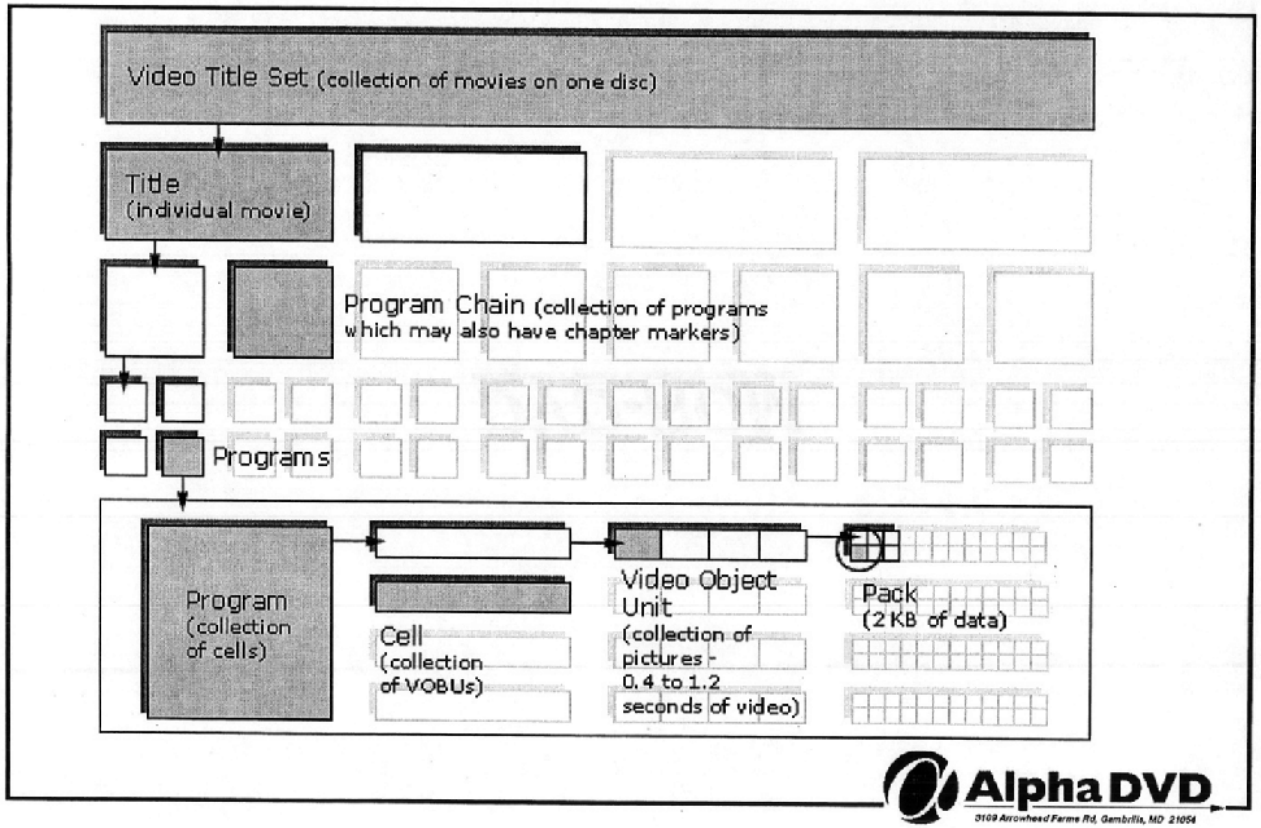
# DVD-Video


Video Title Set (collection of movies on one disc)
Title
(individual movie)
Program Chain (collection of programs which may also have chapter markers)
Programs
Program
(collection of cells)
Cell
(collection of VOBUs)
Video Object Unit
(collection of pictures - 0.4 to 1.2 seconds of video)
Pack
(2 KB of data)
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# DVD-ROM

- Levels of DVD-ROM Development
  - Level Zero - Data or software
    - QuickTime or AVI for multimedia
    - No MPEG-2/Dolby Digital decoder required
  - Level One - ISO MPEG-2 files + software
    - No DVD-Video authoring required
    - Won't play on DVD-Video players
  - Level Two - DVD-V + software
    - Works in DVD-Video player and DVD-ROM PC

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# DVD-ROM

- DVD-ROM has no "Application Layer"
- DVD-ROM title developers can use
  - Video - any digital format
  - Audio - any digital format
  - Images - any digital format
  - Graphic Overlays - any digital format
  - Animation - any digital format
  - Operating Environment - (Windows, MAC, UNIX)
  - Programming Language - Any language supported by operating environment
  - Storage Capacity - 4.7 GBytes - 17.0 GBytes

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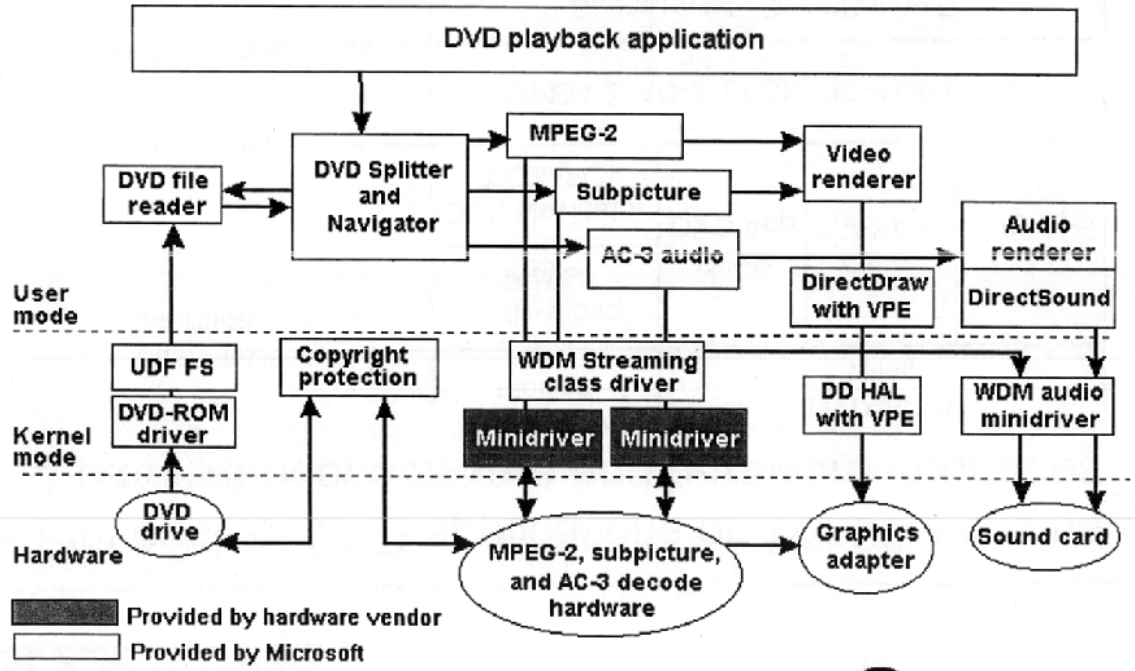
# DVD-ROM

- Windows 98 and beyond use DirectShow API

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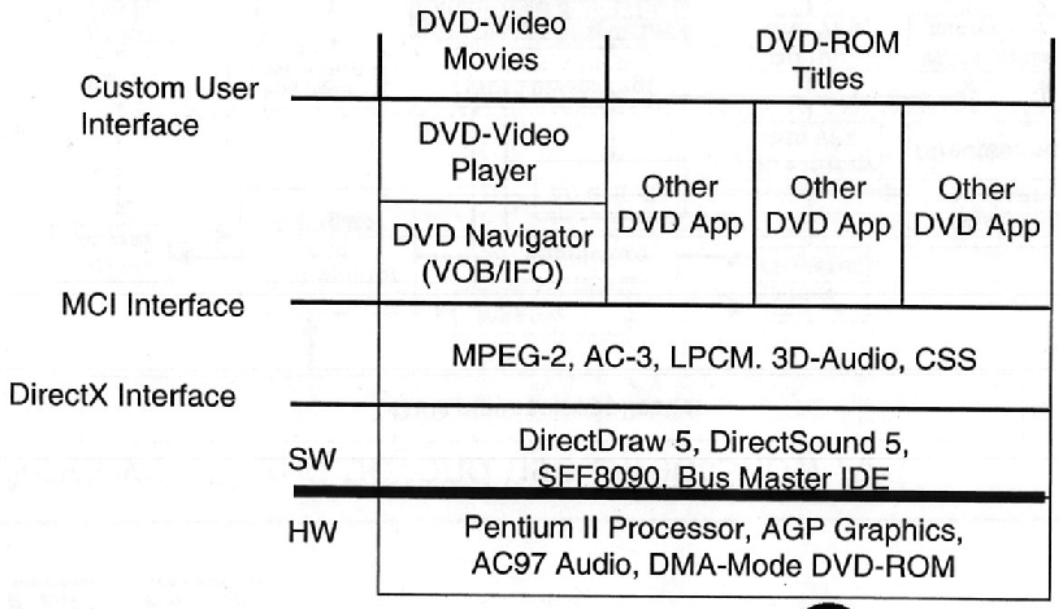
# DVD-ROM

- Playback of DVD applications on Win95 systems uses a patchwork of software and hardware interfaces

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# Hybrid DVD

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# DVD-ROM

- No Application Layer = Compatibility Problems
  - Publishing Format Support
    - CD-Audio, CD+, CD-I, CD-R, CD-ROM, DVD-Video, Photo-CD, Video-CD
  - Multimedia Data Format Support
    - AVI Video, Dolby AC-3 Audio, DVD-Video, MIDI Audio, MPEG-1 Video, MPEG-1 Audio, MPEG-2 Video, MPEG-2 Audio, MOV Video, WAV Audio
  - Software Environment Support
    - MAC (QuickTime), UNIX, Windows 95 (MCI), Windows 98 (DirectShow)
- Intel & Microsoft have held five DVD-ROM Test Events from July 1997 through January 1999
  - Initial test results were poor, > 66% failure rate
  - Recent test results were good, > 90 % success rate
  - MCI issues are well known and stable
  - DirectShow issues are being resolved
  - QuickTime DVD support still being worked on

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# Hybrid DVD Authoring

- Type of DVD Hybrid will dictate what type of authoring and programming tools are required.
  - DVD-Video - Use traditional DVD-Video authoring tools such as Daikin Scenarist, Sonic Solutions Desktop DVD, or Spruce DVD-Maestro
  - DVD-ROM - Use traditional CD-ROM programming tools such as C++, Visual Basic, Director (with limitations).
  - Internet - Use traditional Web publishing tools
- To put it all together use a DVD layout tool that can generate a DVD-Video disc and DVD-ROM files
  - Daikin Scenarist, Sonic Solutions Desktop DVD, Spruce DVD-Maestro, Adaptec Toast, and Top Gear are likely candidates.
  - Be aware that not all DVD layout tools are created equal, particularly with respect to DVD-ROM files and dual layer support

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# Hybrid DVD Overview

- Simply put a Hybrid DVD is a disc that has been designed to support a variety of DVD playback platforms.
  - DVD-Video/DVD-ROM
  - DVD-Video/DVD-Audio
  - DVD-Video/Internet
  - DVD-Video/DVD-ROM/Internet
- A true DVD Hybrid will have unique playback characteristics on each supported DVD platform.
- Hybrid DVD titles will generally comply with the DVD-Video specification for multimedia data types.
  - MPEG video streams
  - Dolby AC-3 audio streams
  - Run Length Coded Bit Map subpicture streams
  - MPEG encoded still images
  - Video Object (VOB) File Format
  - DVD-Video Directory & Volume Layout

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# Hybrid DVD Authoring

- PC Friendly
  - Integrate graphics, animations and videos with the latest information published via the Internet.
  - PCFriendly DVDs may include all types of software, including movie trivia, games, screenplays, and so on.
  - Original screenplay - Provide the dialogue, link directly to a scene, watch the video, and see how it may have changed during the creative process.
  - Unlocking content - used as a "key" to unlock areas on the Internet. Some DVDs contain special video segments that can only be played from a specific web page.

- PC Friendly Clients
  - Columbia Tristar
  - Elektra Entertainment
  - MGM Home Entertainment
  - New Line Home Video
  - Slingshot Entertainment
  - Sterling Home Entertainment
  - Universal
  - Warner Advanced Media Operations
  - Warner Home Video

PC FRIENDLY

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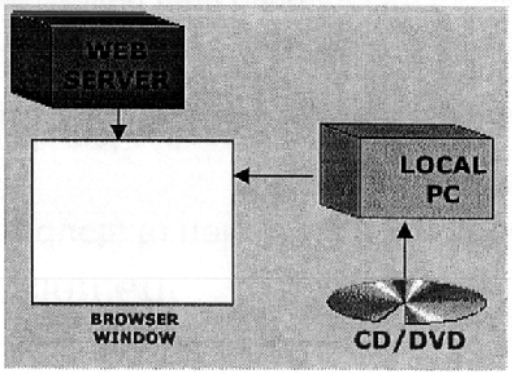
# Hybrid DVD Authoring

- Specialized tools exist for adding Internet connectivity and support to DVD-Video titles.
  - PC Friendly (Interactual Technologies)
    - http://www.interactual.com
  - Spinware (Spinware/AIX Entertainment)
    - http://www.spinware.net
  - Hyperlock (Hyperlock Technologies)
    - http://www.hyperlock.com

# Hybrid DVD Authoring

- Hyperlock
  - Shifts the burden of file transfer from computer telephony to the computer's CPU
  - Video resides on the local disc, but the file has been "encrippled" rendering it useless without first obtaining the missing bits via a remote server
  - Since the video is fully embedded in the HTML code of your page, you have the opportunity to change the viewing environment
  - Also supports simple time release mechanisms via the HTML that allow access to certain files on certain days

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# Hybrid DVD Authoring

- Spinware (Spinware/AIX Entertainment)
  - Spinware offers a family of four products to help DVD developers add Internet features to their titles.
    - Spinware PortaLink - automated Internet connectivity solution for DVD-Video developers
    - Spinware PortaBase - portable web driven data base for DVD-Video developers
    - Spinware PortaSite - makes an entire web site portable and mass produceable
    - Spinware PortaFilm - turns the "B" side of a DVD-Video title into a revenue producer by marketing additional features to DVD-ROM users

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# WebDVD

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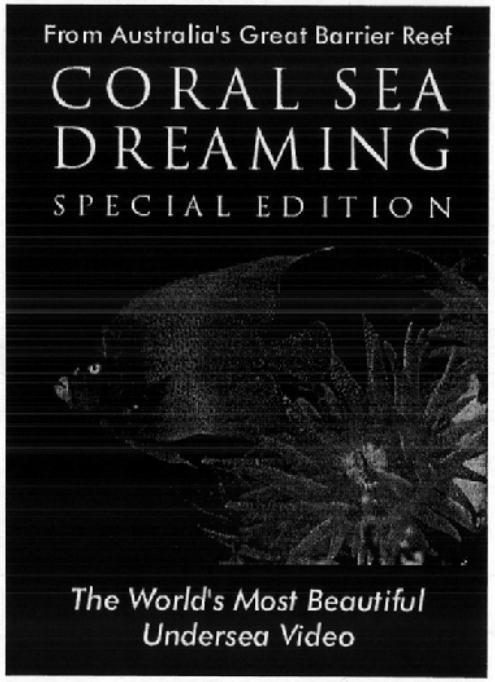
# Hybrid DVD Sample

- Coral Sea Dreaming
  - Hybrid DVD title, works in DVD-Video players as well as DVD-ROM enabled Personal Computers
    - 80 Minutes of undersea videos
    - Full 5.1 channel Dolby AC-3 audio
    - Information subtitles
  - MCI screen saver program
  - DirectShow "Interactive Screen Saver" Program

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# Web DVD

- Microsoft® Windows® Media Player control exposes the IMediaPlayerDvd interface through the DVD property.
  - DirectShow provides the following DVD-related interfaces.
    - Interface
    - Purpose
- IDvdGraphBuilder
  - Enables the DVD application writer to easily build a filter graph for DVD-Video playback.
- IDvdControl
  - Controls the playback and search mechanisms of a DVD-Video disc that contains one or more video movies.
- IDvdInfo
  - Enables an application to query for attributes of available DVD-Video titles and the DVD player status.

# Web DVD

- WebDVD (Microsoft)
  - PC enhancement to DVD-Video content
  - Web technology is a key ingredient
    - customizable faceplates and UI
    - dynamic data integration
    - easy to author
    - supports an endless amount of business opportunity
  - Windows Media Player 3 is the primary enabling technology
  - Requires use of Internet Explorer 5.0
  - Netscape plug-in also provided
  - Will work best on Windows 98 and Windows 2000 systems
  - WebDVD SDK available from Microsoft
    - Email request to dvd@microsoft.com

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# WebDVD

- Windows Media Player control supports the following DVD properties.
  - AnglesAvailable
  - AudioStreamsAvailable
  - ButtonsAvailable
  - CCActive
  - ColorKey
  - CurrentAngle
  - CurrentAudioStream
  - CurrentButton
  - CurrentCCService
  - CurrentChapter
  - CurrentDiscSide
  - CurrentDomain
  - CurrentSubpictureStream
  - CurrentTime
  - CurrentTitle
  - CurrentVolume
  - FramesPerSecond
  - Root
  - SubpictureOn
  - SubpictureStreamsAvailable
  - TitlesAvailable
  - TotalTitleTime
  - UniqueID
  - VolumesAvailable

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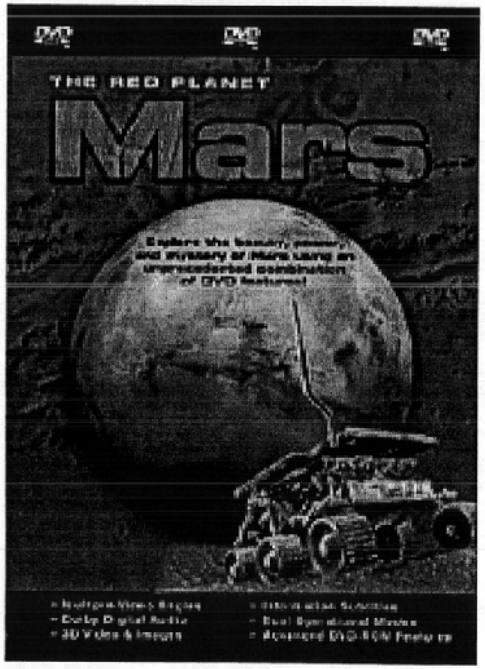
# Web DVD

- The OBJECT tag is used to embed ActiveX objects, such as the Windows Media Player control, into an HTML page. The following code is an example of using the OBJECT tag to insert the Windows Media Player control.
  - <OBJECT CLASSID="CLSID:22D6F312-B0F6-11D0-94AB-0080C74C7E95" WIDTH="652" HEIGHT="382" ID="MediaPlayer1"> <PARAM NAME="AutoStart" VALUE="0"> <PARAM NAME="Filename" VALUE="DVD:"> <PARAM NAME="ShowControls" VALUE="0"> </OBJECT>
  - VBScript or JavaScript is used to control playback

# WebDVD Sample

- Mars, The Red Planet
  - Hybrid DVD Title
    - DVD-Video support
    - DVD-ROM support
    - WebDVD support
  - One of the most sophisticated DVD titles ever released
    - Over 1,000 media elements
    - Over 8,000 menu buttons
    - Multi-Angle content
    - Multi-Audio tracks
    - Informational subtitles
    - Windows Screen Saver
    - Associated WebDVD site (www.MarsDVD.com)

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# Web DVD

- Windows Media Player control supports the following DVD methods.
  - BackwardScan
  - ButtonActivate
  - ButtonSelectAndActivate
  - ChapterPlay
  - ChapterPlayAutoStop
  - ChapterSearch
  - ForwardScan
  - GetAllGPRMs
  - GetAllSPRMs
  - GetAudioLanguage
  - GetNumberOfChapters
  - GetSubpictureLanguage
  - GoUp
  - LeftButtonSelect
  - LowerButtonSelect
  - MenuCall
  - NextPGSearch
  - PrevPGSearch
  - ResumeFromMenu
  - RightButtonSelect
  - StillOff
  - TimePlay
  - TimeSearch
  - TitlePlay
  - TopPGSearch
  - UOPValid
  - UpperButtonSelect

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# ***Questions & Answers***

Ralph LaBarge
Alpha DVD
rlabarge@alphadvd.com
410-721-9460

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***Standards, Applications, and Technology***

**Tom Held**

*President*
*Thomas H. Held Associates*

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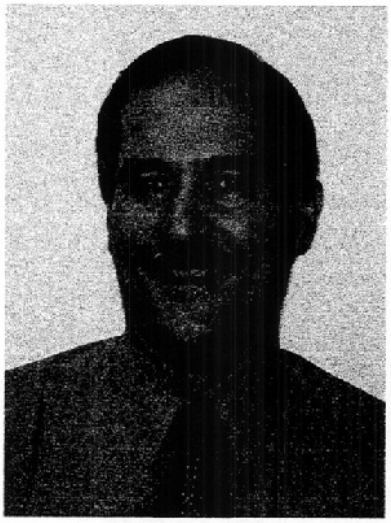

**Robert A. Zollo**

*President & CEO*
*Software Architects, Inc. (SAI)*

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Phone: 425 487-0122

**www.softarch.com**

Robert A. Zollo is President and CEO of Software Architects, Inc. (SAI), a software development company that specializes in file systems, device drivers and utilities for mass storage devices. Mr. Zollo has been a member of the OSTA board of directors for four years, and was personally involved with the drafting of the UDF Implementation Guidelines that are now a key part of the standards for all types of DVD technology devices. His company was the first to commercialize software using a full read/write UDF file system based on the OSTA UDF standard. SAI currently licenses its UDF file system technology to all three manufacturers of DVD-RAM drives, as well as a variety of companies in the computer storage, networking, medical instrumentation and consumer electronics fields.

Mr. Zollo has a BS in Engineering from the U.S. Military Academy at West Point, back when "big iron, punch cards and FORTRAN" were considered "state of the art" computing technology. He has an MBA from Southern Illinois University and over 17 years experience in the IT industry. As the President of the first company to commercialize and sell products that provide interoperability for write-able DVD drives on personal computers, Mr. Zollo hasa unique perspective on this subject.

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## *Standards, Applications, and Technology*

**Bernie L. Mitchell**

*National Market Development Manager*
*Philips Professional DVD*

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Mr. Mitchell began his multimedia career in 1979, when at the UCLA Office of Instructional Development, he created the first interactive laser videodisc to teach college chemistry. He founded his own multimedia design and production company, Silver Platter Productions, Inc. and has designed numerous award winning and profit -making interactive programs for training, point of sale and exhibit and education.

He joined Philips Consumer Electronics in 1991, as National Marketing Manager for Compact Disc - Interactive (CD-I). Bernie fostered a professional market for this low cost, simple to operate, interactive multimedia platform. Bernie was promoted at Philips to Vice President, Educational Publishing for Philips School 2000, where he had responsibility for publishing engaging, curriculum based, interactive educational CD-i software, and teacher support material for schools. After his School 2000 publishing efforts came to a close, Bernie left Philips to head up marketing efforts for Gulliver Ritchie Associates a multimedia training company specializing in disc based and Internet delivered training. Last year, Bernie returned to Philips as National Sales Manager for Professional DVD where he has the responsibility to develop a Professional Producer/Partner program and oversee the launch of Philips Professional DVD products. Bernie is a member of President Clinton's Educational Technology Initiative Task Force, an Emmy nominated television producer/director, Multimedia Person of the Year, and Past International President of the International Interactive Communications Society. He is frequently a featured speaker at international conferences on education and technology.

Bernie lives with his wife, 2 great kids, and a small menagerie overlooking the Smoky Mountains in Tennessee.

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## *Standards, Applications, and Technology*

**Paul Bader**

*President*
*Multimedia 2000*

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**www.m-2k.com**

Paul Bader is currently CEO of M-2K in Seattle, Washington. M-2K was founded by Mr. Bader in February of 1998, using the acquired assets of Multicom Publishing, an early purveyor of CD-ROM lifestyle software, along with the associated libraries of HarperCollins and Meredith (Better Homes & Gardens). Subsequently, M-2K became one of the early pioneers in DVD and DVD-ROM publishing, working closely with Pioneer and Microsoft.

Over the past year, M-2K purchased iPromotions, an internet sweepstakes concern; established a strategic alliance with InfoHarvest, a decision-based analysis concern that has pioneered early work in the preference-profiling software arena; and capitalized on the immediate and continuing growth of e-commerce opportunities by successfully pursuing internet-based sales and distribution of software.

Presently, M-2K is well positioned to be a leader in electronic commerce services and DVD-ROM publishing. M-2K has organized and fulfilled a number of highly successful internet-based sales and marketing promotions, using its sweepstakes technology and software library as incentives. Client base includes: AT&T Worldnet, CVS.com, Mattel, Umax, iCat, Johnson & Johnson, Chipshot.com, Fiskars, and ShopNow.com. M-2K also manages a rapidly expanding online retail venture. M-2K is a privately held concern.

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**www.remstor.com**

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**Jim Weldon**

*Chairman &*
*Chief Technical Officer*
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**Marshall Goldberg**

*Director of Products and Marketing*
*Sigma Electonics*

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East Petersburg, PA 17520-0448

Phone: (717) 569-2681

**www.sigmaelectronics.com**

# Overview

- Sigma Designs Background
- Progressive DVD: What and Why
- Standards for Progressive DVD Encoding and Decoding
- Progressive DVD Output
- Copy Protection
- Conclusion

# Standards for Progressive DVD

Marshall Goldberg
Director of Marketing
Sigma Designs, Inc.

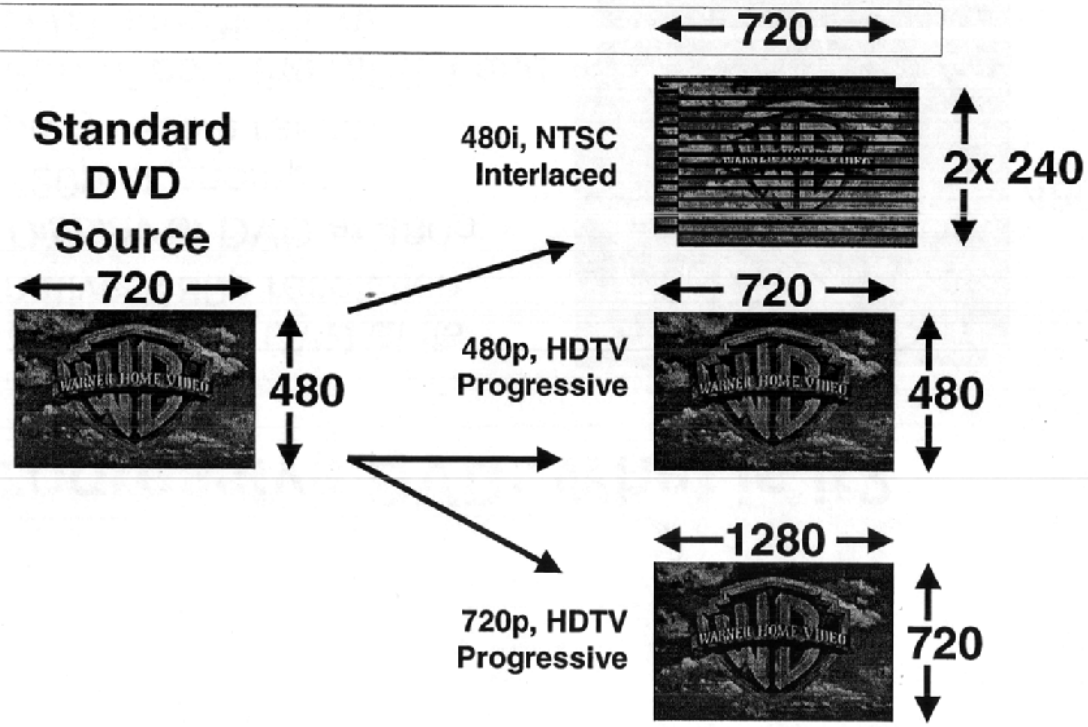
# 4 Steps to Enhanced DVD Playback

1. Dolby Digital 5.1 Channel Surround Sound Decoder, Amplifier and Speakers
2. Widescreen, 16:9 TV Set
3. High-res, Progressive TV Set
4. Progressive DVD Player

# Sigma Designs Background

- Manufacturer of MPEG-2 and DVD decoder chips
- OEM's include Sony, Panasonic, Hitachi, Toshiba, Philips, Samsung and Creative Labs
- Have shipped PC-based Progressive DVD players for about 18 months
- Migrating into set-top DVD player market

# HDTV Output & Progressive Video



# Progressive DVD: What is it?

- *Decoding* of DVD at its native, 480p resolution
- *Display* of DVD at 480p, 720p or another progressive resolution
- Part of both the MPEG and DVD specifications
- Output to VGA, projector or HDTV set
- Eliminates ugly, jaggy artifacts

480i

480p

# Techniques for Progressive DVD Encoding & Decoding

Film: 24 *frames* per second

NTSC: 60 *fields* per second

Inverse Telecine: Encoding process used in DVD mastering. 24 frames/sec, progressive, with "Repeat First Field" flags

3:2 Pull Down: Playback process which converts 24 frame/sec MPEG into 60 field/sec NTSC video

This not only produces progressive video, but also reduces disk space usage on the DVD

# Progressive DVD: Why?

1. Virtually all Hollywood DVD's today are made of *true* progressive content
2. Standard, 480i DVD players actually convert a 24 fps, 480p video stream into a 30 fps, 480i video stream (degrades quality)
3. The quality improvement of Progressive DVD is incredible

# Standards for Encoding

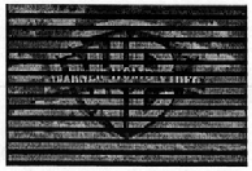
- DVD's can be encoded from either progressive or interlaced source
- Decoders (Players) can switch between progressive and interlaced source on the fly
- Improper digital editing and inverse telecine errors can produce stray or reversed fields, which can cause artifacts during progressive playback
- Visual verification is essential – watch the movie play back using a progressive player

# 3:2 Pull Down

## First Frame of Video

Both fields
(1/24 second)

24 fps
Progressive
Playback



Odd (top) field
1/60 second

Even (bottom)
field
1/60 second

Odd (top) field
(repeated)
1/60 second

30 fps
Interlaced
Playback

# Progressive Output

- Once DVD Video is decoded, a progressive decoder can scale the video to any resolution
- Progressive DVD decoders should also upsample the frame rate from 24 Hz to the display's refresh
- In some cases, the decoder hardware must convert the color space to RGB, or mux to a composite format
- By scaling and upsampling, VGA screens, projectors and HDTV's can all be supported

# Standards for Decoding

Progressive Sequence Flag: Part of the standard, but rarely used

Progressive Frame Flag: Tells decoder that the *current encoded picture* is a progressive frame

Repeat First Field: Tells decoder whether to duplicate a field (half the frame) during interlaced (3:2 pull down) playback

# YUV Connectivity Standards

YUV *appears* to be winning as the dominant connection standard.

Too bad for web surfers…

Y Cb Cr is digital spec, from CCIR 601

Y Pb Pr is the analog spec:

- SMPTE 125M, 170M, 253M & 267 M plus Engineering Guideline #27, see also ISO/IEC 13818-2 (MPEG-2 Video) tables 6-7 through 6-9
- M II: Panasonic's implementation
- Betacam: Sony's implementation
- ColorStream: Toshiba's implementation (?)
- M II and Betacam both differ slightly from SMPTE

Interchangeability is *slightly* threatened

# TV Connection Formats

Composite: Luma and Chroma modulated together

S-Video: Separate Luma and Chroma

Component YUV*: Separate Luma, Red Chroma and Blue Chroma

Component RGB: Separate Red, Green and Blue channels

Digital: A digital stream is decoded by the TV

* Other names are also used for YUV

# Digital Connectivity

- Primary methods are serial digital and IEEE 1394 (FireWire)
- Both are expensive to implement and open up significant copy protection issues
- Serial Digital is used in studios, not really a consumer device standard

## RGB Connectivity

VGA and virtually all computers use RGB

Scart, used across Europe, is an RGB-based connectivity standard

Home theater projectors have been RGB-based for years.

# Copy Protection

DVD player manufacturers are required, by license, to support Macrovision analog copy protection

Macrovision only works on Composite and S-Video NTSC and PAL signals, but not on YUV, RGB and digital streams

5C Standard: IEEE 1394 standard for copy protection

XCA Standard: Competing IEEE 1394 copy protection standard

Although there is a serious lack of copy-protection, fortunately there is a lack of equipment which can record these signals

# Progressive Display Incompatibilities

The physical connection (S-Video, Y Cb Cr) does not specify the refresh rates or signal timings.

The formats designed for NTSC have been adopted for transmitting progressive signals

This opens a new problem: How can the DVD player know which frequencies and resolutions are supported by the TV? Over-driving the TV can destroy it.

There is no spec, or even a proposal, for “Plug and Play” of HDTV equipment.

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***Standards, Applications, and Technology***

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Mr. Buma was born June 27, 1948 in the Hague, The Netherlands. He studied physics at the University of Delft. He then joined Philips in 1975. Mr. Buma has held various functions in development and marketing management in Philips Consumer Electronics and Philips Components divisions. Since 1997, he has been the program manager for AV disc recording activities within Philips.

## Conclusions

Progressive DVD is here today and here to stay

Quality benefits are enormous

Progressive DVD is necessary if the consumer sales/rental market is to continue to exist alongside HDTV programming

There are several bumps in the road to standard methods for verifying titles, interchangeably connecting players to TV's, and copy protecting those signals

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**Dana Parker**

*DVD PRO Workshop Chair*
*Emedia Professional*

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**www.dvdpro.net**

Dana Parker, DVD PRO Conference Chair, Contributing Editor and Columnist for Emedia magazine, independent consultant, speaker, industry analyst, and author of four books on compact disc technology, has been in involved in CD-ROM and CD-R technology since 1989 and has covered the technical and market development of DVD since 1993.

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*President*
*Consumer Electonics*
*Manufacturers Association*

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Arlington, VA 22201-3834

Phone: 703 907-7600

**www.cemacity.org**

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**Karl Schneck**

*President, Co-Founder*
*Optical Disc Manufacturing Association*

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Milford, PA 18337

Phone: 570 686-4153

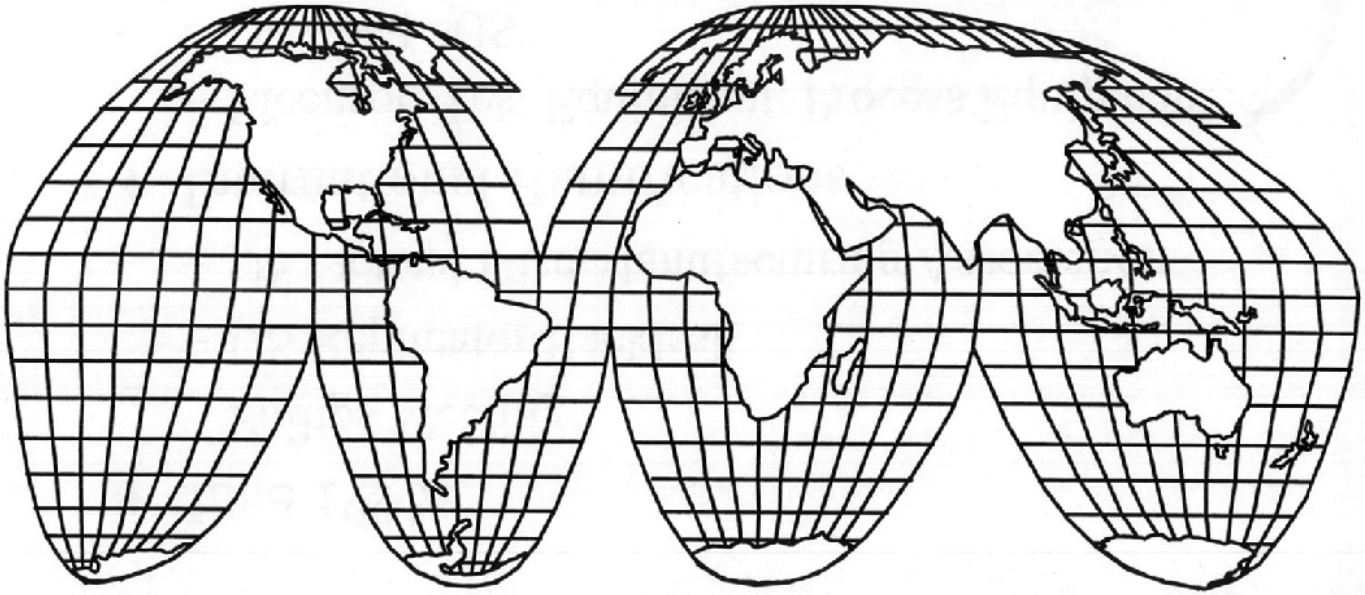
**www.odma.com**

Karl Schneck is the President and co-founder of the Optical Disc Manufacturing Association, an international trade association dedicated to improving all areas of production and compatibility in the optical disc industry. With over 25 years in the Metrology and Quality fields, Mr. Schneck has held management positions in both Quality and R&D functions. He has been involved with the optical disc industry since its U.S. inception. In addition, Mr. Schneck is the Vice President of R&D and Mfg. for Hide & Seek Technologies, Inc., which has developed unique optical disc copy-protection solutions.

# In the Beginning…….

- June 1993
  - Philips Meeting
  - US Replicator Backlash
  - US Optical Disc Manufacturing Association
- International Ramifications
  - Licensor, Test Equipment, Process Equipment
  - Dropped "US"

# OPTICAL DISC



# MANUFACTURING ASSOCIATION

# Committees

- Electrical Measurement
- Physical Measurement
- Materials
- Optical Media Playability
- Packaging

# CHARTER

**To Provide for the Optical Disc Industry:**

- A Forum for Technical Discussions Regarding Product and Quality Issues

- Leadership in the Areas of Education, Clarification, Methodologies, and Standards

- A Means of Collaborating with the Technology Developers in the Establishment/Revision of Technical Specifications to Keep Pace with the Changing Market Requirements

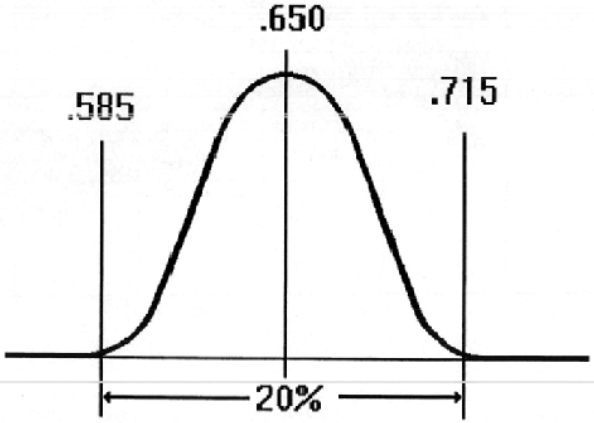
# Establishing a Baseline....

- Where was the Industry????
- No Study had ever been made!!!!!
- Baseline Necessary to:
  - Determine need for improvement
  - Provide starting point to measure improvement

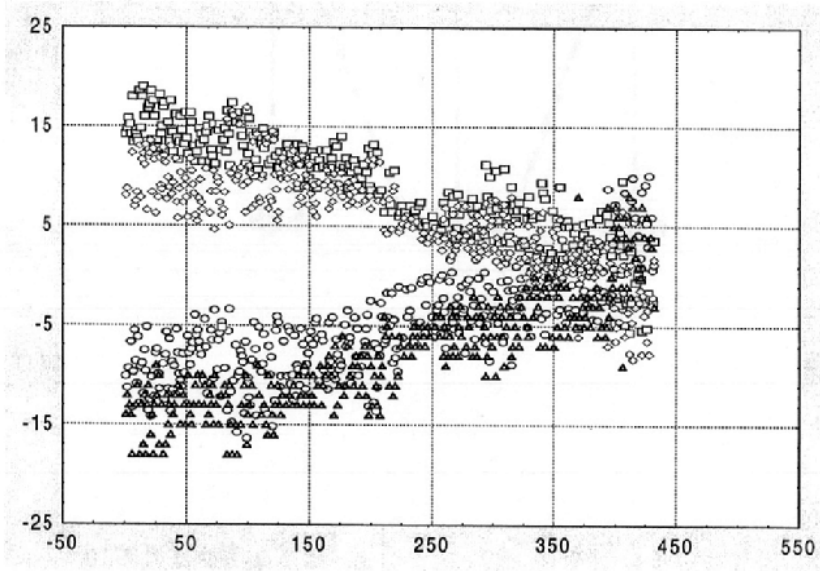
# REDUCING VARIATION in OPTICAL DISC MEASUREMENT

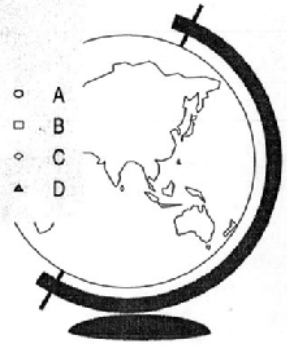
# Effect of Variation

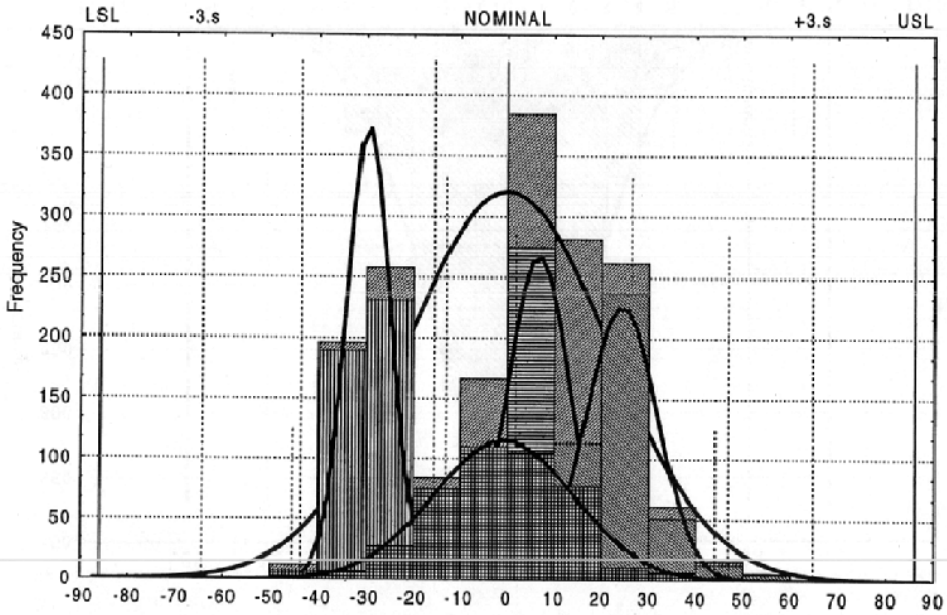
**I11**



# THE VARIATION ALLIGATOR

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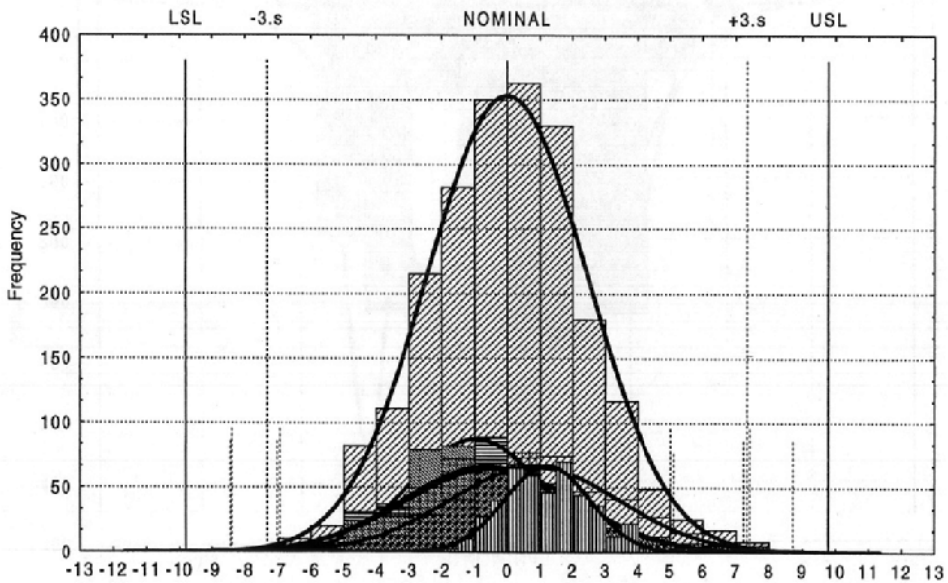
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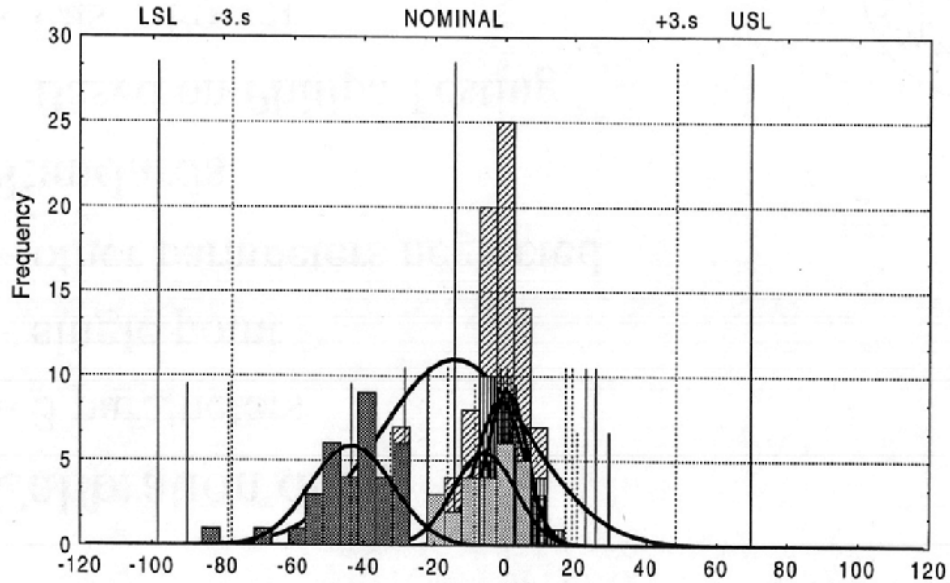
# Contributors

- Calibration discs
  - 3 parameters
  - single point
  - other parameters neglected
- Standards
  - Based on Philips Testing
  - Laser Power
  - Optics
  - Confusing Standard Document (Red Book)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-100
-80
-60
-40
-20
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20
40
60
80
100
120

# Next Steps

- Follow-up study
  - measure improvement
  - establish ongoing measurement audit
- Determine need for standards improvement
- Continue to improve testing methodology (CDRMM)

# Accomplishments

- New Calibration Disc Set
  - All Parameters
  - Multi-Point
- CD Reference Measurement Method Manual
  - New from Philips
  - Living Document

# DVD

# Birefringence

- Historically wide variation in measurement
- Temperature a major factor
- Current study to isolate contributing factors
- NIST providing test pieces and coordination

# Calibration

- No standard discs
- WAMO alternative
  - Expensive

# Background

- DVD Consortium
  - Developed specifications
  - some extremely controversial
  - No initial plans for Test Equipment
  - Initial Production scheduled to coincide with drive availability

# Current Situation

- DVD Variation Study
  - 2nd phase
    - single sourced, multi-point calibration disc set from Audio Development
    - DVD-5 and DVD-9 discs
    - Improvement in Variation????

# Current Situation

- DVD Variation Study
  - 1st phase
    - various reference discs
    - wide variation

# Next Step (cont.)

- Final Planning at Electrical Measurement Committee meeting on Jan 10 in Las Vegas
- Tentatively scheduled for February Manufacture
- Affordably Priced
- All Interested Parties are Invited to Participate

# Next Step -

## Creation of a Multi-point Production Calibration Disc Set

- Modelled on K5 and K9 discs
- Manufactured at WAMO
- 5,000 sets
- Tested on characterized Pulstec DDU-1000

# Conclusion

✦www.odma.com

# Outline

- Motivation
- Experimental setup
- Methods
  - Auto-focusing
  - Image processing
- Results
- Conclusion

# Microscopic Image Analysis for Physical Characteristics in Optical Discs

Xiao Tang, Yu Xiao* and Grace Jordan**
National Institute of Standards and Technology

* Guest Researcher from Tsinghua University, Beijing, China
** Student Intern from University of Limerick, Limerick, Ireland

# Experimental Setup

- Hardware
  - Microscope: NA 0.8, 100x objective with adjustable cover-layer thickness compensation
  - Computer controlled 3D-micro positioning system including piezo driven objective lens for focusing
- Software
  - LABView software tool for instrument control and image processing

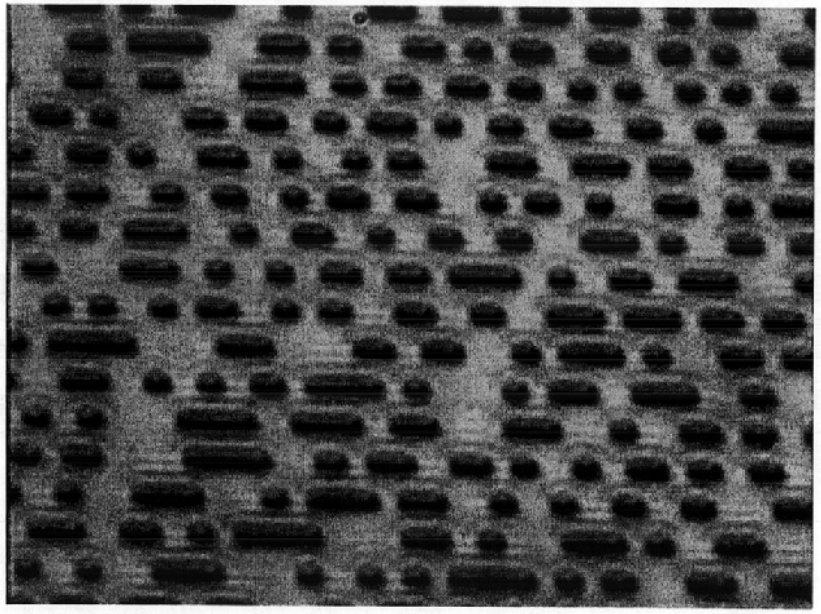
# Methods

- Define an origin and axes for polar coordinate system
- Find the location of an interesting area under the microscope
- Take a sharp microscopic image of an interesting area in an optical disc using our auto-focusing method
- Image processing and data analysis

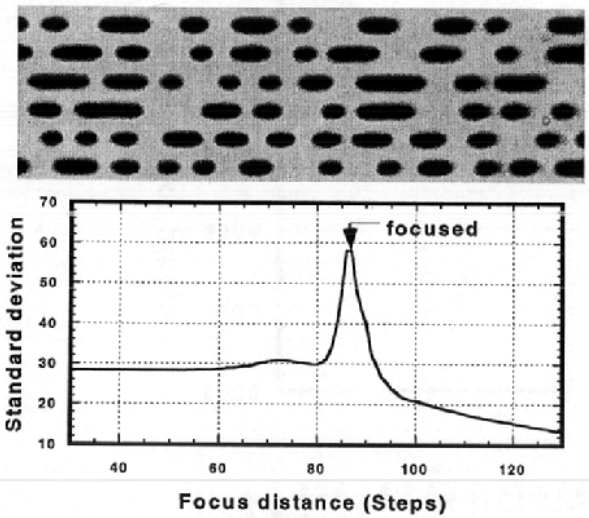
# Auto-focusing

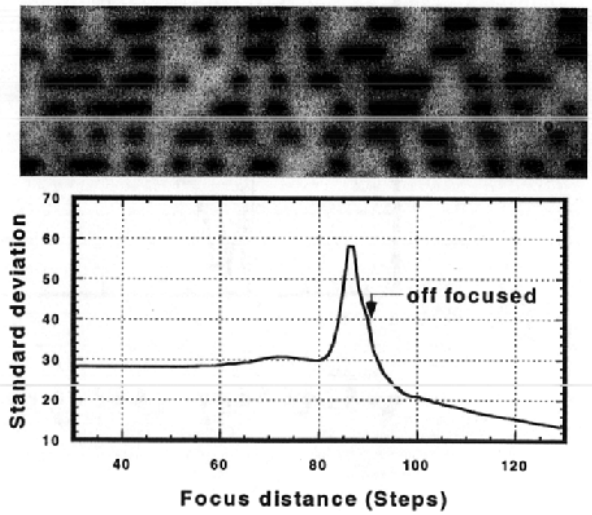
- The value of the **standard deviation** for pixel gray levels is an indication of focus
- Computer controls Z axis movement to get the maximum value of the standard deviation

# Catch a Well-Focused Image

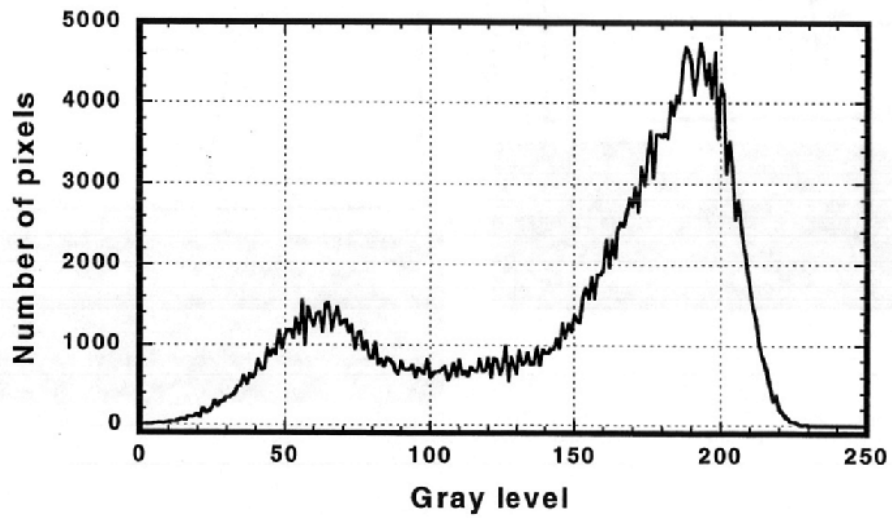


# Standard deviation vs. focus



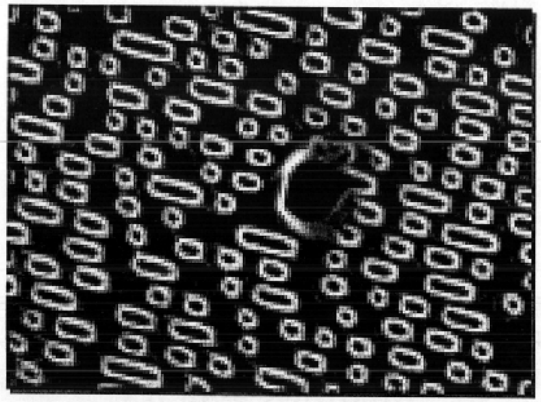



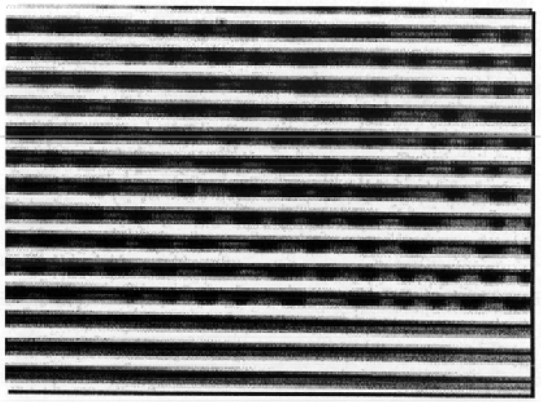
# Histogram of an image

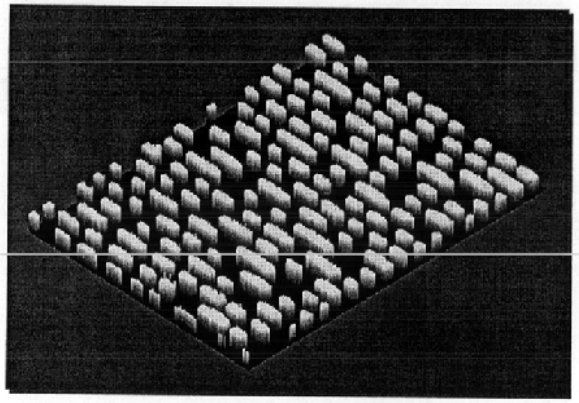


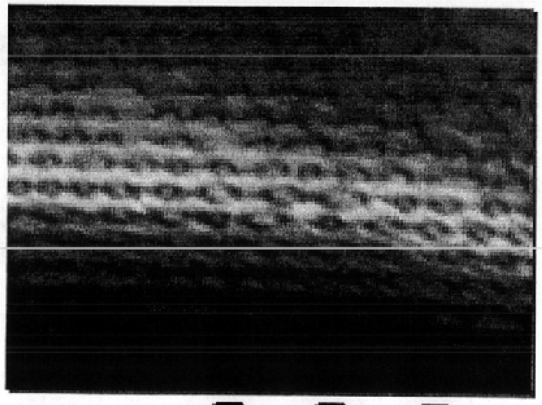
# Image Processing

CD-ROM & CD-R DVD-ROM, Video & RAM





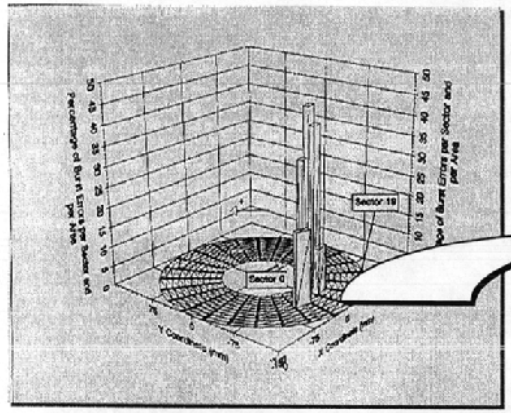




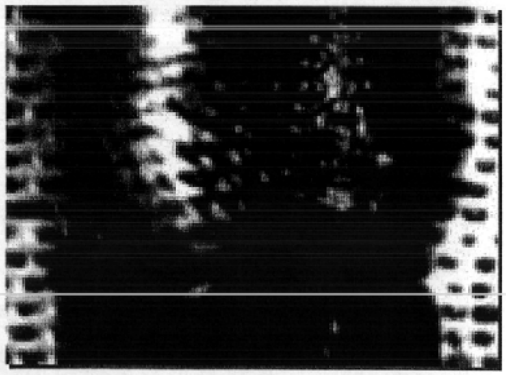
# The results

- Determine and re-search defect locations
- Pit size estimate
- Track pitch measurement
- Disc tilt evaluation

# Cooperation tester - microscope



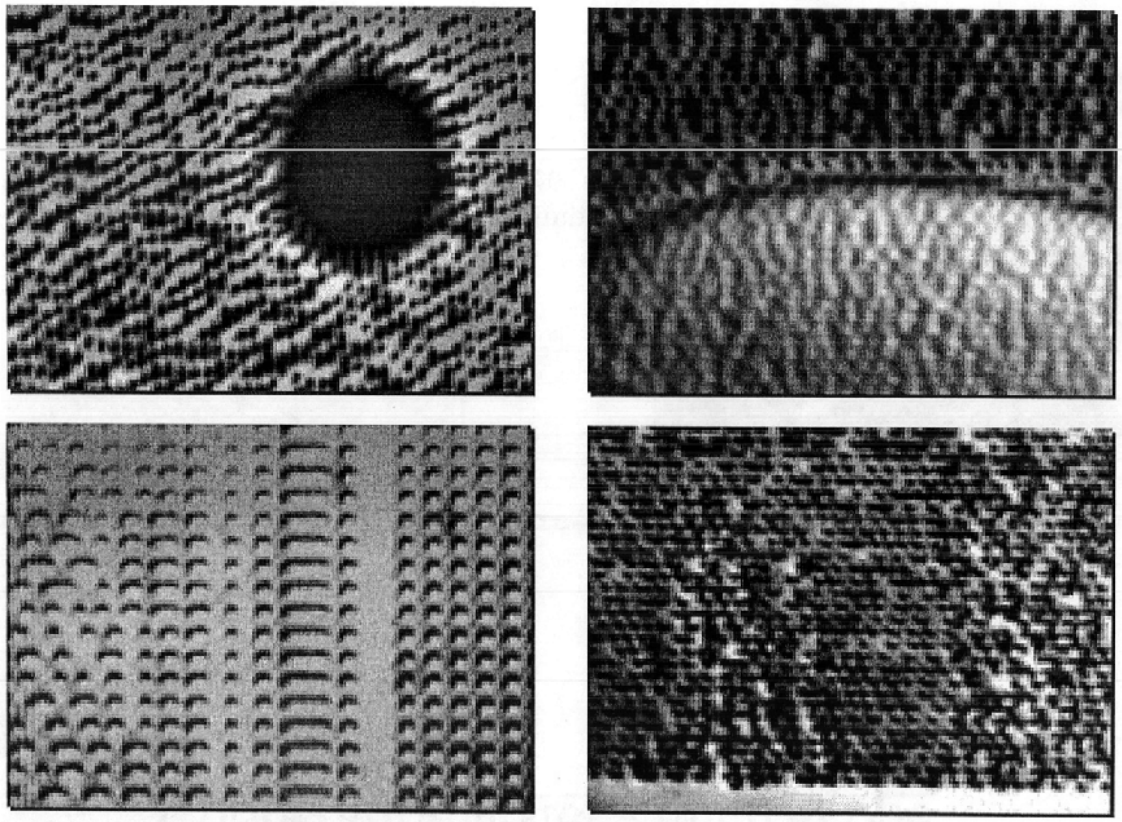

Typical global information
given by optical disk testers:
- Bit Error Rate (BER)
- Burst Error Rate



The defect area automatic search
applied to a specific local zone (sector for example)
will refine the characterization of the defects.

# Image Processing

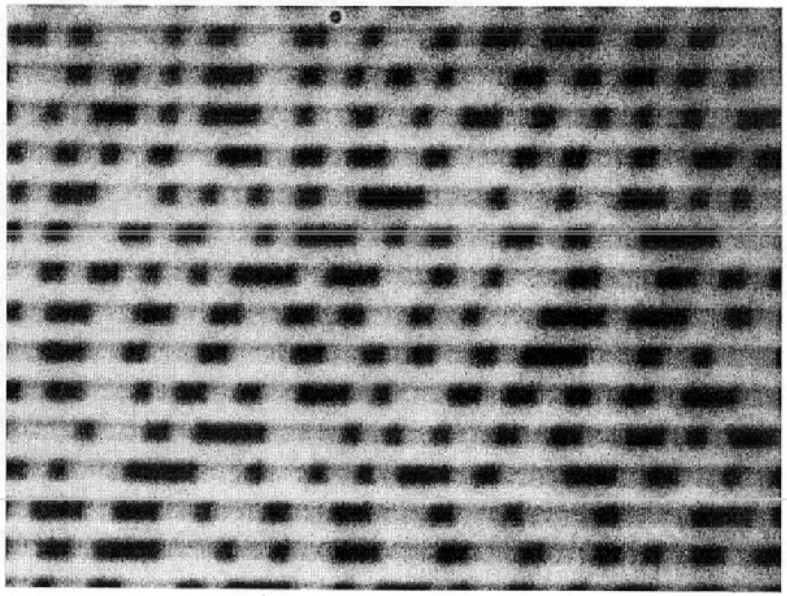
CD-ROM & CD-R DVD-ROM, Video & RAM



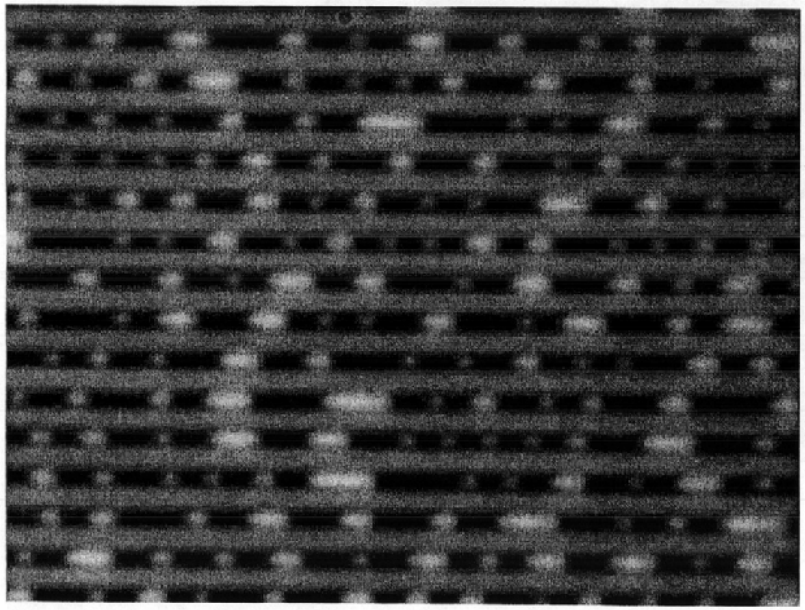
# Image of CD-RW disc

Track pitch

- 1.62+/-0.03 μ



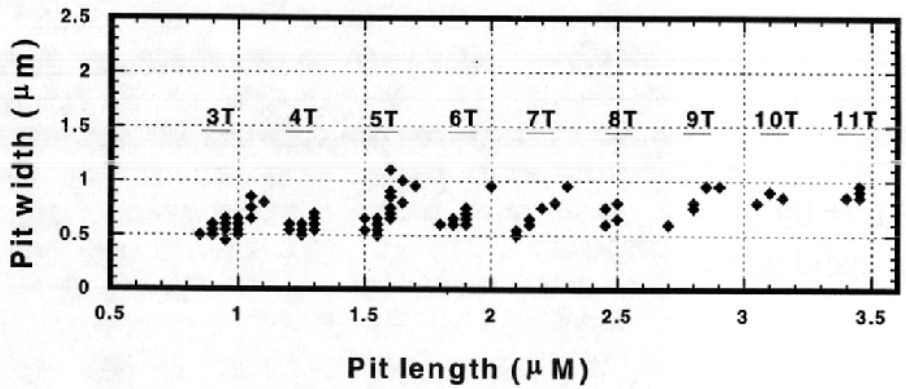
# Image of CD-R Disc



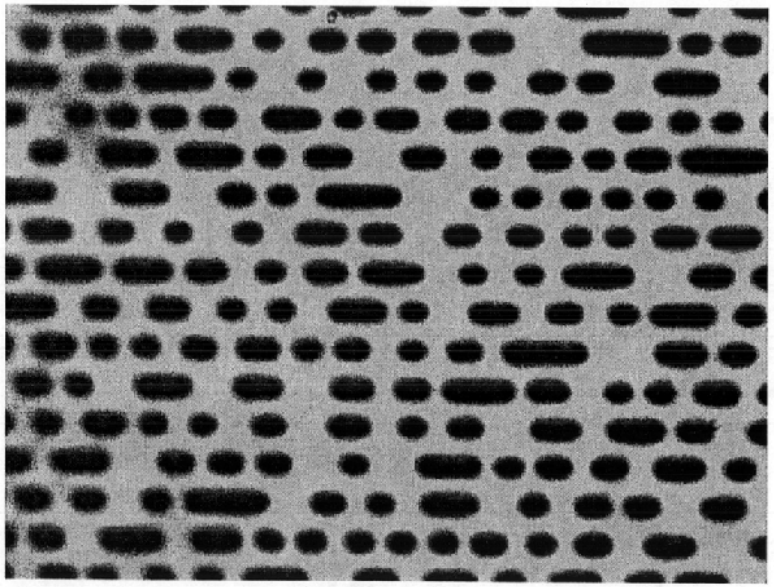
Track pitch

- 1.61 +/- 0.04 μ

# Pit size analysis



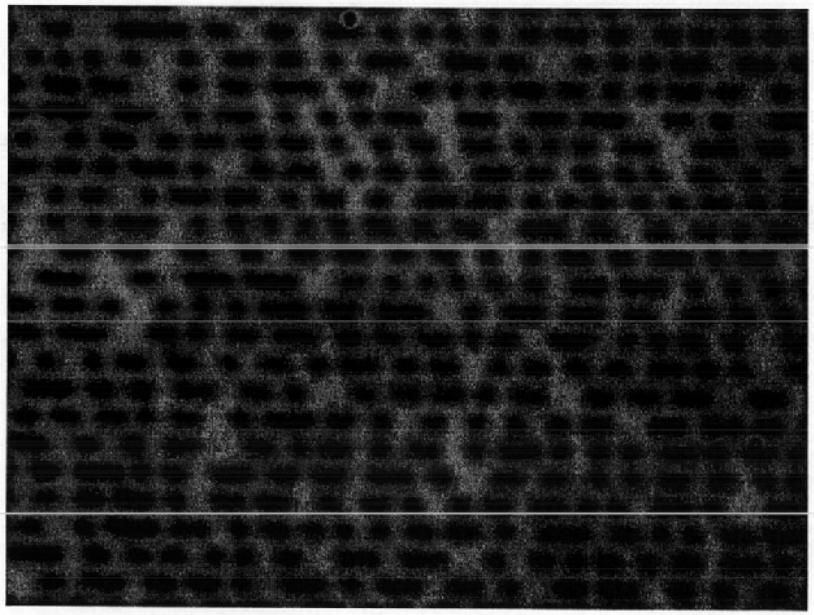
# Image of a CD-ROM disc



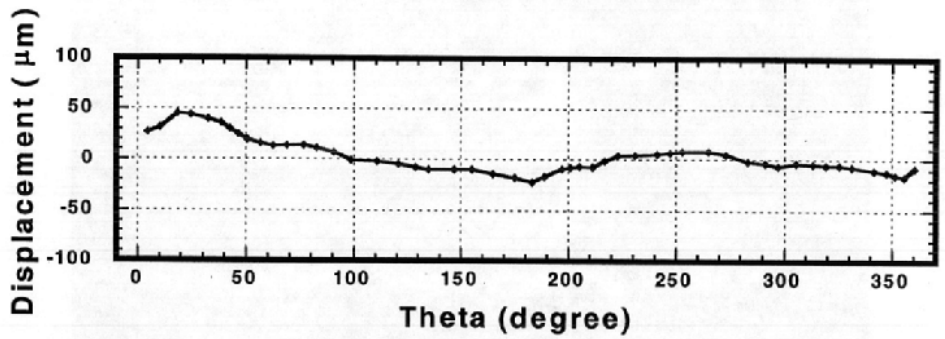
Track pitch

- 1.60 +/- 0.02 μ

# Image of a DVD-ROM disc



# Disc tilt measurement



# Conclusion

- We have developed a micro imaging system for physical characterization of optical discs
- With automatic focusing and image acquisition, the system can locate defect areas in discs and re-search them again after aging treatment
- The track pitch and tilt of CD discs can be measured precisely. The pit length and width can be estimated
- With some improvement in hardware, the system could be applied to DVD, semiconductor chips or bio-specimen analysis