CD-i Frequently Asked Questions

Questions answered in this document

What is CD-i?

CD-i is an entertainment and information system that plays digital data stored on a compact disc. The CD-i player connects to a television set or to a color monitor. You may also connect a CD–i player to your stereo system for higher quality audio. CD-i discs are used in the home, in education, and in business.

CD-i is the first multimedia technology aimed at a mass audience. CD-i allows the multimedia designer to blend different media—in the form of visual, audio, graphic, and computer data—into a single experience for the user. CD-i allows the user to interact with the information on the disc and to guide the presentation in a meaningful way. CD-i lends itself to informational titles, games, encyclopedias, educational material, and many business applications. With the addition of a special hardware module, CD-i players can now play feature films and other video material.

Besides CD-i discs, CD-i player can play Compact Disc-Digital Audio (CD-DA), CD+Graphics (CD+G), Photo CD, and, with a Digital Video cartridge, Karaoke CD and Video CD discs. A CD-i player is a self-contained computer system with specific video, audio and control hardware and software, and an optical disc drive.

CD-i technology was developed jointly by N.V. Philips of the Netherlands and Sony Corporation in Japan. The primary goal of the two companies was to develop a worldwide standard so that CD-i discs would run on all CD-i players anywhere in the world. To that end, they published the "CD-i Full Functional Specification," which is more commonly known as the "Green Book." Any changes or extensions to the CD-i standard must be approved by both Philips and Sony before they become an official part of the specification.

What CD-i discs are available and where can I purchase them?

Philips has an extensive catalog of home entertainment titles. In the United States, you may call a toll-free number 1-800-845-7301 for a catalog and for referral to a retail location where you may purchase discs. CD-i discs are also available via mail order; call the toll-free number 1-800-824-2567. CD-i software (discs) is also being stocked at a limited number of "record" stores that sell audio tapes, compact disc audio titles, videotapes, etc. Rental of CD-i discs is also being tested in a limited number of markets. Samples of professional titles are available through Philips Interactive Media Systems.

What CD-i players are available ?

There are three classes of CD-i players: consumer, professional and development. Consumer players are players for home use and are sold through retail outlets. Professional players have specific features, such as connectivity, floppy disk drive, or portability, and are more expensive than the consumer player. Development players have features that enable title development, such as debugging tools and the ability to connect to an emulator.

The CD-i 220 player, which is designed for consumers, is available at major home electronics outlets around the world. Professional and development players are sold by Philips Interactive Media Systems and their VARs. Philips currently markets several CD-i player models. The CD-i 605 is designed for professional applications and for software development. It contains a floppy disk drive and can connect to a keyboard and other computer peripherals. It can alsobe connected to an emulator and has software testing and debugging features. The CD-i 360 player is a portable player that is sold in the professional market and is not currently available to home consumers. It is particularly useful for point of sale presentations, such as those used by pharmaceutical companies to provide product information to physicians, because it can be carried by the sales representative.

Companies besides Philips—for example, Sony, Samsung, Goldstar, Matsushita, Sanyo, and Kyocera—also manufacture various CD-i players.

Where can I buy a consumer CD-i player?

Consumer CD-i players and discs are available at major home electronics outlets around the world. In the U.S., you may call a toll-free number, 1-800-845-7301, for referral to the nearest retail store that sells CD-i players and discs. Rentals of CD-i players are also being tried in a limited number of test markets.

What are the differences among all of these CD-ROM based platforms?

CD-i, VIS, 3DO, CDTV, CD-ROM, MMCD, Macintosh CD-ROM, MPC, Sega CD, TTI, FM-TOWNS/Marty are some of the many different platforms for delivering CD-ROM based entertainment and information applications.

All of the aforementioned platforms (and others not mentioned here) usually utilize the same kinds of components: specific audio, video, and user input hardware; a computer system; and a CD-ROM drive. However, the components all have different characteristics and features and are, therefore, generally incompatible. If you have a title for any of those systems, it will not work on any of the other platforms unless special steps have been taken by the developer of the title to ensure compatibility with more than one platform.

All of the above-mentioned systems play CD-DA discs. Some play CD+G discs, and some play CD-ROM/XA bridge discs like PhotoCD.

This current world-wide incompatibility presents big challenges for both users and developers, but it is a fact of life until the dust settles around the prevailing format(s).

What are CD-ROM/XA bridge discs?

CD-ROM/XA bridge discs are discs that can be played on a personal computer with sufficient hardware and software, on dedicated players, and on CD-i players. CD-ROM/XA bridge discs contain audio-visual data and adhere to the CD-ROM/XA standard. Therefore, they can be read by any computer with a CD-ROM/XA drive. The computer needs a special program to play the audio visual data from the disc. In addition to the audio-visual content, CD-ROM/XA brdige discs contain a CD-i application program that allows you to play the content on a CD-i player. It is also possible to have players dedicated to playing a specific type of CD-ROM/XA bridge disc.

The most well-known example of CD-ROM/XA bridge discs are Photo CD discs. Photo CD discs contain graphic images in a specified structure and a CD-i program. These discs can be played on a Photo-CD player, a CD-i player, and on a computer using a separate Photo CD access program.

I have a computer with a CD-ROM/XA drive. Can I play CD-i discs on it?

Some manufacturers claim their CD-ROM/XA drives are "CD-i compatible." They probably mean that the drives can read CD-i compatible data. That does not mean that a computer attached to their CD-ROM/XA drive can run CD-i programs.

The CD-i standard includes specifications for audio, video and computer hardware. In contrast to a CD-ROM drive, a CD-i player contains a complete computer system that runs its own operating system. For a system to be CD-i compatible, it needs to have a Motorola 68000 family central processing unit, special audio and video hardware, and a special operating system called CD-RTOS. A CD-ROM/XA drive connected to a PC or a Macintosh does not meet the CD-i specification and, thus, cannot play CD-i discs.

How do I make discs for CD-i?

The creation of CD-i discs involves the development of audio and video assets and an interactive program. CD-i uses a real-time operating system called CD-RTOS (Compact Disc Real-Time

Operating System). CD-RTOS is a specialized operating system designed specifically for CD-i and is based on the OS-9 real-time, multi-tasking operating system.

CD-i titles can be developed through the use of an authoring system, such as MediaMogul from OptImage, or may involve custom software engineering, using C or 68000 assembly language programming. As a rule, if the title design is complex or if the design requires a great deal of interactivity, custom software engineering is required. The software engineering effort can be reduced through the use of software development tools and specialized software libraries, such as the Balboa Run-Time System.

What is an authoring system?

An authoring system is a specialized system that allows a producer or designer to design and assemble the elements of a multimedia presentation without any software engineering. OptImage's MediaMogul and Script System's ABCD-I are examples of authoring systems used for CD-i. Often, authoring systems allow you to custom engineer add-on modules or to buy add-on modules that provide additional functionality.

There are a several authoring systems for CD-i on the market. The capabilities and ease of use of these systems may vary widely. If you have questions about the suitability of an authoring system for your title design, ask the vendor for references to other CD-i developers who have produced similar types of titles with the system in question.

Should I use an authoring system or should I have a software engineer write a custom program?

Authoring systems can reduce development time and effort and make CD-i technology accessible to those who do not have software engineering skills. The design of a title produced with an authoring system is typically constrained to a fairly low level of interactivity and complexity. The creativity of the interactive designer can make these constraints less apparent to the user.

If, however, you wish to produce a title that is more interactive or complex, such as an action game, custom software engineering becomes a necessity. Typically, titles designed for the consumer marketplace require this type of complexity and are much more expensive to produce because of the custom software engineering required to complete them. Custom engineering is done by writing C or 68000 assembly language programs that directly interface with CD-RTOS, the operating system for CD-i, or that make use of the Balboa Run-Time System libraries (available from OptImage).

On the other hand, many applications for presentations, point of sale, marketing, and training may lend themselves very well to use of an authoring system. If a sound and slideshow with some branching is adequate for a design, then an authoring system will probably serve well. Authoring systems are becoming increasingly sophisticated and their developer's continue to enhance them to add functionality. For example, MediaMogul now allows the use of Digital Video segments as assets for a CD-i title and also allows the use of plug-in modules to expand its functionality. Nonetheless, no authoring system currently on the market allows the title designer to approach the complexity of design that can be attained with the services of a skilled CD-i software engineer.

If I decide to use an authoring system, how do I know what hardware and software I'll need?

The supplier for your authoring system typically can provide a complete solution, including hardware and software. Basically, your authoring system will either run on a CD-i 605 (development) player or on a personal computer. You will need to prepare your audio and video assets on a high end personal computer and convert them there to CD-i format. First you will need personal computer programs and hardware for the capture or creation of images and programs for the editing of audio and images. Some examples of these "off-the shelf" programs for the Macintosh are Adobe Photoshop, Studio 32, Macromind Director, and DigiDesign Sound

Tools II. You will also need tools to convert your assets to CD-i format; these are called audio and image conversion utilities.

In addition you'll need cables and networking software to let you connect your player to the personal computer and you will need an emulator so that you can test your work in progress.

Can I use a Macintosh or PC based authoring tool to create CD-i discs?

Commonly used Macintosh and PC based authoring tools such as Macromedia Director or Authorware or Toolbook cannot be used to create CD-i titles. As yet, there is no easy way to convert the output of those tools into a CD-i format disc image.

These personal computer platforms and the CD-i platform differ too much for good cross-platform authoring. When authoring on a PC or a Macintosh, you make use of special features of the personal computer, such as fast video updates, fine image resolution, and fast hard-disk access. On the other hand, when developing for CD-i, you want to make use of the unique features of CD-i, such as DYUV images, two planes, real-time audio play, video effects, Digital MPEG Video etc., which are not available when you are using PC or Macintosh tools.

I am involved in CD-ROM and I would like to make CD-i software. How can I port my PC, Macintosh, CDTV, or VIS title to CD-i?

It is not trivial to port a CD-ROM title to CD-i. However, through the use of careful design and production techniques, it can be done with a lot less effort than starting from scratch.

In our experience title development is about 25 to 50% platform specific and 50 to 75% platform independent. In case of authoring, the actual process of scripting and assembling the presentation is platform specific. In the case of custom C programming, the software design and implementation is largely platform specific. On the other hand, the specific title design, the source audio and video assets, and the integration system can be platform independent.

Our porting guidelines in a nutshell are:

- Keep all your source assets in their high quality, original form (for example, in the form of 24-bit RGB images and 44 KHz PCM audio) .
- Make sure the encoding pathways for all your assets are automated, or at least well documented.
- Separate your code into platform-specific and general parts, if possible.
- Verify that the design specification will translate successfully to CD-i. This can be done by prototyping or "proof of concept" engineering.
- Then, reimplement your title using the design, which has been modified, if necessary, for CD-i, any reusable code, and the original audio and video assets.

What is an emulator?

CD-i programs are developed to run off of a compact disc on an optical disc drive. You cannot properly play back and test your programs from the hard disk of the computer you are using to develop the programs for your CD-i application. The data delivery system and CD interface, the data rate, and the (slow) access time of the CD drive need to be taken into account. Thus, it is necessary to "emulate" play of the application from optical disc. An emulator is an intelligent computer-peripheral device with a high-capacity hard disk. During CD-i development, a disc image is built onto the hard disk of the emulator and the disc image can be "played" as if it were on an optical disc. The emulator removes the need to burn new CD-i discs at various stages of development process to use for functional testing, and can, thus, save a lot of time and money.

What support does Philips provide for the development of CD-i titles for home entertainment ?

Philips Media co-funds a limited number of titles and acts as a distributor for selected titles from independent CD-i developers.

Co-Productions

Philips Media reviews proposals from prospective co-producers. To prepare a proposal, describe the subject matter for the title in two or three sentences. Because Philips cannot guarantee confidentiality in the handling of your proposal in the early stage of the proposal process, we advise you not to send a detailed outline or discussion of your ideas. But, do provide detailed information on your company (brochures, company background, etc.), its personnel (resumés or biographies), and facilities. Because Philips receives a large number of proposals, a response will take at least three weeks. Upon approval of your proposal for further consideration, a next step would be a business plan and a mutual confidentiality agreement.

Distribution for Independent Producers

As part of Philips Media's publishing activity, independent producers are encouraged to seek distribution agreements for their CD-i titles. Philips establishes and maintains distribution channels worldwide. The procedure for obtaining a distribution agreement with Philips is outlined in a document titled "Guidelines for Distribution License Agreements," which is available upon request from the International Product Management and Distribution office, Philips Media Electronic Publishing.

What support does Philips provide for professional or educational applications?

Philips Media Systems is responsible for sales and support of CD-i development systems and players for use in the professional marketplace. This group can assist developers in designing and putting together hardware systems and can direct developers to suppliers of development software and authoring systems.

Suppliers of development systems typically offer complete CD-i development systems that include the hardware and software required for the type of application desired. The often provide training and technical support, as well.

Is CD-i proprietary? Do I need a license to produce CD-i discs?

Content developers for CD-i do not need a license. Manufacturers of CD-i players and CD-i discs do need a patent license from Philips. A content developer may obtain the same information package that is received by licensees for a fee of $5000. If they wish only to obtain the "CD-i Full Functional Specification" (Green Book), they may sign a non-disclosure agreement and pay a fee of US $200.

What are the Red, Yellow, Green, Orange, and White Books?

Philips and Sony jointly developed compact disc technology and they co-own the patents. The two companies have written and now maintain a set of specifications for the encoding and formatting of digital data on compact discs. Each specification is referred to by a color designation and the cover of the specification is that color. These specifications detail the accepted industry foundation for interplatform compatibility. A description of each of the color coded specifications follows:

- **Red Book**

  This is the specification for Compact Disc-Digital Audio. All audio CDs adhere to specification in the Red Book, and are, thus, assured to play on any CD audio player in the world.

- **Yellow Book**

This specification defines the computer-based CD-ROM standard. The standard specifies the sector format on disc. There are two sector formats: Mode 1, CD-ROM , 2048 byte sectors, and Mode 2, CD-ROM/XA, 2324 byte sectors. Mode 2 sectors also contain end-of-record markers, interrupt triggers, data type specifications, etc. Other standards, such as ISO 9660 and Apple HFS, which may be used in combination with the Yellow Book standard, define the directory and file structures.

- **Green Book**

  This specification builds on the Red Book and the Yellow Book and is the specification for Compact Disc-Interactive (CD-i).

- **Orange Book**

  This specification covers writable CDs, including CD Recordable (CD-R), magneto-optical cartridge systems and single- and multi-session recording.

- **White Book**

  This specification covers the Video CD format.

These specifications are available from Bert Gall, Philips Consumer Electronics in The Netherlands.

How do I get a copy of the Green Book (CD-i Full Functional Specification)?

The Green Book is available from both Philips and Sony. The Green Book can be obtained from Bert Gall, Philips Consumer Electronics in The Netherlands. The various regional CD-i associations, such as CD-i Association of North America and CD-i Association of Europe, have also made special arrangements for their members to obtain this specification. (Note that the Red, Yellow, Orange, and White Book are available from the same source.)

What are CD+Graphics discs?

CD+G is a format that allows a music producer to add still graphics to a CD-DA disc. This format has been used to a limited degree; it has been most common in the Japanese marketplace.

What are Photo CD discs?

Photo CD discs are a special type of CD-ROM/XA bridge discs that allow you to put 35 mm photographic images on disc for play back on a dedicated Photo CD player or on a CD-i player. Photo CD allows you to display your personal photographs on your television set. The Photo CD disc contains a special CD-i application program that allows your pictures to be played back on a CD-i player. Photo CD discs can be multi-session discs. This means that after you have had pictures from your first roll of film "burned" into the disc, you can have the photo processor add pictures in additional disc burning sessions until the disc is full.

Photo CD has also added an interesting source of high quality photographic images for developers of CD–i. It is possible to read images from a Photo CD disc via a CD-ROM XA drive and, using Photo CD access software and image conversion utilities, to use the images as source assets for a CD-i disc.

What are multi-session discs?

An optical disc is typically made in one session. The data on a single-session disc cannot be changed, and data can not be added to the disc. However, the Orange Book specifies a special format for recordable CDs: multi-session discs. This format allows you to use one disc for one or more additional recording sessions. After the initial data is burned into the disc, it is possible to add data during future sessions until the disc is full. Since you cannot change information on a recordable disc, a new session should contain a table of contents comprised of the old and the new information on the disc. The system that reads a multi-session disc needs to take this into

account. It should not look for just any table of contents or directory of a CD-ROM disc; it should look for the last table of contents or directory. Because of this issue, many older CD-ROM drives cannot read multi-session discs.

What are Karaoke CD discs?

Karaoke CD discs are a special kind of CD ROM/XA bridge disc that allow you to play Karaoke discs on a dedicated Karaoke CD player or on a CD-i player equipped with a Digital Video cartridge. The Karaoke CD standard was developed jointly Philips and JVC. It features the ability to play full-screen, full-motion video and CD-quality audio using the MPEG-1 compression standard. Note that CD-i players with an added Digital Video cartridge can play Karaoke CD discs; CD-i discs do not play on a Karaoke CD player.

What are Video CD discs?

Video CD discs are a special kind of CD-ROM/XA bridge disc that allow you to play feature films and music videos on a dedicated Video CD player or on a CD-i player equipped with a Digital Video cartridge. A computer equipped with the appropriate hardware and software could also play Video CD discs. The Video CD standard is supported by Philips, JVC, Sony, and Matsushita. It is based on the Karaoke-CD standard and, thus, features the ability to play full-screen, full-motion video with CD-quality audio, using the MPEG-1 compression standard.

Organizations that provide CD-i information, products and services

CD-I Associations

CD-i Association of North America 11111Santa Monica Boulevard, Suite 700 Los Angeles, CA 90025 USA Contact: Laura Foti Cohen Phone +1 310 444 6613 Fax: +1 310 479 5937	European CD-i Association Attn.: Lynda Russell-Whitaker Philips House, 1-19 Torrington Place London WP1E7HD United Kingdom Phone: +44 71 331 1593 Fax: +44 71 580 6757

Authoring and Development Systems--Worldwide

OptImage Interactive Services Company, L.P. 1501 50th Street, Suite 100 Des Moines, IA 50265-0252 Phone: +1 515 225 7000 Toll-free - U.S.: 1 800 234 5484 Fax: +1 515 222-2080	All OptImage representatives may be reached at the numbers to the left. Western Region: John Washburn Eastern Region: Craig Zimmerman Central: Pam Wilber Southeast John Brown
International Interactive Media SA (I2M) 2229 Routes des Cretes Sophia Antipolis, Valbonne 06560 France Phone: +33 92 94 21 30 FAX: +33 92 94 21 32	Script Systems Inc. 115 Metropolitan Drive PO Box 601 Liverpool, NY 13082 Contact: Stephen DiFranco

You may also contact Philips Media Systems or Philips Professional Products for information on development systems.

Philips Hardware

World Headquarters
Philips Media Systems
P.O. Box 80002
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The "Green Book" and Other Optical Disc Specifications

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Home Entertainment Title Development

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Children's Titles
Sarina Simon, President

Games Titles
David McElhatten President

Music, Enrichment, Game Show, and Special Interest Titles
Ann Kronen, President
Laura Cohen, Special Interest
Ted Cohen, Music
Steve Radosh, Social Games

FMV/Digital Video Group
Graham Williams, President

Related documents for prospective CD-i developers

CD-i Development Environments

CD-i Directory

CD-i Publications

CD-i Technical Summary

You may request the publications listed above from:

Developer Services
Philips Interactive Media
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