Toward the Next Century
Face to the World
跨越世紀 面向世界

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# Information Technology in the Year 2000

University of California, Berkeley University Extension

Central Radio and TV University Press

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China Central Radio and TV University Press

(京)新登字 163 号

像字:01-1996-014 号



**图书在版编目(CIP)数据**

二十一世纪的信息革命(1):英文/美国加州大学柏克利分校著 . -北京:中央广播电视大学出版社,1997.2
(跨越世纪、面向世界 500 讲)
电视教育系列课程
ISBN 7-304-01363-X
Ⅰ. 二… Ⅱ. 美… Ⅲ. 信息革命-电视教育-教材-英文
Ⅳ. G202
中国版本图书馆 CIP 数据核字(97)第 02309 号

**Information Technology in the Year 2000**
**(1)**

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**中央广播电视大学出版社出版发行**
社址:北京市复兴门内大街 160 号 邮编:100031
北京印刷二厂印刷
开本 850×1168 1/32 印张 8.125 千字 261
1997 年 2 月第 1 版 1997 年 2 月第 1 次印刷
印数 1—3000
定价 15.00 元
ISBN 7-304-01363-X/G·237

# 出版说明

距世纪之交，仅仅剩下四年了。下一个世纪，究竟是谁人的世纪？

中国，犹如一头醒狮，带着5000年的文明，闪耀着新时期的灿烂，准备再造辉煌。

人们在寻找着跳板，一块能跨越世纪之壑，腾飞强国之林的跳板。人才，人才，还是人才。只有加速培养千千万万个跨世纪的、与国际接轨的、具有全球意识的复合型人才，我们的国家才能兴旺，我们的民族才能再现辉煌。

人们在寻找着窗口，一扇能折射当代科技文明结晶；预示未来世纪变幻的窗口。

大型电视教育系列课程《跨越世纪、面向世界500讲》正是这样的窗口，一扇不出国门，就能领略当今世界经济、科学发展趋势，共享国际一流教育资源的窗口。

由美中远程教育合作发展基金会、中国科学技术发展基金会、上海法学教育发展基金共同资助策划，上海市教育发展基金会参与发起，国家教委电化教育音像出版社、中央广播电视大学出版社出版发行的大型电视教育系列课程《跨越世纪、面向世界500讲》，共分五大序列：《二十一世纪的信息革命》、《现代化城市管理》、《现代企业与商业的经营管理》、《金融财税业的现代化管理》、《国际商务民事法规通则》。每一序列电视课程分别为80～100讲，每一讲约为50分钟，每序列文字教材共分三册，近一百万字。分中文版与英文版共计三十册。

担任授课的学校为世界一流的美国加州大学柏克利分校和美国斯坦福大学法学院以及在美国商学院中名列前茅的加州旧金山州立大学商学院。主讲教授均为本学科领域内公认的权威人士，他们不仅有着资深的教学经验，同时还具备丰富的实践经验。

大型电视教育系列课程《跨越世纪、面向世界500讲》全部在美国实景拍摄。本次教学活动采用了最先进的多媒体手段，在讲课过程中既有课堂教学，又有情景示范；既有实例演示，又有问题研究；既有历史演变过程，又有最新发展成果；既有理论深度，又有实践指导意义。本课程教学大纲，曾征询了北京大学、清华大学、中国人民大学、上海大学等全国四十多所大学以及中国继续教育联合学院等三十余个成人教育机构从事实践工作的专家、学者、领导们的意见，并进行了补充与调整，使之更符合中国的实际需求。为了进一步把好视听教材与文字教材的质量关，我们除了聘请一批具有教授、副教授、译审、副译审职称的相关专业的专家学者进行编译、审校之外，国家教委电化教育音像出版社和中央广播电视大学出版社还成立了出版工作委员会，具体指导、督促视听及文字教材的出版发行工作。

大型电视教育系列课程《跨越世纪、面向世界500讲》一推出，就受到了社会各界的广泛欢迎。北京大学、清华大学、中国人民大学、复旦大学、中山大学、南开大学、吉林大学、西安交通大学、上海大学等一百余所大学及成人教育机构，纷纷签约购买了本课程的教学使用权。国家人事部、国防科工委、中国科协向全国各省市、部委发文，把此系列课程作为全国专业干部继续教育的一项重要内容。司法部、上海市等一些部委和地区的主要领导，不仅全力支持，而且还要求有关领导干部带头学习，掌握更多的现代化科技管理和法律知识，更好地实施科教兴国战略。

本系列课程中文教材，是在保持原作者讲课内容的基础上，根据英文原稿编译而成的。由于时间仓促，难免有不当之处，敬请指正。教材中的内容均为作者自身的观点，并不代表编译出版者的立场，因此仅供参考。

编者

一九九六年十月二十五日

# CONTETS

# 1
# Information Technology in the Year 2000

## 1.1 Introduction

Ronald Ogg and Elias Asmar

### 1.1.1 Introduction to Information Technology

**What is information technology?**

The single most significant influence on business organizations over the past decade has been the rapid transformation in information technology. The impact of information technology has affected all industries and all businesses. Information technology has become critical to the success of every business in all industries. What is information technology? It is a collection of an organization's information systems and the users' management of the information system.

**What are information systems?**

An information system is a system that allows you to input, store, process, output, and transmit data and information. It includes computer hardware and software, networks, telephones, video, fax, and telex, and the integration of all of these elements.

**What is the difference between data and information?**

Simply stated, *data* is organized or unorganized raw facts. *Information* is data that has been processed in ways that make it

meaningful to a particular situation and adds value to it, the added value being more than the value of the raw, unprocessed data. Notice that *information* in a certain situation can be *data* in another situation.

## 1.1.2 The Objectives of This Course

To provide an understanding of the history of computers from mainframes to minicomputers to the personal computer revolution, local and wide-area networks, the integration of multimedia, audio, video and animation, and the merging of computing and telecommunications. This history will give a perspective for the discussions of the future trends of information technology and allow us to define those elements that are going to be important in the year 2000 and beyond.

To provide an understanding of the ways in which organizations are increasingly dependent on computers. Industries such as publishing, clothing manufacturing, telephone, and banking could probably not continue to operate the way they do today without the use of computers. Many other businesses could not exist at all without the presence of computers, the most obvious being the computer industry itself, on-line services and the Internet. The aerospace and credit-cards industries have become possible only because of the availability of powerful computing systems.

To illustrate new trends in information technology and how they are being applied. You will be seeing video clips taken at both commercial and government organizations that illustrate how computers are being used today in the United States and the new uses that these organizations are planning for computers in the future.

## 1.1.3 Format of the Lecture Series

TOPICS

The course is structured as seven separate sections:

I. Information Technology in the Year 2000—an introduction to the course

II. Multimedia and the Information Superhighway

III. Popular Software and Hardware

IV. Telecommunications Development and Management

V. Computer Networks

VI. Satellite Communications

VII. Project Management

I. Information Technology in the Year 2000

——The history of information technology from mainframe computers through personal computers

——The impact of information and information technology on businesses

——The business environment of the 1990s and the new paradigms for business that will emerge in this period

——Strategies that businesses are using for implementing information technology in their organizations

——Trends in the industry between now and the year 2000 and beyond into the twenty-first century

——The impact of information technology on daily life

II. Multimedia and the Information Superhighway

——A definition of what multimedia is

——How multimedia has evolved

——The applications that are emerging from multimedia technology

——The information superhighway and the Internet, which is a global networking of computers

——An in-depth discussion of video conferencing

III. Popular Software and Hardware

——Operating system application and language software

Computer hardware including what is needed in order to be able to evaluate, select, and maintain computer hardware

——The evolution of that hardware from the mainframes through today's advanced systems

IV. Telecommunications Development and Management

——The history, terminology, standards, and regulations that surround telecommunications

——Voice systems and data communication services, system management and outsourcing communication services, wired and wireless communications and interconnection equipment

——Global communications and the major tele-communication vendors worldwide

V. Computer Networks

——An introduction to computer networks, local, wide-area, and other types of networks

——Inner networking and open network architecture

——Enterprise network management systems

——Control of the entire network infrastructure

——Bridging and routing the interconnection of various network devices

VI. Satellite Communications

——The technology and applications of satellite communications

——An overview of various global satellite systems

——The issues for satellite systems

VII. Project Management

——Quality Management, Planning and Assurance

——Risk, Time, Cost, Procurement, and Communications Management

——Human Resources

——The Project Manager's Responsibilities

### 1.1.4 Linkages of the Course Topics

THE INTERRELATIONSHIP AMONG THE TOPICS OF THIS COURSE

——The primary topic is information technology in the year 2000, and that part covers *the history and development* of software and hardware and the impact on business.

——The second topic is *software and hardware*. It is very important to know what computer hardware we are talking about and what software is used with that and how it is used in the business environment.

——All these individual computers have to communicate with one another within *computer networks*.

——*Multimedia*, which has become very prevalent these days, involves other than the text and numbers used in the initial computers; now can add audio and video elements to the text.

——*Telecommunications and satellite communications* allow for networking and the merging of multimedia with computers and the information superhighway.

These different industries have evolved separately.

**A. The Telecommunications Industry**

That started with telephony. Initially, called the *telegraph*, it was used for transmitting low-end data, using Morse Code. This evolved into handling voice communications and what we call the *telephone*. More advanced data transmission was possible with *telex* and *facsimile*. *Satellites* started being used for long-distance voice communications and recently the *cellular telephone* was developed for wireless voice communications.

In the telecommunications industry parallel to telephony, the radio and television evolved. The *radio* led to wireless transmission and then led to television, which was a radio with an image. *Television*, itself, led to the development of *microwave communications* to transmit television signals without cable. Radio and television expanded into the use of *satellite communications* and television led to the development of *cable*, distributed to homes and offices.

**B. The Computer Industry**

Initially, *computers* were used for processing data locally. After that, computers were merged with telecommunications equipment to transmit data to remote sites. That developed *local-area networks* to allow computers to communicate with one another at different locations. The *wide-area networks* started to be used to allow local-area networks to communicate with one another. The computers also began using *high-resolution graphics*. At the beginning, computers used only basic data, which consisted of characters of the alphabet and numbers. Now, we can add high-resolution graphics, *voice*, and full-fledged *audio*: stereo sound and even music and video and pictures in what is called *multimedia*. And now computers are beginning to explore all the capabilities of telecommunications with a complete merging of data and video and the full transmission of telecommunications.

**C. Future Trends**

We can foresee a communications infrastructure emerging between digital data, voice, audio, video, all from one single provider. *Cable* will provide high-speed interconnection of computers. Cable now is used for television and it will be used as a network medium between computers. *Fiber* will to replace copper

lines for data and voice communications.

In computers themselves, we can foresee a continuing trend to higher performance for less money. It seems that every eighteen months a new CPU (central processing unit) will double the *speed* of its predecessor. The *size* of the computers will continue to shrink and the *storage capacity* will increase dramatically. We will see more and more and tighter *integration* of computers with telecommunications, the integration becoming more transparent to the user.

We believe that a new *information appliance* will evolve soon. This will be able to process and exchange data, voice, audio, and video, facilitating their storage, editing, processing, conversion, and communication. It will replace telephones, television, and other communications devices. It will *interface* with our other appliances and devices at home and in the office, controlling copying machines, home security, maybe even coffee makers. It might include *voice recognition*. It will be small, smaller than current devices, and it will definitely have a lower price.

## 1.2 Overview of the Course

### 1.2.1 The Major Sections

INTERRELATIONSHIPS AMONG INFORMATION TECHNOLOGYSUBJECTS

The *history* gives you a perspective of where information technology will be in the year 2000.

——That leads naturally into a discussion of *software and hardware*.

——That leads to an understanding of *computer networks*, local and wide-area networks, global network, and the Internet.

——In the topic of *multimedia*, we discuss the integration of video, audio, voice and communications.

——A discussion of *telecommunications* and *satellite communications* follows.

Last, we discuss the impact of all this on the global information network, *information super-highway*.

### 1.2.2 Impact of Information Technology Now and in the Future

**Briefing**

——*The history of information technology*. It's very important to know where information technology began and how it progressed so as to understand where it may be going in the future. Without that historical perspective, it's very difficult for you to predict how information technology is going to impact you and your organizations in the future.

——*The concepts and applications of networks, multimedia, and telecommunications*. There is a heavy emphasis in this course on telecommunications because it is becoming an underlying structural element, the foundation you might say, of the entire information technology industry.

——*How information technology is being applied*. You will be hearing what some of the organizations in the United States are doing today and what they are expecting to do in the future.

——Predictions about where information technology will be by the year 2000 and beyond.

VIDEO:

THE FUTURE OF INFORMATION TECHNOLOGY

This is a video of a keynote address, given by Dr. Andrew S. Grove, the president of Intel Corporation, which is the largest semiconductor manufacturing company in the world today. Intel was the developer of the original 8080 microprocessor chip, which made the personal computer successful, subsequent improvements, and Pentium the chip, which is being used in personal computers today. He gave this presentation, "Smart Connections to the World," at the Telecom ' 95 Conference on October 3, 1995, in Geneva, Switzerland. Sponsored by the United Nations, Telecom is the world' s leading exposition of telecommunications and information technology. Held once every four years, the event attracts industry leaders from around the world who gather to offer a look at the state of the art and to share their vision of the key trends shaping the future of this vital industry.

In Geneva, Switzerland, a host of international dignitaries participated in the opening ceremonies of Telecom ' 95. Included was the president of South Africa, Nelson Mandela, who issued his own mandate for the ongoing revolution in global communications:

If we cannot ensure that this global revolution creates a wide-range information society in which everyone has a stake and can play a part, then it will not have been a revolution at all.

For the first time ever, the keynote speech of this telecommunications event was delivered by an executive of the personal computer industry, an occasion Dr. Grove considered "symbolic of the growing interdependence and proximity of our two industries, and···the beginning of our future."

He went on:

Almost every industry faces critical moments in its history. I call these moments when the fundamentals of the industry and every company in that industry changes strategic inflection points. It' s a subtle point but it represents profound change. Before the strategic inflection point is the past of the industry, ahead is its future, and the future can be rising upward or can begin a decline. As an outsider, I believe the telecommunications industries are in the middle of that strategic inflection point. The strategic inflection

point is brought upon by the forces of competition and deregulation, but perhaps even more significantly it is brought about by the forces of digital technology that impinge upon it.

Dr. Grove painted a vivid picture of the convergence of the PC and telecommunications industries as "connections that take advantage of the intelligence of the personal computer as well as the capabilities of digital communications."

He began with a graphic illustration of a smart connection, a live link between two distant medical facilities in South Africa. Using personal computers, a doctor in the rural Community Hospital consults with a specialist at Johannesburg General Hospital.

"We basically have a young female who was involved in a motor vehicle accident, sustaining a pelvic fracture and a fracture of the left lower leg. Initially, she was quite stable but on the fourth day post admission, she developed acute chest pain, shortness of breadth and a temperature."

"That certainly seems like quite a marked deterioration. Do you have a chest x-ray?"

"Yes, if you look on page two of the notebook…"

Although their facilities are 500 kilometers apart, the doctors are able to share x-ray and electrocardiogram results in reaching a diagnosis.

"Gentlemen, let me interrupt you." From Geneva, Dr. Grove then joined the conference to discuss the benefits of this technology.

"When working in a remote area of South Africa, one works in isolation, and this system provides the opportunity for teaching and support to help workers in the rural areas. So, obviously, if we can consult with people with this means, we will significantly cut down on time wasted in terms of traveling from one area to the other. But even more important is that we will have continuity: Having seen the patient once, we will be able to follow her up on a day-to-day basis to see what has happened, what progress has been made."

Addressing the doctors, he continued:

"Could you please tell us how you acquired and place the x-ray and the ECG into the computer screen."

"That was very simple. The chest x-ray was taken in the normal fashion and it was then scanned to a scanner via the scuzzy board of the PC. The ECG was done in the normal fashion by a applying the electrodes to the patient and through a small module