Emerging Technologies for Academic Library Information Services

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Introduction

This presentation overviews most relevant Emerging Technologies which could have great potentials on academic library information resources, services, and instructions.

Limitations:

1. This presentation does not recall evolving history of Emerging Technologies.
2. This presentation does not intend to list all kinds of Emerging Technologies in the digital age.

1. Who's Who: Cutting-Edge Technologies vs. Emerging Technologies (A)?

Cutting-Edge Technologies:

1. New innovative technologies which have the leading positions in their specific fields.
2. Most advanced and state-of-the-art technologies in the competitive market.
3. Have gigantic economic effects and epoch-making social changes to boost social productivity.

1. Who's who: Cutting-Edge Technologies vs. Emerging Technologies (B)?

Emerging Technologies:

1. New innovative technologies with great marketing potentials to enhance, integrate, and reorganize existing products and industries.
2. Have potentials to generate new advanced products and new industries.
3. Represent latest developing trends for theories and practices of science and technology studies.

Comparative Features:

Items	Cutting-Edge Technologies:	Emerging Technologies
Market:	Long / Stable	New
Technology:	Mature / Upgrade Enhancement	New Innovative
Implication:	Confirmed Effective	Potential Probable
Application:	Mature Productive	Prototype Test

Real World Examples

1. Computer Input Technologies:
   - Keyboard / Mouse Input
   - Wireless Keyboard / Mouse Input
   - Voice Input

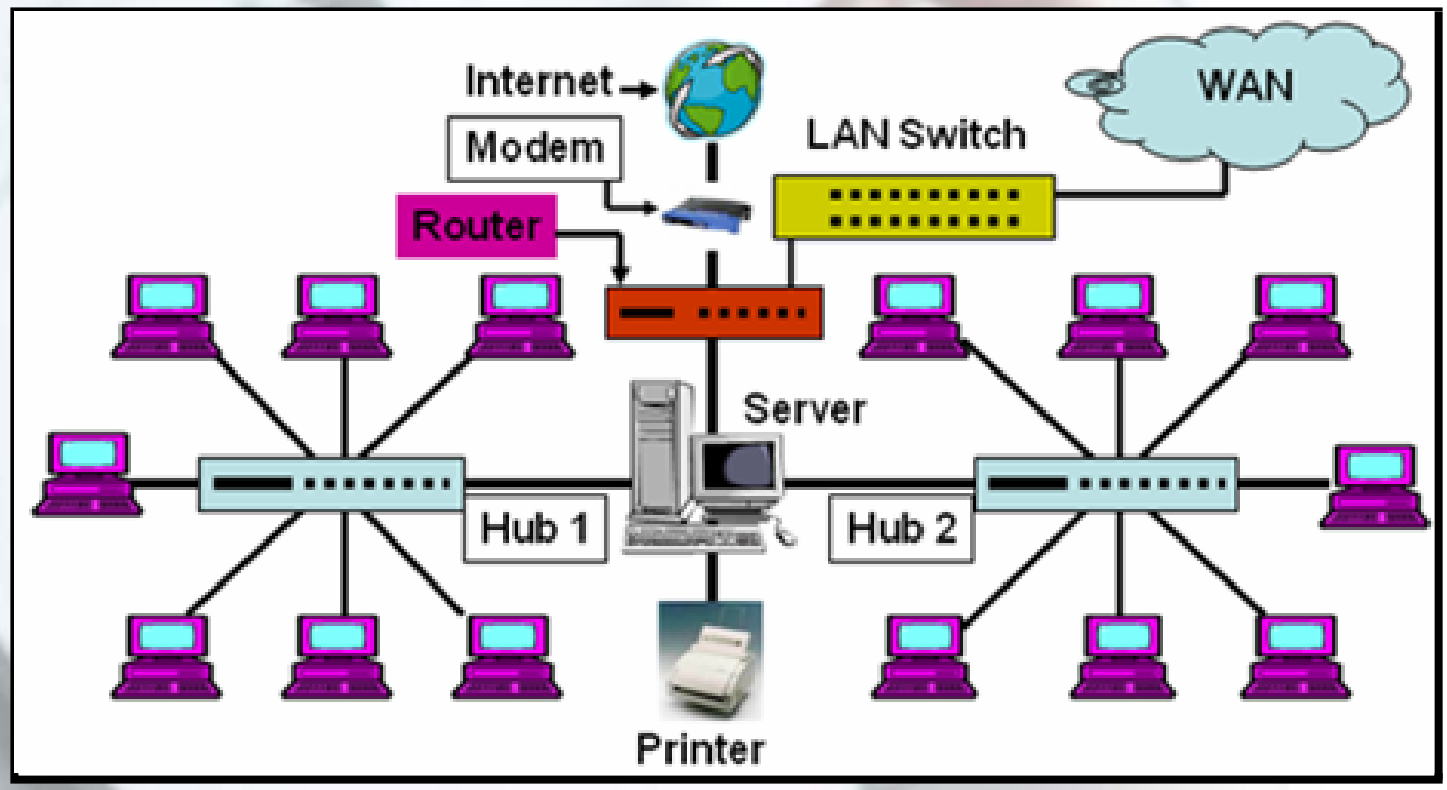
2. Java Technologies:
   - Java SE – Java Standard Edition
   - Java EE – Java Enterprise Edition
   - Java ME – Java Micro Edition

Where Are Emerging Technologies?

They are evolving from these fields:

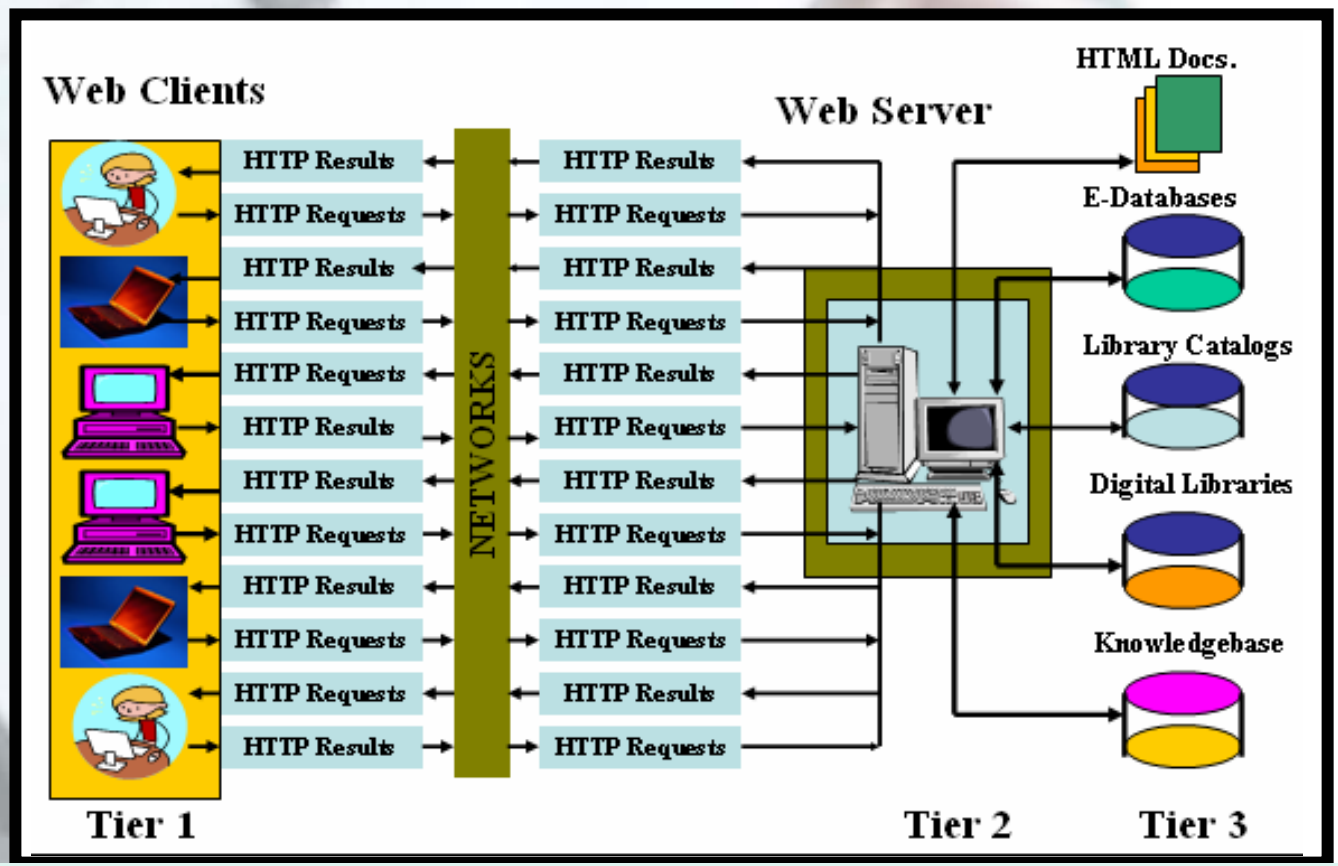
- Artificial Intelligence, Bio-Science,
- Computer Technology,
- Digital Technologies: digital communication, digital copyright protection, and digital media
- E-Business,
- Human-Intelligence,
- Machine-Translation, Medical Technology,
- Network Technology,
- Semiconductor Technology,
- Telecommunication,
- Web Technology, and so on …

2. Network-Based Academic Library Information Architecture



LAN-based Information Technology Architecture

2. Web-Based Academic Library Information Architecture



A Simple 3-Tier Web-Based Client/Server Library Information Architecture

3. Emerging Technologies in Academic Libraries (1)

1. **Next Generation Internet:** IPv6
2. **Personal Computer (PC):**
   Chip Technology: Multi-Core Processor
   Operating systems: Windows Vista/Mac OS X Tiger / Linux OS / Google OS & Google PC
   USB 2.0 Flash Drive: 16MB – 64GB King Kong Flash Drive
   Universal Hard Drive: 40GB – 500GB
3. **Computer Software**
   Office Software: EI-Office / StarOffice / OpenOffice / Open Source Software
   Computer Security Software
   Databases: MySQL/PostgreSQL/Oracle10g/SQL Server
   Web Publishing: Dreamweaver8 / Frontpage2007

3. Emerging Technologies in Academic Libraries (2)

4. **Wireless Broadband Network:**
   Wireless: WiMAX
   Bluetooth
5. **Web Technologies:**
   SGML / XML / XHTML
   Web Services: DOM/SOAP/UDDI/WSDL
   Web Browsers: IE/Netscape/Firefox/Opera/Safari
6. **Digital Library Projects**
   Google Print Library
   European Digital Library
   The Center for Research Libraries
   Open Content Alliance

3. Emerging Technologies in Academic Libraries (3)

7. **Digital Communication:**
   - Digital Broadcasting TV: HDTV
   - Instant Messaging: MSN / Yahoo Messengers
   - Streaming Media / Streaming Video Production
8. **Artificial Intelligence**
   - Blackboard Technology
   - Blackboard / WebCT
9. **Instructional Technology:**
   - Interactive Electronic Whiteboard
10. **Telecommunication:**
   - IPTV (Internet Protocol Television)
   - VoIP (Voice Over Internet Protocol)

4. Impacts on Academic Libraries and Librarians

1. Academic Library Management
2. Academic Library Collection Development and Collection Assessment
3. Academic Library Information Technology
4. Academic Library Information Services
5. Academic Library Assessment and Evaluations
6. Academic Library Long-Term Strategic Plan
7. Academic Librarians:
   - Standards, Criteria, Roles, Procedures
   - Implementations, Managements, Utilizations,
   - Assessments and Evaluations

Impacts on Academic Information Librarians

1. Roles
2. Library Information Resources, Services, and Instructions:
    - Collection Development
    - Collection Assessment and Evaluations
    - Services
    - Instructions and Tutorials
3. Competency, Knowledge, and Skills
4. Trainings
5. Evaluations

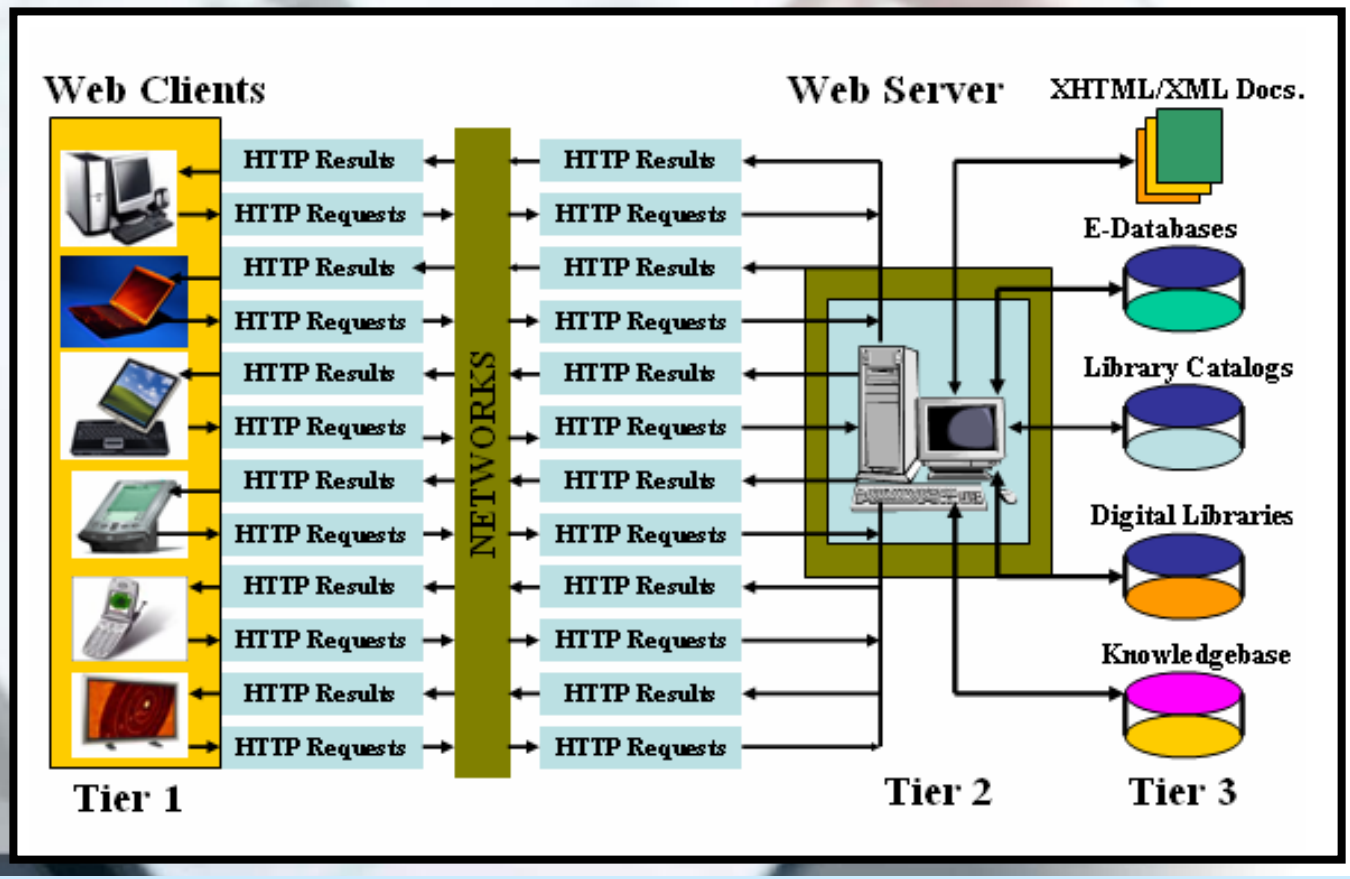
5. How To Manage and Utilize Emerging Technologies (1)

1. Initial Plans (Short-Term / Long-Term):
   - Goals and Objectives
   - Current Systems and Resources Available
   - Leaderships
   - Strategic Visions
2. Assess and Evaluate:
   - Criteria and Standards
   - Procedures
   - User Needs
   - Systems and Resources
   - Funding Supports

5. How To Manage and Utilize Emerging Technologies (2)

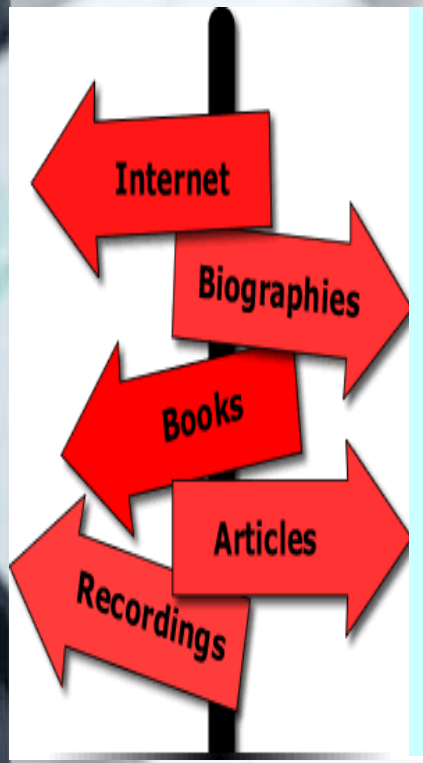
3. Implementation:
   - Operating Systems
   - User Interface
   - Contracts or Leases
   - Vendor Support (Trails / Trainings / Updates …)
4. Decision Making:
   - Cost
   - Performance
   - Documentation
   - Time
   - Life Span

6. Future Web-Based Academic Library Information Architecture



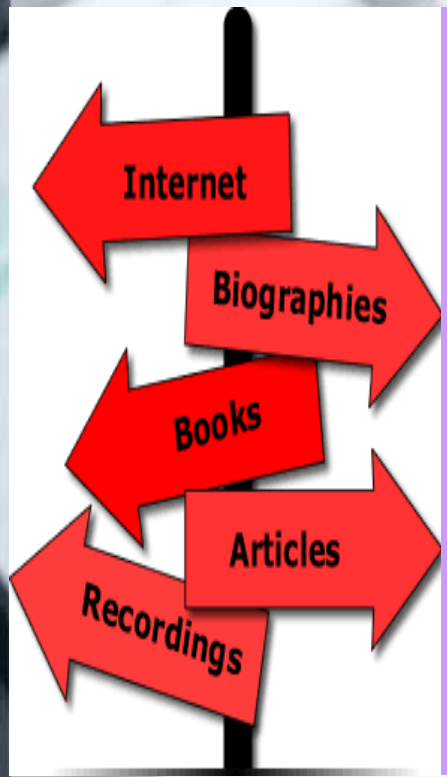
A Simple 3-Tier Web-Based Client/Server Library Information Architecture

Summary



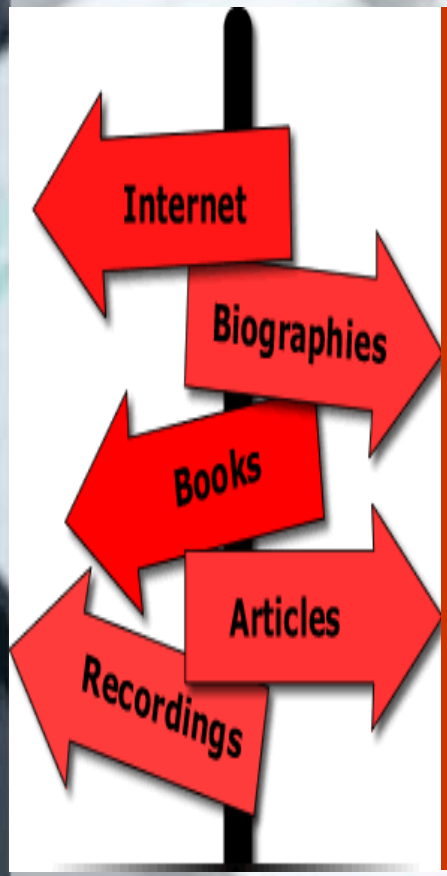
New Emerging Technologies will continue to provide academic libraries with new ways to access, distribute, locate, store, and transfer academic information resources, services, and instructions at different formats via multiple channels.

Summary



If they cannot transfer their knowledge, skills, and roles from subject bibliographers to information technology specialists, academic librarians cannot work effectively under new academic library information distributed systems.

Summary



If they cannot keep close watch on Cutting-Edge Technologies and Emerging Technologies, academic library administrators and executives will lose their strategic vision and strong leadership to shape and build new academic libraries in the digital age.

Thank You

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The Next Generation Internet: IPv6

Note: The U.S. Government has specified that all federal agencies must deploy IPv6 by 2008.

	Internet Protocol v.4	Internet Protocol v.6
Function:	Supporting the Internet communication.	
IP Addresses:	4.3 billion 32-bit unique IP addresses	6.5 billion 128-bit unique IP address
Mobile IP:	None	Yes
Security:	General	Better

Personal Computer (PC) Technologies

Chip Technology:

Multi-Core CPU (Central Processing Unit) –
In 2001, IBM introduced the first dual-core chip called Power4. Since then, Sun Microsystems, HP, AMD, and Intel have released their dual-core processors.

Multi-Core CPU is representing the new trend for the next generation of personal computers.

Google OS and Google PC

It is reported that the Internet search giant Google is negotiating with Wal-Mart Stores Inc. and other retailers about selling Google PCs installed the new Operating System created by Google.

To reduce the risk of computer viruses, it is expected that Google will use the Internet technology to run computer software, such as centralized controlled word-processors, emails, and spreadsheets, via the Internet. However, it may trigger concerns about privacy issues.

Open Source Software

The advantages of Open Source Software include free access to the source code, free customization, and free distribution. In academic library environments,

- Apache
- Mozilla
- MySQL
- PostgreSQL
- Tomcat

are five leading open source software used in web-based academic library information architecture.

Wireless Broadband Network: WiMax

The real breakthrough in wireless networking is WiMAX (**W**orldwide **I**nteroperability for **M**icrowave **Acc**ess), officially known as IEEE802.16x. Specified as an alternative to cable and DSL (Digital Subscriber Line).

WiMAX is a real long-range (ranging up to 30 miles) and high throughput (approximately 75Mbps in the 10GHz – 66GHz band) broadband wireless metropolitan access networks (MANs).

Wireless Broadband Network: Bluetooth

As an industrial standard for wireless Personal Area Networks (PANs), Bluetooth is specified to connect devices such as desktops, digital cameras, keyboards, laptops, mobile phones, mouse, notebooks, PCs, PDAs (Personal Digital Assistants), printers, remote controls, and scanners, etc. within short ranges.

Web Technologies: SGML

SGML (Standard Generalized Markup Language) is used widely to manage large documents that need to be printed in different formats.

SGML itself does not specify any particular formatting.

SGML defines the rules for markup languages, such as:

- HTML (Hypertext Markup Language) and
- XML (Extensible Hypertext Markup Language)

Web Technologies: XML (1)

XML (Extensible Hypertext Markup Language) is a "meta" language to describe data.

XML does not have any pre-defined tags.
XML users can define their own customized tags for different data structure, such as:

Web Technologies: XML (2)

```
<html>
<body>
    <center>
        <p>Welcome to the Emerging Technology World.</p>
    </center>
</body>
</html>
```

```
<?xml version="1.0"?>
<client>Client Information
    <name>Georgia Southern University</name>
    <group>Academic</group>
        <website>Website
            <url>http://www.georgiasouthern.edu</url>
        </website>
</client>
```

Web Technologies: XHTML (1)

Primarily, HTML is used to link web contents and set up the web page layout in use of various predefined tags, such as:

```
<html>
<body>
<center>
                <p>Welcome to the Emerging Technology World.</p>
        </center>
</body>
</html>
```

Web Technologies: XHTML (2)

To standardize the web development, the World Wide Web Consortium (W3C) recommended on January 6, 2000 that XHTML (Extensible Hypertext Markup Language) would be the latest version of HTML.

With more strictly conforming rules, XHTML combines the advantages of HTML and XML.

In the future, XHTML will replace HTML step by step.

Web Technologies: Web Services (1)

The Web Services Technology includes these key components:

1. HTTP (Hypertext Transport Protocol)
2. XML (Extensible Markup Language)
3. SOAP (Simple Object Access Protocol)
4. WSDL (Web Services Description Language)
5. UDDI (Universal Discovery Description Integration)

Web Technologies: Web Services (2)

1. HTTP (Hypertext Transport Protocol) is the protocol to execute the Web Services.
2. XML is used to build XML message so that Web services can support heterogeneous communication.
3. SOAP is the protocol to handle interactions among Web services.
4. WSDL defines the mechanism to access Web services available.
5. UDDI specifies a registry for Web services.

Digital Communication: HDTV

However, the best benefit of Digital TV technology for academic libraries is to integrate a large-screen Digital TV set with a personal computer workstation via a computer TV tuner card, multimedia software, and other audio/video equipments, to create a real powerful digital multimedia workstation.

Academic library users will have a very powerful multimedia workstation to design and develop their digital presentations and projects.

Artificial Intelligence Technology: Blackboard Technology

The Blackboard Technology is an AI Intelligence technology that intends to interpret human learning process and behaviour. Utilizing web technologies and network technologies, Blackboard technology integrates different activities of instruction and learning under one networked Graphical User Interface (GUI):

1. Blackboard: Academic Suite / Commerce Suite
2. WebCT: WebCT Campus / WebCT Vista

Telecommunication: IPTV

IPTV (Internet Protocol TV) integrates high-definition TVs, multimedia, Video-On-Demand (VOD), picture in picture (PIP) and other features to deliver TV programs to subscribing consumers.

IPTV (Internet Protocol TV) provide consumers with the ability to view TV programs from anywhere in the world via a broadband network connection.

Telecommunication: VOIP

VoIP (Voice-Over-Internet Protocol) is the Internet-enabled technology to transfer digitalized voice signals over the broadband networks.

Through a high-speed Internet broadband and the low-cost Internet connection, VoIP enables you to use your computer to start a pc-to-pc talk or use a regular phone hooked up with a telephone adaptor to call anyone else around the whole world. At the other end, the receiver can receive your digitalized voice converted by VoIP either via a regular phone or via a computer hooked up with an earphone.