BUSINESS INFORMATION System and Electronic Commerce

钟 伟 主编

科学出版社

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内 容 简 介

信息技术在快速发展和演变，从早期的交易处理系统到管理信息系统再到企业资源计划，一直发展到如今的电子商务，信息技术对商务活动的支持一直没有改变，也正是由于商务活动广泛地采纳和适用信息技术，双方才有今天各自迅猛的发展态势和空间。商务即交易，交易即决策，正确的决策需要信息，在市场环境瞬息万变的今天，决策对信息从准确性、及时性、完整性等方面提出了更高的要求。本书正是从这一逻辑出发，阐述商务活动与信息系统相互促进的演进关系，试图给读者建立一个完整的关于信息系统发展的脉络以及其对于商务活动的支持模式。

本书既可帮助经济管理类专业的学生从管理应用的角度来理解信息系统对商务运营乃至商务战略的支持，也可供相关专业的专家、学者和研究人员等参考。

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Foreword

Business Information Systems and Electronic Commerce provides an evolutionary view of information technology widely applied to support business operations. The book does not assume that the readers have any previous information system knowledge or experience. It is better for instructing undergraduates and graduates from management and business schools in the subject.

Through several years of information systems research, consulting and corporate training since 1997, Zhong Wei began instructing business information system and electronic commerce courses at International Business School(IBS) of Yunnan University of Finance and Economics(YUFE) in September 2006. The experience of learning management information system in university made him realize that nowadays the environments of application of information systems in organizations are variably changed. Most of the large organizations outsource their IT service and deployment of their applications to commercial solution providers rather than build and maintain the system on their own. For students of management and business major, they do not need to understand the detailed technology terms and mechanisms, but they need to know how they transform contemporary business operations from old TPS to ERP to EC.

After 4 years of taking *Electronic Commerce* series (by Turban et al.) as textbooks that offer the electronic commerce knowledge from a managerial perspective, Zhong Wei noticed that if the evolution of application of information systems within organizations is covered, the view of technologies to support the business operation will be better. Somehow, the management information system may be taken instead.

For the non-native English writer reason, to accurately and precisely and better reflect the nature of certain terms, some chapters take the pieces directly from several works. Zhong Wei owes a great debt of gratitude to Effraim Turban for *Electronic Commerce 2010: A Managerial Perspective*, Ralph Stair and George Reynolds for *Fundamentals of Information Systems* (6E), Kenneth C. and Jane P. Laudon for *Management Information Systems* (12E), and many other unlisted authors.

Zhong Wei

January 2014

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2. Differentiate between information technology architecture and information technology infrastructure.

3. Differentiate information technology and information system.

Chapter Topics

1.1 From Data to Information to Knowledge

1.2 Information Technology and Its Evolution

1.3 Information System

1.1 From Data to Information to Knowledge

Information is the life blood of business operation for a better economic goal and accomplishments. The relationship of data, information and knowledge within an organizational architecture can be simply described as Figure 1.1.

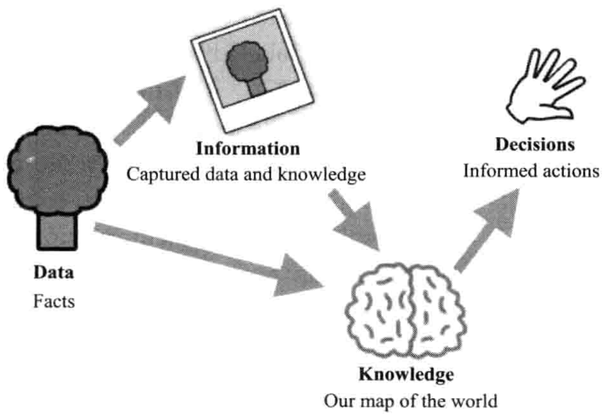


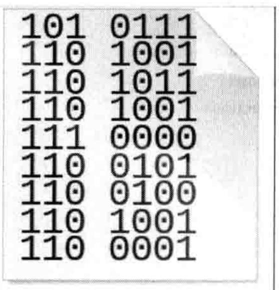
Figure 1.1 From Data to Information to Knowledge

Information

Information, in its most restricted technical sense, is a sequence of symbols that can be interpreted as a message. Information can be recorded as signs, or transmitted as signals. Information is any kind of event that affects the state of a dynamic system. Conceptually, information is the message (utterance or expression) being conveyed. The meaning of this concept varies in different contexts. Moreover, the concept of information is closely related to notions of constraint, communication, control, data, form, instruction, knowledge, meaning, understanding, mental stimulus, pattern, perception, representation, and entropy.

How Binary Numbers Represent Graphics

Several techniques have been developed by computer scientists to represent pictures and other images. The simplest of these is known as "bit mapping". A simple black and white diagram can be broken down into tiny squares (dots). Each square is either black or white. Thus each tiny square can be represented by either "1" for black or "0" for white. The location of each dot can be described in terms of its distance from the left-hand corner of the diagram. Say the diagram is 1,000 dots wide and 1,000 dots high, then (0, 0, 0) could represent a white dot in the bottom left-hand corner; (1,000, 1,000, 1) a black dot in the upper right-hand corner; (500, 500, 1) a black dot in the centre, and so on. It can be seen that quite a small diagram would have a million (1,000×1,000) dots and require at least a million numbers to describe it. Thus graphics tend to eat up the memory of a computer. (This is still true even if we allow for all sorts of ingenious tricks which are used in practice to cut down the memory demands from the enormous figures suggested here.) If it is desired to add colour or intensity, then additional data will have to be stored and processed to describe this. Clearly, the more dots per inch (dpi), the better quality of the picture produced. So high-quality colour pictures demand even more computer memory. A moving picture will be constructed, as on film or television, from a succession of still pictures presented rapidly enough to fool the human eyes into the illusion of movement. Each successive picture (or, more accurately, each change from the previous picture) will have to be "labeled" to indicate at which fraction of a second from "Go" it is to be presented, thus presenting further demands on data storage and processing. This gives an indication of why "multi-media presentations" are a relatively recent feature on computers and how even the rapidly increasing memory capacities of contemporary machines can be so easily stretched by the demands of such applications. The ASCII code for the word "Wikipedia" represented in binary, the numeral system most commonly used for encoding computer information (Figure 1.2).



Wikipedia

Figure 1.2 "Wikipedia" Binary Form (ASCII Code)

Data

Data is the values of qualitative or quantitative variables, belonging to a set of items. Data in computing (or data processing) is represented in a structure, often tabular (represented by rows and columns), a tree (a set of nodes with parent-children relationship) or a graph structure (a set of interconnected nodes). Data is typically the results of measurements and can be visualised using graphs or images. Data as an abstract concept can be viewed as the lowest level of abstraction from which information and then knowledge are derived. Raw data, i.e., unprocessed data, refers to a collection of numbers, characters and is a relative term; data processing commonly occurs by stages, and the "processed data" from one stage may be considered the "raw data" of the next. Field data refers to raw data collected in an uncontrolled in situ environment. Experimental data refers to data generated within the context of a scientific investigation by observation and recording.

> *Data is a collection of processed information. The singular form of data, datum, is Latin for "given", a term interchangeable with "fact". Therefore, data is a collection of facts. While the term "raw data" may refer to unprocessed facts that may be redundant or difficult to understand, information termed simply "data" is usually processed and ready to be applied in research, to have conclusions drawn from it, and to base decisions upon it. Although technically a plural, the term data is often phrased as a singular mass noun in modern English.*

In computer terminology, data often refers to user and configuration files. All digital photographs, e-mail messages, music and video files, Web browser bookmarks, and other files are considered user data. Computer data is stored in storage devices such as hard disks, USB jump drives, and CD-ROM disks, etc. Data security measures must be taken when certain types of sensitive information are stored on the computer, such as credit card numbers, social security numbers, credit reports, tax information. These items are often primary targets in identity theft, and sophisticated data mining techniques can help attackers extract this information. Additionally, data backup strategies are often implemented to prevent accidental or intentional data loss.

Data is often regarded as having high financial or sentimental value. Thus, an incident in which data is destroyed can be viewed as a catastrophe under certain circumstances. Methods by which data can be destroyed include accidental or malicious deletion of critical files, hardware component failure, software bugs, natural disasters, and more. In these cases, data recovery services are employed with the hope that the data which has been destroyed may be recoverable. In the case of malicious intent by a knowledgeable attacker, data recovery may be impossible. However, in the common case of hardware failure data recovery techniques are often successful. Different methods of recovery are employed in each situation, and the cost of data recovery can vary widely.

Knowledge

Knowledge is a familiarity with someone or something, which can include facts, information, descriptions, or skills acquired through experience or education. It can refer to the theoretical or practical understanding of a subject. It can be implicit (as with practical skill or expertise) or explicit (as with the theoretical understanding of a subject); it can be more or less formal or systematic. In philosophy, the study of knowledge is called epistemology; the philosopher Plato famously defined knowledge as "justified true belief". However, no single agreed upon definition of knowledge exists, though there are numerous theories to explain it.

Knowledge acquisition involves complex cognitive processes: perception, communication, association and reasoning. While knowledge is also said to be related to the capacity of ***acknowledgment*** in human beings.

> *The definition of knowledge is a matter of ongoing debate among philosophers in the field of epistemology. The classical definition, described but not ultimately endorsed by Plato, specifies that a statement must meet three criteria in order to be considered knowledge: it must be justified, true, and believed. In contrast to this approach, Wittgenstein observed, following Moore's paradox, that one can say "He believes it, but it isn't so," but not "He knows it, but it isn't so." He goes on to argue that these do not correspond to distinct mental states, but rather to distinct ways of talking about conviction. What is different here is not the mental state of the speaker, but the activity in which they are engaged. For example, on this account, to know that the kettle is boiling is not to be in a particular state of mind, but to perform a particular task with the statement that the kettle is boiling. Wittgenstein sought to bypass the difficulty of definition by looking to the way "knowledge" is used in natural languages. He saw knowledge as a case of a family resemblance. Following this idea, "knowledge" has been reconstructed as a cluster concept that points out relevant features but that is not adequately captured by any definition.*

It has been said that the purpose of information systems is to get the right information to the right people at the right time in the right amount and in the right format. Because information systems are intended to supply useful information, we begin by defining information and two closely related terms, *data* and *knowledge*.

Differentiate Data, Information and Knowledge

The terms data, information and knowledge are frequently used for overlapping concepts. The main difference is in the level of abstraction being considered. Data is the lowest level of abstraction, information is the next level, and finally, knowledge is the highest level among all three. Data on its own carries no meaning. For data to become information, it must be interpreted and take on a meaning. For example, the height of Mt. Everest is generally considered as "data", a book on Mt. Everest's geological characteristics may be considered as "information", and a report containing practical information on the best way to reach Mt. Everest's peak may be considered as "knowledge".

Information as a concept bears a diversity of meanings, from everyday usage to technical settings. Generally speaking, the concept of information is closely related to notions of constraint, communication, control, data, form, instruction, knowledge, meaning, mental stimulus, pattern, perception, and representation.

Beynon-Davies(2002) uses the concept of a sign to distinguish between data and information; data is symbols while information occurs when the symbols are used to refer to something.

It is people and computers who collect data and impose patterns on it. These patterns are seen as information which can be used to enhance knowledge. These patterns can be interpreted as truth, and are authorized as aesthetic and ethical criteria. Events that leave behind perceivable physical or virtual remains can be traced back through data. Marks are no longer considered data once the link between the mark and observation is broken.

Mechanical computing devices are classified according to the means by which they represent data. An analog computer represents a datum as a voltage, distance, position, or other physical quantity. A digital computer represents a datum as a sequence of symbols drawn from a fixed alphabet. The most common digital computers use a binary alphabet, that is, an alphabet of two characters, typically denoted "0" and "1". More familiar representations, such as numbers or letters, are then constructed from the binary alphabet.

Some special forms of data are distinguished. A computer program is a collection of data, which can be interpreted as instructions. Most computer languages make a distinction between programs and the other data on which programs operate, but in some languages, notably Lisp and similar languages, programs are essentially indistinguishable from other data. It is also useful to distinguish metadata, that is, a description of other data. A similar yet earlier term for metadata is "ancillary data". The prototypical example of metadata is the library catalog, which is a description of the contents of books.

1.2 Information Technology and Its Evolution

What Is Information Technology

Information technology (IT) is the application of computers and telecommunications equipment to store, retrieve, transmit and manipulate data, often in the context of a business or other enterprises. The term is commonly used as a synonym for computers and computer networks, but it also encompasses other information distribution technologies such as televisions and telephones. Several industries are associated with information technology, such as computer hardware, software, electronics, semiconductors, internet, telecom equipment, e-commerce and computer services. Linking together definitions of "information" and "technology" from the *Shorter Oxford English Dictionary*, "information technology" means "the systematic study of the industrial arts relating to the communication of instructive knowledge". This definition includes studying printing, or, for that matter, smoke signals.

In a business context, the Information Technology Association of America has defined information technology as "the study, design, development, application, implementation, support or management of computer-based information systems". The responsibilities of those working in the field include network administration, software development and installation, and the planning and management of an organization's technology life cycle, by which hardware and software are maintained, upgraded, and replaced.

Humans have been storing, retrieving, manipulating and communicating information since the Sumerians in Mesopotamia developed writing in about 3000 BC, but the term "information technology" in its modern sense first appeared in a 1958 article published in the *Harvard Business Review*; authors Harold J. Leavitt and Thomas L. Whisler commented that "the new technology does not yet have a single established name. We shall call it information technology (IT)". Based on the storage and processing technologies employed, it is possible to distinguish four distinct phases of IT development: pre-mechanical (3000 BC–1450AD), mechanical (1450–1840), electromechanical (1840–1940) and electronic (1940–present). This book focuses on the most recent period (electronic), which began in about 1940.

IT Infrastructure

An organization's **information technology (IT) architecture** is a high-level map or plan of the information assets in an organization. It is both a guide for current operations and a blueprint for future directions. The IT architecture integrates the entire organization's business needs for information, the IT infrastructure (discussed in the next section), and all applications. The IT architecture is analogous to the architecture of a house. An architecture plan describes how the house is to be constructed, including how the various components of the house, such as the plumbing and electrical systems, are to be integrated. Similarly, the IT architecture shows how all aspects of information technology in an organization fit together. Figure 1.3 illustrates the IT architecture of an online travel agency. We will discuss each part of this figure in subsequent chapters.

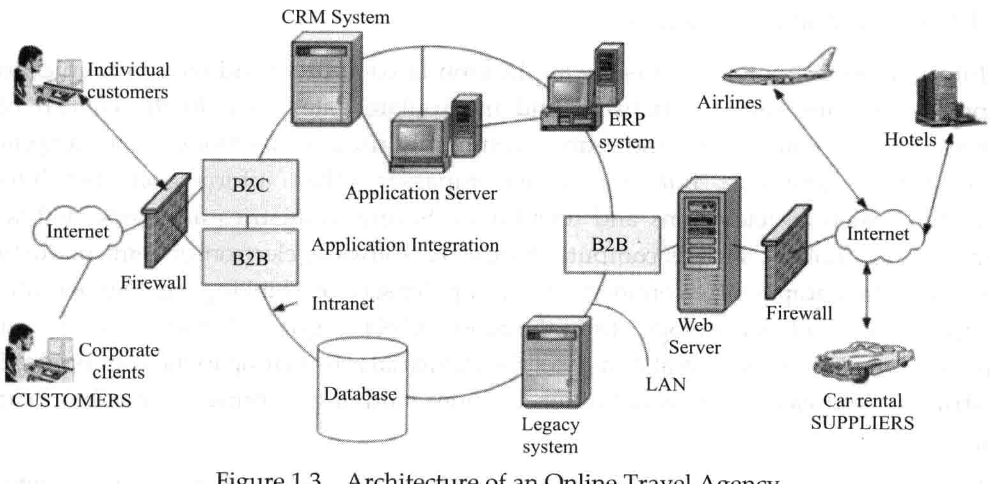


Figure 1.3 Architecture of an Online Travel Agency

An organization's **information technology (IT) infrastructure** consists of physical facilities, IT components, IT services, and IT personnel that support the entire organization. From Figure 1.4, we see that *IT components* are the computer hardware, software, and communications technologies that provide the foundation for all the organization's information systems. As we move up the pyramid, we see that *IT personnel* use *IT components* to produce *IT services*, which include data management, systems development, and security concerns. An organization's IT infrastructure should not be confused with its platform. A platform is part of the IT infrastructure.

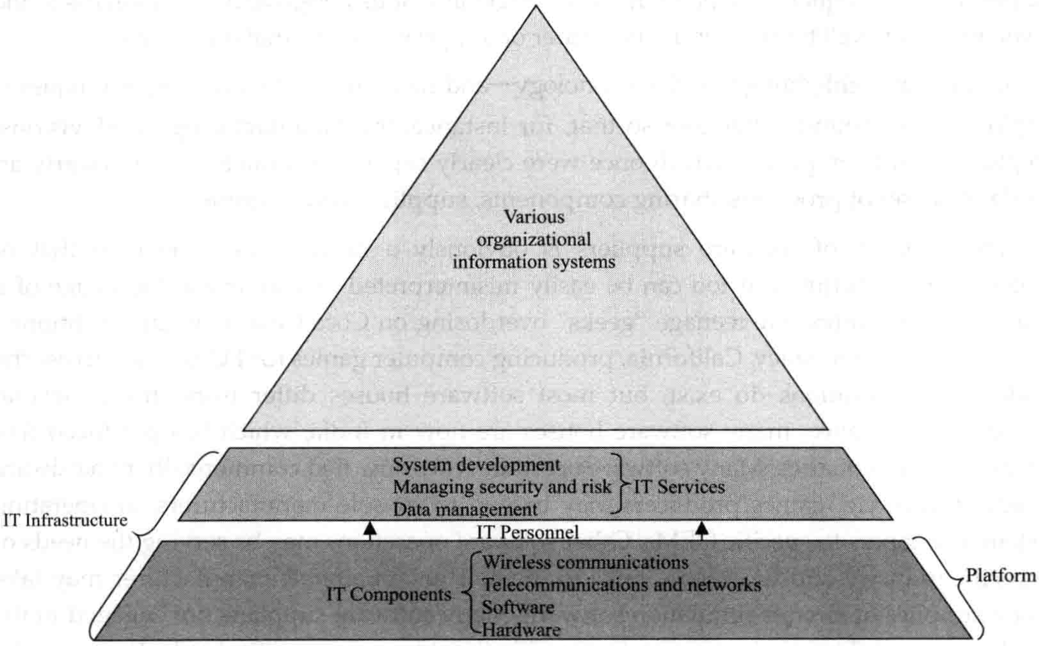


Figure 1.4 An Organization's IT Infrastructure

Complex Information Technologies Players

It can be seen that the modern information and communication industry is a perhaps uniquely complex one. A preliminary distinction may be drawn between the producers of different types of communication goods and services, but in practice there is an increasing trend towards the integration of firms across categories. Each of these categories will be considered in turn, before the issues raised by the structural changes occurring at lightning pace within the industry are considered.

The role of hardware suppliers seems, on the face of it, a straightforward one which has, seemingly, much in common with old-fashioned nineteenth-century industrial manufacturing operations. Raw materials may be presumed to come in the gates at one end of the works to emerge from the production line some time later as goods to be sold to consumers, the price of the goods reflecting the high cost of the sophisticated labour, machinery and materials employed. These assumptions are, however, largely false.

So-called original equipment manufacturers (OEMs) of, say, personal computers are