

## INTERACTIVE MULTIMEDIA AND DIGITAL TECHNOLOGIES

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### Summary

Interactive multimedia and digital technologies enable computer-based multimedia, the World Wide Web, CD-ROMs, video games, interactive television, virtual reality, touch-screen kiosks, 3D architecture design programs, computer graphics and other interactive media innovations. These technologies offer new possibilities for developing a life support system for sustainable development. Much like electricity and transportation, these technologies have become essential tools for almost every aspect of life from health to hobbies and from travel to telepresence. They have the unique potential to represent, model and simulate global problems better than traditional communication methods such as telephone, fax, radio or television.

Interactive multimedia and digital technologies meld diverse digital media such as text, graphics, video and sound. These technologies have three characteristics: interactive multimedia content, networked interactivity and digital convergence. Based on underlying communication principles and key technology concepts, this article covers a wide range of perspectives, such as the diffusion of interactive media technologies; successes and failures in development of interactive media; characteristics of interactive multimedia and digital technologies; the convergence of electronics, computers and telecommunications; strategies for promoting sustainable development in a global and

digital economy; and defining moments in multimedia and interactive media history. Drawing upon analyses of how these technologies are reshaping mass communication with combined effect on the computer, telecommunications and electronics, this article identifies the absence of a global initiative to organize and foster worldwide adoption and application of interactive multimedia and digital technologies. The article concludes that despite inherent limitations as a life support system, the human-engineered, interactive multimedia and digital technologies offer unique opportunities to further the sustainable development of life in the biosphere.

## 1. Introduction

Interactive multimedia and digital technologies cover computer-based multimedia, the World Wide Web, CD-ROMs, video games, interactive television, virtual reality, touch-screen kiosks, 3D architecture design programs, computer graphics, and other new media innovations. At present, these technologies may be classified as new media. However, "new" is a relative term, and from a broader perspective new media refers to the invention, innovation, and application of mass communication. The digital revolution is reshaping journalism and mass communication in myriad ways. It has already changed the way we access news, hear music, watch videos, take photographs, and communicate information (see *The Internet as a Mass Communication Medium*, EOLSS on-line, 2002).

From a global development perspective, the developed world dominates media content, thereby creating global inequity. So there is an urgent need for information and communication technologies to be re-gearred toward addressing needs of developing nations (See *Media Globalization and Localization*; and *Culture of Consumption*). Interactive multimedia and digital technologies such as the Internet, the Web, virtual reality and other hypermedia innovations offer new possibilities for developing a life support system for sustainable development (See *The Internet and Sustainable Development*). These technologies have the unique potential to represent, model and simulate global problems even better than traditional electronic means such as telephone, fax, radio or television (see *Books; Magazines; Newspapers, Newsletters and Pamphlets; Television; and Radio*). So, developing nations should strive to accomplish a threshold of global communication connectivity to qualitatively benefit from the flow of ideas that has fueled the information economy in the developed world (See *Government and Governance in the Networked Age*).

This article provides the framework for understanding the characteristics of interactive multimedia and digital technologies that meld diverse digital media such as text, graphics, video and sound. Based on underlying communication principles and key technology concepts, this article covers a wide range of perspectives, such as the diffusion of interactive media technologies; successes and failures in development of interactive media; characteristics of interactive multimedia and digital technologies; the convergence of electronics, computers and telecommunications; strategies for promoting sustainable development in a global and digital economy; and defining moments in multimedia and interactive media history. Drawing upon analyses of how these technologies are reshaping communication with the combined effect of the computer, telecommunications and electronics, this article explores their potential for

contributing toward sustainable development in the twenty-first century.

The study of interactive multimedia and digital technologies as a specialization within mass communication began to take root with the advent of satellite distribution of television signals and the resultant explosion in new channels (see *The Information Economy and the Internet*). Established models of mass communication included the "broadcast" of messages from a media source (whether print or electronic) to a generally heterogeneous audience with limited (if any) direct feedback from that audience (See *Government and Governance in the Networked Age*). The infusion of computer-mediated communication, interactive systems that connected receiver to sender, and the emergence of the Web have challenged the traditional view of mass communication (see *The Internet as a Mass Communication Medium*). Other 'point-to-point' communication technologies such as fax machines, cellular telephones and pagers have also had a dramatic impact on people's daily lives (see *The Information Economy and the Internet*). Much like electricity and transportation, interactive multimedia and digital technologies have become essential tools for almost every aspect of life, from health to hobbies and from travel to telepresence.

## **2. The Diffusion of Interactive Media Technologies**

Social groups differ widely in terms of their adoption of interactive multimedia and digital technologies (see *Culture of Consumption*, EOLSS on-line, 2002). Unlike traditional mass media such as print (see *Books*; see *Magazines* and see *Newspapers, Newsletters and Pamphlets*) and broadcasting (see *Television* and see *Radio*), which diffused relatively evenly in the United States and other developed societies, new technologies have diffused more unevenly around the world (see *Media Globalization and Localization*). This may be due to at least two reasons. Firstly, unlike many of the traditional media (see *Traditional and Modern Media*), users of interactive multimedia and digital technologies have to incur significant expenses to access the medium. Users must invest in the hardware (personal computers, modems, printers, cellular and wired telephones, pagers, answering machines, and so on) and software to obtain the services they want. They face continuing costs because they have to replace or upgrade hardware and software to keep up with the times. In contrast, television (see *Television*) and, to some extent, cable, radio (see *Radio*) and print (see *Books*; see *Magazines* and see *Newspapers, Newsletters and Pamphlets*) have enjoyed advertising subsidies that have made them relatively inexpensive for consumers; the rate of obsolescence has been slow for broadcasting and practically nonexistent for print (see *Newspapers, Newsletters and Pamphlets*). Secondly, interactive multimedia and digital technologies are only available to people who know how to use them. For instance, computers can be very challenging to use and usually require formal education and/or a significant personal learning curve.

In many ways, interactive multimedia and digital technologies comprise a hybrid medium, combining aspects of the printing press, telephone, public bulletin board and interpersonal communication. They combine crude radio and television transmission without the elaborate investment of equipment required by conventional broadcasting. Some commentators have predicted that the Internet or a successor network will eventually absorb the functions of television, telephone and conventional communication. They speak of an information superhighway, a term coined in 1992 by

then United States Senator Al Gore, Jr., to refer to a unified, interactive system of electronic communication. The prospect of such a system, with the capacity to deliver an unprecedented range of informational services to the home, school, or office has provoked a flurry of strategic alliances between major commercial interests in the telephone, software programming and entertainment industries. By 1995 the business world was beginning to regard the largely noncommercial Internet as the electronic equivalent of China: a huge, ever-growing and virtually untapped market.

For some commentators, however, the potential social benefits of cyberspace far outstrip its commercial potential. Unlike television, which beams its messages to a passive and isolated audience, the Internet depends upon its users to supply and share content, and to act cooperatively to aid its dispersal. Since resource sharing and mutual aid are age-old traits of successful social groupings, some Internet advocates argue that the medium may help repair a social fabric badly weakened by television. They claim that cyberspace encourages the formation of "virtual communities," without the impediments of national or geographic boundaries. They also view the Internet as the harbinger of a renaissance in free speech. Since the network gives everyone the tools to become a publisher or disseminator of information, they say cyberspace offers a potent means of freeing public discourse from the dominant control of private newspaper companies and broadcasters.

### **3. Success and Failure in Development of Interactive Media**

Most people associate cyberspace with networks of computers. The biggest and most familiar of these networks, the Internet, was developed in the 1970s to assist United States military and academic research. As recently as 1990, the Internet was almost unknown to the general public. By the end of 1995, however, the network had become a household name attracting millions of users with no affiliations to defense institutions or universities. The volume of exchanges between these users, who numbered at least 200 million to 300 million in 2001, surpassed 300 terabytes per month, or enough information to fill 300 million books of 7,000 pages each. For many of those involved in these exchanges -- and for millions more who have no experience of computer networks -- cyberspace and the Internet have become nearly synonymous terms.

There is more to cyberspace than just computer networks. Several media organizations experimented with innovations now considered precursors to the present digital revolution. Both failures and successes preceded the present boom in interactive multimedia and digital technologies. Not all interactive media survived in the marketplace. For instance, CBS's Field Sequential Color Television System was rejected by the United States Federal Communications Commission but taken to the moon by the Apollo space missions. Another major false start was AT&T's Picturephone, which wowed the crowds at the 1964 World's Fair with the promise of a new telephone that would let people see one another when they made a call. The Picturephone never caught on, despite AT&T's initial success in demonstrating a one-way AT&T Nipkow disk picturephone four decades earlier, in 1927, with a call by soon-to-be president Herbert Hoover. In recent years, the concept has gained new life in the wired world through high-speed Internet connections and desktop computers equipped with video cameras.

Other significant failures in information and communication technology were: over-the-air subscription television, analog DBS, quadraphonic sound, CB radio, teletext, failure of videotex in the United States in the 1970s, RCA's CED videodisc player, and AM stereo. In the 1970s, Warner-Amex's QUBE cable system provided subscribers with "interactive" services, but it was never a commercial success. These setbacks contributed to insightful visions of pioneers who learned from the mistakes of their predecessors and thus paved the way for new developments such as interactive multimedia and digital technologies and, in general, communication technology innovations.

From a development perspective, such setbacks could be a learning experience for developing nations seeking to adopt similar technologies. Significant new research in the adoption of interactive multimedia and digital technologies may help developing nations avoid such catastrophic failures. On the other hand, developed nations can use advanced research to maintain complex systems that now underpin global transportation, defense, business, finance and healthcare infrastructure (see *Communication Strategies for Sustainable Societies*, EOLSS on-line, 2002). However, critical problems are going unsolved because current research in the field seems restricted by a short-term focus on seeking immediate returns rather than on investigating high-risk, long-term technologies.

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### **Biographical Sketch**

**Debashis "Deb" Aikat** (email: daikat@email.unc.edu) is an associate professor and media futurist in the School of Journalism and Mass Communication at the University of North Carolina at Chapel Hill. An expert on people, products and perspectives that are shaping the digital revolution, Aikat is an award-winning teacher and researcher on the impact of communication technologies, social aspects of the Internet, interactive media and the future of communication.

Along with published book chapters, Aikat's articles have appeared in refereed research publications of the Microsoft Corporation, International Radio and Television Society Foundation, Association for Computing Machinery (ACM) Special Interest Group for DOCUMENTATION (SIGDOC), *Electronic Journal of Communication/La Revue Electronique de Communication*, and *Convergence: The Journal of Research into New Media Technologies*. He is a member of the editorial board of *Journal of Magazine and New Media Research* and has served as a reviewer for *Journalism and Communication Monographs* and several other journals.