

Chapter 7 – Emerging Technologies

Technology emerging falls into two categories:

1. It is technology that is so new that most businesses have not exploited it
2. Technology that is fairly well established, but businesses haven't fully exploited it

4 categories of emerging technologies

- ⇒ **Emerging technologies for all the senses** – (three dimensional images, automatic speech recognition, multimedia, and/or virtual reality)
- ⇒ **Emerging technology for the Internet explosion** – (electronic cash, internet telephones and pc's)
- ⇒ **Emerging Technologies for the wireless revolution** – (smart phones, global positioning systems, wireless local area networks)
- ⇒ **Emerging technologies for your personal life** – (intelligent home appliances and smart cards)

Emerging Technologies for all the senses

3-D Technology – In 2 dimensions, you have length and width. In Pseudo, shades and shadows are added to create a display that is somewhat realistic. **Real 3-D technology** gives you the illusion that the object you are viewing is actually in the room with you (depth of the image)

Automatic Speech recognition – Not only captures spoken words but also distinguishes word groupings to form sentences. We refer to the first phase as automatic speech recognition and the second phase as speech systemization.

Step 1 : Feature analysis – Feature analysis captures your words as you speak into a microphone, eliminates the background noise, and actually converts the digital signals of your speech into phonemes (smallest unit of speech)

Step 2: Pattern Classification – ASR system attempts to recognize your spoken phonemes by locating a matching phoneme sequence among the words stored in an acoustic model database

Step 3: Language Processing – ASR system attempt to make sense of what you're saying by comparing the possible word phonemes with the language model database. Language model databases include grammatical rules, task-specific words, phrases, and sentences you might frequently use. (Step 3 is the most complicated)

Types of ASR Systems

Discrete – requires you to pause between each spoken word

Continuous ASR – system that can process a continuous stream of words (normal speech pattern)

Speaker Independent ASR – Used by anyone, but their vocabularies are often limited, and some lack expansion capabilities

Speaker Dependent ASR – let's you “train” it to recognize your voice. Read a lengthy text into a microphone and the system begins to recognize your voice and builds it's own vocabulary. However, it only recognizes the speech of the person who trained it

The Future of Automatic Speech Recognition

The following technology challenges must be met if speech recognition market projections are to be met.

- ⇒ Greater storage for an expandable Vocabulary
- ⇒ Better feature Analysis to support continuous speech – currently they have a limited ability to distinguish words that are quickly and continuously spoken
- ⇒ More Dynamic Language models to support speech understanding
- ⇒ More flexible Pattern classification to support many people

Multimedia

It is the simultaneous presentation of information through many forms of media that you can control. First it is the combination of content (information) and software (how you control the presentation of information). Second encompasses many forms of media for presenting information (text, graphic images, sound and video). Third, it presents information through various forms of media simultaneously. Multimedia is a presentation that you can control (interactivity).

In multimedia application, a presentation of information is stored in the form of an **object** – a combination of information and procedures for presenting that information.

Where is Business using Multimedia?

1. To support internal processes – Training on new topics, products and procedures
2. To inform customers about products and services – Advertising products & services
3. To enhance products and services – incorporating multimedia into products and services for retail sales

Electronic publishing which takes advantage of multimedia to publish such as books, magazines, newspapers and advertising flyers in an electronic format rather than in the print-on-paper format.

What does it take to build a multimedia application?

Cost and creativity – Besides a computer with ample ram and disk storage, you'll need additional capturing (input) and conveying (output) technologies. Creativity also plays a key role.

In general, most multimedia application developers follow six phases:

1. Analysis
2. Design
3. Programming
4. Production
5. Testing and documentation
6. Delivery

Phase 1: Analysis – You lay the groundwork by addressing five important issues

- What is the subject matter? – What message are you trying to convey
- Who is the target audience? – People in mind
- What is the setting? – Where and how will they be used?
- Why multimedia? – How will it help solve the current problems?
- What other developers need to be involved?

Phase 2: Design – During this phase, you concentrate on the content of the multimedia application and the way people will navigate it. A **storyboard** is a visual representation of your multimedia objects. Determine the how, and the order in which, the users will view the multimedia application (5 ways)

- ⇒ Linear – allows users to move forward to view new material or backward to review previous material.
- ⇒ Menu – Allows users to choose from a list of available topics and returns them to the menu once they've reviewed the requested material.
- ⇒ Hierarchy – Allows users to choose from a list of available topics, which in turn include menus to allow users to further refine their viewing choices
- ⇒ Network – Allows users to jump from any given presentation to another, whether related or unrelated. This is probably the most complex and interesting design
- ⇒ Hybrid – Allows users several navigational options, because it combines any of the other four navigation forms.

Phase 3: Programming – In the programming phase, you choose the appropriate multimedia authoring software, convert your storyboard into multimedia objects and build your multimedia application by creating the links that allow people to navigate through it. Multimedia authoring software is specifically designed to help you create a multimedia application.

Phase 4: Production – Most often performed in conjunction with phase 3. You concentrate on building special forms of media – usually sound and video.

Phase 5: Testing and Documentation – You document how the multimedia application works and test the application by allowing potential users to experiment with it.

Phase 6: Delivery – Usually on CD-Rom (with DVD on the rise)

Why isn't the business world using more multimedia?

Two answers: one is related to network issues and the other to business process issues.

Network issues – important parts of a multimedia application – take up a lot of space
Business process issues – many organizations don't support internal processes with multimedia because some processes are not well suited to multimedia.

Virtual Reality

Virtual reality – is a three-dimensional computer simulation in which you actively and physically participate. It incorporates 3D technologies to give you a real life illusion. It creates a simulation of real life situations and the special input devices capture your physical movements and special output devices send physical responses back to you. One of the more common application of virtual reality is found in the entertainment industry.

Glove – AN input device that captures and records the shape and movement of your hand and fingers and the strength of your hand and finger movements.

Headset – Is a combined input and output device that serves two purposes. It captures and records the movement of your head and as an output device, it contains a screen that covers your entire field of vision and displays various views of an environment.

Walker – Is an input device that captures and records the movement of your feet.

Cybersickness – Eyestrains, simulator sickness, and flashbacks are some of the symptoms of people who participate in virtual reality environments.

The future of virtual reality

Researchers are working daily to solve the problems that produce cybersickness. Further, researchers are suggesting innovative uses for virtual reality – as a tool to illustrate corporate downsizing or to experience the company of friends and family members through virtual reality piped over the Internet.

Cave automatic virtual environments (cave's) – special 3D rooms spread across the world.

Researchers are already working on special aroma-producing systems but taste, unfortunately has a long way to go.

The Internet Explosion

There are two emerging aspects of the Internet (1) Electronic cash which you can use to purchase products on the internet; and (2) the convergence of your telephone, television, computer, and cable TV services as a way of communicating through and accessing the Internet.

Electronic Cash

Cash transactions – buying a product or service in exchange for real cash

Debit transactions – Build up a pool of money in your checking account, and then you spend it

Credit transactions – make purchases first and pay later

Electronic Cash – An electronic representation of cash is a file that says you have a certain denomination of money in electronic form

What's holding up electronic cash?

- ⇒ Anyone can be an electronic bank – no gov't regulations
- ⇒ No standards on how e-cash should look
- ⇒ Merchants must have accounts with electronic banks
- ⇒ E-Cash make money laundering easy – e-cash is completely anonymous
- ⇒ E-Cash is easy to lose

What will it take for E-Cash to become a reality?

1. Standards are needed to define how e-cash will look and work.
2. Federal government must become involved in developing regulations for electronic banks

Converging Technologies for communicating through and accessing the Internet.

Telephones, computers, television, and cable TV service provider all support the electronic movement of information.

Internet-accessing-cable-vision-phone-computer devices – are some sort device that combines any of the features of a telephone, TV, computer and TV service provider, all while giving you access to the Internet.

Internet Telephones – Technology tools required to carry on a phone conversation over the Internet.

Cable ready computers – A computer you can connect directly to a cable TV outlet to receive programming you watch on your monitor. You need a computer with a video card and sound card that connects to the TV and the software necessary to display cable TV programming on your monitor.

Cable Modems – A special communication processor that connects your television to a cable TV service provider. With it you can view your TV programming and surf the Internet. Special combined keyboard and mouse may be used to cruise the Internet.

Cable modems are fast and support bi-directional flows of information between you and your cable. CM support the incoming flow of information to you as well as the outgoing flow of information to your cable TV service provider, who transmits information to the Internet.

Internet PC's – A PC that supports only Internet access (hollow PC) designed for cruising the Internet and little else.

All Purpose home computer - Internet accessing, cable-vision-phone computer devices that allow you to (1) surf the net (2) watch TV and cable programs (3) make phone calls.

So what does the future look like for converging technologies & the Internet?

First, over the next couple of years, there will be enormous positioning in the markets that support the electronic creation & movement of information. Second, the consumer market is demanding all in-one integrated devices. (but will often opt for quality over integration). Third, many dedicated devices will not survive. Finally, access becomes cheaper, faster, easier, and more reliable through a variety of emerging technologies

The Wireless Revolution

Technology for mobilizing People

- ⇒ **Cell phones and digital pagers**
- ⇒ **Smart phones** – Cellular phone that also acts as a transmittal and reception station for digital page messages, email messages, and faxes and also has Internet access capabilities
- ⇒ **Global Positioning System (GPS)** – Is a collection of 24 earth-orbiting satellites that continuously transmit radio signals you can use to determine where you are.

Technology for mobilizing Technology

⇒ **Wireless local area network (LAN)** – A network that covers a limited distance in which all components or computers are connected without physical cables.
Central access point

The “Ility” issue of wireless technology – portability and mobility – making your workforce mobile with portable technologies that allow them to communicate with others, regardless of location.

Emerging Technology For your Personal Life

Smart cards – Are small plastic cards that contain a memory chip on which a sum of money can be recorded and updated. You insert the card into a card reader device that (1) reads the amount of money you have stored (2) deducts the amount of your purchase (3) tells you your balance.

Intelligent Home appliances – Appliances that contain an embedded IT system that controls numerous functions and is capable of making some decisions (smart vacuum that adjusts itself to the density of the carpet or a washer that automatically balances loads).

Many intelligent appliances make use of automatic speech recognition.

Fuzzy Logic – A method of working with fuzzy information; information that is incomplete, ambiguous, or imprecise. Fuzzy logic systems work with information that is often a matter of interpretation.