DVD 2002

STANDARDS, APPLICATIONS, TECHNOLOGY

Conference and Exhibition

June 3-4, 2002
NIST, Gaithersburg, MD

Sponsored by:

DVDA

NIST
**National Institute of
Standards and Technology**
Technology Administration
U.S. Department of Commerce

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DVD 2002:
Standards, Applications, Technology Conference & Exhibition

Conference Proceedings

Edited by:

Victor R. McCrary Jr.
Mary Floyd

Convergent Information Systems Division
Information Technology Laboratory

June 3-4, 2002

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Standards, Applications, Technology

Agenda

Monday, June 3, 2002   **NIST Green Auditorium**

7:00am-11:00am   Exhibit Set-up

8:00am-8:40am   Registration

8:40am-9:00am   **Victor McCrary**, Chief, Convergent Information Systems
                        Division, NIST, *Introduction*

9:00am-9:40am   *Keynote*: **Chris Israel**, Deputy Assistant Sectretary for
                        Technology Policy, Office of Technology Policy. *"DVD:
                        An Enabling Technology for Homeland Security"*

Session 1: DVD after 9-11; The Role of DVD for Homeland Security
Moderator: **Victor McCrary**, Chief, Convergent Information Systems Division,
            National Institute of Standards and Technology (NIST)

9:40am-10:00am   **Omid Omidvar**, Program Manager, Advanced Technology
                        Program, Department of Commerce, NIST. *"Advanced
                        Technology Program (ATP) and DVD"*

10:00am-10:20am   **Sam Wagner**, President, Video I-D Teleproductions, Inc.,
                        Washington, Illinois. *"Designing for DVD: Building a
                        Stronger Message through the Medium"*

10:20am-10:40am   **Oliver Slattery**, Data Preservation Dada Preservation Test
                        Facility, NIST. *"Data Preservation and Optical Discs"*

10:40am-11:00am   Break

Session 2: DVD: It's Not Just for Movies Anymore
Moderator: **Jerry McFaul**, Computer Scientist, U.S. Geological Survey

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11:00am-11:20am   **Rich Harada**, President, Creative Businesses, Inc.,
Executive Director, HDSA. *"A Framework for
Understanding Mass Storage Systems"*

11:20am-11:40am   **Bruce Cox**, Director, Information Products Division,
United States Patent and Trademark Office. *"DVD in the
Patent Trademark Office (PTO)"*

11:40am-12:00pm   **Nick Zilhman**, Physical Scientist, U.S. Geological Survey.
"Near-Line DVD Storage"

12:00pm-12:20pm   **Jim Clark,** Chief, Electronics Products Development
Branch, Bureau of the Census. *"Using DVD for
Disseminating the Nation's Census Data"*

12:20pm-12:40pm   **Jason Hyon**, Deputy Manager, Earth Science Data Systems
Section, NASA- Jet Propulsion Lab. *"Providing Space
Imagery to the Public on DVD"*

12:40pm   ***Exhibits Open - Lecture Rooms A, B and adjacent corridor***

1:00pm-2:00pm   *Lunch   (NIST Cafeteria) and Exhibits*

Session 3: Reaching Out and Traning with DVD: It's a Whole New Ballgame
Moderator: **Jerry McFaul**, Computer Scientist, U.S. Geological Survey

2:00pm-2:20pm   **Bruce Molina**, Polar Research Scientist, US Geological Survey.
"DVD Development Through a CRADA"

2:20pm-2:40pm   **Peggy O'Neill-Jones**, Professor, The Metropolitian State
College of Denver; Director, DVD.learn. *"The Power of
Web-Connected DVDs for Education"*

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2:40pm-3:00pm	**Tom Held**, President & CEO, Metamedia Training International. *"DVD: A Powerful New Instructor-Support Tool"*
3:00pm-3:20pm	**Jeff Hammond**, President, Copper Moon Digital. *"High Impact Training with DVD"*
3:20pm-3:40pm	*Break*

Session 4: The Politics of DVD
Moderator: **Wendy Chinn**, Allyn Solutions, LLC; Chair, DVDA Mid Atlantic Region

3:40pm-4:00pm	**Wendy Selzter**, Fellow, Berkman Center for Internet and Society at Harvard Law School. *"Does Copyright Protection Hinder Technological Innovation? Open Source Development in the Context of the DeCSS and the DCMA"*
4:00pm-4:20pm	**Jonathon Band**, Partner, Morrison and Foerster. *"The DMCA and the Underlying Conflict Between the Entertainment and Information Technology Industries"*
4:20pm-4:40pm	**Bill Adkinson**, Senior Policy Counsel, Progress and Freedom Foundation. *"Online Content: Promoting an Efficient Marketplace*
4:40pm-5:00pm	**Jim Burger**, Member of DOW, Lohnes & Albertson, pllc
5:00pm-6:00pm	***Lab Tours - Data Preservation Test Facility, Bldg 225, A262***
6:00pm-10:00pm	**DVDA Awards Reception and Banquet** *Gaithersburg Mariott, Washington Center*

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<u>**Tuesday, June 4, 2002**</u>   **NIST Green Auditorium**

8:00am-8:40am   Registration

8:40am-9:00am   **Victor McCrary**, Chief, Convergent Information Systems
                         Division, NIST, *Introduction*

9:00am-9:40am   *Keynote*: **Andy Parsons**, Senior Vice President, Industrial
                         Video and Mass Storage, Pioneer Electronics (USA), Inc.
                         "The State of Recordable DVD in 2002"

Session 5: DVD Strategies
Moderator: **Wendy Chinn,** Allyn Solutions, LLC; Chair, DVDA Mid Atlantic Region

9:40am-10:00am   **Bernie Mitchell**, President, Silver Platter Productions, Inc.
                         *"Thru the Mirror Darkly, or 10 Things I Have Learned in
                         Over 20 Years in the Interactive Multimedia Business"*

10:00am-10:20am   **Eugene Wooden**, Founder, Digital Underground. *"The
                         Post House Model"*

10:20am-10:40am   **Ralph LaBarge**, Managing Partner, Alpha DVD. *"The
                         Back-End Royalty Model"*

10:40am-11:00am   **Blaine Grayboyes**, Media Architect, Consultant and
                         Producer. *"The DVD Services Model*

11:00am-11:20am   *Break*

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Session 6: Just the Specs
Moderator: **Geoffery Tully,** Geoffery Tully, Inc.

11:20am-11:40am	**Chris Armbrust**, President and Founder, Marin Digital. *"Creative Workarounds"*
11:40am-12:00pm	**Mark Johnson**, Director, Research and Development Company: Still in Motion, a Technicolor Co. *"The Spec is not Enough"*
12:00pm-12:20pm	**Bruce Nazarian**, President, Gnome Digital Media. *"You Can't Do That With This"*
12:20pm-12:40pm	**Charles Fenimore**, Image Quality Content Leader, NIST. *"Image Quality Specs for DVD*
12:40pm	***Exhibits Open - Lecture Rooms A,B and adjacent corridor***
1:00pm-2:00pm	*Lunch (NIST Cafeteria) and Exhibits*

Session 7: Wrangling Over DVD Writables
Moderator: **Dana Parker**, Editor, *DVD Report*; *Columnist TDB Magazine*, DVDA 2002 Program Chair

2:00pm-2:20pm	**Dana Parker**, Editor, *DVD Report*; Columnist, *TDB Magazine*, DVDA 2002 Program Chair. *"Sex, Lies, and DVD"*
2:20pm-2:40pm	**Ralph LaBarge**, Managing Partner, Alpha DVD. *"DVD Compatibility Test*
2:40pm-3:00pm	**Mark Weinstein**, Vice President, Northeast Office, Video Copy Services. *"Ask the Replicator"*

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3:00pm-3:20pm   **Takeshi Matsui**, Ricoh. *"Advantages of DVD+RW/+R and Prospects"*

3:20pm-3:40pm   *Break*

Session 8: DVD Town Hall

Chairperson:
> **Dana Parker**, Editor, *DVD Report*; Columnist, *TDB Magainze,* DVDA 2002 Program Chair

Panelists:
> **Bernie Mitchell**, President, Silver Platter Productions, Inc.
> **Randolph Hudson**, President and CEO, Broadness LLC, Co-chair NY DVDA
> **Blaine Grayboyes**, Media Architect, Consultant and Producer

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Selected Test Software and Conference Proceedings

The Web address for ordering test software and proceedings from past conference from NIST is **www.itl.nist.gov/div895/products.html**. More conference proceedings can be found available for download in the publications section of the site. These are only the proceedings available for sale.

NIST CD Compliance Test software

The NIST CD compliance test is designed to test CD-ROM, CD-R, CD-RW and DVD-ROM drives for MultiRead Compliance as specified by the MultiRead specifications developed by OSTA for CD-R and CD-RW discs. MultiRead is described by OSTA as the ability of any drive to read all of the following types of media: CD-DA, CD-ROM, CD-R and CD-RW. The NIST CD Compliance Test is designed to test the drive only for CD-R and CD-RW since it is not capable of making CD-ROM or CD-DA discs. While the NIST CD Compliance Test software supports the MultiRead specification developed by OSTA (as specified by the documentation provided on the OSTA website), the NIST CD Compliance Test software is no way endorsed by or an endorsement of OSTA or any of its products.

NIST Digital Cinema Test Patterns and Image Viewer

In the recent (June 2001) MPEG digital cinema compression tests, two display systems were used, with differing interfaces and image formats. The IEC and VESA projector measurement standards are employed in a slightly extended sense to characterize the display systems. Two sets of test patterns were used: one for the DLP and one for the G90. Each set of patterns were stored and played out using the same system components that were employed for the subjective viewing tests. For a comprehensive discussion of the measurements used in characterizing the projection systems used in the MPEG tests see the NIST Interim Report [3].

NIST Prototype Linux Electronic Book Reader

The NIST Linux Platform OEB Viewer is a combination parser and viewer for Open EBook documents. At this time, it can display most types of formatting and most document features, although tables and links do not currently work. This software is also capable of generating a searchable index of individual documents or chapters from an OEB package file. This software runs in X11 and requires libpng, libjpeg, and ncurses along with the standard X11 libraries. Documentation is included with the archive in the text file named 'README'. You will need to use tar to decompress the archive once downloaded.

NIST Prototype Implementation of the DASE PAE

The NIST Distributed Systems Technology Group is pleased to announce the availability of their open Prototype Implementation Platform of the Digital TV Application Software Environment (DASE) Procedural Application Environment (PAE). This Prototype Implementation adheresto the ATSC DASE DRAFT (Not Yet Finalized) specification (version T3-R1) dated February 09, 2001.

MPIProf 1.0

MPIProf is a library which conforms to the MPI profiling interface and thus may be linked with already-compiled MPI applications. Once linked with MPIProf, an application will produce a report during its shutdown phase (MPI_Finalize()) which details the amount of time spent inside of MPI communication routines. In addition, MPIProf also reports the total amount of time spent outside of MPI communication routines (reported as Processing Time), total elapsed run-time, # of calls per MPI function, and min-max-avg MPI communication and Processing Time. All information is reported on a per-process basis.

S-Check

S-Check is a highly-automated sensitivity analysis tool for programs that extends benchmarking and conventional profiling. It predicts how refinements in parts of a program are going to affect performance by making local changes in code efficiencies and correlating these against overall program performance. S-Check Version 3.0 is available for parallel SGI systems, IBM's SP machines, homogenous SUN, SGI, and RS6000 workstation clusters using PVM or MPI, and PCs running Linux. S-Check ML supports multiple languages, including FORTRAN and C, however, advanced editing features are only available in C.

Electronic Book Conferences Proceedings

The Electronic Book Conferences have been instrumental in forming the new field of electronic books. Creating a neutral meeting ground for publishers, manufacturers, and authors, the Electronic Book Conferences have helped to launch a new age in reading.

· **Electronic Book 2000: Changing the Fundamentals of Reading** is available in a bound book through the National Technical Information Service (NTIS), NIST's sister agency, as well as downloadable in PDF format. Orders can be placed by calling 1-800-553-6847 or by ordering online through **http://www.fedworld.gov/onow/**. The order number is PB2000108035. Copies can be purchased for $47.00 (paper copy or CD-ROM), $23.00 (microfiche). Compiled by Dr. Victor McCrary, Jennifer Quinn, Alyssa Smith, and Christie Ileto, the proceedings contain the conference agenda as well as presentations and biographies of the speakers at the Conference.

· **Electronic Book '99: The Next Page** is available both at NTIS and downloadable in PDF format. The proceedings are also available through the National Technical Information Service (NTIS), NIST's sister agency. Orders can be placed by calling 1-800-553-6847 or by ordering online through **http://www.fedworld.gov/onow/**. The order number is PB2001-106741. Copies can be purchased for $47.00 (paper copy or CD-ROM), $23.00 (microfiche). Compiled by Dr. Victor McCrary, Jennifer Quinn, and Alyssa Smith, the proceedings contain presentations and biographies of the speakers at this Conference.

· **Electronic Book '98: Turning a New Page in Knowledge Management** is available both at NTIS and downloadable in PDF format. The proceedings are also available through the National Technical Information Service (NTIS), NIST's sister agency. Orders can be placed by calling 1-800-553-6847 or by ordering online through **http://www.fedworld.gov/onow/**. The order number is PB2001-106319. Copies can be purchased for $47.00 (paper copy or CD-ROM), $23.00 (microfiche). Compiled by Dr. Victor McCrary and Alyssa Smith, the proceedings contain presentations and biographies of the speakers at this Conference.

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Introduction

Welcome to DVD 2002: Standards, Applications, and Technology Conference and Exhibition, co-sponsored by the DVD Association (DVDA) and the National Institute of Standards and Technology (NIST). This year's conference features over thirty speakers and panelists who will discuss new applications and issues in standardization and copyrights as they affect entertainment, data preservation, education, healthcare, homeland security, and storage. DVD's growing commercial popularity has placed a magnifying glass on these topics, and as ongoing standards are being developed participants from government and commercial sectors will come together to shape the future of this still emerging technology.

As our second conference to highlight developments in DVD technology, we are pleased to team with the DVDA, the industry group representative of DVD developers, hardware manufacturers, authors, and standards efforts.

DVD technology is unparalleled in enabling superior digital performance of high quality video and audio and high capacity data storage since its inception in 1997. Even practical everyday uses, such as image archives, are becoming increasingly relevant as businesses migrate their deteriorating magnetic assets to the next generation storage medium of DVD. New challenges, problems, and endeavors are waiting along this new and exciting path of technological development. This Conference offers you the chance to interact with developers, manufacturers, and authors at the forefront of it all.

Sessions of note include those by the Conference Keynote Speakers, Chris Israel and Andy Parsons. Israel, Deputy Assistant Secretary for Technology Policy at the Department of Commerce, will discuss how DVD will play a role in broadband Internet in his talk, *DVD: An Enabling Technology for Broadband Deployment*. Senior VP of Industrial Video and Mass Storage of Pioneer Electronics, Parsons will address how to choose the best recording format and what applications are best for it in *The State of Recordable DVD in 2002*. Also of interest is DVDA Town Hall, the Conference wrap-up moderated by *DVD Reporter* Editor Dana Parker where you may express your thoughts about the Conference in a highly interactive setting with a panel of experts.

In addition, please take the time to visit the exhibition with booths from over twenty business and government agencies, as well as the awards banquet on Monday night, an exciting event that will recognize the best in originally authored DVD titles over the past year. If you have a chance, please visit our Data Preservation Test Facility located in building 225, room A262.

Finally, many thanks to our conference co-sponsor, the DVD Association, the Advanced Technology Program, and the management and staff of the Information Technology Laboratory.

Welcome to DVD 2002!!

Victor McCrary,
Conference Chair
National Institute of Standards and Technology

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Ardent L. Bement, Jr.

Director
NIST
http://www.nist.gov/

Arden L. Bement, Jr., was sworn in as the 12th director of NIST on Dec. 7, 2001. Bement oversees an agency with an annual budget of about $819 million and an onsite research and administrative staff of about 3,000, complemented by a NIST-sponsored network of 2,000 locally managed manufacturing and business specialists serving smaller manufacturers across the United States. Prior to his appointment as NIST director, Bement served as the David A. Ross Distinguished Professor of Nuclear Engineering and head of the School of Nuclear Engineering at Purdue University. He has held appointments at Purdue University in the schools of Nuclear Engineering, Materials Engineering, and Electrical and Computer Engineering, as well as a courtesy appointment in the Krannert School of Management. He was director of the Midwest Superconductivity Consortium and the Consortium for the Intelligent Management of the Electrical Power Grid.

Bement came to his position as NIST director well versed in the workings of the agency, having previously served as head of the Visiting Committee on Advanced Technology, the agency's primary private-sector policy adviser; as head of the advisory committee for NIST's Advanced Technology Program; and on the Board of Overseers for the Malcolm Baldrige National Quality Award.

Bement joined the Purdue faculty in 1992 after a 39-year career in industry, government, and academia. These positions included: vice president of technical resources and of science and technology for TRW Inc. (1980-1992); deputy under secretary of defense for research and engineering (1979-1980); director, Office of Materials Science, DARPA

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(1976-1979); professor of nuclear materials, MIT (1970-1976); manager, Fuels and Materials Department and the Metallurgy Research Department, Battelle Northwest Laboratories (1965-1970); and senior research associate, General Electric Co. (1954-1965).

Along with his NIST advisory roles, Bement served as a member of the U.S. National Science Board, the governing board for the National Science Foundation, from 1989 to 1995. He also chaired the Commission for Engineering and Technical Studies and the National Materials Advisory Board of the National Research Council; was a member of the Space Station Utilization Advisory Subcommittee and the Commercialization and Technology Advisory Committee for NASA; and consulted for the Department of Energy's Argonne National Laboratory and Idaho Nuclear Energy and Environmental Laboratory.

He has been a director of Keithley Instruments Inc. and the Lord Corp. and was a member of the Science and Technology Advisory Committee for the Howmet Corp. (a division of ALCOA).

Bement holds an engineer of metallurgy degree from the Colorado School of Mines, a master's degree in metallurgical engineering from the University of Idaho, a doctorate degree in metallurgical engineering from the University of Michigan, and a honorary doctorate degree in engineering from Cleveland State University. He is a member of the U.S. National Academy of Engineering.

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Susan F. Zevin

Acting Director
ITL
NIST
http://www.itl.nist.gov/

Dr. Susan F. Zevin is the Acting Director and Deputy Director for the Information Technology Laboratory (ITL) of the National Institute of Standards and Technology (NIST), Department of Commerce in Gaithersburg, Maryland. As Deputy Director, Dr. Zevin manages the daily operations and services of the Laboratory, overseeing its research program in the development of standards and performance measures for information technology and leading the implementation and delivery of information technology services in support of the NIST Chief Information Officer.

Dr. Zevin has more than 26 years of progressive professional and executive experience in managing large scientific and technical service delivery organizations. Particular emphasis has been on product development and operational implementation based on constituent needs. Dr. Zevin has particular experience in creating long-term goals and objectives, understanding the conversion from development to operations, and implementing promised outcomes.

Prior to joining ITL, Dr. Zevin was with the National Oceanic and Atmospheric Administration (NOAA) for more than 26 years in a variety of technical and management positions, most recently as the Deputy Assistant Administrator for the National Environmental Satellite Data and Information Services. In this position she managed the NOAA National Data Centers; oversaw the design, implementation and management of environmental information systems; established a new National Coastal Data Development Center; and developed formal agreements with major news organizations, utility companies and financial exchanges for new climate information services. It was during this time that she led the analysis of critical milestones, costs and implementation planning for a new national satellite

operations control facility and created a NOAA digital earth and space facility for near real-time 3-d visualization of environmental data sets.

She also served as Deputy Assistant Administrator, NOAA, National Weather Service where she oversaw the daily operations of the National Weather Service, including operational programs such as aviation, marine, agriculture, fire weather, public warnings and forecasts, hydrologic services, and supporting infrastructure such as training, facilities, electronics, and international programs.

Prior to that she was the Director, National Weather Service, Eastern Region where she managed the provisions of public weather services for 16 eastern states, and oversaw the modernization of weather services facilities, including building 22 new sites, installing new radars and technology suites, and reorganizing 800+ employees.

During her early career she was involved in many international projects including, a detail to the World Meteorological Organization in Geneva Switzerland; installing a real-time flood forecast system on the Yellow and the Yangtze Rivers in China; and evaluating a flood forecast system project in Jamaica.

Dr. Zevin received a B.A degree in Geography from the University of Pittsburgh. She earned a M.S. (Cum Laude) in Geography from the University of Tel Aviv and her Ph.D. in Hydrology and Water Resources from the University of Arizona.

Dr. Zevin was awarded the University of Arizona Alumni Distinguished Citizen Award in 1996. She is a Fellow of the American Meteorological Society (AMS) and served as an elected member of the AMS Council.

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**Dr. Victor McCrary,
Conference Chair**

Division Chief
Convergent Information
Systems Division
NIST
www.itl.nist.gov/div895

Dr. Victor R. McCrary is currently chief of the new Convergent Information Systems Division at the National Institute of Standards & Technology in Gaithersburg, Maryland. In his current position, he leads a group of approximately 50 researchers, computer scientists and students in NIST's Information Technology Laboratory. His organization conducts research into convergent information systems emphasizing standards and interoperability protocols for the exchange, storage, and manifestation of digital content. Topical areas include, digital data preservation, biometric systems, electronic books, digital rights management, digital image quality, and digital cinema. Dr. McCrary organized the world's first conference on electronic books in October 1998, and subsequent conferences in 1999, and 2000. His research group has developed a prototype of the electronic book reader, and a low-cost Braille reader for electronic books which recently received a 2001 R&D 100 Award. In 2000, he was a co-recipient of the Gold Medal from the Department of Commerce, for his leadership in catalyzing the electronic book industry, facilitating standards for the e-book industry, and the development of a Braille reader for e-books. The NIST Braille reader was featured in the September 2000 issue of *Wired Magazine*. He also served as the chair and past-president for the newly formed Open Electronic Book Forum, an industry group dedicated to the development and promotion of standards for electronic books. In March 2002, Dr. McCrary received the Percy Julian Award from the National Organization for the Professional Advancement of Black Chemists and Chemical Engineers, the organization's highest honor, for lifetime achievement in

research in science and engineering.

Victor is also 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. He received his doctoral degree in 1985 from Howard University in physical chemistry. From 1985 to 1995 he was a Member of Technical Staff at AT&T Bell Laboratories in Murray Hill, New Jersey, where he conducted research in crystal growth for semiconductor lasers. He received an Executive Masters of Science & Engineering from the University of Pennsylvania in May 1995. Victor has authored or co-authored over 40 technical papers in refereed journals and co-edited two books. His view on life is simple, "concentrate more on doing the right things than on doing things right!".

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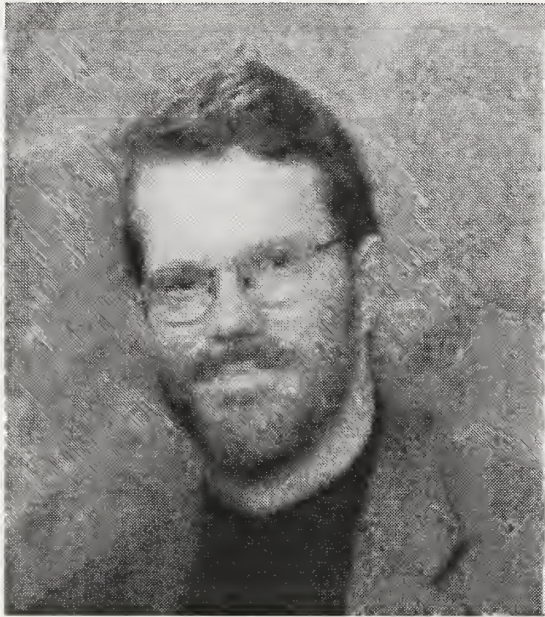
Jim Taylor,
President DVDA

Chief of DVD Technology and
General Manager of the
Technology Products Group
Sonic Solutions

Jim Taylor is Chief of DVD Technology and General Manager of the Technology Products Group at Sonic Solutions, the leading developer of DVD authoring systems. He is the author of DVD Demystified, the best-selling book about DVD technology, published by McGraw-Hill. Called a "minor tech legend" by E! Online, Jim created the popular Internet DVD FAQ, writes articles and columns about DVD, serves as President of the DVD Association, and sits on advisory boards of leading-edge companies in the DVD industry. Jim received the 2000 DVD Pro Discus Award for Outstanding Contribution to the Industry, and was also named one of the 21 most influential DVD executives by DVD Report. He has worked with interactive media for over 20 years, developing educational software, laserdiscs, CD-ROMs, Web sites, and DVDs, along with teaching workshops, seminars, and university courses. Before joining Sonic in 2001, Jim was DVD Evangelist at Microsoft, and was formerly VP of Information Technology at Videodiscovery, an educational multimedia publishing company.

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Dana J. Parker,
DVDA Program Chair

DVDA Board Member
VP Communications
DVD Reporter

Dana J. Parker is a freelance writer, consultant, speaker, industry analyst, and co-author of four books on compact disc technologies. Dana has been involved in CD-ROM and CD-R technology since 1989, and has covered the technical and market development of DVD since 1993. She is currently the editor of DVD Report and a regular columnist for TDB magazine.

She was founding chair of the DVD PRO Conference and DVD PRO University from 1997 through 2000, co-chair of DVD Europe in 2000 and 2001, and is a frequent speaker at domestic and international seminars and conferences. She was contributing editor and regular columnist (Standard Deviations) for Emedia (formerly CD-ROM Professional) magazine, published by Online, Inc., from 1992 through 2000; was the founding contributing editor for Knowledge Industry Publications' DVD Report; and her articles have appeared in Tape/Disc Business, One to One, DVD Intelligence, Computer Currents, Pro Sound News, DV magazine, and Data Production International. She is a contributor to Andy McFadden's CD-R FAQ and Jim Taylor's DVD FAQ, and was one of the technical editors of Jim's book DVD Demystified as well as Ralph LaBarge's DVD Authoring and Production. She is vice president of the Board of Directors of the DVD Association.

Dana received the 1994 Information Authorship Excellence In Writing Award for Best Column. Before becoming self-employed in 1991, she was Senior Technical Support Engineer for Meridian Data, Inc., where she was responsible for supporting the first commercially available CD-ROM and CD-R publishing systems. She was probably the first woman on the planet to record a CD-R.

Ms. Parker was one of the first 50 female field engineers for IBM at the tender age of 19, following which she enjoyed a checkered 15 year career as a field engineer for data communications satellite earthstation, print terminals, and minicomputers before falling in love with compact disc technology in 1987.

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Gaithersburg, MD

EXHIBITORS
(as of 05/29/02)

Advanced Technology Program	atp.nist.gov
AlphaDVD	alphadvd.com
American Multimedia, Inc.	ami-media.com
Antarra Communications	antarra.com
Frederic G. Antoun, Jr.	printlaw.com
CD ROM, Inc.	cdrominc.com
Compact Disc Media, Inc.	compactdiscmedia.com
dataDisc	datadisc.com
Duplium	duplium.com
DV.com	dv.com
DVD Association	dvda.org
DVD Report	pbimedia.com/cgi/catalog/info?DVD
Emedia Live	emedialive.com
Global Technology Group, Inc.	gtgi.com
iOra	iora.com
Media Form	mediaform.com
Microboards	microboards.com
National Institute of Standards and Technology	nist.gov
PBI Media, LLC	pbimedia.com
Pioneer Electronics	pioneerelectronics.com
Primera Technology, Inc.	primeratechnology.com
Ricoh Company, Ltd.	ricoh.com
Rimage Corporation	rimage.com
Royal Philips Electronics	philips.com
SecMedia	secmedia.com
Sonic	sonic.com
Ulead	ulead.com
United States Geological Survey	usgs.gov

Many thanks to Sonic for all of their promotional assistance, and to all of our exhibitors for making this year's conference a success!

SONIC™
FIRST IN DVD™

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DVDA
DVD Association

www.DVDA.org

DVDA is a nonprofit organization funded through membership dues and corporate sponsorships. Our membership is open to all those connected in any way with the creation of DVD titles. The bulk of our members are developers that specialize in the creation of multimedia programs for training, education, presentations and entertainment using the DVD platform. Our members represent some of the most experienced producers of professional applications in the industry.

One of our objectives is to make the use of complex multimedia as simple, reliable and fool proof as possible for the end user, while maintaining the highest quality production value. From software solutions, to new hardware systems and peripherals, many of the industries latest innovations are previewed at the annual DVDA Conference.

Our Directory of Resources and member's forum provide an opportunity to seek advice from some of the most experienced people in the industry. Our newsletter provides both a source of valuable information on what is going on in the industry, and is a means to broadcast your success and offerings to the membership, the press and the industry.

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NIST

**National Institute of
Standards and Technology**
Technology Administration
U.S. Department of Commerce

www.nist.gov

From automated teller machines and atomic clocks to mammograms and semiconductors, innumerable products and services rely in some way on technology, measurements, and standards provided by the National Institute of Standards and Technology.

Founded in 1901, NIST is a non-regulatory federal agency within the U.S. Commerce Department's Technology Administration. NIST's mission is to develop and promote measurements, standards, and technology to enhance productivity, facilitate trade, and improve the quality of life. NIST carries out its mission in four cooperative programs:

- the NIST Laboratories, conducting research that advances the nation's technology infrastructure and is needed by U.S. industry to continually improve products and services;

- the Baldrige National Quality Program, which promotes performance excellence among U.S. manufacturers, service companies, educational institutions, and health care providers; conducts outreach programs and manages the annual Malcolm Baldrige National Quality Award which recognizes performance excellence and quality achievement;

- the Manufacturing Extension Partnership, a nationwide network of local centers offering technical and business assistance to smaller manufacturers; and

- the Advanced Technology Program, which accelerates the development of innovative technologies for broad national benefit by co-funding R&D partnerships with the private sector.

NIST has an operating budget of about $819 million and operates in two locations: Gaithersburg, Md., (headquarters—234-hectare/578-acre campus) and Boulder Colo., (84-hectare/208-acre campus). NIST employs about 3,000 scientists, engineers, technicians, and support and administrative personnel. About 1,600 guest researchers complement the staff. In addition, NIST partners with 2,000 manufacturing specialists and staff at affiliated centers around the country.

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SONIC™
FIRST IN DVD™

http://www.sonic.com/corporate/

Sonic is the world's leading supplier of authoring systems for digital media – DVD and CD – production. Beginning in 1986, Sonic set the standard for quality, productivity and creativity for digital audio workstations and CD premastering. It built upon this success with the introduction of the first commercial systems for DVD production in 1996.

Sonic's core strengths include an in-depth knowledge of digital media formats, including CD and the many variations of DVD media, and the formats used for audio and video information including MPEG. In addition, the company has built considerable expertise in the presentation of friendly, yet powerful, authoring and editing environments to facilitate the rapid, yet creative, production of titles. Sonic's success through the years, in fact, has come from this ability to leverage format and presentation knowledge into powerful and practical products that enable non-technical creative people to author award winning titles.

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dataDisc

http://www.datadisc.com

Welcome to the dataDisc Team. Our primary goal is to provide you the best - the best products, the best service, the best support, the best value.

What do we mean by the best value? Listen to what customers like you are saying about dataDisc:

"When I originally purchased the recorder, I asked, 'How is dataDisc different than other companies selling CDR's.' dataDisc said, 'our service is the best.' Indeed, you have great service, and my thanks for helping out in a crunch. *Bill Daniels, VP, NOVA Graphics*

"The dataDisc solutions are by far the best. I also found that when I called you to inquire about your product, I got straight answers." *Walter Horvath, WJH Photography*

"Your Account Manager was professional in every way regarding my recent order." *L.Dilts, CEO, Data Technology Corporation.*

"It just churns out readable CD-ROMs all day long!" *J.S. John Deere & Company*

dataDisc sells some of the best products on the market. Quality is our standard. Our product managers search for the best products to meet the needs of our clients.

Our technical support team uses the same hardware and software in our own service bureau. They know the products.

Thousands of people contact dataDisc every month looking for quality products and service. We have a growing list of satisfied customers that include large and small companies as well and just about every state and federal agency.

We are here for you. And we want you to have the best products available at a fair price. That's what we're all about. Give us a call and let us help you with your CD-ROM requirements. 1-800-DATADISC - that's 800-328-2347. Call today - and thanks for the opportunity to serve.

Royce White
President

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www.atp.nist.gov

The Advanced Technology Program (ATP) bridges the gap between the research lab and the market place, stimulating prosperity through innovation. Through partnerships with the private sector, ATP's early stage investment is accelerating the development of innovative technologies that promise significant commercial payoffs and widespread benefits for the nation. As part of the highly regarded National Institute of Standards and Technology, the ATP is changing the way industry approaches R&D, providing a mechanism for industry to extend its technological reach and push out the envelope of what can be attempted.

Technology research in the private sector is driven by today's global, economic realities. The pace of technological change is faster than ever before, and victory goes to the swift. These realities force companies to make narrower, shorter-term investments in R&D that maximize returns to the company quickly.

The ATP views R&D projects from a broader perspective – its bottom line is how the project can benefit the nation. In sharing the relatively high development risks of technologies that potentially make feasible a broad range of new commercial opportunities, the ATP fosters projects with a high payoff for the nation as a whole – in addition to a direct return to the innovators. The ATP has several critical features that set it apart from other government R&D programs:

· ATP projects focus on the technology needs of American industry, not those of government. Research priorities for the ATP are set by industry, based on their understanding of the marketplace and research opportunities. For-profit companies conceive, propose, co-fund, and execute ATP projects and programs in partnerships with academia, independent research organizations and federal labs.

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Pioneer sound.vision.soul

www.pioneerelectronics.com/

Pioneer North America, Inc. is a part of Tokyo-based Pioneer Corporation, a world leader in digital entertainment products. The Company was founded in 1938 in Tokyo as a radio and speaker repair shop. Today, Pioneer is recognized as a leader in technology advancements in the consumer electronics industry.

Pioneer is respected for its role in such innovations as interactive cable TV, the Laser Disc player, developing the first Compact Disc player for the car and the first detachable face car stereo, DVD and DVD recording, plasma display, and organic electroluminescent display. The Company's strength in optical disc and display technology is complemented by its state-of-the-art software products and manufacturing capabilities.

Pioneer also distributes music and movie titles on VHS and DVD. Offering a wide variety of titles, with a specialty in anime.

Pioneer began its North American operations in 1972 and currently employs nearly 3,000 people, including approximately 300 at its Long Beach, California headquarters. Kazunori Yamamoto is President and Chief Executive Officer of Pioneer North America. Pioneer is listed on the New York Stock Exchange under the ticker symbol, PIO.

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www.cdrominc.comcompany

CD ROM, Inc. was incorporated in 1988. The three purposes of the company were then and remain today:
- to distribute quality optical products
- to develop CD-ROM products for clients in our consulting branch
- to foster research and development of the optical industry.

We are pleased to report that our distribution company now reaches six of seven continents. We ship literally anywhere in the world and our prices are usually so competitive that even after import duties and freight charges, our customers save money by buying from us. Our distribution company, CD ROM, Inc. was awarded the prestigious INC 500 award in 1994 as being the 184th fastest growing privately held company in the US with base year profitable sales of $1.5 million. We have continued to grow and remain highly profitable since that base year.

Our company formed a consulting division in 1990 called CD ROM-USA, Inc. USA, as we fondly call the consulting and development branch of CD ROM, Inc., has produced about 125 CD-ROM titles for various clients. Our expertise includes the use of state-of-the-art equipment and software, much of which we develop on our own, to meet our clients' needs. This unique approach makes our development work stand apart from our competitors who try to fit everyone's project needs within the capability of off-the-shelf search and retrieval software. We also offer either single one-off test discs or mass replication services for disc duplication and fulfillment.

As a small privately held firm, we have about a 17% re-investment each year back into software development and technology. We hold one very unique patent which we call "Soft Audio" which permits users of standard CD-ROM drives to have access to multimedia sound without the need for a costly sound card. This patented technology was developed from the simple observation that a CD-ROM drive can play regular audio CDs. This means that there exists inside all CD-ROM drives the circuitry to play digital sound. Since all music played inside CD-ROM is digital, why not re-route this digital signal to play multimedia sounds without a sound card? Watch for new products in 1997 which utilize this unique "software audio" solution. We also have a patent pending process called CRI-X2(TM) which permits users of standard ISO 9660 discs to place upwards of 2.0GB per disc on a capacity of 650MB, and we are working on a third patented technology relating to low bandwidth video.

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Antarra
communications

www.antarra.com

Antarra Communications is a full-service international public relations and advertising firm, helping companies become more profitable by improving communications with their current marketplace of potential and existing customers. Targeted markets and your competition are carefully scrutinized for strategic corporate positioning and brand development opportunities.

By using Antarra Communications' unique methodology, corporate marketing processes are optimized so that our clients can achieve greater profitability and to meet their industry positioning goals from their potential and existing customer base.

And through the industry knowledge of the aerospace, multimedia and broadcast environment we have aggregated, our customers get the inside scoop on all the editorial and services available to best get your message out. That way, our customers can choose the solutions that best suit the specific needs of their businesses.

Find out More!

Explore our site for a detailed view of what Antarra Communications can do for your company.

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PRIMERA
TECHNOLOGY, INC.

www.primeratechnology.com

Primera Technology, Inc. is a leading manufacturer of specialty color printers. Primera® is headquartered in Plymouth, Minnesota, USA, and distributes its products in over 80 countries. Sales, service and technical support for European customers is enhanced by Primera Technology EUROPE, located just outside of Frankfurt, Germany. Primera's products are manufactured in Plymouth, Minnesota, USA, and at an overseas facility in Montego Bay, Jamaica.

Primera was founded in September of 1998 on a tradition of innovation by the same management team that built FARGO Electronics, Incorporated into a respected, world-class printer manufacturer. Primera's mission is to produce technologically superior products that offer a high degree of customer satisfaction and value while conducting business affairs with unparalleled integrity, courtesy and professionalism.

With its staff of talented marketing, sales, engineering and manufacturing professionals, Primera is focusing on:

Making current product lines even more successful

Exploring untapped new markets and breaking through with products that satisfy previously unmet needs.

When it comes to new product development, the company's potential is unlimited. For more information on Primera Technology, Inc., please call 763.475.6676 or email sales@primeratechnology.com.

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www.rimage.com

Rimage designs and manufactures on-demand publishing and duplication systems for software distribution, information publishing, digital archival and multi-media development. These systems provide turnkey premastering, recording and surface printing on CD-R and DVD-R media.

The Rimage line includes two product families; the Producer Product Family and the Desktop Product Family. The Producer Family offers CD-R and DVD-R solutions for high-volume production environments while the Desktop Family offers compact and affordable peripherals ideally suited for the office environment.

Product History

Rimage™ Corporation is the worldwide leader in developing and manufacturing replication and finishing equipment for digital media.

A pioneer in the industry, Rimage introduced the Perfect Image® family of automated software manufacturing and information publishing systems. Rimage began with Perfect Image Diskette Systems in the late 80's, which was the most powerful software manufacturing system to date.

Continuing its innovative leadership, Rimage introduced the first and only fully integrated automated CD-R publishing system that combines file transferring, recording, and surface printing in one continuous uninterrupted flow, the Perfect Image® Producer System.

Rimage was the first to offer DVD-R support and the first to offer total flexibility by combining DVD-R and CD-R production in a single automated system. With the introduction of our Desktop Product Family, Rimage offers a complete solution for every CD-R and DVD-R need.

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Frederic G. Antoun, Jr.
Attorney at Law

www.printlaw.com

We offer clients in the print and information dissemination industries a unique combination of experienced legal services and expert technical analysis. This multi-disciplinary approach yields creative and cost effective solutions.

In addition to a unique way of resolving specific client problems, we proactively generate suggestions and programs geared to avoid pitfalls and achieve goals. And we help your staff implement them.

At the heart of our business model is the recognition that knowledge of the industry and your business is critical to providing the best possible service.

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ULEAD

CREATIVE INTELLIGENCE

www.ulead.com

Ulead is committed to being a leader in the digital media software industry. Leveraging core competencies and creativity, Ulead is driving aggressively into integrated Internet-based imaging and video products, services and content to help consumers, businesses and industry partners enjoy the rich communications opportunities available in the new millennium.

Ulead produces multimedia software for users of all levels. Whether you're into video editing, DVD authoring, photo editing, or interested in Web design, we have the software for you. Along with desktop programs, Ulead also carries a range of server-based solutions and royalty-free media.

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AMI American Multimedia, Inc.
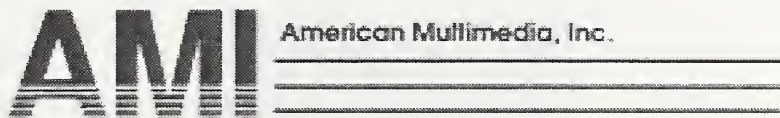
www.ami-media.com

In this age of specialized markets few companies today can truly claim to be a full service, one stop enterprise. However, as our client base has expanded and customer needs have changed, American Media International, LLC. has become precisely that. Our scope of services range from creative inception to final distribution of any CD, CD-ROM, floppy diskette, audio or video cassette, and all elements in between.

AMI's corporate campus located in Burlington, North Carolina houses all of the state-of-the-art manufacturing and service entities needed to provide our customers peace of mind that comes from working with a One Stop Service facility. Our approach to servicing our customers' needs allows financial efficiency and convenience, and ensures that your project is in capable hands throughout the production or duplication process.

Our wide range of services include optical media (CD-Audio/CD-ROM) replication, audio and video cassette, computer software duplication, video production complete with studio recording, printing, warehousing and distribution. We invite you to visit our corporate headquarters and manufacturing campus where you will see an incomparable array of products and services for a rapidly changing world of Optical and magnetic media.

AMI's mission is to provide unparalleled customer service that meets the ever changing needs of our clients while maintaining focus on tomorrow's emerging technologies.

Sales & Information: amisales@ami-media.com
Phone: 1-800-849-3223

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www.dv.com/

DV.com is the principal online resource for creative professionals working in the production, postproduction, and delivery of digital video and dynamic media. DV.com provides the latest industry news before it is released in print, Web-exclusive articles, objective product reviews and case studies, an interactive community section, and weekly newsletters from the contributing Web editors and trusted editors of *DV* magazine. In addition, DV.com offers the DV Product Information Guide, which allows users to comparatively research products. More than 166,000 users visit the site a month (as audited by BPA International Interactive, January 2001) and it experienced a 40 percent increase in traffic in 2001.

DV.com is part of the CMP DV Media Group of CMP Media LLC, the leading information resource for digital video and Web video professionals. The CMP DV Media Group inspires and empowers video professionals with the industry's most comprehensive source of tools and technologies, through a breadth of resources which includes *DV* magazine, DV.com, DV Expo, 3Dgate.com, and associated newsletters. CMP Media LLC (www.cmpnet.com) is a leading high-tech media company providing essential information and marketing services to the entire technology spectrum—the builders, sellers and users of technology worldwide. Capitalizing on its editorial strength, CMP is uniquely positioned to offer marketers comprehensive, integrated media solutions tailored to meet their individual needs. Its diverse products and services include newspapers, magazines, Internet products, research, direct marketing services, education and training, trade shows and conferences, custom publishing, testing, and consulting.

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www.iora.com

iOra is a software technology company that delivers Total Information Mobility for companies that want to extend the benefits of their Intranet or Corporate Portal implementations out to mobile workers and remote offices.

iOra's solutions allow mobile and remote workforces to take portal and intranet content offline into any working environment, with the benefits of increased productivity, reduced cost of support, and reduced fixed, dialup or wireless bandwidth expense.

At the heart of iOra's products is its patent-pending Epsilon Technology, which compresses data - often by 99% of the original size. This means that content updates can be sent to and from mobile users with unprecedented speed, even over low-bandwidth dialup and wireless connections.

Across a broad spectrum of industries and business functions, iOra's products play a key role in keeping mobile professionals and remote users up to date and productive. Any professional in the field who can benefit from simplified and rapid access to continuously updated corporate intelligence will benefit from Total Information Mobility. Sales professionals, consultants, field engineers, and corporate telecommuters alike rely on solutions developed by iOra to harness the power of information and turn it into an engine for generating revenue.

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www.emedialive.com/

EMedia Magazine is for technology professionals who produce, store, present, and stream digital content. Readers work in all industries–from publishing and multimedia to education and training in everything from content creation and delivery to corporate sales and marketing. Readers count on EMedia to deliver relevant product reviews and news, industry trends, case studies, and emerging technology analysis. As early adopters of new technologies, readers look to EMedia to deliver the latest on video production equipment; network delivery and storage devices; authoring, encoding, playback, and streaming tools; sophisticated presentation equipment; duplication and replication products and services; and media packaging.

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DVD Report

www.pbimedia.com/cgi/catalog/info?DVD

A weekly newsletter, **DVD Report** delivers fast-breaking news on the business and technology side of DVD as it happens. Each issue covers such pertinent topics as applications, hardware and software introductions, publisher developments, title releases, statistics and projections, authoring tools and compression technologies and much more.

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G

www.gtgi.com/

Global Technologies Group, Inc.

GTGI manufactures and sells information security, digital publishing and data storage products, and offers a wide range of technical and fulfillment services. GTGI's expertise in understanding and solving customer problems has led to the development of a client base that includes Fortune 1000 companies and U.S. federal government agencies.

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PHILIPS

www.philips.com/

Royal Philips Electronics, the official name of this global company, is one of the world's biggest electronics companies and Europe's largest, with sales of $28.8 billion (€32.3 billion) in 2001. With headquarters in Amsterdam, The Netherlands, Philips is a global leader in color television sets, lighting, electric shavers, color picture tubes for televisions and monitors, and one-chip TV products.

Philips Consumer Electronics is the third largest consumer electronics company in the world and a leader in the development of digital television systems and Compact Disc applications. Its main product lines are television, video, audio and PC peripherals. Philips is credited with inventing the audio cassette and co-developing the compact disc and videocassette recorder, or VCR. Current products include innovative technologies such as Internet radios, high definition televisions and DVD-recorders. In 2001, worldwide sales totaled $9.85 billion.

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www.usgs.gov

The diversity of scientific issues that demand attention has prompted the USGS to focus its efforts into four major areas: natural hazards, resources, the environment, and information and data management.

Created by an act of Congress in 1879, the USGS has evolved over the ensuing 120 years, matching its talent and knowledge to the progress of science and technology. Today, the USGS stands as the sole science agency for the Department of the Interior. It is sought out by thousands of partners and customers for its natural science expertise and its vast earth and biological data holdings. The USGS is the science provider of choice in accessing the information and understanding to help resolve complex natural resource problems across the Nation and around the world.

The USGS serves the Nation as an independent fact-finding agency that collects, monitors, analyzes, and provides scientific understanding about natural resource conditions, issues, and problems. The value of the USGS to the Nation rests on its ability to carry out studies on a national scale and to sustain long-term monitoring and assessment of natural resources. Because it has no regulatory or management mandate, the USGS provides impartial science that serves the needs of our changing world. The diversity of scientific expertise enables the USGS to carry out large-scale, multi-disciplinary investigations that build the base of knowledge about the Earth. In turn, decision makers at all levels of government—and citizens in all walks of life—have the information tools they need to address pressing societal issues.

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www.ricoh.com

Ricoh Company, Ltd., led by Chairman Hiroshi Hamada and President Masamitsu Sakuri, is one of the world's leading suppliers of office automation equipment, including copiers, facsimile machines, data processing systems, and related supplies. The company is also renowned for its state-of-the-art electronic devices and photographic equipment.

Ricoh has a fully-integrated research and development structure with ten laboratories conducting basic and applied research in a broad array of technologies. These include such diverse areas as optics, chemicals, mechatronics, semiconductors, digital electronics, color, image processing and information technologies. Its research and development structure draws on a groupwide commitment to customer-oriented innovations to promote overall advances in image processing and multimedia technologies.

Ricoh's global manufacturing network encompasses Japan, Europe, North America, and Asia. In each area, the company emphasizes top quality - most facilities are certified under the ISO 9000 series - and proactive efforts to protect the environment. We also rely heavily on a growing number of local partners that provide parts and components.

Headquartered in Tokyo, Ricoh employs approximately 75,000 people at its 390 locations worldwide. The company was founded in 1936.

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Duplium

www.duplium.com

Duplium Corporation is a leading provider of optical media replication and global fulfillment services. Customers from both creative and corporate industries rely on Duplium to provide complete turnkey production solutions for CD-ROM, CD-R, DVD and diskette. From precision glass mastering and creative package design to barcode tracking and distribution, Duplium provides its customers with a customized production plan that captures a project's highest vision, and its smallest details.

Duplium's mission is to reproduce and distribute the creative ideas of our customers through the pursuit of technical innovation. The company is well-respected for its impeccable customer service, production excellence and experienced technicians.

President and CEO Bernie Anderson credits Deplium's 827% growth revenues from $3.3 million in 1995 to $30.9 million in 2000 to its unique customized services. Further evidence of the Corporation's upward movement, it received the prestigious "NEXT 100" PROFIT100 award as one of Canada's Fastest Growing Companies. Though it is headquartered in Toronto, the company has a manufacturing facility in Dallas as well, with sales offices throughout North America.

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MediaFORM SMART TECHNOLOGY

www.mediaform.com

MediaFORM is the worldwide leader in CD-R/DVD-R duplication and printing solutions. From high throughput manual systems to sophisticated network production systems, MediaFORM offers the most extensive line of CD-R/DVD-R products anywhere. All products are readily available through an international network of quality channel partners. MediaFORM's corporate office is located in Exton, Pennsylvania. In addition, MediaFORM's branch offices include Boston, New York, and Los Angeles. Please review our products and services at your leisure and contact us with any questions or comments you may have.

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MICROBOARDS
Technology, Llc.

www.microboards.com

Originally founded in 1989 as the international division of a Japanese CD-engineering firm, Microboards Technology has been growing rapidly along with CD-R technology for the past 12 years. And with the introduction and acceptance of DVD-R to the market, Microboards is in a unique position to serve the needs of various industries with CD-R and DVD-R technology.

The company prides itself on offering service and support above and beyond the typical company; with its strong relationships with prominent manufacturers such as Pioneer, Panasonic, Taiyo Yuden, Verbatim, Hoei Sangyo, and many others, Microboards is able to provide the latest technology at competitive prices. In addition, Microboards' acquisition of a manufacturing facility last year gave themnew capabilities, and with their skilled design team, the ability to offer products more tailored to the demands of the industry today than ever.

In order to provide top-of-the-line service and maintain low prices, Microboards sells its products through a carefully trained and selected dealer channel, however, at any time customers are welcome to chat with one of the representatives, e-mail, or call at 800-646-8881. The representatives can provide the "List Pricing" of products over the phone, and quickly put customers in contact with one of the resellers to get a competitive quote.

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CONFERENCE PROGRAM

Speakers and Presentations

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Chris Israel

Deputy Assistant Secretary
Technology Administration
Department of Commerce
www.ta.doc.gov/

**"DVD: An Enabling
Technology for Broadband
Deployment"**

Chris Israel joined the Commerce Department as Deputy Assistant Secretary for Technology Policy, on November 1, 2001, joining Assistant Secretary Bruce Mehlman at the Office of Technology Policy.

From January 2001 until moving to Commerce, Israel was Deputy Director of International Public Policy for AOL Time Warner, and previously worked as a Senior Public Policy Analyst for Time Warner Inc. beginning in 1997. His experience includes working on high profile policy issues such as the protection of personal data collected on-line, safety of children online and international e-commerce.

Earlier in his career, Mr. Israel served as a legislative aide to U.S Representative Jan Meyers (R-KS) and later with U.S. Representative Todd Tiahrt (R-KS). Chris Israel received his B.A. from the University of Kansas and his M.B.A. from The George Washington University.

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Dr. Omid Omidvar
Program Manager
Advanced Technology Program
NIST
www.atp.nist.gov/

"ATP Program and DVD"

Dr. Omid Omidvar is program manager in the Advanced Technology Program of the National Institute of Standards and Technology, U.S. Department of Commerce. He is working on areas of Biometrics, Pervasive Computing, Bioinformatics and Virtual Tele-presence. He joined ATP as the technical program manager of Digital Video Program. Digital Video is a $122 million program which includes High Definition Television (HDTV). Prior to joining ATP he worked as a research scientist in areas of Optical Character Recognition for IRS and Finger Print Classification for FBI, and Face Recognition for Visual Image Processing Group in Advanced Systems Division of Information Technology Laboratory at NIST.

Dr. Omidvar was the technical director of the SPPARC center a supercomputing facility funded by the National Science Foundation in Washington, DC. He also has conducted research for NASA on the design of neurocontroller for robotics arms with neural networks and Fuzzy systems. He was the Chief Technology Officer of Technology Research International. He has been a consultant to IBM, Northrop Grumman, Sun Micro Systems, Oak Ridge National Laboratory, Department of Defense. He also was a technology assessment fellow at Department of Treasury.

Dr. Omidvar authored numerous technical papers, books and journal papers in areas such as Computer Architectures , Machine Vision, Neurodynamics of Learning, Robotics and Control, Finger Print, and OCR. Dr. Omidvar was the Editor-in- Chief of the "Journal of Artificial Neural Networks" a publication of Ablex publishing corporation. Dr. Omidvar has published ten volumes of books in areas such as Machine Vision,

Robotics, Control Theory, Computer Architecture, Pattern Recognition, Neural Networks. These are Ablex and Academic Press Publications. His latest book is on Shape Recognition and is published by Intellect Press of UK. He has organized and run conferences in image processing, neural networks, robotics and control.

Dr. Omidvar's undergraduate degree is in Industrial Management and Engineering, his MS degree in Computer Engineering and his Ph.D. degree is in Computer Science. His research interest includes Financial Engineering, HDTV, Digital Video, Wireless Communications, Intelligent Systems, Wafer Scale Integration, Robotics and Control, and Computer Vision. He is a member of SMPTE, NAB, IEEE, ACM, INNS, and MAA. He also has received his MBA degree from George Mason University.

Technology areas of responsibility:
· Biometrics and Security
· Digital Video and HDTV
· Bioinformatics and Functional Genomic
· Intelligent Systems and Robotics
· Pervasive Computing
· E-commerce and Telepresence

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Sam B. Wagner

President
Video I-D Teleproductions, Inc.

"Designing for DVD: Building a Stronger Message through the Medium"

Since 1977 Mr. Wagner has led Video I-D in developing effective tools to educate, motivate, empower, influence, and facilitate. For nearly five years he has enhanced this communication using the tremendous flexibility and efficiency of DVD.

Mr. Wagner has been a newsman, anchoring news and talk programs. He has taught at the university level, served as consultant for broadcast television, conducted international workshops, and written for publication.

He has been professionally involved with film, video, and TV for more than 45 years.

Mr. Wagner was born in Dallas, raised in Chevy Chase and educated in Japan, Africa, Florida, and Illinois.

DESIGNING FOR DVD
Building a Stronger Message through the Medium
Sam Wagner

Some pictures <u>are</u> worth 1,000 words; some images never fade. Raising the flag on Suribachi, Lyndon Johnson in Air Force One right after President Kennedy was assassinated, Desert Storm and the Iraqi destruction of the Kuwaiti oil fields, the second plane plunging into the South Tower, former President George Bush reaching over to touch George W. immediately after he spoke in the Cathedral, funeral services for police and firefighters (family members), the President near Ground Zero with his arm around the firefighter. We live in a world of images and impressions.

DVD is rapidly moving into its own because the format allows the use of three tremendous technologies that are related but not quite yet seamless. Video, the Computer, and the Internet.

This one-stop potential for inter connectivity offers great latitude for presenting very useful information in a very accessible way to keep interest high and time spent seeking knowledge low while helping make learning a pleasant experience, even entertaining.

It's not yet seamless. You may hear developments from others regarding their efforts to make the transition between DVD-Video, DVD-ROM, and the Internet without a hiccup, but it is an area with great promise.

For the past five years we have been working with DVD and we have found that DVD is an excellent tool for encouraging and teaching and passing information in a pleasant way. About three years ago, we examined the uses of DVD for police and law enforcement and completed our first work by Mid August of last year. What follows is based on our experiences and is given with the hope that it will help you avoid some of the deep spots as you develop work of your own.

Throughout it all, we decided to concentrate on the "Why", leaving the "How-to" to Training Officers and on-site instructors. Now, training can easily be incorporated into a well-designed DVD. It is just that we have chosen to provide something that complements existing instruction and allows best practices education to be incorporated into local departmental processes and procedures.

Our approach is simple...
A **pretest** is provided so each officer understands that this is not "given" information. Some may have been learned at the Academy, some On-The-Job, some through conversations but none of it is to be taken for granted. The pretest also provides a benchmark for Training Officers to give them an indication of how much is known prior to this instruction. A lot of this education is about attitude and staying alert and ahead of the curve regardless the routine nature of the work or assignment. This pretest gives a percentage score at its conclusion, and it is all in DVD-Video.

The **main presentation** uses real cops as uniformed officers in scenarios suggesting ways to think and do. "If you're in a bad position, MOVE." "Always use <u>enough</u> force." "You are never driving for dollars." This presentation is generally short, poignant with high impact. All video is designed to move rapidly, demonstrate the principle and leave the impression. 20 minutes is a max. Most main presentations are held to around 15-minutes, can be seen as a contiguous whole or viewed as specific points by chapter selection.

A sergeant in charge of training at the Los Angeles County Sheriff's Office, some 16,000 sworn officers, said it is the kind of training they are looking for, particularly for the newer officers.

It seems that the newer officers, just coming into police departments across the nation tend to be computer literate, have shorter attention spans and seem to learn best by entertainment. Edutainment is a term I'm hearing more often, usually positive.

A well-designed DVD is much like an automobile. Designed by craftsmen and engineers to be driven by teenagers. If the menus are not easily understood and the navigation is not self-explanatory, you're wasting your time and the time of those using your work.

At the heart of an effective DVD is design and ancillary information, which is complementary and easily accessible. As you know, DVD requires different thinking. It is not linear work paid for by the running minute.

So what is seen is brief, has high impact, leaves an impression, and encourages users to search out more information (which is also on the DVD but under separate menu headings).

Menus we've designed provide such information as case law or legal briefs, training points, discussion questions, real life summaries, multi-angle views of specific action and further information on other resources.

These menus allow the training officer or operator, whether in a classroom setting, roll call or self-study, and the vehicle is designed to work well in all three, to go immediately to the topic of interest, pull up complementary and ancillary information of interest and move ahead with learning. No more fast-forwarding or frustrating search to try to find some point of interest.

Now remember, we're still in DVD-Video, which plays on your everyday, ordinary, homegrown player selling from 65 dollar to 300 or more. And there's more still in the Video Format.

Menu driven headings get you to judgments, chapter headings, support material and previews of upcoming topics. Some menus are tied to specific topics others are generic to keep instruction uniform from one title to the next. But the training officer, or individual officer in the case of self study, decide what is to be seen, saving time and effort and encouraging further study. That 15-20 minute video has now expanded into an extended time for immersion in the topic.

The **DVD-ROM portion** of this DVD delivers the complete Training Officer manual with review and basic instruction lesson plans, full legal opinions or extended case law and a final test. This is where we can place a great deal of information appropriate to instruction, certification, and verification of knowledge to provide a level or degree of accountability. It can be information specifically for the Training Officer if the student has access only to a DVD-Video player.

Access between DVD-Video and DVD-ROM should be seamless, but I have yet to see a satisfactory demonstration of this on DVD. So far, we have to do it the old fashioned way – through the My Computer icon or some other series of keystrokes.

Accessing the Internet portion of this DVD allows the use of specific web sites to enhance the information presented on the DVD. This vast resource encourages further learning through complementing information and references for great depth in a particular area. A well ordered list of sub-topics with specific web sites is invaluable and a home site provides space for complementing and updating all material. We use www.policedvd.com for this purpose, but because these DVD titles are so fresh, there is not much there presently. This will change.

Generalized sites are great for general information, but if you really want to center punch your target audience, go very specific with web addresses and keep it simple with icons.

The key to all of this is simplicity; convenience and using conventionally accepted access. Certain norms have been established for DVD operation and the closer we follow this pattern, the easier these discs will be to use. There is a learning or comfort curve for this technology and it is essential to make it easy and keep it consistent.

We can use all kinds of technology to keep the information secure; the levels are out there and require only a user name and access code. We can even go to some of the older technologies such as DIVX and various hybrids to dole out or timeout certain portions of a DVD, but for most law enforcement education, a 90-dollar player and a monitor will get the job done and a library of titles covering topics recommended from the field will serve well.

You will hear a lot about the uses of DVD today and tomorrow, some general and others very specific. Victor McCrary and NIST have brought together an outstanding and diverse group of presenters. Timing for this initiative is excellent. This is a format whose time in the non-theatrical arena is just beginning. The impact is immeasurable.

HOWEVER—-We have a challenge.

There are training departments, large and small, making full use of some of the latest technologies to great effect. These classrooms are a model of efficiency and effectiveness. And the instructors are very comfortable with everything up to and including DVD.

But here's the however…and it comes from three years of working with law enforcement on many levels and our efforts to move DVD from the extraordinary into the Training Officer's comfort zone.

Many, but absolutely not all, of the senior training officers and instructors, are most comfortable with lectures, overheads, and VHS video. They haven't yet had the opportunity or need to become comfortable with CD-ROM or Power Point or DVD. And to be fair, not much of this new stuff has been available until recently and most of what is out there tends to be expensive. Smaller departments, large ones also, on limited budgets must be more traditional.

But change is coming. Some change will come as a direct result of these meetings here at NIST. Other change, simply because this technology carries great promise for cost effective learning and equipment and software costs are dropping. And as responsibilities increase and resources decrease, this transition becomes even more important. None of the sources of crime are going away and terrorism is an add-on for most police and first responders.

So, we will need to train the trainers. It may not be that difficult, because once they get used to the one-stop resources of a well-organized DVD, they're not likely to want to go back to the vanilla. It will make their tasks that much more effective.

The incoming group of young officers and officer candidates generally arrive with excellent computer skills, a great deal of comfort with technology and technologically based information, an ability to learn well through visualization and through entertainment, and very short attention spans. They have been reared on computer games in a television world where pictures, preferably in full motion with good color and sound, convey concepts and multiple messages, reinforcing the mind and memory. There is nothing quite like a good 30-second spot.

Education and training are the best shields for the men and women who carry the shield. Strip everything but training away from a seasoned officer, and you still have awesome capability. Because you can't strip away the knowledge, experience, the instincts, the reflexes, the focus, the know-how, the years of education and training of these men and women.

DVD is not new technology. Hollywood has been making lots of money with DVD for the past five years. DVD was the prime reason the economy didn't go into the dumpster this past Christmas season according to the New

York Times. Seems the DVD player was on nearly everyone's Christmas list. And DVD-ROM drives add a hundred dollars or more to the cost of most computers and if you want to write your own DVDs, drop another thousand or so and it's all there. The system may not be the fastest, but you can encode, author and write your own DVDs.

When VHS was a brand new thing, it took off first as a Hollywood theatrical release venue. Those early films were expensive…selling for 50 to 85 dollars. But when Raiders of the Lost Ark sold for 39-dollars…people without players bought the VHS tape. And industry began looking at the potential to sell, train, educate, create images and gain market share with this new thing.

That was less than twenty-five years ago. And times are changing. Since its introduction to the public in 1997, DVD is the single fastest growing technology of its kind ever. We're looking at 30 million plus players and a billion DVDs to date…and popularity continues to skyrocket.

I first became interested in the potential for using DVD in police and law enforcement training three years ago. My nephew Matt was becoming a cop. So I talked with friends, looked at what was out there, decided that we could add something to the mix, and we came up with a first DVD in mid-August for a statewide trade show held in suburban Chicago. The DVD was about police safety – "The 10 Deadly Errors". It was a hit. Our first mailer was delivered to the post office on September 10. And the following morning————Yes…we have experience.

We took it to the IACP (International Association of Chiefs of Police) in Toronto where again, we heard great interest in DVD education. And now several state POSTS are reviewing the series.

DVDs don't wear out, can take some serious abuse as rental stores can attest, can make use of the Internet, and deliver information with exceptional quality. It is a wonderful format.

Is DVD going to be replaced by something else? Of course. How soon? Some of those speaking later on may have something to say about it.

So where are we?

Here's a suggestion for a perfect world. And it's based on conversations with quite a few people in law enforcement with a lot of experience.

Someone needs to take ownership of this kind of education and training and move it into all police and law enforcement agencies across the nation. Of the 35,000 agencies, with about 700,000 men and women, here in the US, the vast majority are small departments of 10 or fewer sworn officers. Their departmental budgets are just not big enough for some of these break through technologies.

The Department of Justice working with different agencies could see that particular topics are done. DOJ could get suggestions, recommend topics, see that the expertise of such agencies as the Secret Service, the Marshall Service, FBI and others goes into the content.

Local Law enforcement could be asked to suggest topics through the office of the Attorney General and a coordinated effort would ensure the money and focus on a mission of effectively and efficiently improving the quality of local law enforcement.

We could also incorporate the best from each of the 50 states, coordinating the best efforts of major police departments to come up with topics, develop them, use best practices to keep them universal.

So, what are the benefits:

Best practices, federal agency expertise, cost reduction, and staged releases of one per month. We also begin to tie law enforcement together with a sense of community and commonality through the Internet and specific sites accessible only to police and law enforcement through user names and pass codes.

The ones to benefit the most from this breakthrough technology are the smaller departments and the less well financed departments. As long as we use Best Practices we can provide a generic basic for education to enhance localization. Federal agencies have a wealth of information and great depth of expertise, which will be especially valuable in dealing with volatile terrorist situations. Even in the arena of so-called ordinary crime, this is becoming an increasingly dangerous world.

Just this spring we lost two young officers within 40 miles of where I live. One was shot while chasing a suspect; the other was shot while executing an arrest warrant. The one officer was not wearing body armor. The other allowed the man whom he had served to go back into the house for a coat. Instead, he returned with a shotgun and killed the officer and two neighbors.

Could better training have prevented these tragedies? I don't know, but I would like to think so.

The 10 deadly errors are responsible for the deaths of at least 50 to 60 officers each year according to ongoing FBI studies. For some it is a lapse in concentration, a let down in procedures, a break from the monotonous. Training can help, particularly refresher or review material that is interesting and concise. It at least gives a heads up that the routine is not always routine. Police work is dangerous. Sometimes there is no second chance.

This is a time when we are hearing calls for better and more training for first responders and police and fire fighters. We are hearing threats about terrorist attacks that are likely to occur anywhere.

So, on top of what is already a heavy load of normal law enforcement against child molesters, robbers, burglars, rapists, murderers, drug dealers ... the conventional list is endless...Now we add terrorists, people who have taken the pledge to murder and die in the process. It's becoming more dangerous out there.

The thin blue line is our front line here in America. And the thin blue line is thin.

We need to get serious with this training, particularly for the smaller departments. When the majority of departments are less than 10 officers, the blue line is thin.

Good education and training are their ultimate protection.

DVD may be just a tool, but it is the hands-down leader when it comes to connecting the dots with convenient relevant useful complementary information.

Thank you for inviting me. May God bless you, these United States and the men and women who serve her so well.

-Sam B. Wagner

DVD 2002
Conference and Exhibition
Standards, Applications, Technology

Oliver Slattery

Convergent Information
Systems Division
NIST
www.nist.gov/div895

**"Data Preservation and
Optical Discs"**

Oliver Slattery has worked as a Guest Researcher and then Contractor at the Convergent Information Systems Division (CISD) at NIST since 1998. Until September 2000, he worked primarily on the NIST Rotating Wheel Braille Display project and was part of the team that won the 2001 R&D 100 award for that project. In 2001, he graduated with a MSc form the University of Limerick in Ireland with a thesis based on the Braille display entitled "Development of New Braille Display and Characterization of Displays for Electronic Books". Since September 2000, he has being involved in the data preservation program at CISD.

Data Preservation: Project Summary

Ongoing and Future Projects include:

- Interoperability of storage devices and media
  - -HDSA Data Preservation Laboratory
  - -MultiRead Test (Optical Disc Drive Compliance Test)
- Reliability Study
  - -Microscopic image observer
  - -CD tester/DVD tester
  - -Temperature + Humidity
  - -Photo-degradation
- Data Recovery from Disasters
  - -Use of Advanced Error Correction Coding (Turbo)
- Collaborations
  - -OSTA, HDSA, NSF, LOC, CMU, UL, WAMO, DVDA

Data Preservation: Applications

Archives-
- -preservation,
- -of digital objects,
- -of digitized objects...

Libraries-
- -digital libraries,
- -e-books,
- -online bookstores...

Company storage-
- -email/general documents,
- -data,
- -results...

Academic-
- -syllabus transcripts,
- -online publications...

Security-
- -criminal records/profiles,
- -biometric databases,
- -security video data storage...

Data recovery-
- -catastrophes,
- -aging,
- -long-term preservation...

Entertainment-
- -world wide web,
- -digital cinema...

Government...

Health care...

Industry...

Internet...

and many more...

NIST/HDSA Data Preservation Test Facility

NIST High Density Storage Association
Promoting Automated Storage

HDSA/NIST Data Preservation Laboratory

```
                         Computers        Peripherals
                       Management
                       Software A      CD          System 1

                       Management
                       Software B      DVD         System 2
NT
Server       Switch    Management
                       Software C      MO          System 3
Test
Programs               Management
                       Software D   12" Optical     System 4

                       Management
                       Software E   Optical Tape    System 5

                       ▼ Add more later ▼
```
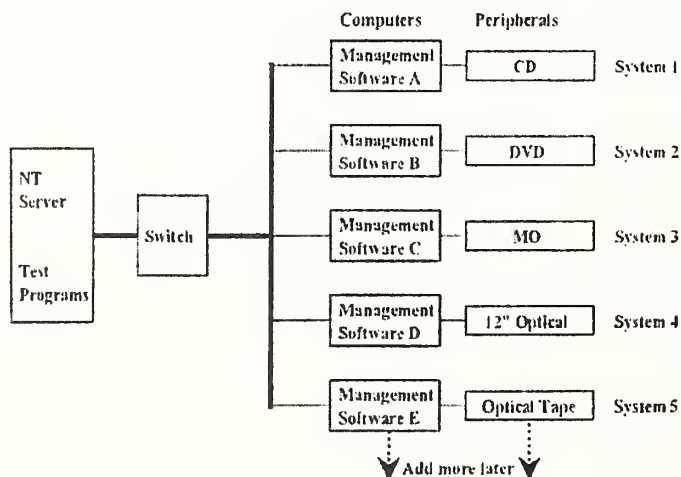
HDSA/NIST Data Preservation Laboratory

Data Types:
- Text
- Audio
- Video
- Images
- Mixed
- other...

Media Types:
- CD
- DVD
- Magneto-Optic
- 12" Optical
- Optical Tape
- more...

Storage Systems:
- DVD Jukeboxes
- CD Jukeboxes
- Tape Libraries
- more...

Questions:
- How much data will the media hold?
- How long will it take to access the data?
- Can I transfer data from my existing system?
- Can I mix systems and media?
- Will the media preserve the data integrity for as long as I need?
- Will my data formats transfer between systems?
- Many, many more...

HDSA/NIST Data Preservation Laboratory

Goal: Create a real life demonstration facility for present and future end users of these systems.

Goal: Highlight the capabilities and limitations of different jukebox types and systems.

Goal: Improve jukebox and library interoperability, performance and transfer rates.

Goal: Study interchangeability between storage systems, media types, and storage management.

Goal: Work with industry (HDSA) to create a Storage Technology Tool that evaluates different storage media.

Optical Disc Drive Compliance Test

NIST **MultiRead**

ODDC Test layout
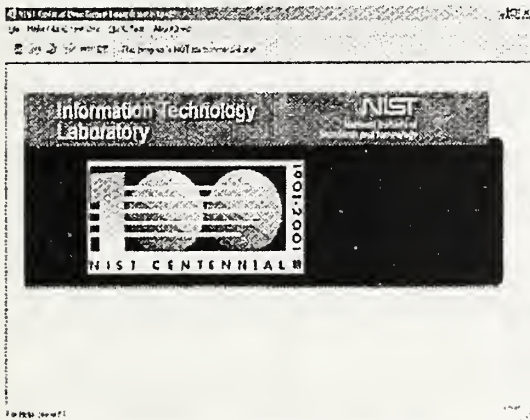
Available for free at www.itl.nist.gov/div895/NISTCDTest/index.html

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Optical Disc Drive Compliance Test

Problem Statement:
No mechanism available to the user to test their drive for MultiRead compliance.

NIST Response:
NIST then developed a test, which followed step by step the MultiRead specifications, that allows users to test their drives for compliance. The test comprises of the following:

1) generation of test pattern,
2) burn the pattern test disc,
3) test drive for MultiRead compliance using test disc and
4) show and print the results of the test.

ODDC Test Procedure
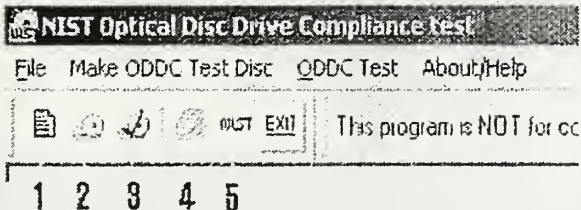
1. Create source (pattern) files.
2. Burn the source files to the test disc
3. Test for MultiRead compliance using the test disc created (based on MultiRead Test plan).
4. Prints results outlining where (if any) failures occur
5. Help and Information.

Optical Disc Reliability Testing

NIST

High Magnification Microscope
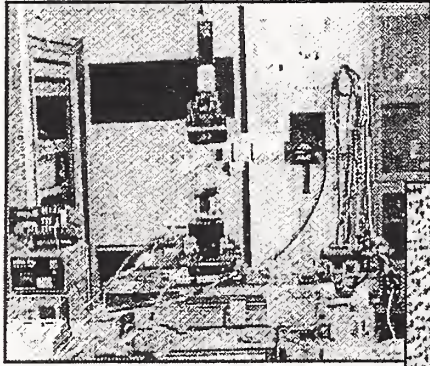
Examination of physical defects
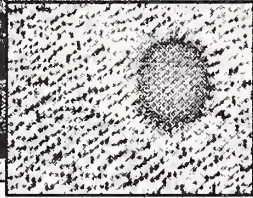
Optical Disc Microscope Testbed

TV Screen — CCD camera — Filter — Mercury lamp — Computer — Microscope — Controller — Disk — 3-D micro-positioning

Compact Disc

Digital Versatile Disc
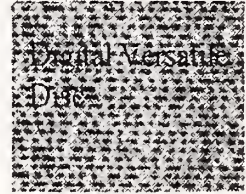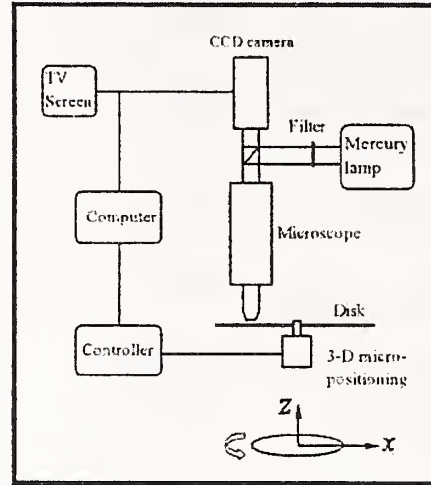
Image Processing
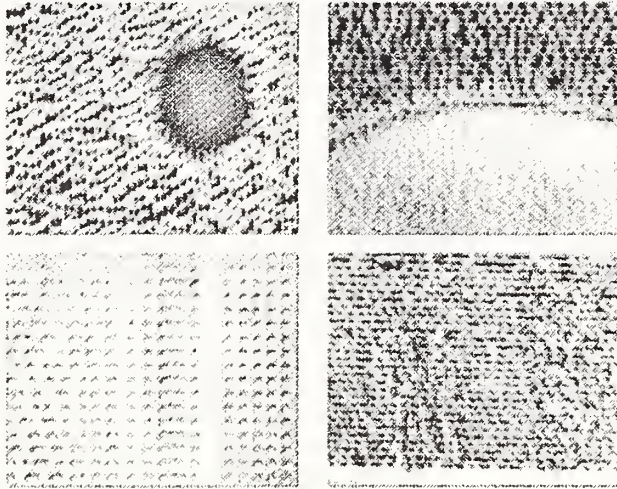
Pit Size Analysis and Disc Tilt Measurement

Pit width (μm)

3T 4T 5T 6T 7T 8T 9T 10T 11T

Pit length (μM)

Displacement (μm)

Theta (degree)

Eye Pattern

DVD-ROM

DVD-R
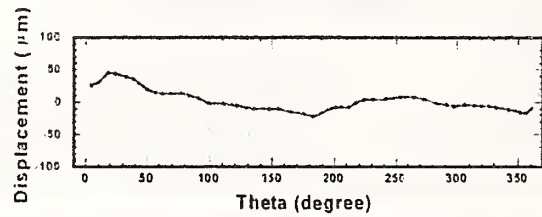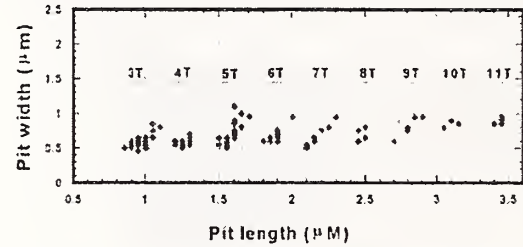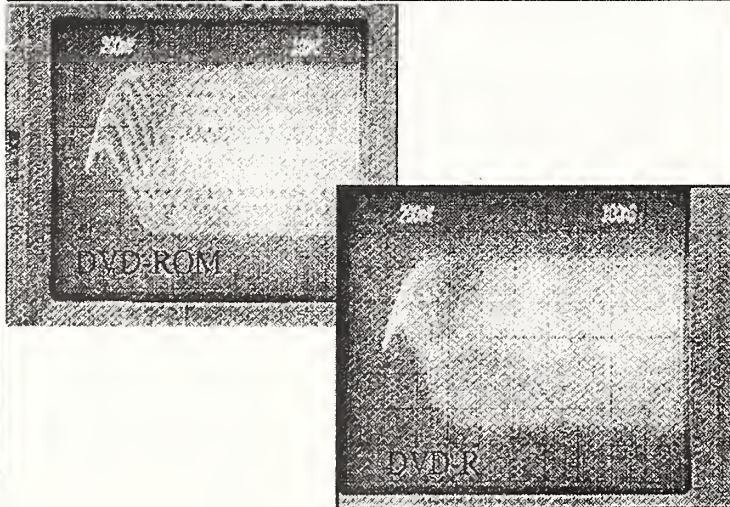
Temperature/Humidity and Light Chambers
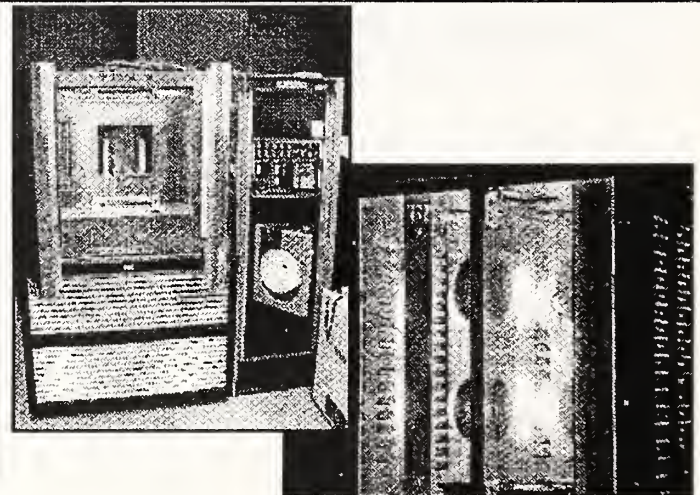
CATS SA3 Compact Disc Analyzer
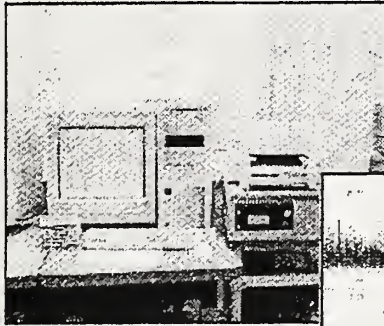
Provides CD parameters after temperature and/or humidity effects
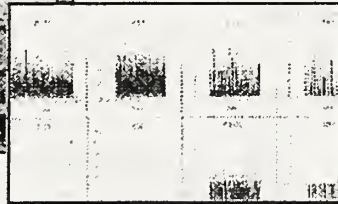
CD Associates DVD Analyzer
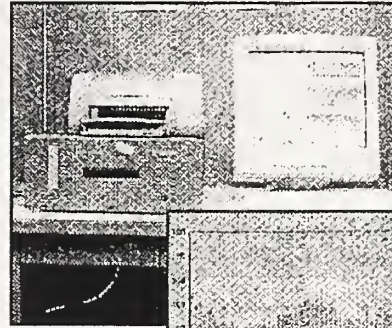
Provides DVD parameters after temperature and/or humidity effects
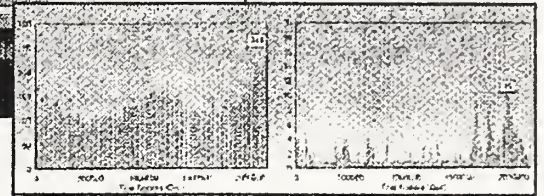
Disc Reliability: Project Goals

- **Stimulate the use of Optical Discs for Preservation:**

  Much of the original digital information produced today is placed on CD-R and DVD-R media (valuable experimental data from a scientist, for example) and therefore that is where we concentrate our efforts.

- **Identify the discs that are suitable for archiving:**

  This recommendation can be used by archivists and librarians as a disc selection guide.

- **Develop a methodology to test existing discs:**

  Allow archivists and librarians (and others) to test the valuable discs already in their collection.

Disc Reliability: Project Procedure

1. **Initial acquisition of disc media:**

   Gather a complete and full collection of all the media types, both of different technologies and manufactures

2. **Group and label discs:**

   Divide the discs into various test criteria groupings and label them according to their type, manufacturer and test criteria.

3. **Develop testing conditions:**

   Develop experimental test conditions for each of the disc groups based on the life-time formula:

   $$\text{Life-time} \propto e^{\frac{1}{t h}} \quad \text{where} \quad t = \text{Temperature}$$
   $$\text{and} \quad h = \text{Humidity}$$

   Example of experimental test condition: Temperature = 90°C and Humidity = 80%.

   Change the experimental test conditions for each grouping of discs.

Disc Reliability: Project Procedure (cont.)

4. **Burn pattern:**

   In order to get results of disc errors, it is necessary to burn some pattern or put some data on the disc itself. Each disc should be full.

5. **Test new disc:**

   Initially, it is necessary to test the new burned test disc using the CD-Associates DVD analyzer for the DVD and the CATS SA3 CD analyzer for the CD.

6. **Age discs artificially:**

   Using the temperature and humidity environmental chamber, we age the disc groups using the various testing conditions for a specified period (usually 48 hours).

7. **Retest the now aged discs:**

   Again, we test the now aged test disc using the CD-Associates DVD analyzer for the DVD and the CATS SA3 CD analyzer for the CD.

Disc Reliability: Project Procedure (cont.)

8. **Age further and repeat to test:**

   Repeat steps 6 and 7 as outlined until the disc are destroyed.

9. **Record and graph data:**

   Once the test for a particular test condition is complete, we graph the data which show the reliability and the lifetime of the discs.

10. **Analyze results:**

    Identify the discs most suited to long term storage, investigate the effect of temperature as the only variable; investigate the effect of humidity as the only variable.

Disc Reliability: Important Parameters

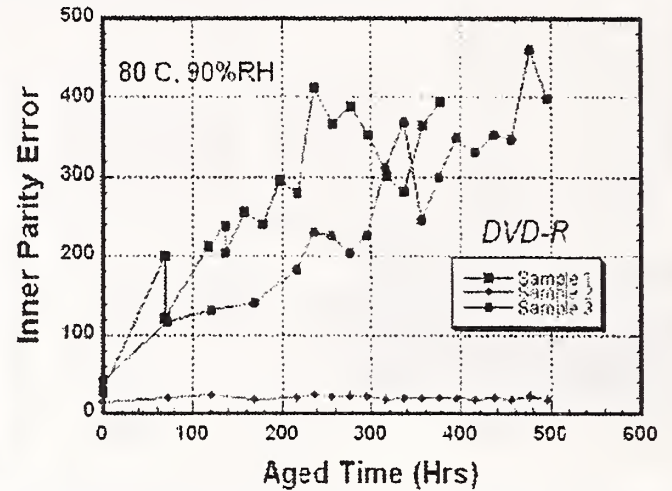DVD:

    Inner Parity Errors (PI).

    Outer Parity Errors (PO).*

CD:

    Block Error Rate (BLER).
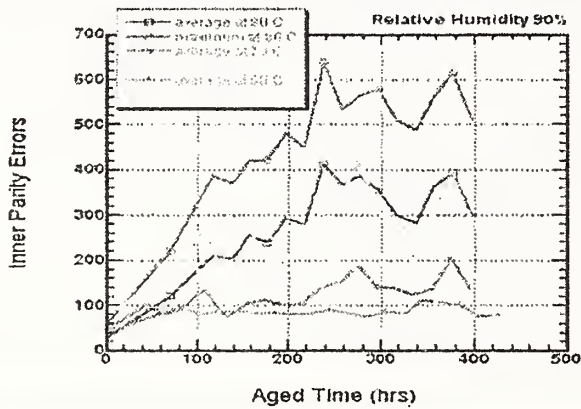
    E22 Errors.

    E32 Errors.*

*Existence of these errors effectively means the disc is destroyed.
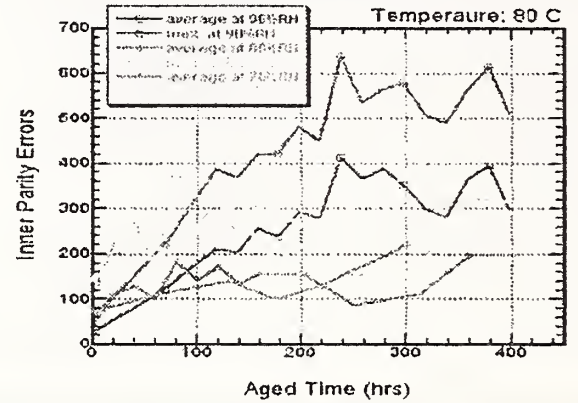
Different Manufacturers

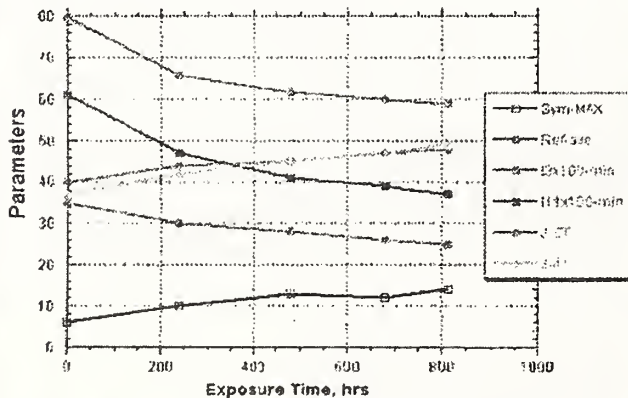## Temperature Effect

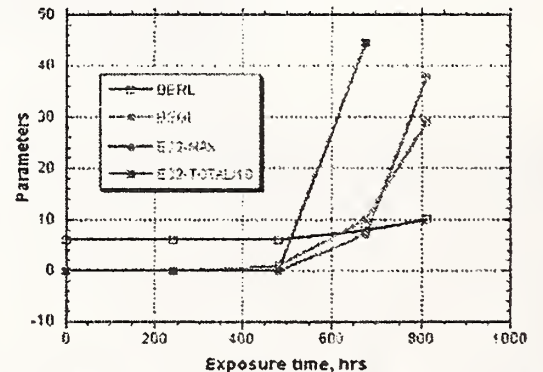Temperature Effect of DVD-R

Humidity Effect

Humidity Effect

Same Disc – Intensity vs. Exposure
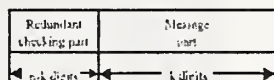
Parameter change with exposure time for phthalocyanine-silver CD-R

Different Discs – BLER vs. Light

Error rate increase with exposure time for phthalocyanine-silver based CD-R

Data Recovery with Advanced Coding

NIST

Redundant checking part	Message part
n-k digits	k digits

Advanced Coding for Data Preservation

Problem Statement:
The technical challenge of this project is to evaluate the performance of error correction codes (and in particular advanced error correction codes such as turbo codes) in the recovery of information lost on optical media due to aging or some catastrophic event.

NIST Response:
- Identify the parameters related to data error on optical discs
- Measure these parameters before and after accelerated aging/catastrophic simulation.
- Process the data by both conventional ECCs and more advanced ECCs.
- Development of standardized formats for data thought valuable enough for long term preservation

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CISD Data Preservation Collaborations

NIST

Data Preservation: CISD Involvement

Organization	Standard/Collaboration	NIST role	Status
Optical Storage Technology Association (OSTA).	MultiRead: defines the parameters necessary for optical devices to read discs created in CD formats	Develop test to ensure MultiRead compliance.	MultiRead test (CISD website). MultiRead 2 (DVD) test under development.
DVD Association (DVDA).	Promotion of DVD technology and standards	Member, Host 2002 joint NIST/DVDA conference	Conference in June 2002.
High Density Storage Association (HDSA).	Promoting Automated Storage for high-density applications.	Member. Testing facility in test storage systems and to guide industry	NIST HDSA Data Preservation laboratory, development in 2002.
Joint Technical Commission: Care and Handling of media.	ISO TC 171/SC 1N 120- "Verification of information on CD's".	Member of Commission. Provided help and feedback on proposal.	ISO working draft
JTC: Care and Handling of media.	Care and Handling of Optical Media — General Standard	Member. Provide input and testing capabilities	Began April 2002.
Warner Advanced Media Operations (WAMO).	Reflectance Measurement for DVD	CISD measured the reflectance to an accuracy of 1%	Result used as the standard reflectance for all DVD discs.
Library of Congress (LOC) / National Science Foundation (NSF).	Promotion of importance of Data Preservation for Archival purposes	Proposed establishment of Data Preservation Lab at NIST	In proposal phase.

Data Preservation: Other Notable Activities

Organization	Activity	Organization	Activity
Optical Storage Technology Association (OSTA).	Standardizing parameters for optical discs and drives	Open Archiving Information Systems (OAIS).	Researching migration as a preservation strategy.
High Density Storage Association (HDSA).	Promoting Automated Storage for high density applications.	Joint Technical Commission: Care and Handling of media.	Care and handling of storage media.
Victorian Electronic Records Strategy (VERS).	XML based standard for the management / preservation of electronic records.	Creative Archiving at Michigan and Leeds: Emulating the Old on the New (CAMILEON).	Researching technology emulation as a preservation strategy
Preserving and Accessing Networked Documentary resources of Australia (PANDORA).	Capture, archive and provide long-term access to online publications.	Publishing Requirements for Industry Standard Metadata (PRISM).	Policies for information integrity for digital library architecture
Library of Congress (LOC).	Web archival.	Warner Advanced Media Operations (WAMO).	Production of DVD and standards for DVD's.
National Archives and records Administration (NARA).	Persistent archives and electronic records management	Nederland Community Library (NEDLIB).	Develop tools to build deposit systems for electronic publications.
National Science Foundation (NSF).	Promotion of importance of data preservation for archival purposes.	International Research on Permanent Authentic Records Electronic Systems (InterPARES).	Theoretical knowledge and methodology for the preservation of authentic records

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For more information....

Xiao Tang, group leader.

• Information Storage and Integrated Systems •

xiao.tang@nist.gov

Phone: 301 975 2503

www.nist.gov/itl/div895/isis

Information Technology Laboratory

NIST National Institute of Standards and Technology

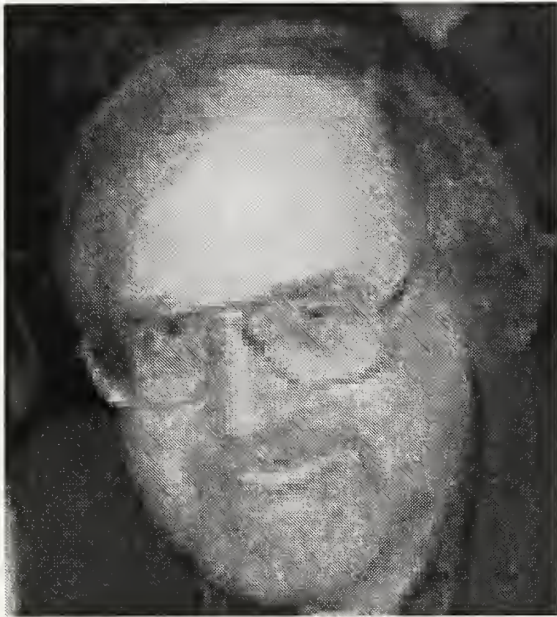Supporting the information technology industry with measurements, standards, and research.

DVD 2002
Conference and Exhibition
Standards, Applications, Technology

E. J. (Jerry) McFaul

Computer Scientist
U.S. Geological Survey
www.usgs.gov

"DVD: It's Not Just for Movies Anymore"
and
"Reaching Out and Training with DVD: It's a Whole New Ballgame"

Mr. McFaul is a computer scientist with the U.S. Geological Survey. He has held many technical and managerial positions, both in and out of the Federal Government. In the late 70's, he quite literally brought the first PCs into the USGS, where they now number in the thousands. He established the first CD-ROM Support Center at the USGS that has resulted in the publication of hundreds of scientific CD-ROM products over the last decade. He also founded a CD-ROM special interest group at the USGS in 1986 that ultimately became a non-profit foundation and the world's largest user group on this technology (SIGCAT), with over 11,000 users in 75 countries. In his current role as a staff scientist, he is the principal investigator of optical storage, focusing on the use of CD and DVD technologies in data-intensive applications such as GIS.

Mr. McFaul has published many articles on the global implications of CD technology and has testified several times before Congress on the Federal Government's use of this technology to enhance its data dissemination activities. For over 15 years, Mr. McFaul has been helping the Geological Survey as well as many other Federal, State and local organizations understand and apply CD-ROM (and now, DVD-ROM) technology to a wide range of information management and dissemination activities. Through his many speeches and seminars, Mr. McFaul has facilitated the use of these technologies to make available to the general public the Government's vast data holdings.

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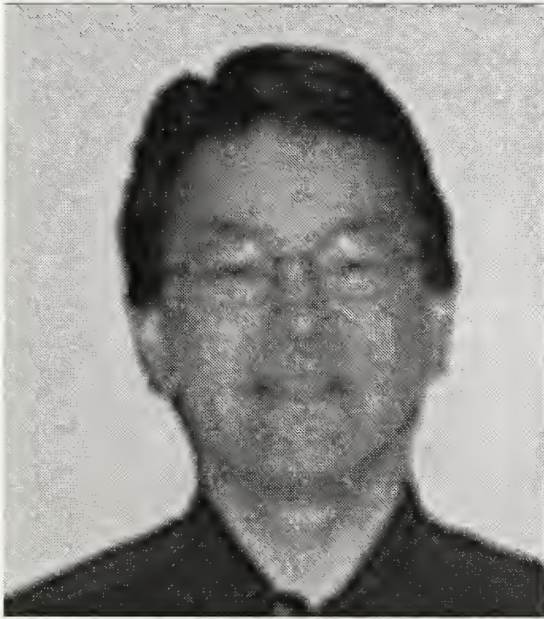
Richard Harada

President
Creative Businesses, Inc.
www.creativebusinc.com
www.hidensity.org

"A Framework for Understanding Mass Storage Systems"

Rich Harada is the President of Creative Businesses, Inc. CBI is a consultancy of strategic planning, engineering support and training services to prominent computer and data storage manufacturers. CBI also provides consulting and integration support services to Fortune 500 companies, banks, and healthcare companies who are evaluating storage systems.

Prior to joining CBI, Mr. Harada held executive positions at Sony and Panasonic. Mr. Harada also holds the position of Executive Director of the High Density Storage Association. The HDSA is composed of companies who manufacture automated optical disc jukebox and tape library technologies. Together with NIST, the HDSA is developing a Data Preservation Test Facility that will be used to understand and evaluate data storage technologies.

For more information, visit www.creativebusinc.com and www.hidensity.org

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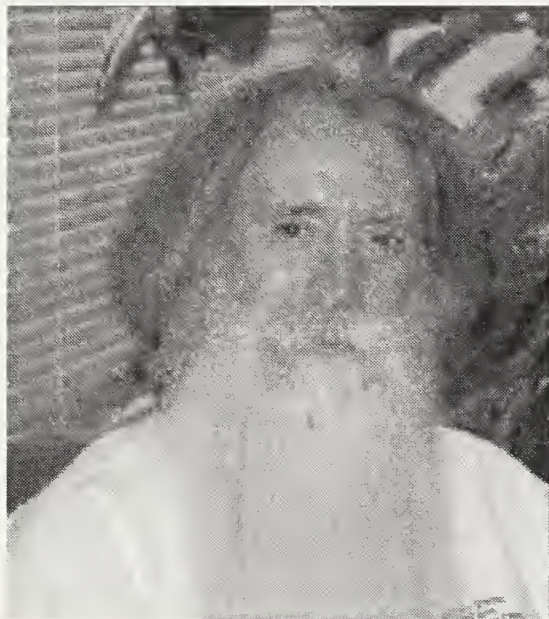
Bruce B. Cox

Director
Information Products Division
**United States Patent & Trade-
mark Office**
www.uspto.gov/

"DVD in the PTO"

After a twenty-year career as a librarian, Mr. Cox took a post at the U.S. Patent & Trademark Office in 1990 where he planned information dissemination products. In 1992 and 1993 Mr. Cox was Senior Industrial Property Information Officer at the World Intellectual Property Organization in Geneva. Upon his return to the USPTO, Mr. Cox managed product design and production for the Cassis series of optical disc products until he became Director of the Division that produces electronic information products for the USPTO. Mr. Cox is actively involved in the design and implementation of XML-based data standards for industrial property information developed by the USPTO, European Patent Office, Japan Patent Office, and WIPO.

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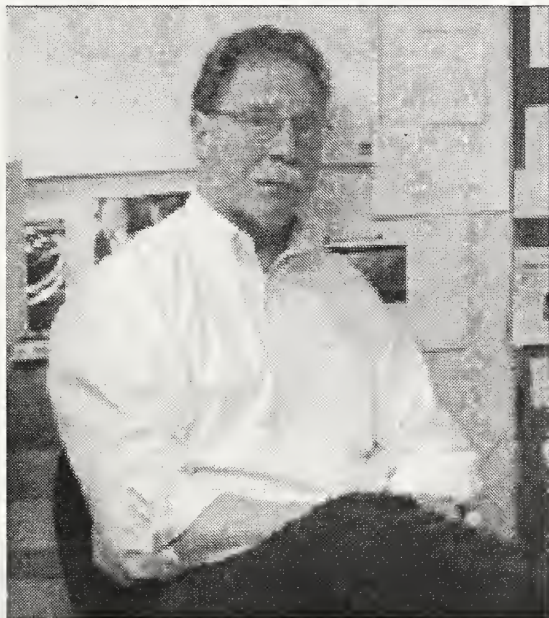
Nick Zihlman

Physical Scientist
U.S. Geological Survey
www.usgs.gov

"Near-Line DVD Storage"

Nick Zihlman has worked with optical storage technology since 1989. An employee of the U.S. Geological Survey, Nick has played a key role in the development and operations of the National Energy Research Seismic Library (NERSL), a program to rescue geophysical data and documentation from deteriorating media, archive it to CD-R, and now DVD-R media, and make it available over the Internet (http://nerslweb.cr.usgs.gov).

Nick received a BS degree (Biology) from the University of Maryland, 1978, and an MS in Information Systems from the University of Denver, University College, in 1995. He currently lives and works near Denver, Colorado.
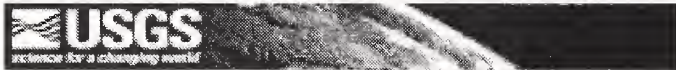
Near-Line DVD Storage

Using DVD-R Technology to Capture, Archive, and Distribute Geophysical / Geological Data from the National Petroleum Reserve, Alaska

Nick Zihlman
U.S. Geological Survey
Denver, CO

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A Brief History of the NPRA

•23 million acre area, approximately the size of Indiana
•Largely unexplored until the early 1900's
•1923 President Harding formed Naval Petroleum Reserve 4
•1923-1926 Initial surveys by the USGS for the Dept. of the Navy
•1926-1943 Little exploration done
•1943-1953 PET-4 oil and gas exploration by the Dept. of the Navy
    •45 shallow core test wells
    •36 test wells
•1974 Dept. of the Navy initiated a 5 year contract with Husky Oil NPR Operations to manage the exploration program
•1976 Naval Petroleum Reserve 4 transferred to the Dept. of the Interior and renamed the National Petroleum Reserve Alaska
•1977 Exploration program responsibilities transferred to the USGS
•1982 NPRA exploration program terminated
    •28 test wells drilled
    •Over 12,000 line miles of seismic data collected
    •Almost $1 Billion dollars spent
•1980's - 1993 NOAA stored & distributed NPRA data to the public
•1993 NOAA returned all materials to the USGS

5/22/2002   2

Data Storage Problems - Magnetic Tapes

•Approximately 12,000 9-track and 21-track magnetic tapes.

•Most close to 20 years old.

•Required 1,200 cubic feet of expensive, conditioned storage.

•Required an expensive, specialized, tape library storage rack system.

•Paper documentation for the magnetic tape data not stored in the same location as the tapes.

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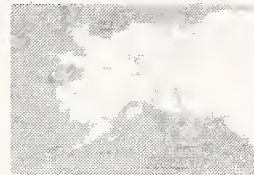
Data Storage Problems - Paper Documents

•Approximately 15,000 pages of documents associated with the demultiplexed data alone.

•Hundreds of large seismic data displays.

•Thousands of well logs, many of which tens of feet long.

•Thousands of pages of other documents and analyses associated with the exploratory wells.

•Most data and documents stored in boxes in a warehouse, making it impossible to use the information.

5/22/2002   4

USGS

Data Distribution Problems

Labor Intensive

•Data requests collected, inventoried, and packaged by hand.

•Data requested usually stored in more than one location.

•The reverse process required for data returned.

Time Consuming

•Many hours required to answer data requests.

USGS

Data Distribution Problems

Single Person / Single Use

•Only one copy of many data items.

•Access to data limited to one person at a time.

Potential for Data Loss

•Only one copy of many data items.

•Single copy items could be lost or destroyed.

USGS

Storage Solutions Using DVD-R Technology

•Initially data captured to CD-R before DVD-R technology was available.

  •Magnetic tape data captured to digital files.
  •Paper documents scanned into image files.
  •Well log displays scanned into image files.
  •Seismic displays scanned into image files.
  •Data captured to CD-R inventoried and organized.
  •Inventories captured to MS-Access database tables.

•CD-R data documented and organized into data archive DVD-R's.

•DVD-R's stored in a 600 slot DVD-R jukebox.

•DVD-R jukebox near-online network accessible.

USGS

Benefits of Using DVD-R Technology

•Very high density storage medium.

•Multiple data types can be stored on the same medium.

•Random access to the information.

•Replication is as simple as duplicating the desired DVD-R.

•Many copies of the DVD-R's can be made, disseminating the information widely.

•50+ years shelf life in standard office conditions.

•DVD-R's usable by any computer having a standard DVD reader.

Distribution Solutions Using DVD-R Technology

Physical Distribution

•Different but related data types recorded on the same medium.

    •Can distribute a box of DVD-R's versus many boxes of tapes and paper documents.

•Smaller volume of materials to distribute.

    •Magnetic tape media required a 1 cubic foot box per 10 tapes.

    •Entire DVD-R seismic library (data and documentation) projected to require less than ½ cubic feet.

    •Physical distribution of data is much less time and labor consuming.

Distribution Solutions Using DVD-R Technology

Near-Line Data Access

•Near-Line data storage allows for Internet access to the data on an "as needed" basis.

•Discs in the jukebox are robotically placed online in response to direct requests through a web site.

•Access to data is available 24 hours per day, 7 days a week, without human intervention.

•Multiple users have simultaneous access to data previously restricted to one copy/one user.

•Large volume of data per DVD-R disc means fewer disc swaps by the jukebox, improving performance.

Conclusion

DVD-R technology is allowing the USGS to archive and distribute a large volume of geophysical and geological data from the National Petroleum Reserve, Alaska.

Robotic DVD-R jukeboxes allow the near-line storage of these data. Having the data near-line makes it available to multiple simultaneous users on an "as needed" basis, instead of relying on a constantly spinning hard drive array.

Accessed through a web site, this technology allows data distribution 24 hours/day, 7days/week without human intervention.

NERSL Web Site: http://nerslweb.cr.usgs.gov

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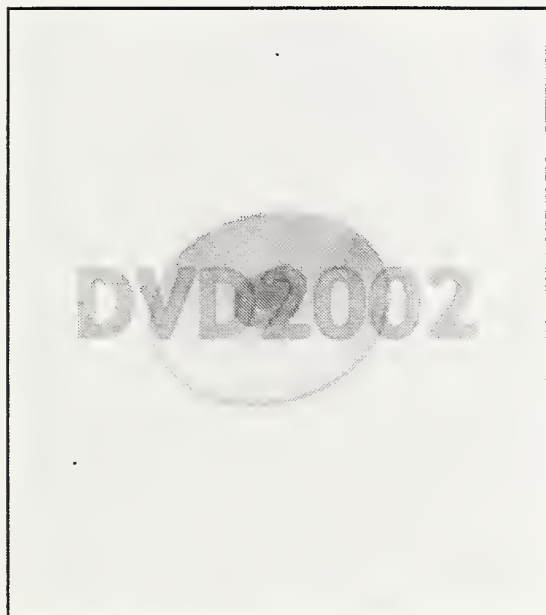
Jim Clark

Chief
Electronics Products
Development Branch
Bureau of the Census

**"Using DVD for
Disseminating the Nation's
Census Data"**

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Jason Hyon

Deputy Manager
Earth Science Data Systems
Section
**NASA - Jet Propulsion
Laboratory**
www.nasa.gov

**"Providing Space Imagery
to the Public on DVD"**

Jason Hyon has been with JPL since 1985 and is currently a Deputy Manager for the Earth Science Data Systems Section. His research focuses on real time data architecture, information management, object-oriented distributed computing, and optical data storage. He is a principal investigator for Data Distribution Laboratory and a manager for the integrated information management task for the JPL TMOD on-board data management research. He also manages the Data Archival and Retrieval Enhancement (DARE) task for Defense Threat Reduction Agency. He has been involved in development of CD/DVD file format standards since 1988 and led numerous industry-wide compatibility tests of CD/DVD hardware.

DDL Data Distribution Laboratory

DVD 2002 Conference
Providing Space Imagery to the
Public on DVD

Jason Hyon
Data Distribution Lab
Jet Propulsion Laboratory,
California Institute of Technology
June 3, 2002

DDL Data Distribution Laboratory

CHALLENGE

- Rising volume of data that needs to be safely distributed and archived
- Current technologies of CD and DVD no longer viable solutions
- Higher capacity media must be found

DDL Data Distribution Laboratory

AIM

- Research and evaluate new options for archiving PDS (Planetary Data System) data
- Determine a viable solution

DDL Data Distribution Laboratory

What makes an acceptable archival and distribution media?

- The National Archives and Records Administration (NARA) and the National Institute of Standards and Technologies (NIST) determine the suitability of media for archiving.
- They only publish that which has proven to be reliable which is a long-term process.

  For example, the acceptance of CD-ROM took around 10 years.

DDL Data Distribution Laboratory

What guidelines does the DDL use?

- Must use an open standard (UDF/ISO 9660)
- Should have multiple vendors of hardware and media
- Must carry directory information
- Must employ robust error correction with graceful degradation
- Must provide the capability for easy migration to higher capacity media
- Should have some organization monitoring industry performance

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DDL Data Distribution Laboratory

What technologies are on the horizon?

- High-Density DVD-ROM

  Matsushita has recently exhibited the next generation optical disk drive with 50 GB capacity (dual layer) on a single side (100 GB dual side).
- High-Density Read Only Memory (HDROM)

  Norsam Technologies in conjunction with an IBM research group has developed a high-capacity storage technology storing 165 GB of data on a CD/DVD size disk.
- Holographic Storage

  Computer storage that uses laser beams to store computer-generated data in three dimensions.
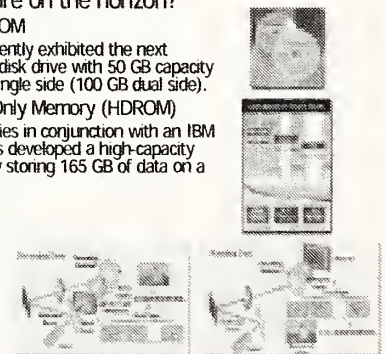
BUT...

– None of these new technologies meet all of the requirements set forth by the DDL/PDS.

ALSO...

– Who will archive the data? What do they require for the medium?

€ There is no cost-effective archive solution
  – Size is limited and cost is high
  – Data transfer rate is slow
  – It needs special environment

€ A concept of "live" media
  – Compatible physical format for next 5 – 10 years(upward compatible)
  – Compatible logical format for next 5 – 10 years (ISO/de facto)
  – Migration path is well defined

€ What are they?
  – CD/DVD
  – Hard drives (RAID, JBOD)
  – *High density tapes with Jukebox*
  – **Combination of the above with rigorous system operations concept**

Automated DVD Archiving System   JPL

Pioneer DRM-7000 DVD jukebox with a 370 disc capacity, two CD/DVD readers and one DVD recorder.

UI design allows for selection of volumes for conversion to DVD-R, for specification of the type of conversion to be performed and the specification of duplication requirements for the output volumes.
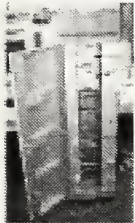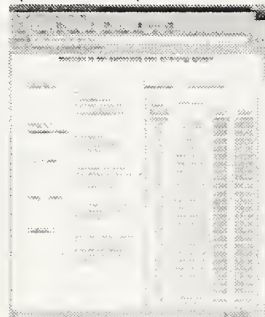
SmartStor Archive 4.04 software with an application programming interface (API) package using Microsoft Active Server Pages.

€ The system can be combined with a process control module to migrate data from online to near online or offline storage.

€ The Automated DVD Archiving System consists of 3 major components.
  – Smart Store Archive eXtender API wrapper written in Microsoft Visual Basic
  – MS.NET WebService.
  – Web Application front end

€ Smart Store Archive eXtender API wrapper written in Microsoft Visual Basic
  – Compiled into an out-of-process DLL (Dynamically Linked Library).
  – VB wrapper functions as a proxy between the Microsoft .NET Automated DVD Archiving System Web Service and the "C" API function calls to the DVD Jukebox.

€ MS.NET WebService.
  – The Automated DVD Archiving System Web Service takes advantage of MS.NET C# ability to produce WebServices with ease.
  – It exposes the methods and functionality of the underlying "C" APIs
  – adds convenience methods to handle communications and data transfers from Client Web Applications to the underlying "C" APIs.

€ Web Application front end.

- A Web Application is the user interface which may access and call methods that have been published through the Web Service.
- The implementation language used for the Web Application is also C# for its ease of use in constructing Web Applications through the Microsoft Visual Studio .NET development environment.

The automated DVD archiving system provides both API and Web interface to control and to process jobs.

Completed conversion and validation of the NEAR CD-ROMs to DVD-R. 67 DVDs have been produced and made available online for the NEAR data analysis team.

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Bruce Molina

Polar Research Scientist
U.S. Geological Survey

**"DVD Development
through a CRADA"**

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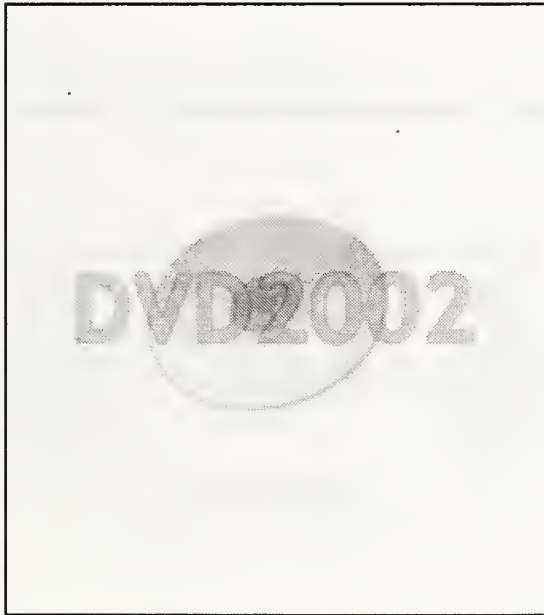
Peggy O'Neill-Jones

Associate Professor
Metropolitan State College of Denver
http://clem.mscd.edu/ %7Etechcom
www.dvdlearn.com/

"The Power of Web-Connected DVDs for Education"

Peggy O'Neill-Jones is a Professor of Technical Communications at The Metropolitan State College of Denver and the Director of DVD.learn, a training center for Sonic DVD authoring and InterActual Web-connected DVD authoring. She has over 24 years of award-winning media production experience and teaches in the areas of corporate video production, corporate scriptwriting, writing for interactive media and DVD/multimedia production. She is currently involved in a Web-connected DVD chemistry project that has been funded by the National Science Foundation. Her work in online course development, multimedia and DVD and provides a perspective on media in training and education.

Web-connected DVD
for
Education

Peggy O'Neill-Jones
The Metropolitan State College
of Denver
DVD.learn, Denver, CO

Web-connected DVD
for
Education

The DVD Difference

The DVD Difference

€ Broadcast-quality digital video
€ MPEG-2 encoding
€ PCM or Dolby Digital
€ Interactive access
€ Same physical form as CD
€ Holds massive data 4.7 GB to 18 GB of data

Web-connected DVD
for
Education

DVD Features

DVD Features

€ Multi-angle – multiple video tracks
€ Multi-language – multiple audio tracks
€ Multi-subtitles – multiple subtitle tracks

DVD Features

€ Navigation commands
€ Dolby Digital 5.1 surround sound
€ Parental block – multiple ratings
€ Regional coding – theatrical release

DVD Playback

Web-connected DVD
for
Education

DVD Playback

€ Ubiquitous
- Set top players
- DVD computer drives
- Portable players

Web-connected DVD

Web-connected DVD
for
Education

Quality of the Media

€ How far off is the promise of broadband
€ Fast access to media with data connection
€ Guarantee media will play and perform as expected

Characteristics of the Web

€ Instantly upgrade content
€ Change interface on the fly
€ Link to wealth of information
€ Chats, E-commerce, dynamic communication

Web-connected DVD

€ Broadcast-quality video
€ High quality audio
€ Motion menus with audio
€ HTML menus with linking and functionality

Web-connected DVD

€ DVD and HTML can be displayed in the same viewing environment

€ DVD video can initiate commands within an HTML page

Web-connected DVD

€ HTML page can initiate commands to the DVD Video disc

€ Combine high-quality physical media with Internet features

Web-connected DVD Types

€ Built into authoring tool
  – Connects DVD-Video to the web
  – A browser is launched at a certain point in the video or on a button click

€ Conditional Access
  – Encryption
  – Hidden features
  – Timed content
  – Controlled by Website

Web-connected DVD Types

€ DVD-Web Integration
  – Playback is in same environment
  – Seamlessly control one another
  – DVD controls browser
  – HTML controls the video

Web-connected DVD
for
Education

Physical Chemistry in Practice
DVD Project

Learning Issues in Physical Chemistry

€ Small course
€ Abstract concepts
€ Mathematical in nature
€ Expensive lab equipment

Physical Chemistry in Practice

€ Brings real-world applications of theoretical pchem into the classroom →
€ Puts pchem in relevant contexts
€ Provides authentic sample data for student analysis
€ Includes visualizations of abstract or microscopic concepts

Web-connected DVD for Education

The PCIP DVD Today and in the Future

€ Utilizes the hybrid WebDVD format
  – Video components for TV or Computer
  – Computer files
€ Pilot
  – AFM -- SERS
€ Full Disk
  – 10-15 modules
  – Full range of PChem topics

Web-connected DVD for Education

In the Classroom

€ Integrate the DVD with a textbook
  – "special topics" sections
  – homework/EOC problems
€ Supplement lecture *or* lab
  – in-class use by instructor
  – private viewing by students on computer or TV with DVD player

Web-connected DVD for Education

Module Layout

€ Theory
€ Video
€ Animations
€ Interactive Activities

Web-connected DVD for Education

Web-connected DVD for Education

DVD Production

Web-connected DVD Production

€ First Play
  € Where the player looks when the disc is inserted
€ Video Manager Menu
  € Accessed by the title button on the remote/transport bar
€ Video Title Set
  € Accessed by the menu button on the remote/transport bar
€ Title Sets
  € 1-99 allowed

Web-connected DVD for Education

Accessing DVD Features

€ Full Screen
€ Audio Streams
€ Video Angles
€ Chapter Points
€ Custom Transport Bar

Web-connected DVD for Education

Adding Web Elements

€ Flash
€ Database
€ Java Functionality

Web-connected DVD for Education

DVD.learn

dvd=learn

* Located in downtown Denver
* 2-day Web-connected DVD Training
* 1-3 day DVD Authoring Training

Web-connected DVD for Education

Acknowledgements

€ NSF CCLI-EMD
€ Dr. Richard Schwenz, UNC-Greeley
€ Drs. Stephen Leone and Cindy Berrie, UCB
€ Drs. Gerard Cote and Patrick O'Neal, TAMU
€ Auraria Media Center
  – Mark Rose
  – Ray LeJeune
  – Carolyne Janssen
  – Vincent Comparetto
€ The Metropolitan State College of Denver
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Thomas Held

President and CEO
MetaMedia Training International

"DVD: A Powerful New Instructor-Support Tool"

Thomas Held is President of MetaMedia Training International, Inc. and directs the development and applications of advanced education, training, and simulation technologies that include: video, interactive multimedia, computer based training, CD-ROM, DVD-Video and DVD-ROM delivery, distance education, telemedicine, team training, and internet/intranet delivery. He has extensive experience in the development of interactive courseware and information systems for the health care, scientific, and science center and museum communities. He has directed the development of over three hundred interactive videodisc; CD ROM, CD-i, DVD-ROM, DVD-Video, Web-based, and computer based training projects.

He holds a Bachelor of Science Degree in Biology from Western Illinois University and Graduate Degrees in Instructional Systems Technology from Indiana University. He has served on the faculties at the University of Wisconsin School of Nursing as Assistant Dean for Education, and the University of Maryland School of Medicine as Director of Media and Computer Assisted Medical Education. For a three-year period he directed research and development projects in optical laserdisc and computer based medical education for the National Library of Medicine.

He founded MetaMedia Systems, Inc. in 1981, which became a nationally and internationally recognized premier developer of interactive programs. MetaMedia produced more than 200 interactive videodisc, CD ROM, CD-i, DVI, and computer-based training projects. Reed International of the U.K. acquired MetaMedia Systems in 1990. For three years, he served as an expert consultant to business, industry, medical associations, government

agencies, and universities. He conducted educational seminars and workshops dealing with advanced interactive technologies and program development in the U.S., Japan, India and Indonesia. After a 3 year tour as Director of Multimedia and Program Development for Cubic Applications, Inc., he founded MetaMedia Training International, Inc.

He has received numerous awards and commendations including the Indiana University Outstanding Alumnus Award, Top 100 Multimedia Producers of the Year, and appointed as a Fellow for the Society for Applied Learning Technologies.

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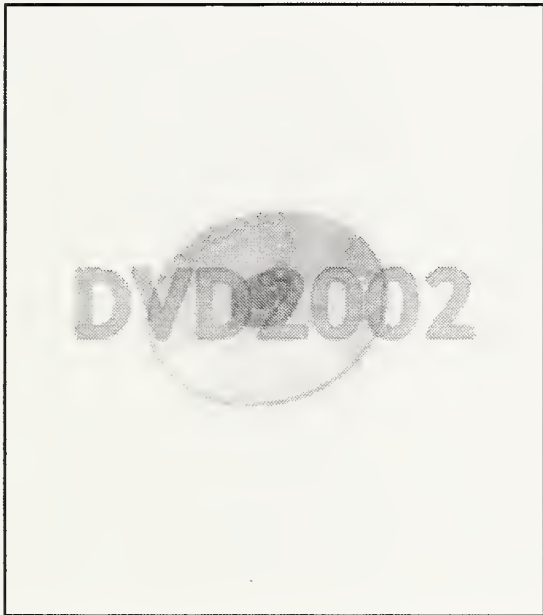
Jeff Hammond

President and Founder
Copper Moon Digital
www.coppermoondigital.com

"High Impact Training with DVD"

Jeff Hammond, President and founder of Copper Moon Digital, received his BA in Technical Communications from Metropolitan State College of Denver. His prior digital media experience includes more than 20 years working in broadcast television, audio, and video/film production, with over 17 years at KMGH-TV Channel 7, Denver's ABC network affiliate. Jeff is a Sonic Solutions Certified DVD Trainer, and serves as DVD Consultant to the US Postal Service. Some of Jeff's clients have included The Coors Brewing Company, Keystone Resorts, Rocky Mountain PBS, Fox Sports Rocky Mountain, Cigna Health Care, Scripps Institution of Oceanography, and Frontier Airlines.

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Wendy Chinn

Allyn Solutions

"The Politics of DVD"
and
"DVD Strategies"

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Wendy Seltzer

The Berkman Center for
Internet & Society
Harvard Law School
*www.harvard.edu/programs/
center_law/*

**"Does Copyright
protection hinder
technological innovation?
Open Source Development
in the context of DeCSS
and the DMCA"**

Wendy Seltzer is a Fellow with the Berkman Center for Internet & Society at Harvard Law School and a litigation and intellectual property associate with Kramer Levin Naftalis & Frankel in New York. She teaches Internet Law as an adjunct professor at St. John's University School of Law.

Wendy led participants in the Berkman Center's Openlaw project in filing amicus briefs in Universal v. Corley (the 2600 DeCSS case), arguing that technological protections for digital media must accommodate free speech and fair use. She recently launched the Chilling Effects Clearinghouse, www.chillingeffects.org.

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Jonathan Band
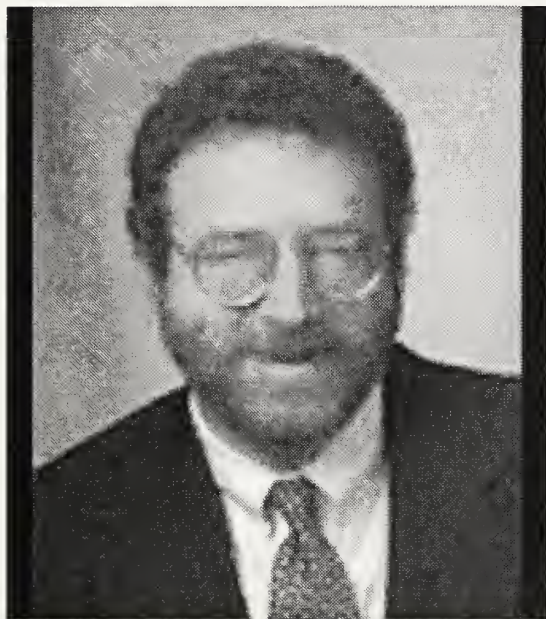
Partner
Morrison & Foerster
www.mofo.com

"The DMCA, and the Underlying Conflict Between the Entertainment and Information Technology Industries"

Mr. Band is a partner in the Washington, D.C. office of Morrison & Foerster. Mr. Band's areas of practice include intellectual property, administrative and appellate litigation, Internet regulation, and legislation. Mr. Band also has advised clients on Internet issues including online banking, privacy, gambling, and indecency. Mr. Band is the co-author of Interfaces on Trial: Intellectual Property and Interoperability in the Global Software Industry (Westview Press 1995) and over 50 articles on intellectual property and Internet topics. He is an adjunct professor at Georgetown University Law Center, and on the Editorial Board of The Computer and Internet Lawyer. Mr. Band received his B.A., magna cum laude, Phi Beta Kappa, in 1982 from Harvard College, and a J.D. from Yale Law School in 1985. He is admitted to practice in the District of Columbia and California, and before the U.S. Supreme Court and the U.S. Courts of Appeals for the Tenth and District of Columbia Circuits.

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Bill Adkinson

Senior Policy Council
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"Online Content: Promoting an Efficient Marketplace"

William F. Adkinson, Jr. is Senior Policy Counsel at The Progress & Freedom Foundation. He focuses primarily on competition, intellectual property, and regulatory issues, conducting research and analysis from both legal and economic perspectives. Before joining PFF, Adkinson was an associate at Wilmer, Cutler & Pickering in Washington DC, where he practiced law in their antitrust and e-commerce groups. While at Wilmer, Adkinson guided companies through the merger clearance process and provided advice on a variety of antitrust issues. Prior to his tenure at Wilmer, Adkinson served as an attorney with the Office of Policy and Planning at the Federal Trade Commission. He worked at the FTC on antitrust enforcement policy, and was responsible for recommendations on proposed antitrust enforcement action. His previous public service career also includes a stint as an economist with the Council on Wage and Price Stability. Adkinson graduated from Amherst College and received his law degree from Yale Law School. He also completed course work and oral examinations towards a Ph.D. from Yale's Economics Department.

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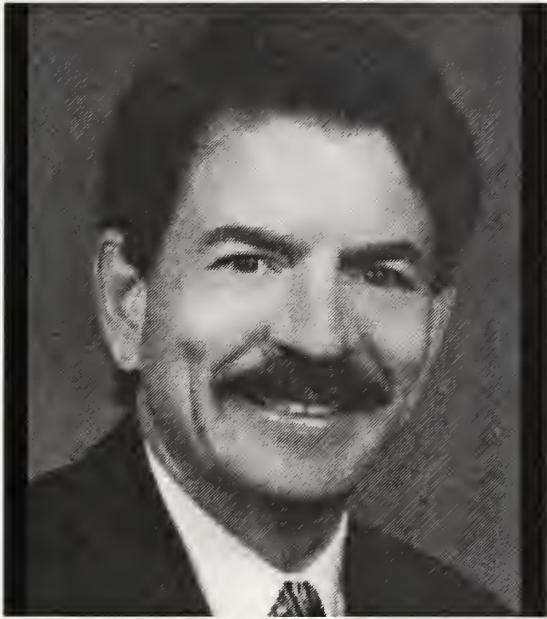
Jim Burger

member of the law firm of
Dow, Lohnes & Albertson

James M. Burger, member of the law firm of Dow, Lohnes & Albertson, represents technology companies on intellectual property, communications and government matters. He was Apple Computer's Senior Director Law and Chairman, Information Technology Industry Proprietary Rights Committee. Jim has worked extensively on legal and policy issues arising from the confluence of digital technology, IP protection, and regulation. Jim has participated in resolving such complex issues as DVD and DTV copy protection-representing the computer industry in negotiations developing CSS copy rules, Wireless Data Communications, and Digital TV. Jim received his Bachelors (with Honors), Masters and Law (cum laude) degrees from NYU.

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Pioneer Electronics (USA), Inc.
www.pioneerelectronics.com

"The State of the World for DVD in 2002"

Andy Parsons has worked in the optical disc industry for more than 20 years. He has held technical and management positions at Pioneer, Optical Disc Corporation and Discovision Associates. Most of his career so far has been devoted to industrial applications of LaserDisc, CD-ROM, professional videodisc recorders, and, most recently, DVD video and DVD-R and -RW. Andy is now senior vice president of the industrial video and mass storage group at Pioneer Electronics (USA), headquartered in Long Beach, California.

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Bernie Mitchell

President
Silver Platter Productions, Inc.

"Thru the Mirror Darkly or 10 Things I have Learned In Over 20 Years In The Interactive Multimedia Business"

Bernie has just returned from spending the last 16 months working and living in Dubai in the United Arab Emirates where he was hired to design and launch a new global broadcast TV, Radio and Web network for His Highness, Sheikh Mohammed. This was a daunting task made all them more complicated after Sept. 11.

Upon returning to the US, Bernie has resumed his position as head of his own company to continue to create and implement various multimedia solutions and to consult to a number of international organizations on the effective implementation of interactive multimedia technologies.

Before the desert sands beckoned, Bernie was Senior Producer/Director for iPIX Movies (www.ipix.com). He and his team were responsible for providing the production infrastructure necessary to create a dynamic 360 degree immersive, interactive, iPIX Movie. Bernie has produced and directed "Atlantis: Once Upon A Time", the first iPIX Movie to be streamed over the Internet. In addition, he has directed iPIX Movies of Dubai, the Dixie Chicks in concert, and Bernie's team also created and posted iPIX Movies from the Olympics and the Burning Man Festival in Nevada.

Prior to joining iPIX, Bernie spent 10 years with Philips Electronics where his responsibilities included introducing digital media hardware platforms and software, including Professional DVD and before that CD-i. As Vice President of Educational Publishing he launched a new business unit for Philips "School 2000"

A veteran of over 20 years experience in interactive multimedia, Bernie graduated

from UCLA Film School, and started his own multimedia company, Silver Platter Productions, Inc. way back in 1979.

He is an Emmy nominated Producer/Director, member of the TV Academy, multimedia person of the year, and a member of the White House Educational Task Force Initiative.

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Eugene Wooden

Founder
Digital Underground

"The Post House Model"

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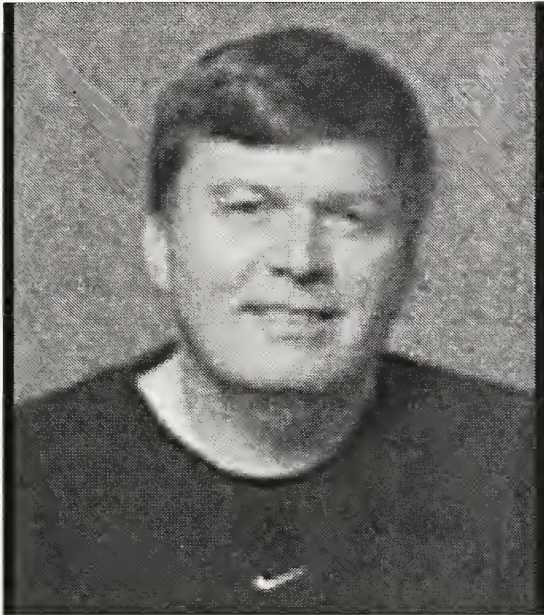
Ralph LaBarge

Managing Partner
Alpha DVD
www.alphaDVD.com

"The Back-end Royalty Model"
and
"DVD Compatibility Test"

Author, "DVD Authoring & Production" Ralph LaBarge is an independent DVD title developer with more than 200 DVD projects to his credit. He is a member of the DVD Association (DVDA) Board of Directors, a former chairman of the IMA/SPA DVD-ROM Technical Working Group, and a columnist for DV magazine. With master's degrees in electrical engineering and computer science and over 12 years of practical experience in the fields of digital video compression and DVD, Ralph is widely recognized as a DVD expert. He specializes in the development of cutting-edge consumer DVD-Video, DVD-ROM, and WebDVD titles, including AVIA Guide to Home Theater, Mars: The Red Planet, the Naxos Musical Journey series, The Planet Earth series, StarGaze and USA on DVD.

DVD Strategies

Ralph LaBarge
Alpha DVD

The DVD Food Chain

Consumers
Authoring Tool Vendors
Authoring Service Bureaus
Content Owners
Retailers
Specialists
Distributors
Replication Facilities
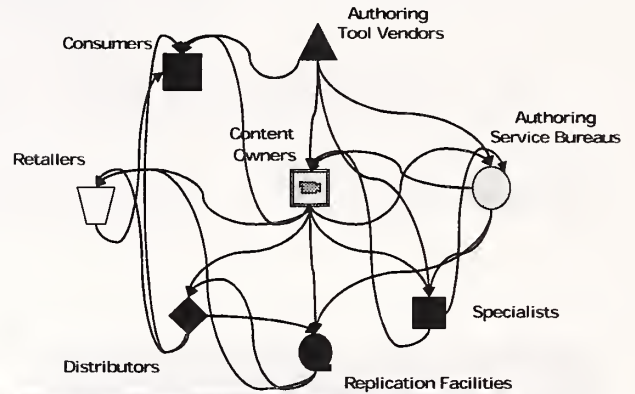
The DVD Food Chain

Authoring Tool Vendors

Professional Tools
- Panasonic
- Sonic Solutions

Corporate Tools
- Apple
- DV Studio
- Intec
- MTC
- Pinnacle
- Sonic Solutions
- Vitec Multimedia

Consumer Tools
- Apple
- Adaptec
- Pinnacle
- Sonic Solutions
- Ulead

Ancillary Tools
- Director Plug-In
- Dolby AC-3 Compression
- DTS Audio Compression
- DV Capture & Edit
- Hyperlock
- MPEG-2 Video Compression
- PC Friendly & Player 2.0
- Spinware

The DVD Food Chain

Content Owners

Studios
- Full length feature films
- Television shows

Corporate
- Sales
- Marketing
- Presentation
- Training & Education

Government
- Public Information
- Distribution
- Training
- Education

Education
- K-12 education
- Secondary education
- Consumer education

Consumers
- DVD Titles
- DVD Playback Hardware
- DVD Playback Software
- Desktop Video Publishing

The DVD Food Chain

Authoring Service Bureaus

Studio Affiliates
- Many major studios develop their DVD titles in house
  - Sony
  - Universal DVCC
  - Warner CVC

Distributors
- Several large distributors also have DVD production capabilities in house
  - Image Entertainment

Replicators
- Almost all DVD replication facilities offer in house DVD authoring to their clients

Full service video post production facilities
- Work closely with one or more studio clients
- Offer post production services as well as DVD services

DVD Authoring Specialists
- Only provide DVD authoring services
- May be affiliated with replicator or post production facility
- Mix of corporate, government & entertainment jobs

The DVD Food Chain

Specialists

Audio
- 5.1 Surround Mix
- AC-3 Compression
- DTS Compression

Menu Graphics
- Static Menu Graphics
- Motion Menu Graphics

Package Design
- Disc Label Art
- Inside Insert Art
- Outside Cover Art

Subtitle Generation
- Open Caption Graphics
- Closed Caption Data

Translation Services
- Narration
- Subtitles
- Menus

Video
- Pre-processing & filtering
- Film transfer & restoration
- VBR MPEG-2 Compression

WebDVD

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The DVD Food Chain

Replication Facilities

Technology Leaders
- JVC Disc America
- Panasonic Disc Services
- Sony Disc Manufacturing
- Technicolor/Nimbus
- Warner Advanced Media Operations

Technology Followers
- Dozens of CD-ROM replication facilities now offer DVD services

Replication Services

Glass Mastering
- DLT in DDP 2.0 Format
- DVD-R

Check Disc Package
- 10-20 check discs

Mass Duplication
- Small runs < 1,000
- Medium runs <500,000
- Large runs > 1,000,000

Packaging
- Printing
- Packaging
- Security Measures

Warehousing

Direct Shipping

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The DVD Food Chain

Distributors

Master Distributors
- Most studios have their own distribution companies
- Several independent distributors
  - DVD International
  - Elite Entertainment
  - Image Entertainment
- Many distributors sell large retail clients direct
- Small retail clients need to purchase through an aggregator

Aggregator
- Provide a variety of product to retail stores, including DVD
  - Ingram
  - Pioneer
  - Valley Media

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The DVD Food Chain

Retailers

Brick & Mortar
- Most VHS retailers have already started to carry DVD
- Most VHS rental stores have already started to carry DVD
- Limited shelf space in traditional retail store is a problem
  - Both VHS & DVD product must be displayed
  - Traditional Brick & Mortar stores generally carry the top selling DVD titles, with a product depth of less than 500 titles
- DVD titles sell at or near suggested retail price

On-Line
- All on-line retailers offer DVD titles
- Virtual shelf space means all 8,000+ DVD titles can be offered for sale
- Typical discount is 20-40% off Suggested Retail Price

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The DVD Food Chain

DVD is the fastest growing consumer electronics product ever.

Worldwide Market for Home Video
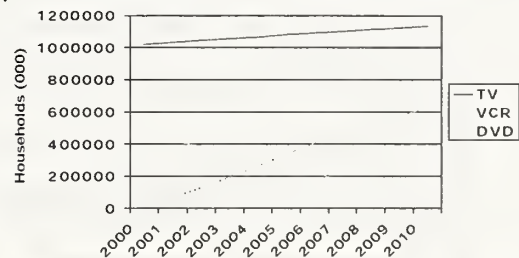
Source: DVD Intelligence, July 2000

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The DVD Food Chain

DVD title sales are projected to grow rapidly in the next decade

Home Video Software Sales
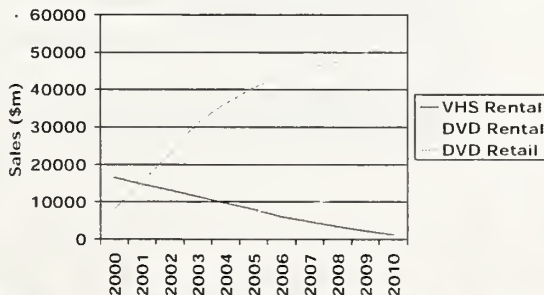
Source: DVD Intelligence, July 2000

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Horizontal Business Model

In the horizontal business model a specific DVD product or service is offered to a broad segment of the market

DVD Authoring
- Offer a full range of DVD authoring services to broad segment of clients
  - Entertainment
  - Corporate
  - Government
  - Education

Keys to success are:
- Automate the production process
- Provide quality work
- Provide good customer service
- Keep equipment, facility and staff up to the latest standards

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Vertical Business Model

In the vertical business model as aspects of developing, manufacturing and selling a DVD product are brought in house

- Content Acquisition/Creation
- DVD Authoring
- DVD Replication
- DVD Distribution

Keys to success are:

- Bring every aspect of DVD production process in house to minimize cost and maximize profit
- Develop deep product catalog
- Develop a consistent look and feel for all titles so that authoring templates can be used to reduce cost and time required for development

Specialist Business Model

In the Specialist business model a company offers a limited set of DVD products or services, and tries to find a niche market where they can make a living

- A single area of DVD production is selected, and marketed to a broad segment of the market
- Product or service can be only a piece of the DVD process, such as translation services, 5.1 surround mixing, or just DVD authoring.

Keys to success are:

- Be the best at what you do
- Deliver a quality product on time
- Provide good customer service
- Develop captive clients who use only your service

Back-End Royalty Model

In the Back-end Royalty business model a company produces DVD titles in return for a portion of wholesale revenues generated by title sales.

- Vertical integration is key to performing as much work in house as possible.
- Partnerships with content owners and distributors allow the title developer to concentrate on their area of expertise.
- Works well with special interest or niche content that may not get onto DVD any other way.
- Royalty rates vary depending on the scope of work, potential retail sales, and the reputation of the title developer.
- Royalties range from 5% to 50% of wholesale revenues.

Back-end Royalty Model

Keys to Success Are:

Get Paid in Royalties

In the long run owning a piece of a retail DVD title will generate more revenue than getting paid a one time fee to create a DVD disc image.

Quality & Quantity

Since your revenue depends on the success of the title at retail you will want to make the title as good as it can possibly be.

It is difficult to know which titles will do well at retail, so make sure you develop a number of titles to improve your chances of success

Do Everything In House

Bring as much of the production process in house as possible. This will allow you to control the quality of each step in the process, and also minimize development costs.

Include Advanced Features

Try to include advanced features on your titles such as multiple audio tracks, subtitle streams, motion menus, DVD-ROM features, and WebDVD features. These "extras" will help the title sell in a crowded retail market.

Back-end Royalty Model

Keys to Success Are:

Break Even in Less Than 12 Months

Most DVD titles can sell for at least 36 months. If you can recover your development costs in the first 12 months, you will have several years of profits from each project.

Sales will be highest in the first 12 months, and then drop off each subsequent year.

If you cant break even on a title after 12 months of sales, you probably should not consider it as a project.

Have enough working capital

It usually takes 6 months to complete a DVD title, and most distributors pay on Net 90 terms.

You must have enough working capital to stay in business for 9 months, before you start to see the royalties from your first project

Back-end Royalty Model

Keys to Success Are:

Find a Distributor you can trust.

Most DVD title developers have no idea how the DVD wholesale and retail markets work.

Spend time doing what you do best – developing DVD titles.

Partner with a Distributor who can handle all the marketing, sales, PR, advertising, replication, packaging and distribution tasks.

Back-End Royalty Example - StarGaze

Back-End Royalty Deal
- Complex DVD-Video, DVD-ROM & WebDVD Title
  - 70 minutes VBR video
  - 350 minutes Dolby AC-3 stereo audio
    - English, French, German & Spanish narration
    - Stereo music track
  - 70 minutes Dolby AC-3 surround music
  - 70 minutes DTS surround music
  - 480 minutes subtitles
    - English, French, German & Spanish subtitles
  - Custom DVD-ROM screen saver program
  - Custom associated WebDVD site
  - Combination of 100 static and dynamic menus
    - English, French, German & Spanish menus
  - Widescreen anamorphic video
- All DVD package and label art designed in house
- 10 DVD-R Check Discs
- 1 DVD-Video check disc package
- 1 DLT tape
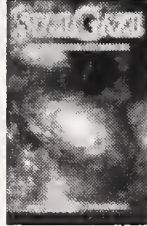
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Case Study #3 - StarGaze

Out of Pocket Costs
- Music Royalty Advance - $20,000
- 5.1 Surround Mix - $2,000
- AC-3 & DTS encode - $2,000
- Translation services - $4,500
- Narration Services - $4,000
- DVD-ROM Screen Saver Program Update - $1,000
- DVD-R & DLT - $1,000
- DVD Check Disc $1,500

Development Labor
- Research – 240 hours
- Video creation – 200 hours
- Menu creation – 160 hours
- Subtitle creation – 80 hours
- DVD Authoring – 80 hours
- DVD-ROM Program – 40 hours
- WebDVD Pages – 80 Hours
- Package Art Design – 40 Hours

Total Project Cost - $72,000

Back End Expenses
- $1.50 per unit music royalty

Back End Revenues
- 35% of Distributors Wholesale Revenues
- Suggested Retail = $24.98
- Wholesale Price
  - USA avg = $13.00
  - International avg = $10.00
- Monthly Sales
  - USA – 2,000 units
  - International – 1,000 units
- Net Monthly Revenues
  - $9,600

Break Even after 7 months

Title should sell for 3 years

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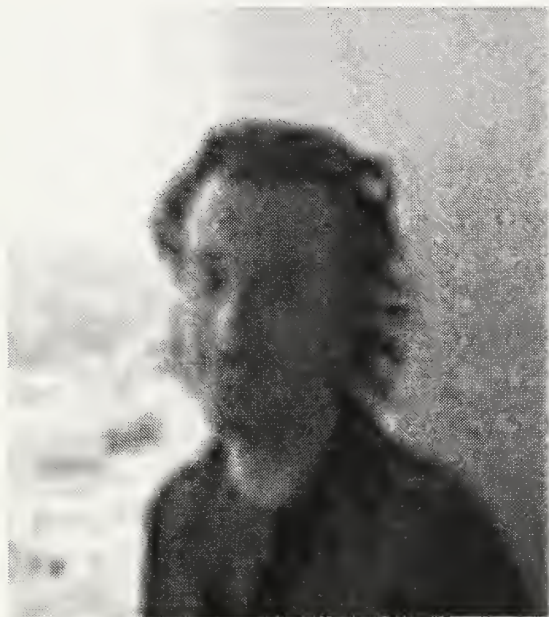
Blane Graboyes

Media Architect
Consultant and Producer

"The DVD Services Model"

Blaine Graboyes is a Media Architect, collaborating with artists, writers, actors, directors and producers for interactive broadcast media. Working as a Creative and Technical Director, as well as a hands-on Producer and Engineer, Blaine has been involved in over 4,000 interactive broadcast projects since 1995.

At Bennington College, Blaine lead a team that created one of the first interactive CD-ROM viewboooks in 1994, and acted as the Creative Director and Programmer, producing one of the first applications of Apple's QuickTime VR technology.

In 1996, as an independent New Media Producer, Blaine programmed a prototype broadband entertainment and news system that demonstrated the future of interactive broadcast for Time Warner.

Blaine founded ZUMA DIGITAL in 1997, was Chief Operating Officer and Creative Director until September 2001. At ZUMA, Blaine contributed to projects for world-known clients, technical development for WebDVD, and software product like ActiveDVD(tm).

In Hollywood, Blaine was the Creative Director for Final Fantasy DVD release for Columbia Tri-Star, I'm Your Man (the first interactive movie on DVD), The Unknown Marx Bros. (the first DVD link-outs), and the Scream Cutting Room Floor (the first DVD re-editing feature).

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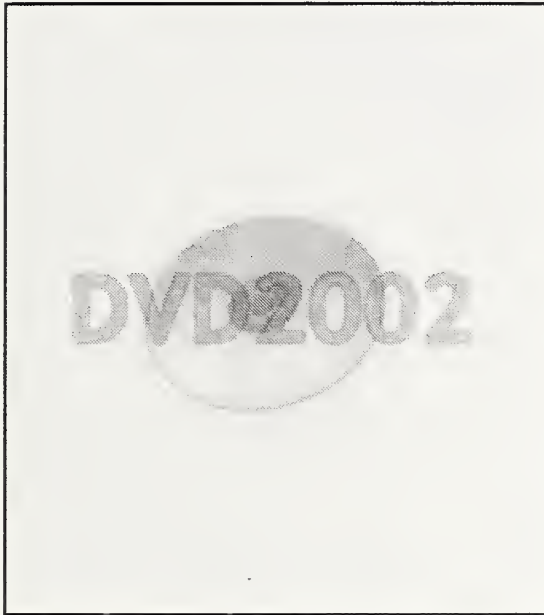
Geoffry Tully

Geoffrey Tully, Inc

"Just the Specs"

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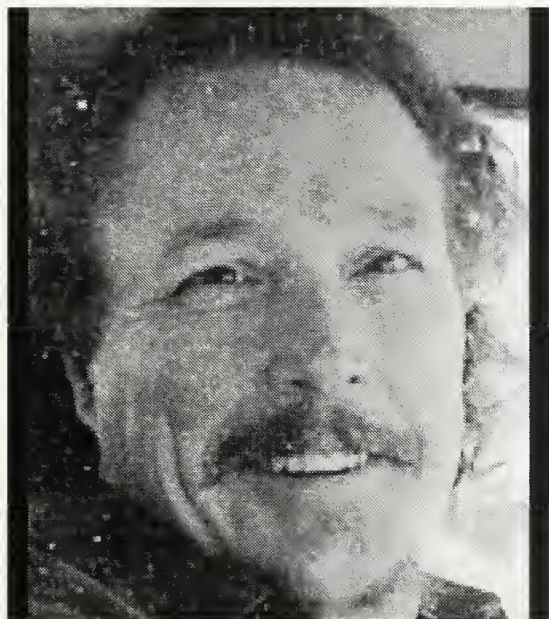
Chris Armbrust

President and Founder
Marin Digital
www.marin-digital.com

"Creative Workarounds"

Chris has over twenty-five years experience in research, development and delivery of digital media services..

Since 1998, Marin Digital has produced over 550 different DVD titles including technically and creatively exceptional projects for clients such as Digidesign, Hilton Hotels, Maxtor Corporation, Sun Microsystems, Autodesk and the San Francisco Museum of Modern Art.

Chris is very fluent in sharing his first hand experience in the business of creating DVDs. Chris has taught a series on DVD Authoring at the Center for Electronic Art in San Francisco, CA in 2001/2002.

He has a BS in EE/CS from the University of Santa Clara.

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Mark Johnson

Director
Research & Development
Company:
Still In Motion
A Technicolor Company
www.stillinmotion.com

"The Spec Is Not Enough"

Mark Johnson is an award winning author and technology developer who has been working in DVD since its original release in 1997. He is currently the Director of Research and Development for Still In Motion, a Technicolor company, where he has worked on such titles as Walt Disney's "Snow White and the Seven Dwarfs," "Atlantis: The Lost Empire," "Beauty and the Beast," and Pixar's "Monster's Inc." Before joining Still In Motion, Mark served as Technical Manager for Daikin U.S. Comtec Laboratories, where he was instrumental in the development of the Scenarist and ReelDVD authoring products.

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DVD Advanced Authoring Seminar

DVD Association Conference
June 2002

Agenda

Who I am
Advanced Techniques
– Resume, Stops, Multistory & Angles
Introduction to Scripting
– GPRMs, SPRMs & Timers

➢ Must Ask Questions!

Who I Am

DVD Author for 5 years
Director of R&D
– Still In Motion, a Technicolor Company
Titles include:
– Snow White and the Seven Dwarfs
– Atlantis: The Lost Empire
– Beauty and the Beast
– Monsters Inc.

Advanced Techniques

(Resume, Stop, etc.)

Advanced Techniques

DVD Navigation Structure
Resume()
Hard Stops vs. Soft Stops
Multi-story & Multi-angle

DVD Navigation Structure

VMG (VMGM_DOM)
– Title Menu, additional PGC's
VTS (1 – 99)
– VTS Menu Area (VTSM_DOM)
  Root Menu, Angle Menu, SP Menu, PTT Menu, Audio Menu, addition PGC's
– VTS Title Area (TT_DOM)
  Contains 1 – 99 Titles
  Feature content, multi-audio & subs.

DVD Navigation Structure (cont.)

Program Chain (PGC)
- Program (PG) / Part of Title (PTT)
  - Cell ("Scene")

Navigation Layer
- PGC, Program (PG), Part of Title (PTT)

Physical Layer
- Cell

Resume()

Specific function defined by DVD spec.

In practice, tied to MENU, TITLE, & PLAY buttons

Dependent on navigation path

Cannot be programmed directly

Has many potential side-effects

Definition of Resume()

Resume information is stored at any transition from the Title Domain (TT_DOM) to Menu Space (VTSM_DOM or VMGM_DOM)

Resume() may be activated only from Menu Space or following a "Soft Stop"

Resume() always returns playback to the Title Domain

.RSM Information

Cell number

Navigation pack (NV_PCK) address

PGC Playback control status
- Loop count, Shuffle history, etc.

VTS Number

SPRMs 4 – 8

Resume() with TITLE & MENU

DVD specification makes no connection between TITLE & MENU and Resume()
- But, DVD Forum does suggest guidelines

In practice, DVD player manufacturers tied Resume() function to TITLE & MENU

Result: Unnecessarily complex

Resume() Depends on Path

Press MENU button
- If in Title Space (TT_DOM), go to Root Menu
- If in Menu Space (VTSM_DOM or VMGM_DOM)
  - If RSM info exists, Resume()
  - Else, Stop()

Resume() Depends on Path

Press TITLE button
- If in Title Space (TT_DOM), go to Title Menu
- If in Menu Space (VTSM_DOM or VMGM_DOM)
  - If passed through Video Manager (VMGM_DOM) since entry to Menu Space
    - If RSM info exists, Resume()
    - Else, Stop()
  - Else, go to Title Menu

Resume() Cannot Be Programmed

Resume() can be called directly
- Resume() command
- LinkGoUpPGC(FFFFh) command

There are no commands for reading RSM information

Only CallSS can programmatically set RSM info (very limited)

Hard Stops & Soft Stops

Most players support multiple "stop states"

Not defined in DVD specification

Can really foul up scripting logic if not addressed

"Soft" Stop

Triggered by pressing STOP once

Sends player to the idle screen

RSM information & GPRM data is preserved

PLAY triggers Resume()

Similar to Pause (PA) command in laserdisc terminology

"Hard" Stop

Triggered by pressing STOP twice

Sends player to the idle screen

RSM information & GPRM data is lost

PLAY causes playback to start at Title 1, Chapter 1 – not First_Play_PGC

Detecting a Hard Stop

Standard method of detection:
- Set a GPRM value in First_Play_PGC
- In Pre-command of Title 1's Entry PGC, check GPRM value:
  - If GPRM = 0, Hard Stop has occurred so jump immediately to First_Play_PGC
  - If GPRM ≠ 0, proceed as normal

Non-seamless Multi-story

Create multiple ways of accessing content without duplicating it

Navigation layer separate from Content layer

Multiple Titles/PGC's/Programs/Cells can refer to the same content on disc

Must be within the same VTS

Seamless Multi-story & Multi-angle

Content streams interleaved to allow seamless playback while skipping unwanted content

Bit-rate ceiling decreases as number of angles or stories increases

Single-angle segments can be seamlessly connected to multi-angle segments

Creating Multi-angle

Each angle contains a duplicate of all audio and video

Each angle is first multiplexed into a complete stream

The muxed angles are then interleaved together in ~2 second increments

Introduction to Scripting

(GPRMs, SPRMs & Timers)

Introduction to Scripting

General Parameters
- Storage & Access
- Functions & Operations

System Parameters

Timers

Other Script Commands

Modular Scripting

General Parameters

16 registers for general use
- 16-bits each = 32 bytes total

Global scope
- Available throughout the disc
- Cleared when disc is inserted, on "Hard Stop," or Title_Play()

Not all registers are available in all authoring tools.

Understand Binary

Binary is the language of computers
Without binary:
 – You have just 16 numerical values
With binary:
 – You have up to 256 numbers, symbols, flags
 – (16 GPRMs x 16 bits = 256 bits)
Read any Computer Programming book

Standard Math Functions

Mov – assign the value of a GPRM
Swp – swap values between GPRMs
Add – add a value to a GPRM
Sub – subtract a value from a GPRM
Mul – multiply a GPRM value
Div – divide a GPRM value (integer)
Mod – modulus of a GPRM value

Special Functions

Rnd – generate random number
And – calculate bit-wise product
Or – calculate bit-wise sum
Xor – calculate Exclusive OR (toggle)

.System Parameters

Provide player setup information
Provide player state information
Control player state

System Parameters 0 to 6

SPRM 0	*Menu Language Code*
SPRM 1	Audio Stream (TT_DOM)
SPRM 2	Subpicture Stream & On/Off (TT_DOM)
SPRM 3	Angle Number (TT_DOM)
SPRM 4	Title Number (TT_DOM)
SPRM 5	VTS Title Number (TT_DOM)
SPRM 6	Title PGC Number (TT_DOM)

System Parameters 7 to 13

SPRM 7	PTT Number for One_Sequential_PGC
SPRM 8	Highlight Button Number
SPRM 9	Navigation Timer
SPRM 10	PGC Number for Navigation Timer
SPRM 11	Player Audio Mixing Mode (Karaoke)
SPRM 12	*Parental Management Country Code*
SPRM 13	Parental Level

System Parameters 14 to 20

SPRM 14	*Player Configuration for Video*
SPRM 15	*Player Configuration for Audio*
SPRM 16	*Initial Language Code for Audio*
SPRM 17	*Initial Language Ext. Code for Audio*
SPRM 18	*Initial Language Code for Subtitles*
SPRM 19	*Initial Language Ext. Code for Sub.*
SPRM 20	*Player Region Code*

System Parameters 21 to 23

SPRM 21	*reserved*
SPRM 22	*reserved*
SPRM 23	*reserved for extended playback mode*

System Parameters (details)

SPRM 0 – Menu Language Code
– Language code used to select VMG and VTSM language
– Read-only

SPRM 1 – Audio Stream
– Selected audio stream number (0 – 7)
– If none, value is 15
– Read/write

System Parameters (details)

SPRM 2 – Subpicture stream
– Selected subpicture stream (0 – 31)
– If none, value is 62
– If *Dummy stream*, value is 63
– Bit 6 = Display On/Off flag (+64)
– Read/write

System Parameters (details)

SPRM 3 – Angle Number
– Video angle (1 – 9)
– Read/write

SPRM 4 – Title Number
– Selected Title number (0 – 99)
– Relative to beginning of disc
– Read/write

System Parameters (details)

SPRM 5 – VTS Title Number
– Selected Title number (0 – 99)
– Relative to current VTS
– Read/Write

SPRM 6 – Title PGC Number
– Select PGC number (0 – 32,767)
– Relative to current Title
– Read/Write

System Parameters (details)

SPRM 7 – PTT Number
– Defined only if One_Sequential_PGC Title
– Valid values: 0 – 99
– Read/write

SPRM 8 – Highlight Button Number
– Button # x 1024 (1024 – 36864)
– Read/write

System Parameters (details)

SPRM 9 – Navigation Timer
– Remaining time on timer (0 – 65,535)
– Decrements by 1 each second
– Setting to 0 disables timer
– Triggers jump to PGC at 1 $\Rightarrow$ 0 transition
– Value frozen while in System Space
– Value frozen when user pauses playback
– Value cleared when changing Titles
– Read/write

System Parameters (details)

SPRM 10 – PGC for Navigation Timer
– Number of PGC to jump to when countdown completes (0 – 32,767)
– PGC must be within current Title
– Jump triggered at 1 $\Rightarrow$ 0 transition
– Read/write

System Parameters (details)

SPRM 11 – Audio Mixing Mode
– Controls mixing of channels 2, 3 & 4 into audio channels 0 and 1 for playback
– Bits 2, 3, 4 $\Rightarrow$ Mix Ch. 2, 3, 4 into Ch. 1
– Bits 10, 11, 12 $\Rightarrow$ Mix Ch. 2, 3, 4 into Ch. 0
– Valid only if Karaoke capability is specified by player
– Valid only when playing Karaoke audio
– Read/write

System Parameters (details)

SPRM 12 – Parental Management Country Code
– Country Code (ISO3166: Alpha-2 code)
– If none, value is 65,535
– Read-only

System Parameters (details)

SPRM 13 – Parental Level
– Parental level of DVD player (1 – 8)
– If none, value is 15
– Read/write

System Parameters (details)

SPRM 14 – Player Configuration, Video
- Bits 8 & 9: Display mode of current domain
  - 00b: Normal (4:3) or Wide (16:9)
  - 01b: Pan-scan
  - 10b: Letterbox
  - 11b: reserved
- Bits 10 & 11: User's preference for initial display
  - 00b: 4:3
  - 01b: Not specified
  - 10b: reserved
  - 11b: 16:9
- Read-only

System Parameters (details)

SPRM 15 – Player Configuration, Audio
- Bit 2: SDDS Karaoke capability
- Bit 3: DTS Karaoke capability
- Bits 4 & 5: MPEG Karaoke capability
  - 00b: incapable, 01b capable, others reserved
- Bit 6: AC-3 Karaoke capability
- Bit 7: PCM Karaoke capability

(continued)

System Parameters (details)

SPRM 15 – Player Configuration, Audio
- Bit 10: SDDS capability
- Bit 11: DTS capability
- Bits 12 & 13: MPEG audio capability
  - 00b: incapable, 01b capable, others reserved
- Bit 14: AC-3 capability
- Read-only

System Parameters (details)

SPRM 16 – Initial Language, Audio
- Language code (ISO639)
- If none specified, value is 65,535
- Read-only

SPRM 17 – Initial Language Ext., Audio
- Language code extension
  - 0: Not specified, 1: Normal captions, 2: Audio for visually impaired, 3: Director's comments 1, 4: Director's comments 2, others reserved
- If none specified, value is 0
- Read-only

System Parameters (details)

SPRM 18 – Initial Language, Subtitles
- Same as SPRM 17, but for Subtitles

SPRM 19 – Initial Language Ext., Subtitles
- Language code extension
  - 0: Not specified
  - 1, 2, 3: Normal, big, children's captions
  - 5, 6, 7: Normal, big, children's closed captions
  - 9: Forced captions (only 1 per language)
  - 13, 14, 15: Normal, big, children's director's comments
- If none specified, value is 0
- Read-only

System Parameters (details)

SPRM 20 – Player Region Code
- Bits 0-5: Regions 1 – 6
- Bit 7: In-flight Entertainment, Global
- Some "chipped" players set bits for more than one region, which can be checked for
- Read-only

SPRM 21, 22, & 23
- Reserved

Timers

Two kinds of timers available

Navigation Timer (SPRM 9 & 10)
- Set countdown & jump

GPRM Counter Mode
- Increments GPRM

Navigation Timer

Specify countdown & target PGC

When timer expires, immediately jumps to target PGC

Countdown frozen while in Menu Space

Set Navigation Timer (SPRM9) to zero to deactivate timer
- (Careful: Some players may jump)

Only good within current Title

GPRM Counter Mode

Set GPRM Counter Mode & initial value

GPRM is incremented once per second

Value frozen while in Menu Space

Can only be read or set, not manipulated

Must be "polled" to determine time

Not all players count or count well...

GPRM Counter Mode Uses

As a measuring device
- Determine how long an action or series of actions take

As a trigger
- When timer reaches a threshold, activate

As a pseudo-random value
- Use value as a modifier to random number generator for greater randomness

Other Script Commands

Go To
  Jump to line in command list
Break
  Exit commands and proceed with playback
Exit
  Stop playback (like STOP button)
Links & Jumps
Set System commands
  Set Streams, Navigation Timer, Button Highlight, Audio Mix Mode, GPRM Mode

Modular Scripting

Treat PGC Pre-commands as functions

Treat GPRMs as parameters

Use one or two lengthy scripts instead of hundreds of small ones
- Saves time & effort
- Improves readability

Example: Jumping Across VTS's

DVD Specification does not allow jumping from VTS to VTS

Only Video Manager can access all Video Title Sets and Titles

Create "Dummy" PGC in VMG
- Use GPRM value to indicate which Title to redirect to

DVD 2002
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Bruce Nazarian

President
Gnome Digital Media
www.gnomedigital.com

"You Can't Do That With This"

Bruce Nazarian is an Apple Solutions Expert, a recognized DVD Consultant, the Factory Certified DVD Trainer for Sonic Solutions, and an award winning DVD Producer. He is also a member of the DVD Association - Americas Advisory Board, where he sits on the Training and Careers Working Group. He specializes in digital media production for video, broadcast, DVD and the web, and is the owner and operator of Gnome Digital Media, his Award-winning DVD Production company in Burbank, CA. Bruce has created the DVD Companion for Macintosh, and runs a web site called recipe4DVD.com to make learning about DVD Authoring easier.
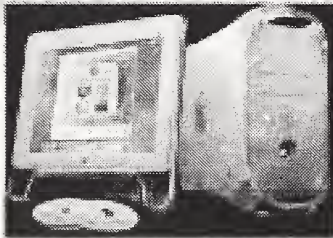
DVD Authoring

Presenter: Bruce Nazarian.

Agenda

- DVD Technology
- What is DVD?
- DVD Authoring overview
- DVD Workflow
  - Create (Plan & prep)
  - Encode
  - Author
  - Output (Burn & Run)
- Summary
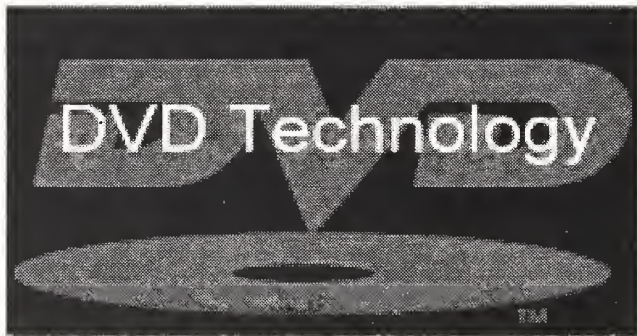
DVD Technology

DVD is Everywhere!
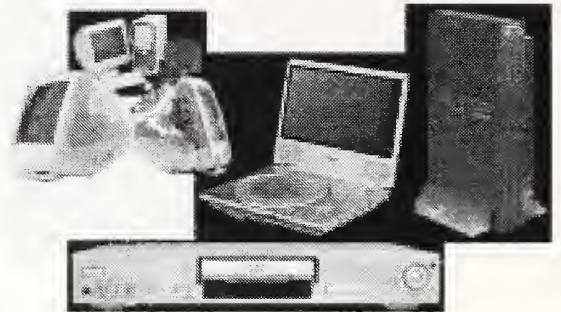
The Digital Hub
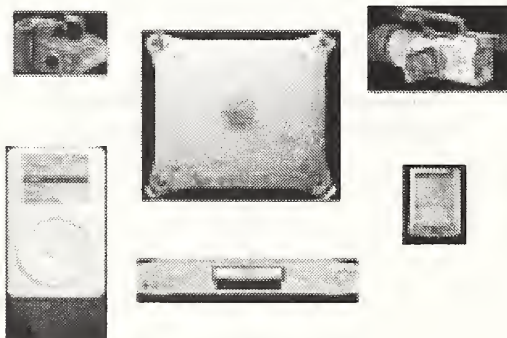
DVD is a Runaway Success!

DVD is being adopted faster and earlier than any previous technology format in history

- DVD
- Black & White TV
- Compact Disc
- VHS - VCR Recorder
- Color Television
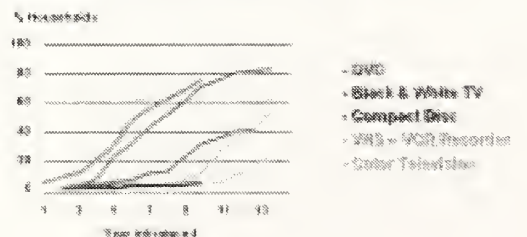
What is DVD?

What is DVD?

- Originally Digital Versatile Disc, now just "DVD"
- Most people think movies, but it's much more
- DVD is a 12 cm disc (the same size as a CD)
- It holds 2-4 hrs of broadcast-quality video, or
- 74 min. of high-resolution audio, or

Advantages of DVD

- Superior video quality
- Superior audio quality
- Compatibility
- Interactivity
- Flexibility
- Durability
- Low cost

DVD Types

- Different DVD formats do different things...

Let's review the formats

- DVD-ROM (for computer data)
- DVD-Video (for digital video) LOGICA
- DVD-Audio (high-resolution sound)
- DVD-R (recordable DVD)
- DVD-RW (re- recordable DVD)
- DVD-RAM (re-recordable DVD)

PHYSIC

DVD Layers and Sides

Single Sided Single Layer	Single Sided Dual Layer	Dual Sided Single Layer	Dual Sided Dual Layer
DVD-5 4.37 GB 4.7 BB	DVD-9 7.95 GB 8.5 BB	DVD-10 8.74 GB 9.4 BB	DVD-18 15.9 GB 17 BB
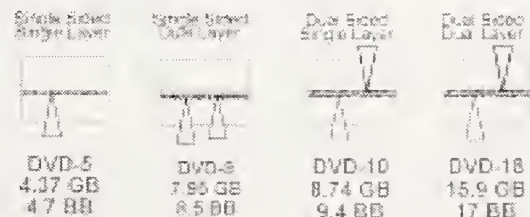
DVD-R, -RW

DVD Formats

Format Compatibility

DVD Authoring

Overview

DVD Workflow

Production Steps

Production Step 1

Edit Compelling Content
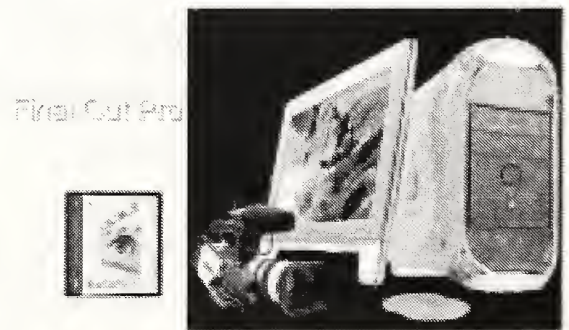
Create Menu Graphics
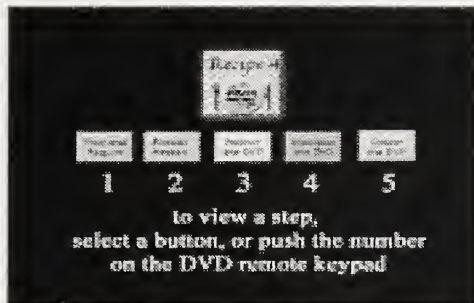
Create Video Segments
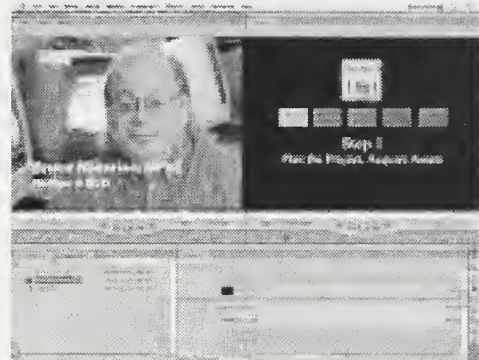
Production Step 2

Export Video to MPEG
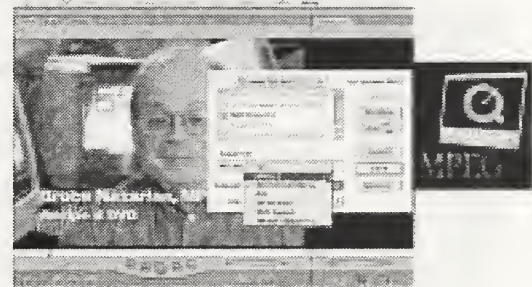
MPEG Encodi[ng]

Software or Hardware

- Export MPEG-2 directly from QuickTime.
  - 0.7-2x time of video
  - Depending on the CPU speed
- DVD Studio Pro can use any compliant MPEG asset
- PCI based Hardware Encoders available that are real time
  - Wired Inc.
  - Sonic Solutions
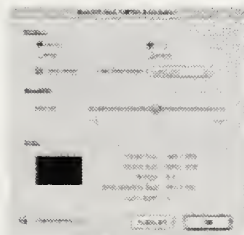
Production Step 3
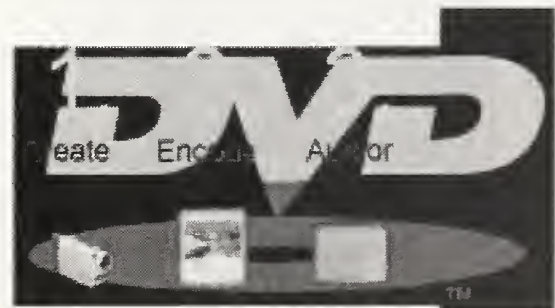
Authoring adds:

- Multiple tracks and angles
- Still or motion menus
- Multiple soundtracks
- Chapter and story creation
- Region coding
- Subtitles
- Scripting
- Dolby Digital encoding included

Add a Menu
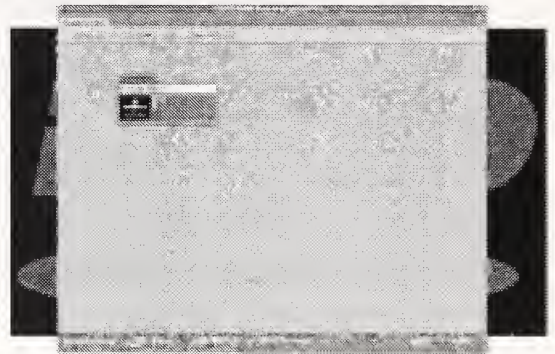
Add Video Tracks
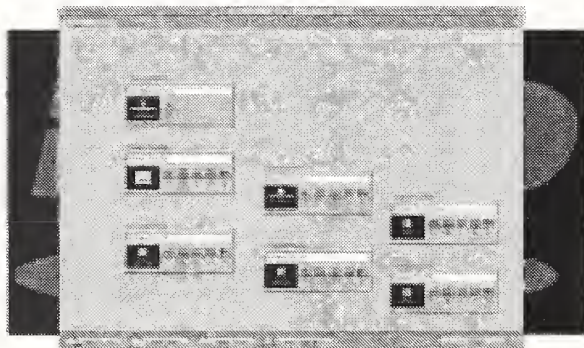
Add Web links
(DVD@cess)
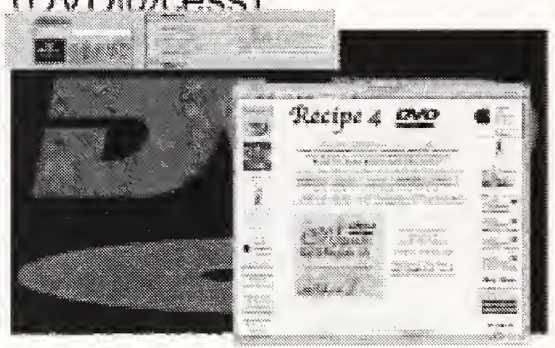
Full Real-time Preview with debug

Production Step 4

Create   Encode   Author   Build/Burn
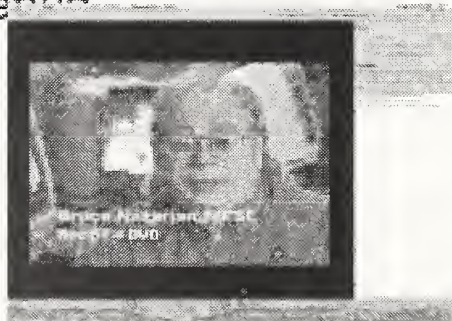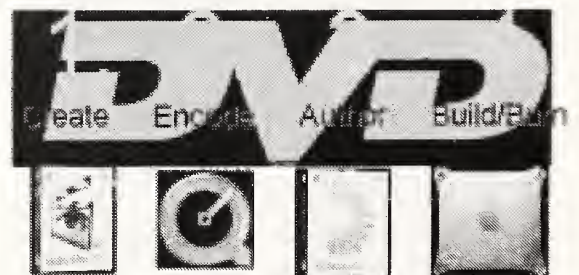
DVD Output Options

- 4.7 GB write-once, read forever
- 4.7 GB (use Toast) write and rewrite, 1000 + times
- - Digital Linear Tape (use DLT Type III media) for submission to replicator (yes, you CAN do this!)
- 4.7 GB for use in computers

Build the DVD ("mux")
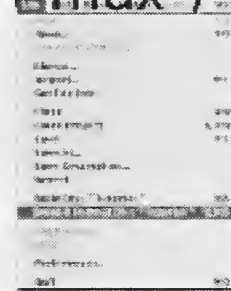
- "Build" creates the DVD Data, called a "DVD Volume"
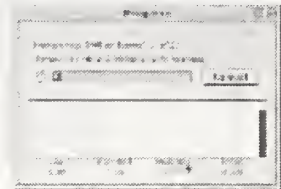
Burn a DVD-R
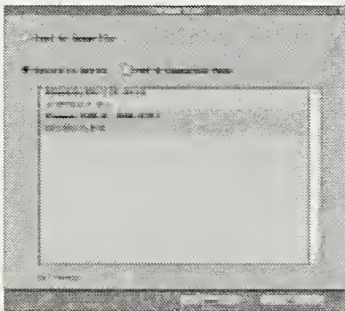
- DVD-Rs 4.7 GB DVD-R (G) General Media with
- DVD-R 4.7 GB or 3.95 GB (A) Authoring Media with

DVD-R SuperDrive

- DVD-R/RW - CD-R/RW drive available in select Power Mac G4 SKUs and from Pioneer
- Unprecedented price and features
- Uses affordable media
- ($5.00 ea. in
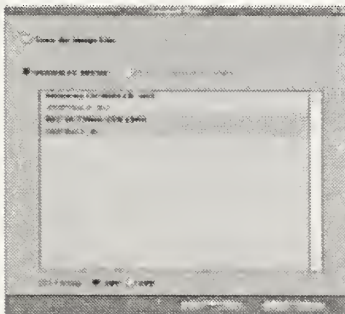
Write a DLT

- DLT - Write a digital linear tape (DLT Type III) for submission to a replicator
- (in many cases you can also submit a DVD-R you burn on your Superdrive - check with your replicator for info on this)

Summary
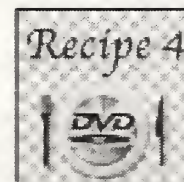
Recipe 4

Production Steps
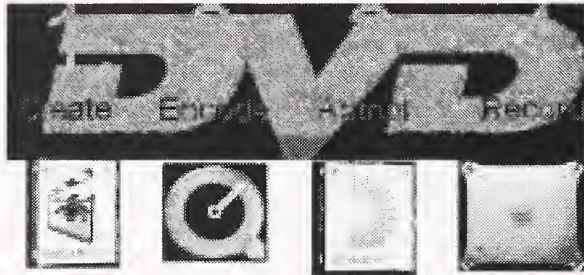
Great 3rd Party Helper

- Roxio Toast Titanium

http://www.roxio.com/
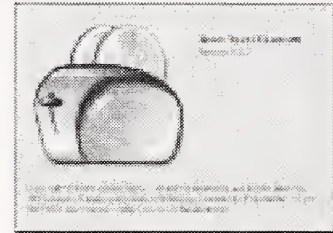
Where Do I Get Info?

- Recipe 4 DVD web site
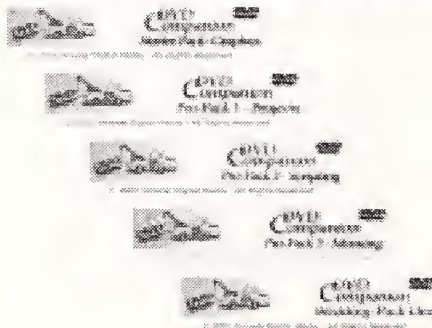

http://www.recipe4dvd.com
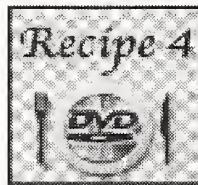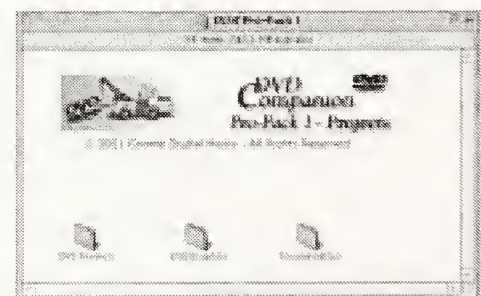
The DVD Companion™...
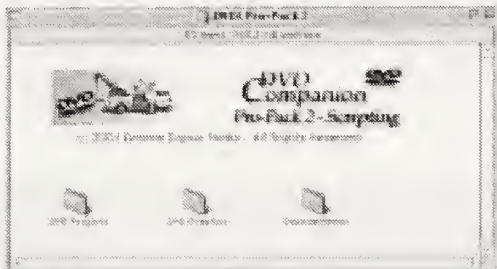
- Interactive Help Guru **for** Macintosh
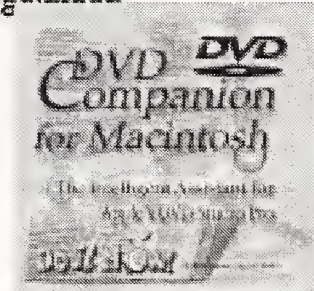
Wait! there's more!...

DVD Companion Pro-Pack1- Prebuilt DVD Projects
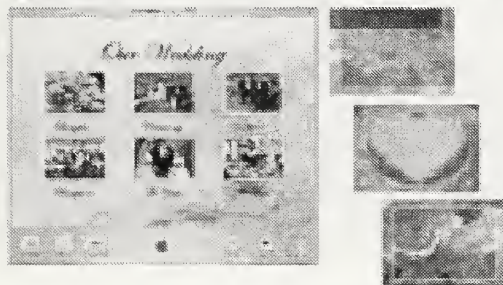
DVD Companion
Pro-Pack 2 - Scripting for DVDSP
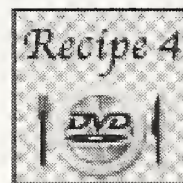

DVD Companion
Pro-Pack 3 - Menus for DVDSP

Wedding-Pack One -
Great graphics for iDVD or DVDSP

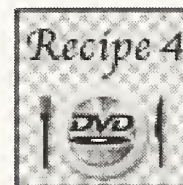
Where Do I Learn More?
- Get hands-on DVD training

http://www.recipe4dvd.com/Get/Authorized.html

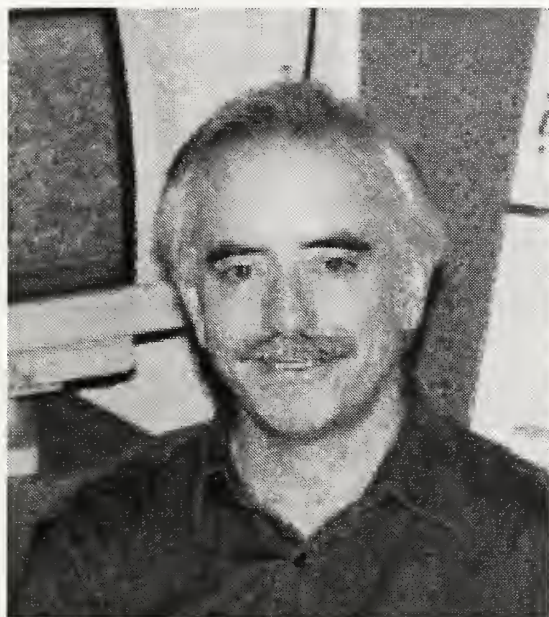## Where to get info or buy?

http://www.recipe4dvd.com

Thanks for Coming!

DVD 2002
Conference and Exhibition
Standards, Applications, Technology

Dr. Charles Fenimore

ISIS Group Staff
Convergent Information
Systems Division
NIST
www.itl.nist.gov/div895/

"Image Quality for DVD Interoperability"

Charles Fenimore leads the Image Quality Project at NIST. For several years his work has focused on quality measurement for motion digital imagery, which supports the development of new image processing and presentation technology. It has involved the development and evaluation of computed measures of quality, of test methods for subjective evaluation, and the development of collections of test imagery needed for quality assessment. This work on imaging has contributed to the development of new standards through international organizations including SMPTE (Image Technology Committee), MPEG, the IEEE, and the Video Quality Experts Group.

Recently, this work has turned to assessment of quality for digital cinema. It has included supporting the MPEG d-cinema compression tests with display characterization measurements, with quality assessment tools, and with design of subjective assessment tests for (nearly) lossless compression. In addition Fenimore has worked to catalyze the emerging d-cinema industry by bringing the industry stakeholders together at

Image Quality for DVD Interoperability

Abstract

The convergence of information systems is leading producers and authors of e-works to export to platforms, which neither existed nor were imagined by authors a decade ago. The DVD is a particularly interesting case. Originally developed as a device dedicated to video, the Digital Video Disc, it has now become the Digital Versatile Disc. This "new" DVD is just another storage media, albeit a particularly flexible one. This versatile device is the high quality delivery device for movies on home TVs. But as newer presentation platforms come into use, the good quality presentation on older devices may be replaced by a flawed showing in which newer technology reveals the previously unexamined limits of the older. When visual information arrives the first question is "Can it be displayed". If "Yes", one has interoperability as compatibility. The second question is "Is the visual quality as intended by the author?" If "No", one constrains the value. Conversion affects the quality of the displayed information. This issue is properly a part of interoperability.

A couple of examples of changes in image quality may be illustrative.
- Up-conversion: A DVD-video which looks great on a home CRT, may provide an instructive, but unpleasant lesson in image blocking when viewed on a wide-screen display in a theatrical environment. In the theater, some audience members sit at a smaller relative distance (measured in screen heights) and the resolution of the e-display device may be higher. Here the enhanced presentation system exposes the previously hidden impairments introduced by MPEG compression.
- Down-conversion: Most documents that are authored on and tuned to the desktop PC environment can be exported to e-Books. Some of these newer devices store imagery with only 4 bits per sample. Seen at such a low bit depth, imagery is likely to have contouring and shifts of tone that degrade the quality. Here the limits of storage and display prevent the viewer from seeing the original imagery as the author intended.

NIST's Image Quality Laboratory is addressing these interoperability issues with:

Measurements – Current methods for assessing the subjective quality of motion imagery were developed to characterize the performance of systems with large excursions in quality. For applications in medical imaging, critical viewing, and digital cinema the quality requirements are high. The methods for assuring lossless presentation are being defined. In addition, characterizing the temporal performance of displays, particularly new projection technology, is under development.

Models – Models of human vision have been adapted for computing quality measures that mimic the subjective ratings of human viewers. These models are weakest in measuring changes in the imagery under low light conditions – exactly the conditions for high quality viewing. NIST is exploring the threshold performance of "just noticeable difference" models.

Display – The NIST Image Quality Lab has a state of the art uncompressed digital HD video server and a 3-chip DLP projector for moving picture presentation and measurements of image quality. The system can handle 10-bit imagery end-to-end and is being used to examine the validity of JND models for small image changes near the threshold for perception.

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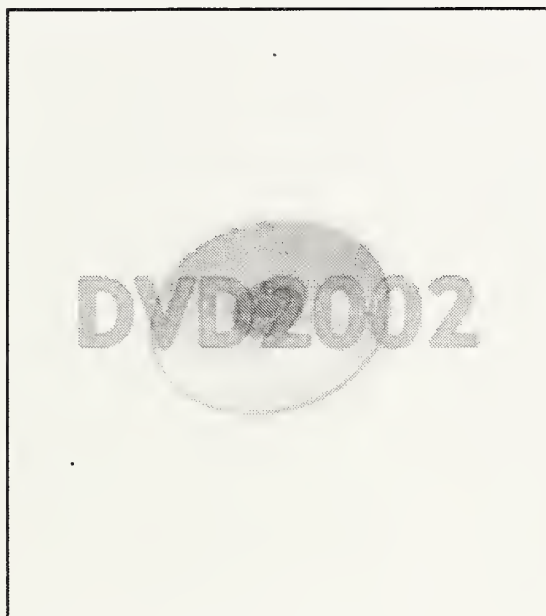
Martin Weinstein

Vice President
Northeast Office
Video Copy Services
www.video-copy.com

"Ask The Replicator"

Martin has been in many facets of the media business for the past 25 years — currently he is Vice President of the Northeast Office of Video Copy Services which is headquartered in Atlanta, GA.

Video Copy Services is a full service media facility, which provides turnkey solutions for many entertainment and corporate clients. Their services include replication, duplication, authoring, encoding, format conversions and fulfillment. Clients include Turner Broadcasting, The Weather Channel, Cox Communications, BellSouth, Coca Cola, Burger King, Delta Airlines, Siemens and Roche Pharmaceutical.

Prior to Video Copy, Martin was National Sales Manger for Sonopress (a Bertelsmann Company) and was involved in many large-scale replication projects.

Prior to Sonopress, Martin was president of his own company AlertNetworks for many years. Alert distributed video and multimedia products to video stores throughout the U.S and Canada.

Before AlertNetworks, Martin was Senior Vice President of Turner Home Entertainment (a division of Turner Broadcasting) for 6 years and was in charge of their North American home video operation.

BFA in Communications - New York Institute of Technology.