

"Part I Understanding Information Systems Technology"



INTRODUCTION TO INFORMATION SYSTEMS TECHNOLOGY



Information Systems Technology

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LEARNING GOALS

- Describe the major characteristics of the digital world.
- Explain data, information, and information systems
- Discuss the use of information systems in organizations.
- Describe the features of working in the digital world.
- Describe ethics and the ethical problems posed by the digital world.

The Nature of the Digital World

Revolutions in technology lead to changes in business. The information revolution gave rise to the digital world & has changed the nature of business in various ways:

1. The digital world is increasingly **global** today
2. The **digitization of goods** (products like music, movies, printed material that has been historically distributed in a physical format are now distributed digitally)
3. The **increased speed of commerce** (the instant communication over the WWW)
4. The **merger of products and services** now require the purchase of both a product & a service (e.g. mobile phones)
5. The **role of ideas & their protection** in the digital world is increasingly important
6. The emergence of **new markets without physical presence** and **new pricing schemes**

Globalization - The system of interconnected economies

- Based on capital markets
- Characterized by the use of technology
- Emerged in late 1980s
- Presents opportunities for growth (firms have customers around the world)
- Requires an understanding of:
 - Local customs
 - Local laws
 - Regulations of foreign countries

The Digitization of Goods — led to change in format of many creative products

- CDs
- DVDs
- MP3s
- Software
 - Download virus protection files automatically to protect your computer
- Digital documents
 - Newspapers — [NY Times](#)
 - Electronic library databases

Speed — because the physical transfer of goods, money, & people is not always required.

- Digital availability includes the expectation of rapid availability and delivery
 - Anytime
 - Any place
- Speed of technological change
 - some 20 years ago there wasn't a mobile phone, MP3 player, PDA
 - From 1996 to 2001 the number of patents issued worldwide increased by 50%

The Merger of Products and Services

- Blending of tangible products with intangible services
- The service becomes a product (e.g. OnStar - a global positioning system combined with a mobile phone)

The Role of Ideas — in the past people valued primarily tangible goods (land, gold, etc), in the digital world ideas are more valuable.

- New ideas are at the heart of IT innovations
- Digitalization makes theft much easier
 - Web-site design; Digital images; Digital content
- Protection of intellectual property
 - Patents — protect inventions for a period of 20 yrs.
 - Copyrights — protects the expression of an idea, not the idea itself (covers books, music, plays, movies, art works). The copyright owner controls the way his/her works are reproduced, distributed, performed, displayed, & has control over derivative works, based on the copyrighted material.
 - Trademarks — a word, phrase, symbol used to identify a product or business for conducting commerce (e.g. Coca-Cola, IBM)
 - Service mark — similar to a trade mark, but applies to a service
 - Trade secrets — inventions, the basis of which the inventor is keeping secret. Individuals & companies use trade secrets when they do not wish to give up patent protection after 20 yrs.

New Markets and Pricing – digital businesses operate in digital markets, which have no physical existence. They only exist as entries in a computer database, & participants in digital markets interact through computers

- **Digital markets have created new businesses**
 - **Internet Travel Sites** – allow customers to plan trips, purchase airline tickets, make hotel & rental car reservations from their computers
 - Orbitz
 - Expedia
 - **Customer-to-customer exchanges and auctions**
 - eBay – allows users to auction items worldwide & makes money by charging a fee for the listing & takes % of the winning bid. It never handles physical goods (seller sends directly to the buyer)
 - Yahoo auctions
- **Digital businesses produce intelligent products & services** (automatically adjust to current conditions, & allow for dynamic pricing)

Data, Information, Information Systems

- **Data** – raw facts about people, events, & objects.
 - Temperature – 75° F
 - Intel stock price – \$32.375

Raw facts are generally not useful out of context & to gain value from data businesses need to transform it into information.

- **Information** – facts within a given context; data that has been processed and presented in a meaningful form for human interpretation, often with the purpose of revealing trends or patterns.
 - Intel stock price after the 2-1 stock split yesterday settled at \$32.375/share – now you know the number of shares and their value
 - The temperature at midnight in Times Square, NYC was 75° F – NYC winter heat wave still continues

The Value of Information – information is the most valuable asset for most companies.

According to Tom Davenport & Larry Prusak, there are six qualities that make information valuable:

- **Accuracy** – is the information correct, can we rely on it?
- **Timeliness** – how current is the information?
- **Accessibility** – can we access the info when we need it?
- **Engagement** – is the information affecting our decision?
- **Application** – is it relevant in the current context?
- **Rarity** – is it previously known or confidential?

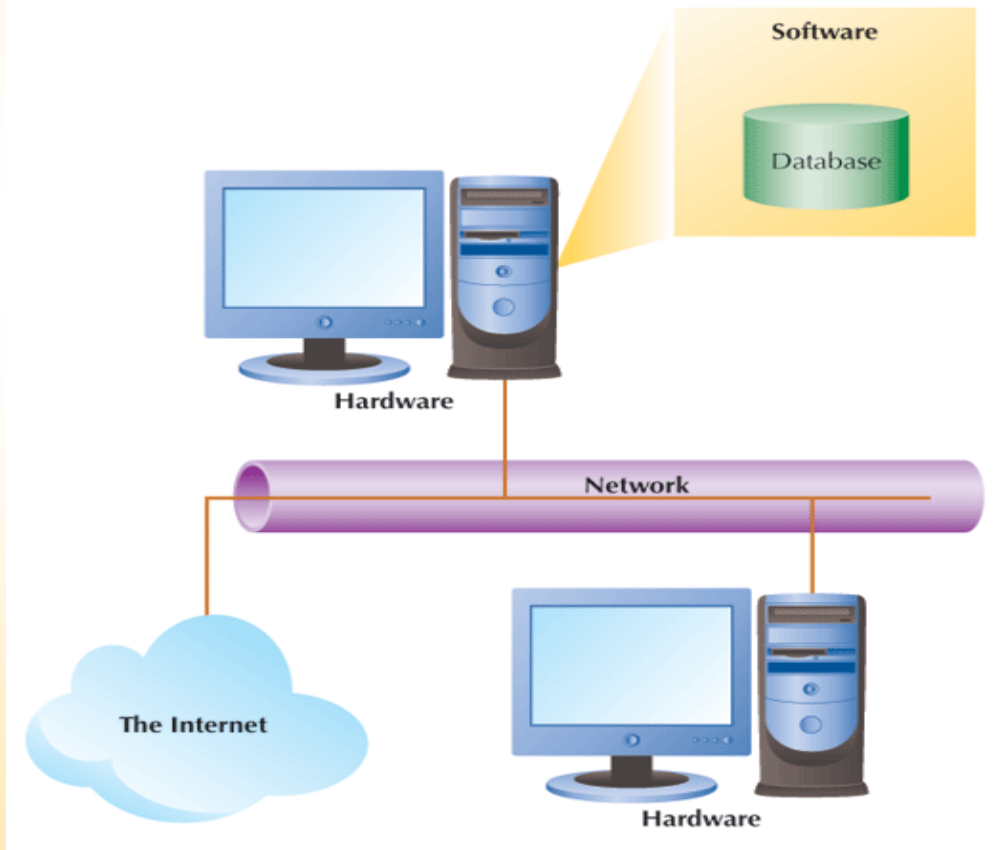
We can add value to information by :

- **pruning** (eliminating the obsolete, irrelevant, inaccurate part
- **adding context** (summarising, analysing, comparing, concluding)
- **enhancing style** & choosing the **right medium** for presentation & distribution

Information Systems - A set of interrelated information technologies that work together to collect, store, process, retrieve, and distribute information

- **Purpose of IS** — to get the right information to the right people at the right time.
- **Major parts**
 - Hardware
 - Software
 - Databases
 - Networks
 - People

Figure 1.1 Information System Components



Information Systems in Organizations

- **Organization** - is an administrative and functional structure applied to people working toward a specific goal.
- To understand the organization IT needs we need to understand its **administrative** and **functional structure**.
 - **Hierarchical** – based on a military structure where one person directly supervises other people (a number of vice presidents & chiefs report to the president)
 - **Matrix** – employees work in multidisciplinary teams
 - **Other**

The various levels in the hierarchy will have different information systems needs.

Administrative Information Systems – serve a specific administrative purpose. There are seven types:

- **Transaction Processing Systems (TPS)** – support operational-level employees in the organization, who perform the routine day-to-day transactions. These systems process & store data (e.g. payroll, accounts, registration, inventory systems)
- **Office Automation Systems (OAS)** – support office workers to create, use & manipulate data, but these people do not create new information (word processing & spreadsheet SW)
- **Knowledge Work Systems (KWS)** – highly specialised systems used by knowledge workers (professionals who create new information as part of their job, e.g. doctors, lawyers, architects, computer programmers)
- **Management Information Systems (MIS)** – for managers, who need systems that generate reports to warn them about problems in particular area (operations, finance, personnel). These systems process data internal to the organisation, & that is coming from transaction processing systems.
- **Decision Support Systems (DSS)** – help managers to make decisions that are not routine. These systems use complex analytical tools, combined with both internal data (coming from inside organization) & external data (economic indicators, etc)
- **Executive Information Systems (EIS)** – for strategic planning performed by top executives who require info systems tailored to provide the exact information in the required format
- **InterOrganizational Systems (IOS)**- provide information links between companies and interorganisational systems. Exist at various levels of the admin. hierarchy.

Functional Information Systems – beside administrative needs, organisations also have functional needs for IS to support their business units (finance & accounting, marketing & sales, manufacturing & operations, human resources)

- **Finance and Accounting Systems** – emerged in 1950s; include accounts payable & receivable, payroll, budgeting, investment analysis, & auditing
- **Marketing and Sales Systems** – in the past were responsible for selling only.
 - Sales Force Automation (SFA) systems help salespeople to maintain prospect list, track orders, & project sales
 - Marketing Automation systems enable marketing personnel to plan campaigns & track their effectiveness
 - Customer Relationship Management (CMR) systems integrate all of the sales & marketing functions into one system & may provide links to other systems
- **Manufacturing and Operations Systems** – very complex systems that link all the functional areas within organisation by use of shared database
- **Human Resources Management Systems** – help HR staff determine personnel needs & the skills required to fill them. Can be integrated with other organisational systems.

Interaction of Administrative and Functional IS

Figure 1.3 Administrative and Functional Information Systems

		Functional Area				
		Finance and Accounting	Marketing and Sales	Manufacturing and Operations	Human Resources	
Administrative Level	TPS	Accounts receivable, payroll	Order tracking, shipping	Machine automation	Time sheets	Enterprise Resource Planning (ERP)
	OAS	Spreadsheet Word processing				
	KWS	Investment modeling	Market analysis	Engineering workstation	Recruitment	
	MIS	Auditing	Sales forecast	Inventory management	Benefits management	
	DSS	Budget analysis	Product price analysis	Material logistics	Work force analysis	
	EIS	Financial forecast	Product planning	Plant location	Compensation planning	
	IOS	Invoices, payments	Joint marketing campaigns	Just-in-time inventory	Managing temporary employees	
			Customer Relationship Management		Human Resources Management Systems	

Working in the Digital World – in the digital world, an individual's economic value is based not on the physical work done in an hour or day, but on how much the person knows. This causes major changes in the way individuals work and created **knowledge workers**

- **Knowledge workers**
 - People who create new knowledge or modify existing knowledge
 - Use their mental not physical power to perform their work
 - People who are most likely to use ISs as part of their job
 - Their job typically requires advanced education
 - College degree
 - Professional certifications
- **Data workers** – people who enter data into ISs, with no higher than high school degree, but trained to use computers
 - Word processors – type free-form text (letters, memos, reports, written by the knowledge workers)
 - Data entry keyers – responsible for entering lists of items into ISs
- **Telecommuting** – to allow employees to work from home or other remote location providing access to computerised data & applications that are available at the office. Telecommuting keeps costs low & employees happy.

Ethics in the Digital World – how we build and use IS will depend on our ethical standards.

- **Ethics -**
 - A set of principles of right conduct, &
 - the rules or standards governing the conduct of a person or the members of a profession
- Ethical is not always the same as legal.
- Ethical problems in the digital world are confusing because Legal system has not kept pace with the technology developments.

Major Ethical Issues in the Digital World

- **Privacy**
 - Criminals who use ISs to steal the identity of others (credit cards, mortgages, bank accounts, using private data e.g. PPS numbers)
 - Companies that sell confidential customers personal information to other companies for marketing purposes
- **Intellectual Property**
 - Now that books, music, movies are available in digital format, anyone with a little know-how can make copies & distribute them over the Internet worldwide. The dilemma for us is whether to make & accept such copies.
- **Social Concerns** – poorer people & those living in rural communities may not be able to access the Internet (the main requirement to live in the digital world), & this increases the digital divide.

Figure 1.4 Ten Commandments of Computer Ethics

Ten Commandments of Computer Ethics
1.Thou Shalt Not Use A Computer To Harm Other People.
2.Thou Shalt Not Interfere With Other People's Computer Work.
3.Thou Shalt Not Snoop Around In Other People's Computer Files.
4.Thou Shalt Not Use A Computer To Steal.
5.Thou Shalt Not Use A Computer To Bear False Witness.
6.Thou Shalt Not Copy Or Use Proprietary Software For Which You Have Not Paid.
7.Thou Shalt Not Use Other People's Computer Resources Without Authorization Or Proper Compensation.
8.Thou Shalt Not Appropriate Other People's Intellectual Output.
9.Thou Shalt Think About The Social Consequences Of The Program You Are Writing Or The System You Are Designing.
10.Thou Shalt Always Use A Computer In Ways That Insure Consideration And Respect For Your Fellow Humans.

Source: www.brook.edu/dybdocroot/its/cei/overview/The_Commandments_of_Computer_Ethics.htm

Learning Goals Summary

- ✓ The major characteristics of the *digital* world
- ✓ What data, information, and knowledge are
- ✓ How organizations use information systems
- ✓ Some of the features of working in the digital world
- ✓ Ethics and the ethical problems of the digital world