Preface

The term encyclopedia comes from the Greek words εγκύκλιος παιδεία , enkyklios paideia ("in a circle of instruction").

The purpose of the *Encyclopedia of Multimedia Technology and Networking* is to offer a written compendium of human knowledge related to the emerging multimedia digital metamarket.

Multimedia technology, networks and online interactive multimedia services are taking advantage of a series of radical innovations in converging fields, such as the digitization of signals, satellite and fibre optic based transmission systems, algorithms for signal compression and control, switching and storage devices, and others, whose combination has a supra-additive synergistic effect.

The emergence of online interactive multimedia (OIM) services can be described as a new technological paradigm. They can be defined by a class of new techno economic problems, a new pool of technologies (techniques, competencies and rules), and a set of shared assumptions. The core of such a major shift in the evolution of information and communications services is the service provision function. This shirt occurs even if the supply of an online interactive multimedia service needs a wide collection of assets and capabilities pertaining also to information contents, network infrastructure, software, communication equipment and terminals.

By zooming in on the operators of telecommunications networks (common carriers or telecoms), it is shown that though leveraging a few peculiar capabilities in the technological and managerial spheres, they are trying to develop lacking assets and competencies through the set-up of a network of collaborative relations with firms in converging industries (mainly software producers, service providers, broadcasters, and media firms). This emerging digital marketplace is constantly expanding.

As new platforms and delivery mechanisms rapidly roll out, the value of content increases, presenting content owners with both risks and opportunities. In addition, rather than purely addressing the technical challenge of the Internet, wireless and interactive digital television, much more emphasis is now being given to commercial and marketing issues. Companies are much more focused on the creation of consistent and compelling user experiences.

The use of multimedia technologies as the core driving element in converging markets and virtual corporate structures will compel considerable economic and social change.

Set within the framework of IT as a strategic resource, many important changes have taken place over the last years that will force us to change the way multimedia networks develop services for their users.

- The change in the expectations of users, leading to new rapid development and implementation techniques;
- The launch of next generation networks and handsets;
- The rapid pace at which new technologies (software and hardware) are introduced;
- Modularization of hardware and software, emphasizing object assembly and processing (client server computing);
- Development of non-procedural languages (visual and object oriented programming);

- An imbalance between network operators and independent application developers in the value network for the provision of network dependent services;
- Telecommunications integrated into, and inseparable from, the computing environment;
- Need for integration of seemingly incompatible diverse technologies.

The force behind these realities is the strategic use of IT. Strategic management which takes into consideration the basic transformation processes of this sector will be a substantial success factor in securing a competitive advantage within this deciding future market. The change from an industrial to an information society connected therewith, will above all else be affected by the dynamics of technological developments.

This strategic perspective manifests itself in these work attributes:

- an appreciation of IT within the context of business value;
- a view of information as a critical resource to be managed and developed as an asset;
- a continuing search for opportunities to exploit information technology for competitive advantage;
- uncovering opportunities for process redesign;
- concern for aligning IT with organizational goals;
- a continuing re-evaluation of work assignments for added value;
- skill in adapting quickly to appropriate new technologies;
- an object/modular orientation for technical flexibility and speed in deployment.

Accelerating economic, technological, social, and environmental change challenges managers and policy makers to learn at increasing rates, while at the same time the complexity of the systems in which we live is growing.

Effective decision making and learning in a world of growing *dynamic complexity* requires us to develop tools to understand how the structure of complex systems creates their behaviour.

THE EMERGING MULTIMEDIA MARKET

The convergence of information and communication technology has lead to the development of a variety of new media platforms that offer a set of services to a community of participants. These platforms are defined as media which enable the exchange of information or other objects such as goods and services (Schmid, 1999).

Media can be defined as information and communication spaces, which based on innovative information and communication technology (ICT), supports content creation, management and exchange within a community of agents. Agents can be organizations, humans, or artificial agents (i.e., software agents).

The multimedia metamarket—generated by the progressive process of convergence involving the television, informatics and telecommunication industries—comes to represent the «strategic field of action» of this study.

According to this perspective, telecommunications, office equipment, consumer electronics, media, and computers were separate and distinct industries through the 1990s. They offered different services with different methods of delivery. But as the computer became an "information appliance", businesses moved to take advantage of emerging digital technologies, virtual reality, and industry boundaries blurred.

As a result of the convergence process, we cannot, therefore, talk about separate and different industries and sectors (telecommunications, digital television, and informatics). Such sectors are propelled towards an actual merging of different technologies, supplied services and the users' categories being reached. A great ICT metamarket is thus originated.

Multimedia finds its application in various areas including, but not limited to, education, entertainment, engineering, medicine, mathematics, and scientific research.

In education, multimedia is used to produce computer based training courses.

Multimedia is heavily used in the entertainment industry, especially to develop special effects in movies and animation for cartoon characters. Multimedia games such as software programs available either as CD-ROMs or online are a popular pastime.

In engineering, especially mechanical and automobile engineering, multimedia is primarily used for designing a machinery or automobile. This lets an engineer view a product from various perspectives, zoom critical parts and do other manipulations, before actually producing it. This is known as computer aided design (CAD).

In medicine, doctors can get trained by looking at a virtual surgery.

In mathematical and scientific research, multimedia is mainly used for modelling and simulation. For example, a scientist can look at a molecular model of a particular substance and manipulate it to arrive at a new substance.

Multimedia technologies and networking are at the heart of the current debate about economic growth and performance in advanced economies.

ORGANIZATION OF THIS ENCYCLOPEDIA

The goal of the *Encyclopedia of Multimedia Technology and Networking* is to improve our understanding of multimedia and digital technologies adopting an integrative approach.

The encyclopedia provides numerous contributions providing coverage of the most important issues, concepts, trends and technologies in multimedia technology each written by scholars throughout the world with notable research portfolios and expertise.

The encyclopedia also includes brief description of particular software applications or websites related to the topic of multimedia technology, networks and online interactive multimedia services.

The encyclopedia provides a compendium of terms, definitions and explanations of concepts, processes and acronyms offering an in-depth description of key terms and concepts related to different areas, issues and trends in multimedia technology and networking in modern organizations worldwide.

This encyclopedia is organized in a manner that will make your search for specific information easier and quicker. It is designed to provide thorough coverage of the field of multimedia technology and networking today by examining the following topics:

- From Circuit Switched to IP-Based Networks
  - Network Optimization
  - Information Systems in Small Firms
- Telecommunications and Networking Technologies
- Broadband Solution for the Last Mile to the Residential Customers
  - Overview
  - Copper Solutions
- Multimedia Information Management
- Mobile Computing and Commerce
  - General Trends and Economical Aspects
  - Network Evolution
- Multimedia Digital Television
- Distance Education Technologies
- Electronic Commerce Technologies Management
- End User Computing
- Information Security Management

- Open Source Technologies and Systems
- IT and Virtual Communities
- Psychology of Multimedia Technologies

The encyclopedia provides thousands of comprehensive references on existing literature and research on multimedia technologies.

In addition, a comprehensive index is included at the end of the encyclopedia to help you find cross-referenced articles easily and quickly. All articles are organized by titles and indexed by authors, making it a convenient method of reference for readers.

The encyclopedia also includes cross-referencing of key terms, figures and information related to multimedia technologies and applications.

All articles were reviewed by either the authors or by external reviewers via a blind peer-review process. In total, we were quite selective regarding inclusion of submitted articles in the encyclopedia.

INTENDED AUDIENCE

This encyclopedia will be of particular interest to teachers, researchers, scholars and professionals of the discipline, who require access to the most current information about the concepts, issues, trends and technologies in this emerging field. The encyclopedia also serves as a reference for managers, engineers, consultants, and others interested in the latest knowledge related to multimedia technology and networking.