

**Unit IV: Making Multimedia: The stages of multimedia project - The intangible needs - The Hardware needs - The software needs- an Authoring system needs - Multimedia production needs.**

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**CHAPTER 7: MAKING MULTIMEDIA**

**Definition : How do you make multimedia ?**

- Multi- media is made, with guidance and suggestions for getting started, and learn about planning a project. Learn about producing, managing, and designing a project; getting material and content; testing the work; and, ultimately, shipping it to end users or posting it to the Web.

**The Stages of a Multimedia Project**

- Most multimedia and web projects must be undertaken in stages.
- Some stages should be completed before other stages begin, and some stages may be skipped or combined. Here are the four basic stages in a multimedia project:

- 1. Planning and costing**
- 2. Designing and producing**
- 3. Testing**
- 4. Delivering**

**1. Planning and costing**

- A project always begins with an idea or a need that you then refine by outlining its messages and objectives.
- Identify how make each message and objective work within your authoring system.
- Before to begin developing, plan out the writing skills, graphic art, music, video, and other multimedia expertise that require.
- Develop a creative “look and feel” (what a user sees on a screen and how he or she interacts with it), as well as a structure and a navigational system that will allow the viewer to visit the messages and content.
  - The more time you spend getting a handle on project by defining its content and structure in the beginning, the faster later build it, and the less reworking and rearranging will be required midstream.

**2. Designing and producing**

- Perform each of the planned tasks to create a finished product.
- During this stage, there may be many feedback cycles with a client until the client is happy.

**3. Testing**

- Testing the programs to make sure that they meet the objectives of the project, work properly on the intended delivery platforms, and meet the needs of client or end user.

**4. Delivering**

- Package and deliver the project to the end user.
- Be prepared to follow up over time with tweaks, repairs, and upgrades.

## What You Need: The Intangibles

- ❖ Multimedia need hardware, software, and good ideas to make multimedia.
- ❖ To make good multimedia, need talent and skill.
- ❖ Need to stay organized, because as the construction work gets under way, all the little bits and pieces of multimedia content—the six audio recordings of Alaskan Eskimos
- ❖ Need time and money and need to budget these precious commodities
- ❖ Need the help of other people
- ❖ Multimedia development of any scale greater than the most basic level is inherently a team effort: artwork is performed by graphic artists, video shoots by video producers, sound editing by audio producers, and programming by programmers.

### **Creativity**

- ❖ Before beginning a multimedia project, must first develop a sense of its scope and content.
- ❖ Taking inspiration from earlier experiments, developers modify and add their own creative touches for designing their own unique multimedia projects.
- ❖ It is very difficult to learn creativity.

### **Organization**

- ❖ It's essential that develop an organized outline and a plan that rationally details the skills, time, budget, tools, and resources will need for a project.
- ❖ These should be in place before start to render graphics, sounds, and other components, and a protocol should be established for naming the files so can organize them for quick retrieval when they need them.
- ❖ These files—called **assets**—should continue to be monitored throughout the project's execution.

### **Communication**

- ❖ Many multimedia applications are developed in workgroups comprising instructional designers, writers, graphic artists, programmers, and musicians located in the same office space or building.
- ❖ The workgroup members' computers are typically connected on a local area network (LAN).
- ❖ The client's computers, however, may be thousands of miles distant, requiring other methods for good communication.
- ❖ Communication among workgroup members and with the client is essential to the efficient and accurate completion of the project.
- ❖ If the client and system both connected to the Internet, a combination of Skype video and voice telephone, e-mail, and the File Transfer Protocol (FTP) may be the most cost-effective and efficient solution for both creative development and project management.

- ❖ In the workplace, use quality equipment and software for your communications setup. The cost—in both time and money—of stable and fast networking.

### What You Need: Hardware

- ❖ The two most significant platforms for producing and delivering multimedia projects: the Apple Macintosh operating system (OS) and the Microsoft Windows OS found running on most Intel-based PCs (including Intel-based Macintoshes).
- ❖ These computers, with their graphical user interfaces and huge installed base of many millions of users throughout the world, are the most commonly used platforms for the development and delivery of today’s multimedia.
- ❖ Detailed and animated multimedia is also created on specialized workstations from Silicon Graphics, Sun Microsystems, and even on mainframes, but the Macintosh and the Windows PC offer a compelling combination of affordability, software availability, and worldwide obtain- ability.
- ❖ A **graphic image** is still a graphic image, and a digitized sound is still a digitized sound, regardless of the methods or tools used to make and display it or to play it back.
- ❖ Many software tools readily convert picture, sound, and other multimedia files from Macintosh to Windows format, and vice versa, using known **file formats** or even binary compatible files that require no conversion at all.
- ❖ While there is a lot of talk about platform-independent delivery of multimedia on the Internet, with every new version of a browser there are still annoying failures on both platforms.
- ❖ These failures in cross- platform compatibility can consume great amounts of time as you prepare for delivery by testing and developing workarounds and tweaks so project performs properly in various target environments.

Table 7-1 shows the penetration of operating systems.

Windows	Mac	Other
90.76%	4.32%	4.92%

Table 7-1 Worldwide Operating System Market Share in September, 2010

### Windows vs. Macintosh

- ❖ A **Windows computer** is not a computer per se, but rather a collection of parts that are tied together by the requirements of the Windows operating system.
- ❖ Power supplies, processors, hard disks, CD-ROM and DVD players and burners, video and audio components, monitors, keyboards, mice, WiFi, and Bluetooth transceivers—it doesn’t matter where they come from or who makes them.
- ❖ Made in Texas, Taiwan, Indonesia, India, Ireland, Mexico, or Malaysia by widely known or little-known manufacturers, these components are assembled and branded by Dell, HP, Sony, and others into computers that run Windows.

### Networking Macintosh and Windows Computers

- ❖ Working in a multimedia development environment consisting of a mixture of Macintosh and Windows computers, to communicate with each other and also wish to share other resources among them, such as printers.
- ❖ Local area networks (LANs) and wide area networks (WANs) can connect the members of a workgroup.
- ❖ In a LAN, workstations are usually located within a short distance of one another, on the same floor of a building,
- ❖ For example. WANs are communication systems spanning greater distances, typically set up and managed by large corporations and institutions for their own use, or to share with other users.
- ❖ LANs allow direct communication and sharing of peripheral resources such as file servers, printers, scanners, and network routers.
- ❖ They use a variety of proprietary technologies to perform the connections, most commonly Ethernet (using twisted-pair copper wires) and WiFi (using radio).
- ❖ **Ethernet** is only a method for wiring up computers, so you still will need client/server software to enable the computers to speak with each other and pass files back and forth. The Windows and Mac operating systems provide this networking software, but you may need expert help to set it up—it can be complicated!

## Connections

- ❖ The equipment required for developing your multimedia project will depend on the content of the project as well as its design.
- ❖ Certainly need as fast a computer as you can lay your hands on, with lots of RAM and disk storage space. Table 7-2 shows various device connection methodologies and their data transfer rates.
- ❖ Content such as sound effects, music, graphic art, clip animations, and video to use in your project, may not need extra tools for making your own.
- ❖ However, multimedia developers have separate equipment for digitizing sound from tapes or microphone, for scanning photographs or other printed matter, and for making digital still or movie images.

Connection	Transfer Rate
Serial port	115 Kbps (0.115 Mbps)
Standard parallel port	115 Kbps (0.115 Mbps)
USB (Original 1.0)	12 Mbps (1.5 Mbps)
SCSI-2 (Fast SCSI)	80 Mbps
SCSI (Wide SCSI)	160 Mbps
Ultra2 SCSI	320 Mbps
FireWire 400 (IEEE 1394)	400 Mbps
USB (Hi-Speed 2.0)	480 Mbps
SCSI (Wide Ultra2)	640 Mbps
FireWire 800 (IEEE 1394)	800 Mbps
SCSI (Wide Ultra3)	1,280 Mbps

SATA 150	1,500 Mbps
SCSI (Ultra4)	2,560 Mbps
SATA 300	3,000 Mbps
FireWire 3200 (IEEE 1394)	3,144 Mbps
USB (Super-Speed 3.0)	3,200 Mbps
SCSI (Ultra5)	5,120 Mbps
SATA 600	6,000 Mbps
Fibre Channel (Optic)	10,520 Mbps

Table 7-2 Maximum Transfer Rates for Various Connections in Megabits Per Second

## SCSI

- ❖ The **Small Computer System Interface** (SCSI—pronounced “scuzzy”) adds peripheral equipment such as disk drives, scanners, CD-ROM play-ers, and other peripheral devices that conform to the SCSI stan- dard.
- ❖ SCSI connections may connect internal devices such as hard drives that are inside the chassis of computer’s power supply, and external devices, which are outside the chasis are plugged into the computer.

## IDE, EIDE, Ultra IDE, ATA, and Ultra ATA

- ❖ **Integrated Drive Electronics (IDE) connections**, also known as **Advanced Technology Attachment (ATA)** connections, are typically only internal, and they connect hard disks, CD-ROM drives, and other peripherals mounted inside the PC.
- ❖ With IDE controllers, you can install a combination of hard disks, CD-ROM drives, or other devices in your PC.
- ❖ The circuitry for IDE is typically much less expensive than for SCSI, but comes with some limitations. For example, IDE requires time from the main processor chip, so only one drive in a master/slave pair can be active at once.

## USB

- ❖ A consortium of industry players including Compaq, Digital Equipment, IBM, Intel, Microsoft, NEC, and Northern Telecom was formed in 1995.
- ❖ To promote a **Universal Serial Bus** (USB) standard for connecting devices to a computer. These devices are automatically recognized (“plug-and- play”) and installed without users needing to install special cards or turn the computer off and on when making the connection (allowing “hot- swapping”).
- ❖ USB technology has improved in performance.
- ❖ USB uses a single cable to connect as many as 127 USB peripherals to a single personal computer.
- ❖ **Hubs** can be used to “daisy- chain” many devices. USB connections are now common on video game consoles, cameras, GPS locators, cell phones, televisions, MP3 players, PDAs, and portable memory devices.

## **FireWire and i.LINK (IEEE 1394)**

- ❖ FireWire was introduced by Apple in the late 1980s, and in 1995 it became an industry standard (IEEE 1394) supporting high-bandwidth serial data transfer, particularly for digital video and mass storage.
- ❖ USB, the standard supports hot-swapping and plug-and-play, but it is faster, and while USB devices can only be attached to one computer at a time, FireWire can connect multiple computers and peripheral devices (peer-to-peer).
- ❖ Both the Mac OS and Windows offer IEEE 1394 support.
- ❖ Because the standard has been endorsed by the Electronics Industries Association and the Advanced Television Systems Committee (ATSC), it has become a common method for connecting and interconnecting professional digital video gear, from cameras to recorders and edit suites.
- ❖ Sony calls this standard i.LINK. FireWire has replaced Parallel SCSI in many applications because it's cheaper and because it has a simpler, adaptive cabling system.

## **Memory and Storage Devices**

- ❖ Add more memory and storage space to your computer, gigabyte hard disk;
- ❖ To estimate the memory requirements of a multimedia project—the space required on a hard disk, thumb drive, CD-ROM, or DVD, not the random access memory (RAM) used while your computer is running—you must have a sense of the project's content and scope.
- ❖ Color images, text, sound bites, video clips, and the programming code that glues it all together require memory
- ❖ Making multimedia, you will also need to allocate memory for storing and archiving working files used during production, original audio and video clips, edited pieces, and final mixed pieces, production paperwork and correspondence, and at least one backup of your project files, with a second backup stored at another location.

## **Random Access Memory (RAM)**

- ❖ Faced with budget constraints, you can certainly produce a multimedia project on a slower or limited-memory computer.
- ❖ Fast processor without enough RAM may waste processor cycles while it swaps needed portions of program code into and out of memory.
- ❖ Increasing available RAM may show more performance improvement on the system than upgrading the processor chip.

## **Read-Only Memory (ROM)**

- ❖ RAM, read-only memory (ROM) is not volatile.
- ❖ When turn off the power to a ROM chip, it will not forget, or lose its memory.
- ❖ ROM is typically used in computers to hold the small BIOS program that initially boots up the computer, and it is used in printers to hold built-in fonts.

- ❖ Programmable ROMs (called EPROMs) allow changes to be made that are not forgotten when power is turned off.

### **Hard Disks**

- ❖ Adequate storage space for your production environment can be provided by large-capacity hard disks, server-mounted on a network.
- ❖ As multi-media has reached consumer desktops, makers of hard disks have built smaller-profile, larger-capacity, faster, and less-expensive hard disks.
- ❖ As network and Internet servers drive the demand for centralized data storage requiring terabytes (one trillion bytes), hard disks are often configured into fail-proof redundant arrays offering built-in protection against crashes.

### **Flash Memory or Thumb Drives**

- ❖ These flash memory data storage devices are about the size of a thin cigarette lighter and can be integrated with USB or FireWire interfaces to store from eight megabytes to several GB of data.
- ❖ They are available in every color of the rainbow, are extremely portable, and, because they have fewer moving parts, are more reliable than disk drives.

### **CD-ROM Discs**

- ❖ Compact disc read-only memory (CD-ROM) players have become an integral part of the multimedia development workstation and are an important delivery vehicle for mass-produced projects.
- ❖ A wide variety of developer utilities, graphic backgrounds, stock photography and sounds, applications, games, reference texts, and educational software are available on this medium.
- ❖ CD-ROM players have typically been very slow to access and transmit data (150 KBps, which is the speed required of consumer Audio CDs), but developments have led to double-, triple-, quadruple-speed, 24x, 48x, and 56x drives designed specifically for computer (not Red Book Audio) use.
- ❖ With a compact disc recorder, you can make your own CDs, using CD-recordable (CD-R) blank discs to create a CD in most formats of CD-ROM and CD-Audio.
- ❖ The write-once, enhanced CDs make excellent high-capacity file archives and are used extensively by multimedia developers for pre-mastering and testing CD-ROM projects and titles.
- ❖ Because they have become very inexpensive, they are also used for short-run distribution of finished multimedia projects and data backup.
- ❖ A CD-RW (read and write) recorder can rewrite 700MB of data to a CD-RW disc about 1,000 times.

### **Digital Versatile Discs (DVD)**

- ❖ In December 1995, nine major electronics companies (Toshiba, Matsushita, Sony, Philips, Time Warner, Pioneer, JVC, Hitachi, and Mitsubishi Electric) agreed to promote a new optical disc technology for distribution of multimedia and feature-length movies called Digital Versatile Disc (DVD)
- ❖ With a DVD capable not only of gigabyte storage capacity but also full-motion video (MPEG2) and high-quality audio in surround sound, this is an excellent medium for delivery of multimedia projects.

- ❖ Commercial multimedia projects will become more expensive to produce, however, as consumers' performance expectations rise.
- ❖ There are three types of DVD, including
  - DVD-Read Write,
  - DVD-Video, and
  - DVD-ROM.

These types reflect marketing channels, not the technology.

## Blu-ray Discs

- ❖ Driven by the implementation of High Definition TV (HDTV) and by the motion picture industry, a new technology was needed to increase storage capacity and throughput beyond DVD.
- ❖ By 2008, Toshiba had sold about one million HD-DVD players, but Sony had sold close to ten million Blu-ray players, which were also included in popular PlayStation game machines. Toshiba announced it was quitting.
- ❖ Blu-ray is promoted not only for high definition television recording and high definition video distribution, but also for high definition camcorder archiving, mass data storage, and digital asset management and professional storage when used as a recording medium in BD-R format.

DVD Feature	DVD Specification	Blu-ray Specification
Disc diameter	120 mm (5 inches)	120 mm (5 inches)
Disc thickness	1.2 mm (0.6 mm thick disc × 2)	1.2 mm (0.6 mm thick disc × 2)
Memory capacity	4.7 gigabytes/single side	25 gigabytes/single layer
Wave length of laser diode	650 nanometer/635 nanometer (red)	405 nanometer (blue-violet)
Data transfer rate 1x and sound	Variable speed data transfer at an average rate of 4.69 Mbps for image and sound	Variable speed data transfer at an average rate of 36 Mbps for image and sound
Image compression AVC, and SMPTE VC-1	MPEG2 digital image compression	MPEG-2 Part 2, H.264/MPEG-4
Audio	Dolby AC-3 (5.1 ch), LPCM for NTSC and	Dolby Digital (AC-3), DTS, and linear PCM
	MPEG Audio, LPCM for PAL/SECAM (a maximum of 8 audio channels and 32 subtitle channels can be stored)	
Running time (movies)	Single Layer (4.7GB): 133 minutes a side (at an average data rate of 4.69 Mbps for image and sound, including three audio channels and four subtitle channels)	Single Layer (25GB): Encoded using MPEG-2 video, about two hours of HD content; using VC-1 or MPEG-4 AVC codecs, about 4 hours of HD quality video and audio

Table 7-3 DVD and Blu-ray Specifications

## Input Devices



- ❖ A great variety of input devices—from the familiar keyboard and handy mouse to touchscreens and voice recognition setups—can be used for the development and delivery of a multimedia project.
- ❖ Designing your project for a public kiosk, use a **touchscreen**.
- ❖ If the project is for a lecturing professor who likes to wander about the classroom, use a remote handheld mouse.
- ❖ Scanners enable you to use **optical character recognition (OCR)** software, such as OmniPage from ScanSoft, a division of Nuance Communications (see Figure 7-1), or Recore from Maxsoft-Ocron.
- ❖ With OCR software and a scanner, you can convert paper documents into a word processing document on your computer without retyping or rekeying.
- ❖ Barcode readers are probably the most familiar optical character recognition devices in use today mostly at markets, shops, and other point-of-purchase locations.
- ❖ Using photo cells and laser beams, barcode readers recognize the numeric characters of the Universal Product Code (UPC) that are printed in a pattern of parallel black bars on merchandise labels.
- ❖ With OCR, or bar coding, retailers can efficiently process goods in and out of their stores and maintain better inventory control.
- ❖ An OCR terminal can be of use to a multimedia developer because it recognizes not only printed characters but also handwriting.
- ❖ This facility may be beneficial at a kiosk or in a general education environment where user friendliness is a goal, because there is growing demand for a more personal and less technical interface to data and information.
- ❖ Digital cameras use the same CCD technology as video camera.
- ❖ They capture still images of a given number of pixels (resolution), and the images are stored in the camera's memory to be uploaded later to a computer.
- ❖ The resolution of a digital camera is determined by the number of pixels on the CCD chip, and the higher the megapixel rating, the higher the resolution of the camera.
- ❖ Images are uploaded from the camera's memory using a serial, parallel, or USB cable, or, alternatively, the camera's memory card is inserted into a PCMCIA reader connected to the computer.
- ❖ Digital cameras are small enough to fit in a cell phone, and in a more complicated manner they can be used in a television studio or spy camera on an orbiting spacecraft.

## Output Devices

- ❖ Presentation of the audio and visual components of your multimedia project requires hardware that may or may not be included with the computer itself, such as speakers, amplifiers, projectors, and motion video devices.
- ❖ The monitor need for development of multimedia projects depends on the type of multimedia application High-end, large-screen graphics monitors and LCD panels are available for both, and they are expensive.
- ❖ Cathode-ray tube (CRT) projectors, liquid crystal display (LCD) panels, Digital Light Processing (DLP) projectors, and liquid crystal on silicon (LCOS) projectors, as well as (for larger projects) Grating-Light-Valve (GLV) technologies, are available.
- ❖ CRT projectors have been around for quite a while—they are the original “big-screen” televisions and use three separate projection tubes and lenses (red, green, and blue).
- ❖ The three color channels of light must “converge” accurately on the screen.

- ❖ Setup, focusing, and alignment are important for getting a clear and crisp picture. CRT projectors are compatible with the output of most computers as well as televisions.
- ❖ Graphic print designers often use special color-correction hardware to ensure that what they see on screen matches precisely what will be printed.
- ❖ Hard-copy printed output has also entered the multimedia scene.
- ❖ From storyboards to presentations to production of collateral marketing material, printouts are an important part of the multimedia development environment.
- ❖ Color helps clarify concepts, improve understanding and retention of information, and organize complex data.
- ❖ As multimedia designers already know, intelligent use of color is critical to the success of a project.

### **What You Need: Software**

- ❖ Multimedia software tells the hardware what to do.
- ❖ Display the color red. Move that tiger three leaps to the left. Slide in the words “Now You’ve Done It!” from the right and blink them on and off.
- ❖ Play the sound of cymbals crashing. Run the digitized trailer for Avatar. Turn down the volume on that MP3 file!
- ❖ The basic tool set for building multimedia projects contains one or more authoring systems and various editing applications for text, images, sounds, and motion video.
- ❖ A few additional applications are also useful for capturing images from the screen, translating file formats, and moving files among computers.
- ❖ The tools used for creating and editing multimedia elements on both Windows and Macintosh platforms do image processing and editing, drawing and illustration, 3-D and CAD, OCR and text editing, sound recording and editing, video and moviemaking, and various utilitarian housekeeping tasks.

### **Text Editing and Word Processing Tools**

- ❖ A word processor is usually the first software tool computer users learn.
- ❖ From letters, invoices, and storyboards to project content, word processor may also be most often used tool, as the design and build a multimedia project.
- ❖ The better keyboarding or typing skills, the easier and more efficient your multimedia day-to-day life will be.
- ❖ An office or workgroup will choose a single word processor to share documents in a standard format. And most often, that word processor such as Microsoft Word and WordPerfect are powerful applications that include spell checkers, table formatters, thesauruses, and prebuilt templates for letters, résumés, purchase orders, and other common documents.
- ❖ Many developers have begun to use OpenOffice ([www.openoffice.org](http://www.openoffice.org)) for word processing, spreadsheets, presentations, graphics, databases, and more.
- ❖ It can be downloaded and used completely free of charge for any purpose and is available in many languages.
- ❖ It can read and write files from other, more expensive, office packages. In many word processors, can embed multimedia elements such as sounds, images, and video.

## OCR Software

- ❖ OCR software turns bitmapped characters into electronically recognizable ASCII text.
- ❖ A **scanner** is typically used to create the bitmap. Then the software breaks the bitmap into chunks according to whether it contains text or graphics, by examining the texture and density of areas of the bitmap and by detecting edges.
- ❖ The text areas of the image are then converted to ASCII characters using probability and expert system algorithms.
- ❖ Most OCR applications claim about 99 percent accuracy when reading 8- to 36-point printed characters at 300 dpi and can reach processing speeds of about 150 characters per second.
- ❖ These programs do, however, have difficulty recognizing poor copies of originals where the edges of characters have bled; these and poorly received faxes in small print may yield more recognition errors than it is worthwhile to correct after the attempted recognition.

## Painting and Drawing Tools

- ❖ Painting and drawing tools, as well as 3-D modelers, are perhaps the most important items in your toolkit because, of all the multimedia elements, the graphical impact of your project will likely have the greatest influence on the end user.
- ❖ **Painting software**, such as Photoshop, Fireworks, and Painter, is dedicated to producing crafted bitmap images.
- ❖ **Drawing software**, such as CorelDraw, FreeHand, Illustrator, Designer, and Canvas, is dedicated to producing vector-based line art easily printed to paper at high resolution.
- ❖ Some vector-based packages such as Macromedia's Flash are aimed at reducing file download times on the Web and may contain both bitmaps and drawn art.

Look for these **features** in a drawing or painting package:

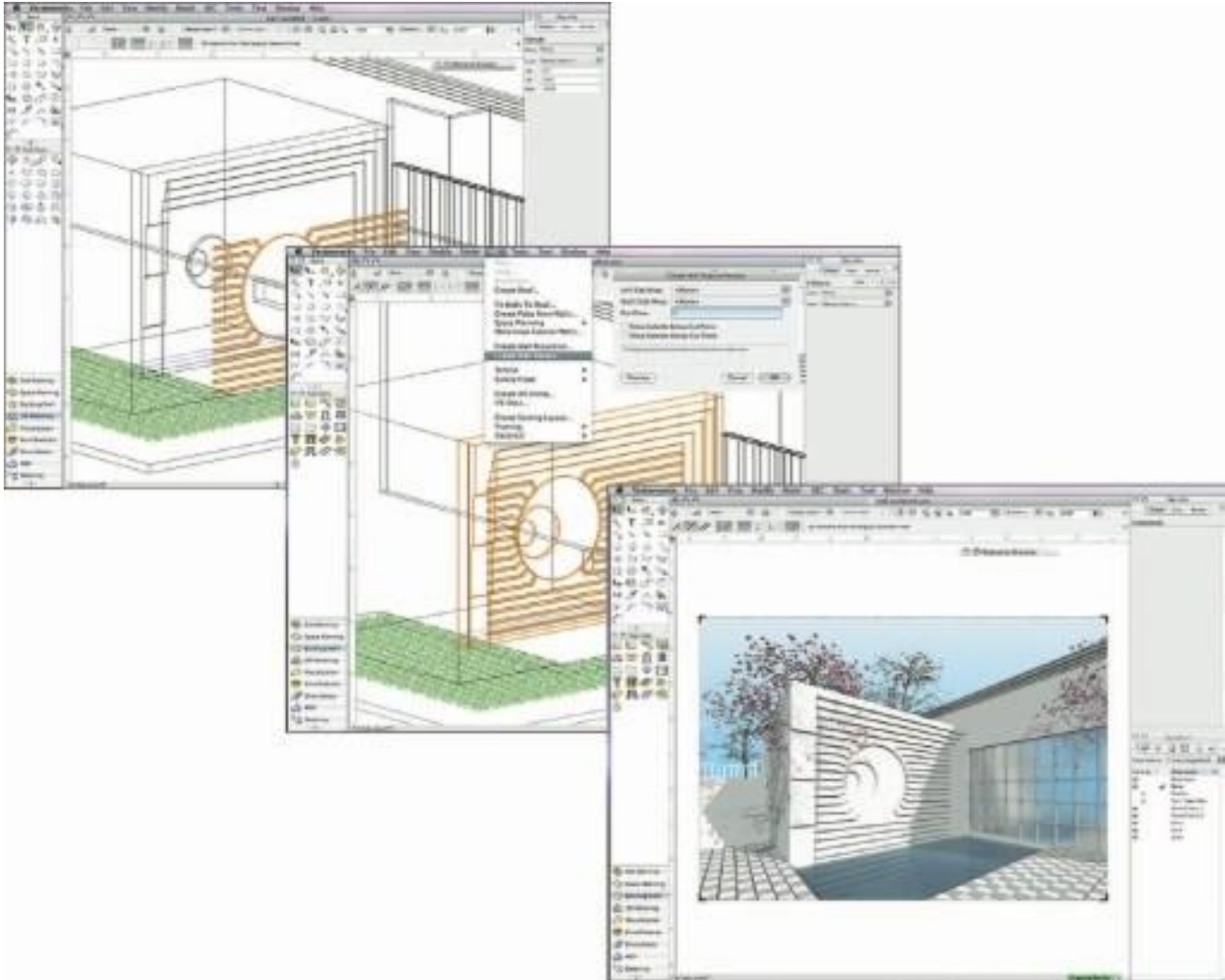
- An intuitive graphical user interface with pull-down menus, status bars, palette control, and dialog boxes for quick, logical selection
- Scalable dimensions, so that you can resize, stretch, and distort both large and small bitmaps
- Paint tools to create geometric shapes, from squares to circles and from curves to complex polygons
- The ability to pour a color, pattern, or gradient into any area
- The ability to paint with patterns and clip art
- Customizable pen and brush shapes and sizes
- An eyedropper tool that samples colors
  - An autotrace tool that turns bitmap shapes into vector-based outlines
- Support for scalable text fonts and drop shadow
- Multiple undo capabilities, to let you try again history function for redoing effects, drawings, and text
- A property inspector
- A screen capture facility
- Painting features such as smoothing coarse-edged objects into the background with anti-aliasing (see illustration); airbrushing in variable sizes, shapes, densities, and patterns; washing colors in gradients; blending; and masking.
- Support for third-party special-effect plug-ins
- Object and layering capabilities that allow you to treat separate elements independently

- Zooming, for magnified pixel editing
- All common color depths: 1-, 4-, 8-, and 16-, 24-, or 32-bit color, and gray-scale
- Good color management and dithering capability among color depths using various color models such as RGB, HSB, and CMYK
- Good palette management when in 8-bit mode
- Good file importing and exporting capability for image formats such as PIC, GIF, TGA, TIF, PNG, WMF, JPG, PCX, EPS, PTN, and BMP.

### 3-D Modeling and Animation Tools

- ❖ 3-D modeling software has increasingly entered the mainstream of graphic design as its ease of use improves. As a result, the graphic production values and expectations for multimedia projects have risen.
- ❖ 3-D is an abbreviation for “three dimensions.” While in a 2-D graphics program, images are painted in the “x” (horizontal or width) and “y” (vertical or height) axes, in 3-D depth is labeled as the “z” axis. Every program that layers objects on the screen must know each object’s “z” axis. Web browsers, for example, place objects on the screen using the CSS “z-index” attribute.
- ❖ Some software programs (such as Flash CS4 and ToonBoom Studio) can simulate depth by automatically scaling images based on a z-axis value to create a cartoonish or simulated 3-D effect. This differs from true 3-D modeling and rendering, where objects can be rotated and viewed from any direction or angle.
- ❖ If you are making a complex walkthrough or flyby, plan to set aside many hours of rendering time on your computer.
- ❖ **Good 3-D modeling tool** should include the following **features**:
  - Multiple windows that allow you to view your model in each dimension, from the camera’s perspective, and in a rendered preview
    - The ability to drag and drop primitive shapes into a scene
  - The ability to create and sculpt organic objects from scratch
  - Lathe and extrude features
  - Color and texture mapping
  - The ability to add realistic effects such as transparency, shadowing, and fog
  - The ability to add spot, local, and global lights, to place them any- where, and manipulate them for special lighting effects
  - Unlimited cameras with focal length control
  - The ability to draw spline-based paths for animation

Figure 7-2 VectorWorks and other CAD applications can translate precise 2-D drawings into 3-D perspectives with lighting and shadows, but they can be complicated and very difficult to learn.



## Image-Editing Tools

- ❖ Image-editing applications are specialized and powerful tools for creating, enhancing, and retouching existing bitmapped images.
- ❖ These applications also provide many of the features and tools of painting and drawing programs and can be used to create images from scratch as well as images digitized from scanners, video frame-grabbers, digital cameras, clip art files, or original artwork files created with a painting or drawing package.

Here are some **features** typical of **image-editing applications** and of interest to multimedia developers:

- Multiple windows that provide views of more than one image at a time
- Conversion of major image-data types and industry-standard file formats
- Direct inputs of images from scanner and video sources
- Employment of a virtual memory scheme that uses hard disk space as RAM for images that require large amounts of memory
- Capable selection tools, such as rectangles, lassos, and magic wands, for selecting portions of a bitmap

- Image and balance controls for brightness, contrast, and color balance
- Good masking features
- Multiple undo and restore features
- Anti-aliasing capability, and sharpening and smoothing controls
- Color-mapping controls for precise adjustment of color balance
- Tools for retouching, blurring, sharpening, lightening, darkening, smudging, and tinting
- Geometric transformations such as flip, skew, rotate, and distort, and perspective changes
- The ability to resample and resize an image
- 4-bit color, 8- or 4-bit indexed color, 8-bit gray-scale, black-and-white, and customizable color palettes
- The ability to create images from scratch, using line, rectangle, square, circle, ellipse, polygon, airbrush, paintbrush, pencil, and eraser tools, with customizable brush shapes and user-definable bucket and gradient fills
- Multiple typefaces, styles, and sizes, and type manipulation and masking routines
- Filters for special effects, such as crystallize, dry brush, emboss, facet, fresco, graphic pen, mosaic, pixelize, poster, ripple, smooth, splatter, stucco, swirl, watercolor, wave, and wind
- Support for third-party special-effect plug-ins
- The ability to design in layers that can be combined, hidden, and reordered

## **Sound-Editing Tools**

- ❖ Sound-editing tools for both digitized and MIDI sound music as well as hear it. By drawing a representation of a sound in fine increments, whether a score or a waveform, perform cut, copy, paste, and otherwise edit segments of it with great precision—something impossible to do in real time (that is, with the music playing).

## **Animation, Video, and Digital Movie Tools**

- ❖ Animations and digital video movies are sequences of bitmapped graphic scenes (frames), rapidly played back.
- ❖ But animations can also be made within the authoring system by rapidly changing the location of objects, or sprites, to generate an appearance of motion. Most authoring tools adopt either a frame- or object-oriented approach to animation, but rarely both.
- ❖ To make movies from video, you may need special hardware to convert an analog video signal to digital data. Macs and PCs with FireWire (IEEE 1394) or USB ports can import digital video directly from digital camcorders.
- ❖ Moviemaking tools such as Premiere, Final Cut Pro, VideoShop, and MediaStudio Pro let to edit and assemble video clips captured from camera, tape, other digitized movie segments, animations, scanned images, and from digitized audio or MIDI files. The completed clip, often with added transition and visual effects, can then be played back—either stand-alone or windowed within your project.

## **Helpful Accessories**

- ❖ No multimedia toolkit is complete without a few indispensable utilities for performing some odd, but oft-repeated, tasks. These are the comfortable and well-worn accessories that make computer life easier.
- ❖ On both the Macintosh and in Windows, a screen-grabber is essential.
- ❖ Bitmapped images are so common in multimedia, it is important to have a tool for grabbing all or part of the screen display so that you can import it into authoring system or copy it into an image-editing application for custom work.
- ❖ Screen-grabbing to the clipboard, for example, lets you move a bitmapped image from one application to another without the cumbersome steps of first exporting the image to a file and then importing it back into the destination application.
- ❖ In Windows, press the PRINT scREEN key to place the contents of your screen onto the clipboard.
- ❖ On a Macintosh, press the coMMAND key, the coNTRoL key, the SHIFt key, and the number 4 all at the same time, and then drag a rectangle across the screen.

### **What You Need: Authoring Systems**

- ❖ Multimedia **authoring tools** provide the important framework you need for organizing and editing the elements of the multimedia project, including graphics, sounds, animations, and video clips.
- ❖ **Authoring tools** are used for designing interactivity and the user interface, for presenting project on screen, and for assembling diverse multimedia elements into a single, cohesive product.
- ❖ **Authoring software** provides an integrated environment for binding together the content and functions of the project, and typically includes everything you need to create, edit, and import specific types of data; assemble raw data into a playback sequence or cue sheet; and provide a structured method or language for responding to user input.

With multi-media authoring software, we can make

- ✓ **Video productions**
- ✓ **Animations**
- ✓ **Games**
- ✓ **Interactive web sites**
- ✓ **Demo disks and guided tours**
- ✓ **Presentations**
- ✓ **Kiosk applications**
- ✓ **Interactive training**
- ✓ **Simulations, prototypes, and technical visualizations**

### **Helpful Ways to get Started**

Consider the following **tips for making production** work go smoothly:

Use templates that people have already created to set up your production. These can include appropriate styles for all sorts of data, font sets, color arrangements, and particular page setups that will save you time.

- ❖ Use wizards when they are available—they may save much time and pre-setup work.
- ❖ Use named styles, because if take the time to create our own it will really slow down. Unless your client specifically requests a particular style, you will save a great deal of time using something already created, usable, and legal.
- ❖ Create tables, which can build with a few keystrokes in many programs, and it makes the production look credible.
- ❖ Help readers find information with tables of contents, running headers and footers, and indexes.
- ❖ Improve document appearance with bulleted and numbered lists and symbols.
- ❖ Allow for a quick-change replacement using the global change feature.
- ❖ Reduce grammatical errors by using the grammar and spell checker provided with the software. Do not rely on that feature, though, to set all things right— still need to proofread everything.

### **Making Instant Multimedia**

- ❖ Common desktop tools have become multimedia-powerful.
- ❖ Some multimedia projects may be so simple that you can cram all the organizing, planning, rendering, and testing stages into a single effort, and make “instant” multimedia. We get many more ways to effectively convey your message than just a slide show.





Figure 7-3 Most word processing programs allow you to include various image formats, movies, and digitized sounds (including voice annotations).

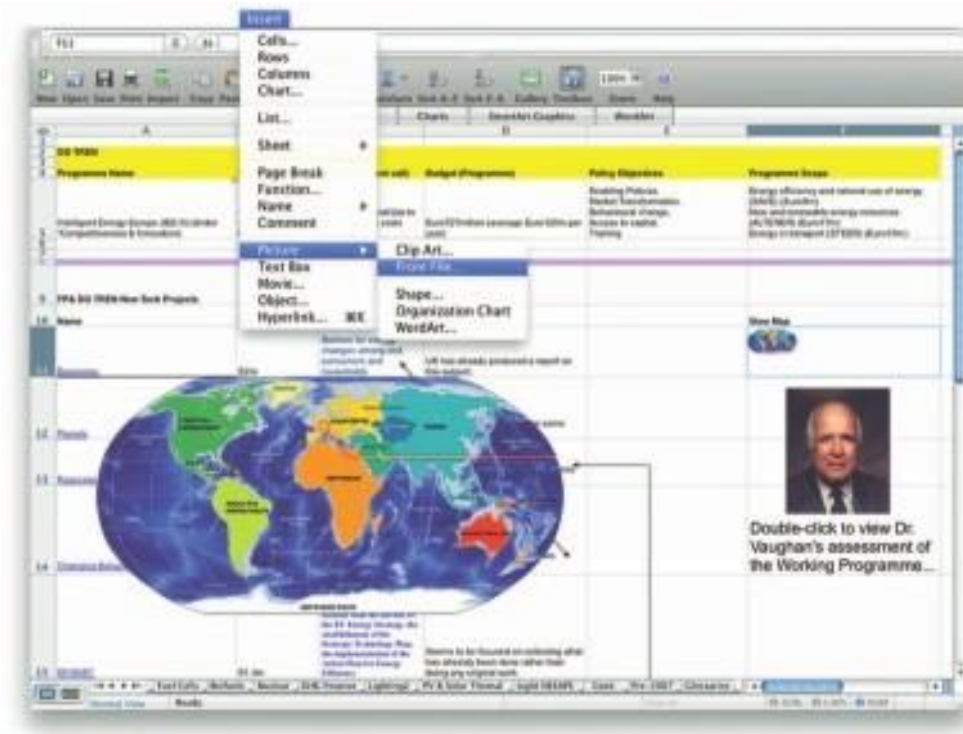


Figure 7-4 Spreadsheets can include embedded objects made with other applications.

## Types of Authoring Tools

- ❖ Each multimedia project undertake will have its own underlying structure and purpose and will require different features and functions.
- ❖ E-learning modules such as those seen on PDAs, MP3 players, and intra-college networks may include web-based teaching materials, multi- media CD-ROMs or web sites, discussion boards, collaborative software, wikis, simulations, games, electric voting systems, blogs, computer-aided assessment, simulations, animation, blogs, learning management software, and e-mail.
- ❖ This is also referred to as **distance learning or blended learning**, where online learning is mixed with face-to-face learning.

The various multimedia authoring tools can be categorized into three groups, based on the method used for sequencing or organizing multi- media elements and events:

- **Card- or page-based tools**
- **Icon-based, event-driven multimedia and game-authoring tools**
- **Time-based tools**

## Card- and Page-Based Authoring Tools

- ❖ Card-based or page-based tools are authoring systems, wherein the elements are organized as pages of a book or a stack of cards.

- ❖ Thousands of pages or cards may be available in the book or stack. These tools are best used when the bulk of your content consists of elements that can be viewed individually, letting the authoring system link these pages or cards into organized sequences.
- ❖ Jump, on command, to any page you wish in the structured navigation pattern.
- ❖ Page-based authoring systems such as LiveCode from Runtime Revolution ([www.runrev.com](http://www.runrev.com)) and ToolBook ([www.toolbook.org](http://www.toolbook.org)) contain media objects: buttons, text fields, graphic objects, backgrounds, pages or cards, and even the project itself.
- ❖ The characteristics of objects are defined by properties (highlighted, bold, red, hidden, active, locked, and so on).
- ❖ Each object may contain a programming script, usually a property of that object, activated when an event (such as a mouse click) related to that object occurs.
- ❖ Events cause messages to pass along the hierarchy of objects in the project; for example, a mouse-clicked message could be sent from a button to the background, to the page, and then to the project itself.
- ❖ As the message traveled, it looks for handlers in the script of each object; if it finds a matching handler, the authoring system then executes the task specified by that handler.

Following are some typical messages that might pass along the object hierarchy of the LiveCode and ToolBook authoring systems:

LiveCode Message	ToolBook Message
closeCard	leavePage
closeStack	leaveBook
idle	idle
mouseDown	buttonDown
mouseStillDown	buttonStillDown
mouseUp	buttonUp
newBackground	newBackground
openCard	enterPage
openStack	enterBook

### **Icon- and Object-Based Authoring Tools**

- Icon- or object-based, event-driven tools are authoring systems, wherein multimedia elements and interaction cues (events) are organized as objects in a structural framework or process.
- Icon- or object-based, event-driven tools simplify the organization of your project and typically display flow diagrams of activities along branching paths. In complicated navigational structures, this charting is particularly useful during development.
- Icon-based, event-driven tools provide a visual programming approach to organizing and presenting multimedia.

- First, build a structure or flowchart of events, tasks, and decisions, by dragging appropriate icons from a library.
- These icons can include menu choices, graphic images, sounds, and computations. The flowchart graphically depicts the project's logic. When the structure is built, you can add your content: text, graphics, animation, sounds, and video movies. Then, to refine your project, you edit your logical structure by rearranging and fine-tuning the icons and their properties.

## **Time-Based Authoring Tools**

- Time-based tools are authoring systems, wherein elements and events are organized along a timeline, with resolutions as high as or higher than 1/30 second.
- Time-based tools are best to use when a message with a beginning and an end have.
- Sequentially organized graphic frames are played back at a speed that you can set.
- Other elements (such as audio events) are triggered at a given time or location in the sequence of events.
- The more powerful time-based tools, program jumps to any location in a sequence, thereby adding navigation and interactive control.
- Each tool uses its own distinctive approach and user interface for managing events over time.
- Many use a visual timeline for sequencing the events of a multimedia presentation, often displaying layers of various media elements or events alongside the scale in increments as precise as one second.

## **Flash**

- ❖ Flash is a time-based development environment. Flash, however, is also particularly focused on delivery of rich multimedia content to the Web.
- ❖ With the Flash Player plug-in installed in more than 95 percent of the world's browsers, Flash delivers far more than simple static HTML pages.
- ❖ ActionScript, the proprietary, under-the-hood scripting language of Flash, is based upon the international ECMAScript standard ([www.ecma-international.org](http://www.ecma-international.org)) derived from Netscape's original JavaScript.
- ❖ Director Adobe's Director is a powerful and complex multimedia authoring tool with a broad set of features to create multimedia presentations, animations, and interactive multimedia applications.
- ❖ It requires a significant learning curve, but once mastered, it is among the most powerful of multimedia development tools.
- ❖ In Director, you assemble and sequence the elements of your project, called a "movie," using a Cast and a Score.
- ❖ The Cast is a multimedia database containing still images, sound files, text, palettes, QuickDraw shapes, programming scripts, QuickTime movies, Flash movies, and even other Director files.

## **Objects**

- ❖ In multimedia authoring systems, multimedia elements and events are often treated as objects that live in a hierarchical order of parent and child relationships.
- ❖ Messages passed among these objects order them to do things according to the properties or modifiers assigned to them.
- ❖ Object-based authoring programs typically provide objects pre-programmed with sensible properties, messages, and functions.
- ❖ A video object, for example, will likely have a duration property (how long the video plays) and a source property (the location of the video file) and it will likely accept commands from the system such as “play” and “stop.”

### **Choosing an Authoring Tool**

- ❖ Authoring tools are constantly being improved by their makers, who add new features and increase performance with upgrade development cycles of six months to a year.
- ❖ It is important that you study the software product reviews in the blogs and computer trade journals, as well as talk with current users of these systems, before deciding on the best ones for your needs. Here’s what to look for

### **Editing Features**

- ❖ **The** elements of multimedia—images, animations, text, digital audio and MIDI music, and video clips—need to be created, edited, and converted to standard file formats, using the specialized applications
- ❖ Also, editing tools for these elements, particularly text and still images, are often included in your authoring system.
- ❖ The editors that may come with an authoring system will offer only a subset of the substantial features found in dedicated tools.

### **Organizing Features**

- ❖ **The** organization, design, and production process for multimedia involves storyboarding and flowcharting.
- ❖ Some authoring tools provide a visual flowcharting system or overview facility for illustrating your project’s structure at a macro level.
- ❖ Storyboards or navigation diagrams can also help organize a project and can help focus the overall project scope for all involved.
- ❖ Because designing the interactivity and navigation flow of your project often requires a great deal of planning and programming effort, your storyboard should describe not just the graphics of each screen, but the interactive elements as well.
- ❖ Features that help organize your material are a plus.
- ❖ Many web-authoring programs such as Dreamweaver include tools that create helpful diagrams and links among the pages of a web site.

- ❖ Planning ahead in an organized fashion may prevent countless moments of indecision, keep the client from changing her mind without periodic sign-offs on the materials included, and, in the long run, save you money.

## Programming Features

Multimedia authoring systems offer one or more of the following approaches, as explained in the following paragraphs:

- Visual programming with cues, icons, and objects
- Programming with a scripting language
- Programming with traditional languages, such as Basic or C
- Document development tools
- ❖ Visual programming with icons or objects is perhaps the simplest and easiest authoring process. If you want to play a sound or put a picture into your project, just drag the element's icon into the playlist—or drag it away to delete it.
- ❖ Authoring tools that offer a very high level language (VHLL) or interpreted scripting environment for navigation control and for enabling user inputs or goal-oriented programming languages—such as Flash, LiveCode, Director, and ToolBook—are more powerful by definition.
- ❖ The more commands and functions provided in the scripting language, the more powerful the authoring system.
- ❖ Once learn a scripting language able to learn other scripting languages relatively quickly; the principles are the same, regardless of the command syntax and keywords used.

## Interactivity Features

Interactivity empowers the end users of your project by letting them control the content and flow of information.

**Authoring tools should provide one or more levels** of interactivity:

- ❖ Simple branching, which offers the ability to go to another section of the multimedia production (via an activity such as a keypress, mouse click, or expiration of a timer)
- ❖ Conditional branching, which supports a go-to based on the results of IF-THEN decisions or events
- ❖ A structured language that supports complex programming logic, such as nested IF-THENS, subroutines, event tracking, and message passing among objects and elements

## Performance Tuning Features

- ❖ Complex multimedia projects require exact synchronization of events—for example, the animation of an exploding balloon with its accompanying sound effect.

## **Playback Features**

As you build your multimedia project, you will be continually assembling elements and testing to see how the assembly looks and performs. Your authoring system should let you build a segment or part of your project and then quickly test it as if the user were actually using it. You should spend a great deal of time going back and forth between building and testing as you refine and smooth the content and timing of the project. You may even want to release the project to others who you trust to run it ragged and show you its weak points.

### **Why need for authoring system**

## **Delivery Features**

- ❖ Delivering your project may require building a run-time version of the project using the multimedia authoring software.
- ❖ A run-time version or standalone allows your project to play back without requiring the full authoring software and all its tools and editors.
- ❖ Often, the run-time version does not allow users to access or change the content, structure, and programming of the project.

## **Cross-Platform Features**

- ❖ It is also increasingly important to use tools that make transfer across platforms easy. For many developers, the Macintosh remains the multimedia authoring platform of choice, but 80 percent of that developer's target market may be Windows platforms.
- ❖ Develop on a Macintosh, look for tools that provide a compatible authoring system for Windows or offer a run-time player for the other platform.

## **Internet Playability**

- ❖ Because the Web has become a significant delivery medium for multimedia, authoring systems typically provide a means to convert their output so that it can be delivered within the context of HTML or DHTML, either with special plug-ins or by embedding Java, JavaScript, or other code structures in the HTML document.
- ❖ Test your authoring software for Internet delivery before you build your project. Be sure it performs on the Web as you expect! Test it out for performance stability on as many platforms as you can.

## **CHAPTER 8: MULTIMEDIA SKILLS**

### **Multimedia Production Team**

## **Multimedia Skills**

- ❖ Video producers become experts with computer-generated animations and MIDI controls for their edit suites.
- ❖ Architects become bored with two-dimensional drafting and create three-dimensional animated walk-throughs.

- ❖ Oil field engineers get tired of manipulating complex data sets and design mouse-driven human interfaces.
- ❖ Classical painters learn the electronic elements of red, green, and blue and create fantastic, computer-based artwork.
- ❖ A multimedia developer might be any or all of these and typically doesn't fit a traditional management information system (MIS) or computer science mold; many have never seen a line of C++ code or booted up a Linux server. Perhaps, in the broadest definition, multimedia developers might simply be called information technology workers.
- ❖ A multimedia production team may require as many as 18 discrete roles, including:
  - Executive Producer Producer/Project Manager
  - Creative Director/Multimedia Designer Art Director/Visual Designer
  - Artist
  - Interface Designer Game Designer Subject Matter Expert
  - Instructional Designer/Training Specialist Scriptwriter
  - Animator (2-D/3-D) Sound Producer Music Composer Video Producer
  - Multimedia Programmer HTML Coder Lawyer/Media Acquisition Marketing Director

## **Project Manager**

- ❖ A project manager's role is at the center of the action. He or she is responsible for the overall development and implementation of a project as well as for day-to-day operations.
- ❖ Budgets, schedules, creative sessions, time sheets, illness, invoices, and team dynamics—the project manager is the glue that holds it together.

## **Project Manager/Interface Expert**

- ❖ Multimedia company looking to immediately fill position working on interactive television project for major telecommunications company.
- ❖ Project manager needed to manage production and design efforts on large-scale, interactive television project for air in United States.
  - Must be adept and experienced at managing complex projects, preferably with large corporate accounts.
  - Must have solid understanding of interactivity and experience with interactive media in the broadcast television world.
  - Must have several years of experience with interface design or have worked in management of an interface design group
  - Must have good design sensibilities.
  - Communication skills a must; candidate must be an articulate and effective communicator, an excellent listener, and should be able to act as a conduit for the information passing between our team and the client's teams.
  - Superior attention to detail and ability to coordinate large amounts of information a must.



- Prefer entertainment experience—ideally, television or video production.
- Solid computer or digital media experience and knowledge a must.
- Travel required for visiting focus groups and gathering consumer information.
- Must function well in fast-paced, team-oriented environment.
- Position must be filled immediately.

## **Multimedia Designer**

- ❖ The look and feel of a multimedia project should be pleasing and aesthetic, as well as inviting and engaging.
- ❖ Screens should present an appealing mix of color, shape, and type. The project should maintain visual consistency, using only those elements that support the overall message of the program.
- ❖ Navigation clues should be clear and consistent, icons should be meaningful, and screen elements should be simple and straightforward.
- ❖ If the project is instructional, its design should be sensitive to the needs and styles of its learner population, demonstrate sound instructional principles, and promote mastery of subject matter.
- ❖ Graphic designers, illustrators, animators, and image processing specialists deal with the visuals.
- ❖ Instructional designers are specialists in education or training and make sure that the subject matter is clear and properly presented for the intended audience.
- ❖ Interface designers devise the navigation pathways and content maps. Information designers structure content, determine user pathways and feedback, and select presentation media based on an awareness of the strengths of the many separate media that make up multimedia. All can be multimedia designers.

## **Kurt Andersen**

- ❖ Kurt Andersen is an instructional designer and was a senior designer at the George Lucas Educational Foundation, where he designed multimedia prototypes for middle school math and science curricula.
- ❖ A multimedia designer often wears many hats, but most importantly he or she looks at the overall content of a project, creates a structure for the content, determines the design elements required to support that structure, and then decides which media are appropriate for presenting which pieces of content.
- ❖ In essence, the multimedia designer (sometimes called an information designer) prepares the blueprint for the entire project: content, media, and interaction.
- ❖ Multimedia designers need a variety of skills. You need to be able to analyze content structurally and match it up with effective presentation methods.

## **Multimedia Designer/Producer**

- ❖ Seeking an experienced, new-media professional who loves inventing the future and enjoys the challenge of integrating complex information and media systems.
- ❖ Our ideal candidate has solid experience in interface design, product prototyping, and marketing communication

- ❖ Knowledge of image manipulation is critical, as well as proven skills in Lingo scripting and the use of digital time-based authoring tools.
- ❖ Must have experience designing large information and/or entertainment systems.
- ❖ Must have experience creating system flows and program architectures.
- ❖ Must have solid organizational skills and attention to detail.

## **Interface Designer**

- ❖ Like a good film editor, an interface designer’s best work is never seen by the viewer—it’s “transparent.”
- ❖ In its simplest form, an interface provides control to the people who use it.
- ❖ It also provides access to the “media” part of multimedia, meaning the text, graphics, animation, audio, and video— without calling attention to itself.
- ❖ The elegant simplicity of a multimedia title screen, the ease with which a user can move about within a project, effective use of windows, backgrounds, icons, and control panels—these are the result of an interface designer’s work.

## **Nicole Lazzaro**

- ❖ Nicole Lazzaro is an award-winning interface designer with XEODesign in Oakland, California, and teaches interface design at San Francisco State University’s Multimedia Studies Program. She spends her days thinking of new ways to design multimedia interfaces that feel more like real life.
- ❖ The role of an interface designer is to create a software device that organizes the multimedia content, lets the user access or modify that content, and presents the content on screen. These three areas
  - Information design,
  - Interactive design, and
  - Media design—are central to the creation of any interface, and of course they overlap.

## **Writer**

- Multimedia writers do everything writers of linear media do, and more. They create character, action, and point of view—a traditional scriptwriter’s tools of the trade—and they also create interactivity.
- They write proposals, they script voice-overs and actors’ narrations, they write text screens to deliver messages, and they develop characters designed for an interactive environment.
- Writers of text screens are sometimes referred to as content writers.
- Domenic Stansberry is a writer/designer who has worked on interactive multimedia dramas for commercial products. He has also written for documentary film and published two books of fiction.

## **Video Specialist**

- ❖ Prior to the 2000s, producing video was extremely expensive, requiring a large crew and expensive equipment.
- ❖ The result is that video images delivered in a multimedia production have improved from postage-stamp-sized windows playing at low frame

- ❖ rates to full-screen (or nearly full-screen) windows playing at 30 frames per second.
- ❖ As shooting, editing, and preparing video has migrated to an all-digital format and become increasingly affordable to multimedia developers, video elements have become more and more part of the multimedia mix.
- ❖ For high-quality productions, it may still be necessary for a video specialist to be responsible for an entire team of videographers, sound technicians, lighting designers, set designers, script supervisors, gaffers, grips, production assistants, and actors.
- ❖ Video Specialist wanted for multimedia production. Must have strong background in video direction, nonlinear editing, and preparing digital video for efficient delivery.
- ❖ Good understanding of shooting for inter- active programming required.
- ❖ A background working with Ultimatte green screens for compositing live video with computer-generated backgrounds a plus.

### **Audio Specialist**

- ❖ The quality of audio elements can make or break a multimedia project. Audio specialists are the wizards who make a multimedia program come alive, by designing and producing music, voice-over narrations, and sound effects.
- ❖ They perform a variety of functions on the multimedia team and may enlist help from one or many others, including composers, audio engineers, or recording technicians.
- ❖ Audio specialists may be responsible for locating and selecting suitable music and talent, scheduling recording sessions, and digitizing and editing recorded material into computer files (see Chapter 4).

### **Multimedia Audio Specialist**

- ❖ Audio specialist needed for multimedia project.
- ❖ Must have strong background in studio recording techniques— preferably with time spent in the trenches as an engineer in a commercial studio working on a wide range of projects.
- ❖ Must be comfortable working with computers and be open and able to learn new technology and make it work, with high-quality results.
- ❖ Familiar- ity with standard recording practices, knowledge of music production, and the ability to work with artists a definite plus.
- ❖ Requires fluency in MIDI; experience with sequencing software, patch librarians, and synth programming; and knowledge of sampling/samplers, hard disk recording, and editing.

### **Multimedia Programmer**

- ❖ A multimedia programmer or software engineer integrates all the multimedia elements of a project into a seamless whole using an authoring system or programming language.
- ❖ Multimedia programming functions range from coding simple displays of multimedia elements to controlling peripheral devices and managing complex timing, transitions, and record keeping.

- ❖ Creative multimedia programmers can coax extra (and sometimes unexpected) performance from multimedia-authoring and programming systems.
- ❖ Without programming talent, there can be no multimedia. Code, whether written in JavaScript, OpenScript, Lingo, RevTalk, PHP, Java, or C++, is the sheet music played by a well-orchestrated multimedia project.

### **Hal Wine**

- ❖ **Hal Wine** is a programmer familiar with both the Windows and Macintosh environments. In his many years of experience, he has worked in most of the important areas of computing and for many of the leading computing companies.
- ❖ Interactive Programmer (HTML, JavaScript, Flash, PHP, and C/C++) needed to work on multimedia prototyping and authoring tools for DVD and interactive web-based projects.
- ❖ Thorough knowledge of ActionScript, JavaScript, Flash, HTML5, PHP, and C/C++, Macintosh and Windows environments required.
- ❖ Must have working familiarity with digital media, particularly digital video
- ❖ Must have a demonstrated track record of delivering quality programming on tight schedules.
- ❖ Must function well in fast-paced, team-oriented environment.
- ❖ Knowledge of AJAX methodologies desired.

### **Producer of Multimedia for the Web**

- ❖ Web site producer is a new occupation, but putting together a coordinated set of pages for the World Wide Web requires the same creative process, skill sets, and (often) teamwork as any kind of multimedia does.

### **Kevin Edwards**

**Kevin Edwards** is Senior Multimedia Producer for CNET, a publicly traded media company that integrates television programming with a network of sites on the World Wide Web.

- ❖ In both types of media, CNET provides information about computers, the Internet, and future technology using engaging content and design.
- ❖ CNET has about two million members on the Internet, and its television programming—which airs on the USA Network, on the Sci-Fi Channel, and in national syndication—reaches an estimated weekly audience of more than eight million viewers.

Some related areas listed by the bureau include

- ✓ Artists and related workers
- ✓ Multi-Media Artists
- ✓ Animators
- ✓ Designers
- ✓ Motion picture production and distribution
- ✓ Television, video, and motion picture camera operators and editors
- ✓ Writers and editors.