

Chapter 1

Why it matters?

- Information Systems are very important in our daily life
 - o Blackberry, Twitter, Facebook
- Organizations that ignore the impact of technology and Information Systems have a high change at risk
- The adoption of the internet within a decade
- Radio to television, took many decades
- Individuals and organizations must keep up with technology

Moore's Law – states that computing power (as the number of transistors in an integrated circuit) roughly doubles every 18 months

- o It illustrates the rate of change in technology capability over time, and the resulting effect on cost
- o Moore's law means more performance for lower cost
- o More transistors into smaller space
- o Processing power, measured in millions of instructions per second (MIPS), has risen because of increased transistor count
- o Technology will improve 1 percent per weeks and approx 11-15 % per quarter

Information Technology - is a key enabler to all organizations and impacts all organizations and it impacts all business disciplines.

- It is hardware, software and communication
- Allow individuals and organizations to accomplish goals
- Without people, clear goals and process, IT itself is irrelevant

Knowledge Work – This involves the discovery, analysis, transformation, synthesis and communication of data, information and knowledge

What is information system?

Information System – is an organized collection of people, information, business process and IT designed to transform inputs into outputs, in order to achieve goals

- They enhance work, decision makings, problem solving, communication and coordinating

IPO Model

Input (Data, Knowledge, Information and decisions) →

Process (People, business process, Information Technology) →

Output (Business Value)

As this input-process-output (IPO) model shows, a business should design its information system to leverage the human ability to use information technology to its best advantage. By doing this, the output is more than the sum of its parts (data, information, knowledge, decisions)—it is the creation of business value.

Information System Components

Input - entering information into a system

Example Enter your friends contact information

Process – A series of one or more steps by a business to transform input into output

Example: Save to contact to database

Output – the end result of the process

Example: An alphabetical order of the list of friends and their contact information

Data – Raw and unorganized data

Example: list of friends who may be interested in a spring trip

Information – Process/ organized .transformed data that is useful

Example: List of confirmed friends and potential locations

Knowledge – Information plus human experience and judgement

Example: If enough agree, the group will get a discount on the trip

Information Technology - the physical concept – typically hardware, software, is a key enabler to all organizations and impacts all organizations

Example: Making a website

Business Processes – collection of steps that interact with each other to transform inputs into outputs to achieve a goal

Example: A function which allows ur friend to ranks the preferred locations

People – people or organizations that have both an interest in and an influence on the creation, implementation, or operation of an IS

Example: your friends add comments about what location they like

Decision – a choice made from one or more alternatives to follow or avoid some course of action

Example: The numbers of votes are received and the location is chosen

Business Value – A positive return on the investment of resources created through the effective and efficient integration of an organization's people, information, information technology, and business processes.

Information Systems Vs. Information Technology

Information System – is an organized collection of people, information, business process and IT designed to transform inputs into outputs, in order to achieve goals

Information Technology – is simply a collection of tools (hardware, software, connectivity) that individuals or businesses to achieve their goals

The Productivity Zone

- Occurs at *the intersection of people, process and technology*
- IS system integrates all three of these components to create business value
- Business can achieve superior productivity and enhance their competitive advantage businesses; this can mean increased efficiency and greater profits.
- For government, this could mean better services delivered at a lower cost.
- For not-for-profits, this could mean enhanced online donor and event management systems.

The Internet

Internet – an integral part of personal and business lives for communication, information's and commerce

Communication - possible for professionals the share information both between themselves and other business partners

- Providing newsgroups, chat rooms, bulletin boards, text messaging using mobile phones, as well as email and instant messaging.

World Wide Web – has dramatically reduced the effects required to carry out both activities and it is very easy to publish something

- Web makes it easy to publish information in a variety of ways.
- the Internet and Web have been called the greatest advances in publishing

Information overload – difficult for a person to understand and make decisions due too much information's

Commerce – buying and selling of goods and service for the internet

E-Commence - use of IS, technology and computer network by individuals and organizations to create business value

Business Organizations and the Business Environment

Business - any organization with one or more people who:

1. Decide on common goals to pursue
2. Work together to locate and organize resources
3. Create processes to achieve the desired goals

- A business's primary goal is to generate economic value (make a profit) over a sustained period of time. For example, when you order coffee at Tim Horton's, this generates value for the company.

Business environment - is a complex collection of political, economic, social, and technological factors that organizational leaders must consider when making decisions regarding goals, organizational forms, and the creation of business value.

Types of IS Found in Business

TPS (transaction processing system)

Captures and processes transactions to make them available to the organization. A transaction is the exchange of something of value the business produces for something in return that the business values (e.g., revenue from product sales).

MIS (management information system)

Through processing and reporting features, an MIS provides timely information to decision makers.

DSS (decision support system)

Provides analytical and visualization tools to support and enhance decision making and planning.

ERP (enterprise resource planning) system

Integrates and standardizes processes, and centralizes and standardizes the storage and management of data.

CRM (customer relationship management) system

Integrates data collection, transformation, storage, and analysis of customer transaction data, including purchases, service requests, and other forms of customer contact.

Globalization

- Means that modern businesses use information technology to expand their market to customers around the globe,
- IT has been a key enabler in making the world flatter and smaller

10 forces identified by Friedman as responsible for flattening the world, only one is not directly related to technology:

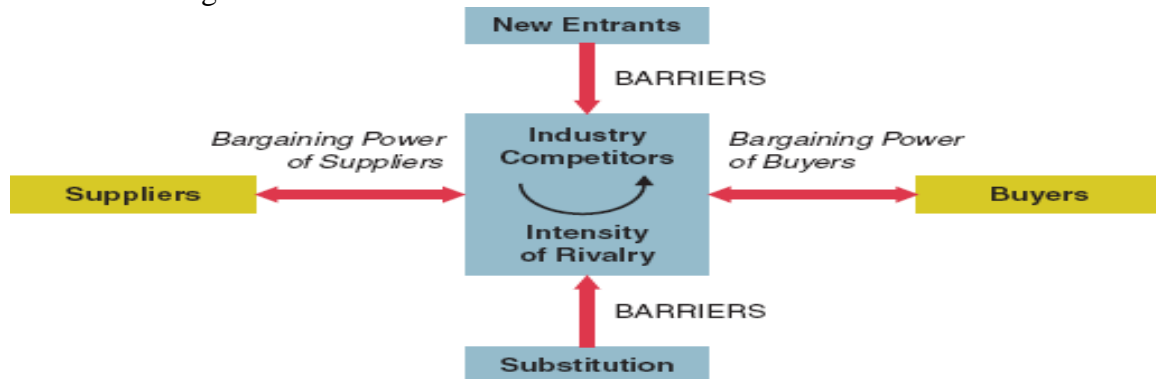
1. *Collapse of the Berlin Wall – 1989* (not related to technology)
2. Netscape – an early search engine allowing the general public to search the internet
3. Workflow software – using Internet technologies to allow work to be done without human intervention (e.g., the use of PayPal for financial transactions)
4. Open sourcing – allowing online contribution and collaboration
5. Outsourcing – allowing work to be divided between companies or locations, enabling them to be more efficient; the work is then integrated back to the assigning organization; customer contact call centres are often outsourced
6. Off shoring—allowing companies to take their operations to another location, this allows them to produce items better, faster, and cheaper
7. Supply-chaining – using technology to streamline operations and provide products/services to market faster and cheaper
8. In sourcing – allowing companies, small and large, to use outside firms to manage key operations on their behalf, thus allowing them to focus on core business (e.g., a company may insource its warehouse and distribution activities so that it can focus on product design)
9. Informing – the ability to find any type of information online
10. “The steroids” – technology such as mobile phones, iPods, instant messaging, and voice over Internet protocol (VoIP)

CHAPTER 2 - Business Organizations and Business Processes

A number of different tasks need to be coordinated to deliver a product or service therefore a company needs a **business strategy**

Michael Porter states that a **strategy** is a broad-based formula for how a business is going to compete, what its goals should be, and what plans and policies will be needed to carry out those goals.

- He suggests if an industry is attractive and few barriers, then more competitors will enter and increase competition
- More barriers than hard for competitors to enter the entity
- Bargaining power of both suppliers and buyer help create and sustain competitive advantage



Business as a Open System

Open System Model – indicates that a business operates by transforming inputs into outputs and by constantly interacting with its environment

Stakeholders and Boundaries in the Business Environment

Stakeholder – is a person or entity that has a **interest in and an influence** on how a business will function in order to succeed

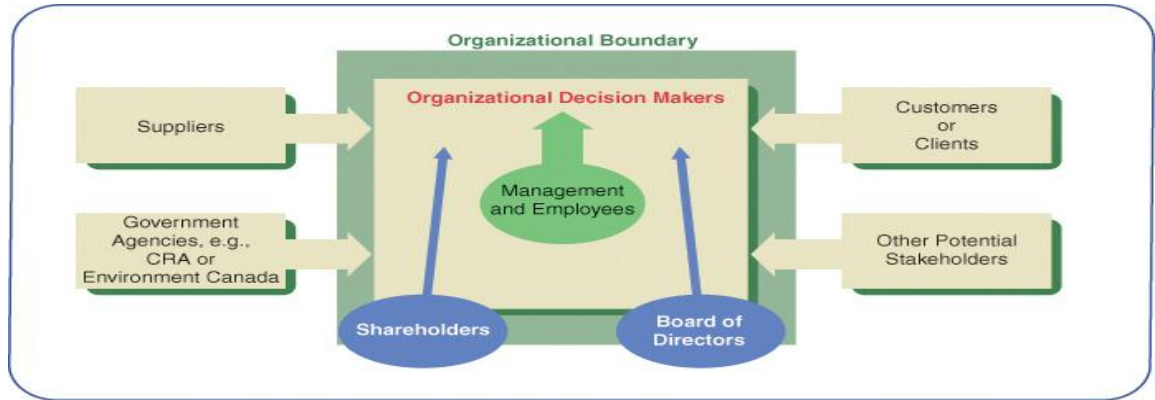
- A stakeholder may be external (in the environment) or internal (within the organizational boundary) relative to the system.



Organizational Boundary

- Business must remain open to their environment, so that it allow the business to receive input and produce an output
- An open boundary allows a business to receive inputs and to produce outputs.

- A business must be aware of what is going on its environment so it can take steps to remain competitive by responding to opportunities and threats
- A business needs external information to run operations or process on a daily basis
 - o However, interaction with that environment carries risk, especially when the environment changes constantly.



For example, before making business decisions, soft drink manufacturers like Coke or Pepsi need information about purchases of their competitors' products in various regions of the country, the expected cost of high fructose corn syrup (sweetening ingredient), and even the government's recent changes to tax laws.

How Business Organize to Create Value

Functional and Decentralized structure

- The line of authority and communication are vertically orientated

Matrix

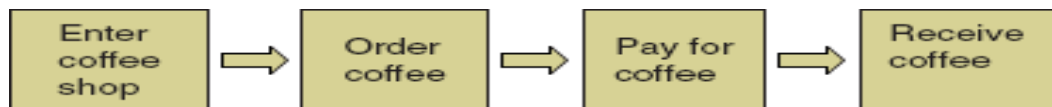
- Blends the functional and decentralized organizations structures
- Top to bottom, is organized as a functional structure
- Left to right, the matrix follows a product-focused structure that creates teams across business units

Table 3.1 Advantages and Disadvantages of Functional, Decentralized, and Matrix Organizational Forms		
Organizational Form	Advantages	Disadvantages
Functional	<ul style="list-style-type: none"> • Economies of scale through efficient use of resources • Significant technical expertise found in the functional areas • Clear chain of authority and communications within a function 	<ul style="list-style-type: none"> • Poor communication and coordination between functional areas • Relatively inflexible or slow to respond to change in the business environment • Employees may focus on functional area goals rather than organizational goals
Decentralized	<ul style="list-style-type: none"> • Faster response and greater flexibility • Greater communication and coordination between organizational units • Greater development of breadth of managerial skills 	<ul style="list-style-type: none"> • Duplication of resources and efforts across organizational units • Technical knowledge not as in-depth relative to functional organizational form • Less direct control by upper management
Matrix	<ul style="list-style-type: none"> • Increased flexibility and responsiveness to business needs and environmental changes • Enhanced problem solving, cooperation, communication, and resource sharing • Decision making occurs lower in organization and closer to customer 	<ul style="list-style-type: none"> • Frustration due to dual lines of authority and responsibility • Increased need for coordination between functional areas consumes time and resources • Potential for goal conflict between functional and decentralized components of matrix (e.g., marketing manager vs. product A manager)

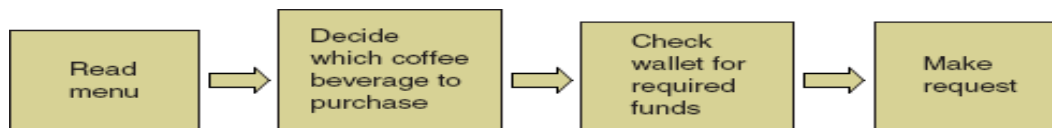
Business Process - transforms inputs to their main outputs, organizations need to perform a series

- A **process** is often shown as input → process → output
- One method used to analyse and better understand processes is called IGOE
Input (I) are the resources needed to start the process,
Guides (G) rules and policies within the process,
Output (O) is the results of the process
Enablers (E) are a special kind of input or resource that facilitates a process

Example: Input is reading a book, the process is studying, and the output the using the knowledge amount IS in business



- A **sub process** is one or more tasks that accomplish a significant portion or stage of a process and is more detailed and complete



Examples of Inputs are Data, Information, Knowledge, Technology, Raw Material, Capital and Labour

Input Type

Data, information, and knowledge

Raw facts, summarized data, information derived from research, and expert knowledge relevant to a business's goals (e.g., census data, consumer purchasing data, industry analysis, and a consultant's assessment of a business's IS security capabilities)

Labour

People hired to carry out all or part of the essential business processes or supporting functions (e.g., a production employee hired to make a product or a human resource analyst who manages an employee benefits program)

Raw materials

The "ingredients" from which the company makes its products (e.g., for an automobile manufacturer, a partial listing of raw materials includes steel, plastics, glass, and rubber)

Capital

The money that businesses need to operate (different forms of capital include cash, debt instruments like bonds, and stock—shares of company ownership)

Technology

Available in many forms, and greatly extending beyond PCs and software applications (e.g., robotic welders, computer-controlled assembly lines, mobile phones, and database and Web servers)

Feedback is a special kind of measurement created by a business process that is then returned to the system (“fed back”) to control the system’s future inputs, processes, and outputs. Normally, this feedback will include information such as error or failure rates, processing speeds, process costs, and information on approvals and controls required in the process and if they are being respected.

Competitive advantage as an equation that looks like this:

Competitive advantage = quality of insight + speed of execution + cost competitiveness

IT can be applied to value chain activities to create business value in three ways:

1. Automating

- *uses technology to perform tedious or repetitive tasks faster, cheaper, and more consistently*
- *with greater efficiency and accuracy*

Examples: Banking (ATM), Grocery Store/ Retail (Barcode)

2. Informating

- *is recognizing that executing processes also creates new data and information*
- *An organization can process these new data to improve its decision making or improve the process itself*
- *Through informating, IT can deliver more long-term benefits than from automation alone*
- *To use informating, businesses need to determine if the IT stores data so that it can be used for learning and decision making*

Use information to improve

Transforming

- *Since one of the primary goals of business is to achieve a competitive advantage, most businesses have a **transforming** view of IT, that is, to use IT to acquire or continue a competitive advantage over competitors*
- *There are two ways to obtain a competitive advantage:*
 - *A company gains a cost advantage when it delivers the same benefits to customers as its competitors at a lower cost*
 - *A company gains a differentiation advantage when it delivers superior benefits to customers*

Doing things better than ur competitors, in cost and differentiation advantage

Decision Making

- *A **rational decision** is a choice about actions to take (or not take) in a given situation*
- *A **structured decision** is one that can be programmed; it is routine or repetitive*
- *A **semi-structured decision** is one that involves some uncertainty or doubt about the outcome*
- *An **unstructured decision** is one that involves a significant amount of uncertainty about the outcome*

CHAPTER 3

Value Chain

Value Chain is a connected series of activities, each of which adds value or supports the addition value to the firm's goods or services and it has five core components

- ***Inbound Logistics*** – includes the receiving, warehousing and inventory control of raw materials to create goods and services
- ***Operations*** – are the value creating and often proprietary activities that transform the raw input in to the final output
- ***Outbound Logistics*** – are the activities required to get the finished product to the customers, includes packaging, warehousing and order fulfillment
- ***Marketing and sales*** - are all the activities associated with getting buyers to purchase the product, including the distributors, retailers or online channels marketing, advertising and pricing
- ***Service*** – are those that maintain and enhance the product value, including customer support, repair services and warranty and recall
- ***Money, People, and Technology***

Example:

- The Beer Store
- Ryerson University
- Purchasing an Apple iPod

Value Chain can be further classified in to primary and secondary activities:

Primary Activities – related to the productions and distribution of the organization and its customers

Support activities – that an organizations conducts to support the creation of business value by the primary activities

- Porter identified four critical support activities
 - 1) Firm infrastructure(which we call administration), (Finance, Accounting, DSS)
 - 2) Technology development, Technology
 - 3) Human Resource Management
 - 4) Procurement

Information's Systems that Support Business Activities

Functional Information Systems – they focus on the activities of the functional departments to improve its efficiency and effectiveness

Accounting IS

- Typically dedicated to the reporting of a firm's financial health
- Relies on input from transaction processing system (TPS) since it must record all transaction data
- Provides both internal and external reports of a company's financial status

Marketing IS

- Supports marketing research and decision making in developing and distributing products and services
- Includes input from TPS, strategic plans and corporate policies, and external sources
- Includes marketing research outputs to support the four Ps of marketing: product development, pricing decisions, promotion, and product placement

Human Resources IS

- Supports activities related to managing the organization's employees
- Includes input from TPS, strategic plans and corporate policies, and external sources
- Supports human resources planning, recruiting, and hiring
- Enables administration of salaries, benefits, and training

Financial IS

- Provides financial information to the organization's financial managers
- Includes both internal input items—TPS, financial objectives, and project needs—and external input items—competitor and environmental data
- Generates both internal and external audits, supports management of funds

Manufacturing IS

- Supports manufacturing processes and activities
- Includes input from TPS, strategic plans and corporate policies, and external sources
- Uses outputs primarily for controlling processes: design and engineering, control of inventory, resource planning, and computer-aided manufacturing

Work Management Systems

Work Flow – represents the steps, organizational resources, input and output data, and tools needed to complete a business process

Workflow management system (WMS) supports activities that several departments of the organization may carry out.

A WMS typically provides tools for modeling the steps of the process.

Benefits:

- Less misplaced or stalled work and Improves efficiency and quality
- Manager can focus more time on decision making than on tracking work

Transaction Processing Systems

Transaction – is an exchange of goods or services between two or more parties that creates a relationship between the parties

Transaction processing systems (TPS) enable transaction activities and capture the key data created by the transaction.

Example: An individual using an ATM, is a transaction between the individual and an organization

A transaction is a unit of work that has the following characteristics known as **ACID**:

Atomicity—A transaction must be unequivocally completed. If an error causes the transaction to fail, then the entire transaction to that point should be undone and the data reset to its previous state (e.g., when a sale is voided or reversed).

Consistency—All unchanging properties of data must be preserved. This means that the data captured by the transaction must fit within the rules of data storage.

Isolation—Each transaction should execute independently of other transactions that may occur at the same time on the system.

Durability—The characteristics of a completed transaction should be permanent.

- Helps organizations ensure that the activities of any one transaction all succeed or fail as a group
- TSP brings together the common components of IT, data storage, data processing, data capture and software Pg. 126-127

Management Information and Document Management Systems

Document Management Systems – tracks, routes and process the many documents used in an organization

- DMS can create the documents electronically or convert them to electronic form using image technology
- Business can use DMS to support Workflow by managing the storage and routing of documents

Management Information Systems – to meet the need of storing processed transaction data as reports for managers

1. Periodic reports, such as a company's annual financial statements or monthly sales reports, which are updated and generated after a specific time period has passed.
2. Exception reports, to monitor when, and perhaps why, exceptions occur of key values, defined as critical to the operation.
3. Demand reports, generated based on user requests. Many systems also include a library of such reports from which a user could choose.

Executive information systems (EIS) designed to provide summary information about business performance to those making higher-level strategic decisions. This often involved creating "views" of data about business trends that gave rise to graphical displays of information.

Knowledge Management

Knowledge Management – how the company recognizes, generates, manages and shares knowledge

- Is the most difficult to store and share, because organizations rely on two types of knowledge: explicit and tacit knowledge

Explicit knowledge includes anything that can be written down, stored, and codified (e.g., business plans, patents and trademarks, and market research).

Tacit knowledge includes the know-how that people have through learning and experience, which is difficult to write down and share.

- To support tacit knowledge KM uses a collaborative system called groupware

Groupware – are computer systems that support teamwork, communication and collaboration

Decision Support Systems

Decision support systems (DSS) help businesses use communications technologies, knowledge, and models to organize and access data to perform decision-making activities. There are five types of DSS

Communications-driven DSS

-Focuses on communications, collaboration, and shared decision making

Example: Conferencing tools; online bulletin boards and chat facilities; email; and meeting support applications

Data-driven DSS

-Emphasizes access to and manipulation of internal company data and sometimes external data

Example: Executive information systems (EIS); geographic information systems (GIS); and OLAP-enabled data warehouses

Document-driven DSS

-Focuses on retrieval and management of unstructured documents

Examples: Document management systems (DMS); search services; and tools for working with oral, written, and video documents

Knowledge-driven DSS

- Provides special problem-solving tools that help decision making by suggesting or recommending actions to users

Examples: Expert systems (ES); artificial intelligence applications; and data mining tools

Model-driven DSS

-Emphasizes access to and manipulation of a model

Examples: Financial, statistical, optimization, and simulation models

- Financial models—use financial mathematical models and financial data to support financial decision making
- Statistical models—use statistics and probability to describe or forecast possible scenarios
- Optimization models—incorporate relatively certain data into a mathematical model of a situation; solving the model helps to find the “best” solution
- Simulation modeling—a technique for conducting experiments that test possible outcomes resulting from a quantitative model of a system

Supply Chain Management

Supply Chain – is a system of organizations, people, technology, activities, information and resources in moving a product or service from supplier to customer

- Transforms natural resources, raw material and components into a finished product

Supply Chain Management - manages materials, information and finances as they moves from supplier to manufacturer to wholesale to retailer to costumer

- Seek to optimize the supply chain to create business value and competitive advantage
- If a company can produce and distribute its products and reduce cost at the same time

Typical modules in any supply chain management software system include:

- **Materials management**—the procurement, storage, and use of raw materials to be used in the end product; may connect externally to supplier supply chain systems
- **Inventory management**—finished goods inventory
- **Order management**—orders by customers, distributions, retail outlets
- **Logistics management**—plans for shipping the product and tracking it from origin to destination and related shipping documentation

Enterprise Resource Planning

Enterprise Resource Planning - one way to integrate the departments and functions across an organization

- Is able to run all of the applications for a single database
- ESP can support all areas of the value chain, both primary and supporting processes and also help to achieve efficiencies
- But at the same time ERP is complex and difficult to manage as it grows

Enterprise Systems that Support the Value

Enterprise Systems - are large-scale applications that support business units or functions; they are another way that an organization might apply IT to its value chain.

Inbound Logistics - sourcing and ordering materials from suppliers, keeping track of expected arrival dates of materials, receiving and checking the materials upon arrival, approving the packing slip/bill and authorizing payment, distributing the materials to the correct location, storing the materials, and monitoring supply levels.

Radio Frequency identification (RFID) is a critical technology to inbound logistics.

- Uses radio wave to automatically transit information to an IT system
- Most used as a serial number on a microchip that is attached to an antenna
- The antenna transmits the identification number to a reader
- The reader converts it into digital information, such as product names and price
- This kind of technology can greatly assist with tracking inventory, picking orders and performing inventory counts for audits
- RFID tags are small and cheap and it don't need "line-of-sight" scanning and also can be read if it's in a certain range

RFID is part of most logistics management systems (LMS)

Operation - All of the activities required to create a product or service and make it available to the marketplace are contained in the operations component of the value chain.

- Operation tend to be unique and contribute to competitive learning
- Both supply chain management and enterprise resource planning systems are deployed in the operations of a company to monitor work in progress and the efficiency of the operations processes.
- CAD/CAM (computer aided design/computer aided manufacturing) software that assists in the design and manufacture of products by creating engineering documents and 3D design images.
- Another component would be the scheduling tools, they optimize the production machinery and availability of staff to run the machinery
- Another critical function in manufacturing businesses is quality management. Quality management systems monitor and control the quality of the products being produced.
- Example of no quality management Maple Leaf Foods

Marketing and Sales investigates what customers need and determines the products and services that will meet those needs

- Relies on enterprise systems to help provide and organize data
- It is essential that companies closely monitor existing sales for trend identification and for input into sales forecasts.

Outbound Logistics - involves the warehousing of finished goods and the distribution of those goods to customers. Customers may be distributors, wholesalers, retailers, or direct customers.

- Logistics management systems and RFID, TMS, TPS,IMS and POS systems are used in outbound logistics

-The POS system conducts the transaction between the organization and the customer at the location of the sale.

-Transaction processing systems (TPS) enable transaction activities and capture the key data created by the transaction.

-In recent years, a lot of effort has been made to put POS in the hands of customers themselves. Self-check-outs, chip technology in credit and debit cards, and mobile commerce are all moves in this direction.

-Fulfillment systems are also important outbound logistics systems. These come into play when you order something online or at a retail store, such as furniture. As

transactions take place and goods transfer to the hands of customers, inventory must be updated.

-Inventory management systems (IMS) constantly monitor the supply of finished goods to ensure that enough supply is on hand to meet demand.

IMS help enable the concept of just-in-time (JIT) inventory, which optimizes the manufacturing process (making just enough of something just when it is needed) and ensures that excess inventory does not need to be managed and stored.\

Service - Once a product or service is in the hands of a customer, the service component of the value chain starts.

- **Customer Relationship Management (CRM)** system provides organizations with the tools to service customers better through knowing their past purchases, their purchasing patterns, and even what their future needs may be.
- CRM systems help route customer calls to the most appropriate agent to help them.
- CRM systems not only enable companies to be more efficient in servicing customers, they can also increase revenue through up-selling and increased customer satisfaction

Administration and Finance Systems

- Seen as being too expensive to perform manually and costly without directly contributing to the primary activities
- Administrative activities include functions related to finance, accounting, payroll, and legal, as well as activities like knowledge management and decision making
- Enterprise systems are aiming at automating and optimizing administrative processes in the hope of reducing costs and ensuring processes are efficient

Example: Cell phone user, send text, browse, and talk

- o Ur provider is tracking wht ur doing

Software as a Service (SaaS) and as an Outsourced Service (ASP)

	SaaS	ASP
Pricing model	Per use or per user	Monthly, flat fee, or subscription
Ability to customize	Some ability to customize at a price, but major deviations from the core product are discouraged	More ability to customize at a price, as each installation is unique to a customer
Control over the system	None	Some; clients are usually provided administrator tools
Data security and privacy	It may be unknown how data are processed and stored, but data are likely contained in common databases with other customers of the SaaS	Negotiable; some ASPs will provide a separate database keeping it completely secure and separate from their other customers, at a cost
Security	As the applications are generally available over the Internet, the system is subject to the same vulnerabilities as any Internet application	Option is available to connect to the system over a dedicated connection, which increases security, in addition to accessing over the Internet

Advantages for clients include:

- Clients no longer have to develop or maintain the applications.
- Applications are available anywhere clients can gain access to the Web.
- Costs are reduced, as clients pay for only what they use and for only as long as they use the service.

Comparing IT Application Views

Support of value chain

Organization-wide

- Views organization as a system with need for integration of components and activities
- Allows a focus on enabling value-adding activities
- Helps to fit IT applications and infrastructure to organization
- Use subscription data to forecast demand and to better schedule inbound logistics, production, and outbound activities
- Use demographic data for targeted marketing promotions and improved customer service

Automating

Process/transaction

- Allows for cost reduction, efficiency, quality, and consistency
- Use online subscription for newspaper to reduce printing and handling costs of paper-based, mailed subscription forms

Informating

Process/transaction

- Allows for knowledge and learning of core competencies

- Use transaction data to understand subscription process
- Collect demographic data during online subscription application and use it to better understand customers

Transforming/competitive advantage

Organization-wide

- Connects automating and informing of processes to organizational strategy
- Develop a unique competency for delivering targeted content to various customer segments as identified by demographic and subscription data

Enterprise Risk Management

Enterprise Risk Management - A process affected by an entity's board of directors, management, and other personnel, applied in strategy setting and across the enterprise, designed to identify potential events that may affect the entity, and manage risk to be within its risk appetite, to provide reasonable assurance regarding the achievement of entity objectives.

Four overlapping categories of business objectives for focusing on risk assessment and management:

- Strategic—high-level goals, aligned with and supporting its mission
- Operations—effective and efficient use of its resources
- Reporting—reliability of reporting
- Compliance—compliance with applicable laws and regulations

Compliance – reduces risk through policies and processes that ensure proper financial and accounting procedures

- Protect employees and customer data
- Increases organizational stakeholders abilities to trust the integrity and accuracy of information reported by corporation
- IT helps organizations with compliance by ensuring that appropriate checks and balances are in place in the systems used by the organization on a daily basis, and that information required for any external audits, accounting or systems, is provided

Risk Reduction Methods

Table 4.6

Types and Examples of Organizational Responses to Risk

Risk Response	Action
Risk transfer	Move the risk to someone who is more able to deal with it
Risk deferral	Postpone exposure to the risk until circumstances are more favourable or resources are available to address the risk
Risk reduction	Either reduce the probability of the risk occurring or lessen the impact
Risk acceptance	Realize that some risks are unavoidable and make sure that contingency plans are in place
Risk avoidance	Eliminate the possibility of the risk occurring; however, that may close the doors on some business opportunities as well

Risk Transfer

Through the use of IT, organizations can use outsourcing to transfer risk. Earlier in this chapter we discussed outsourcing as a way to make business processes more efficient. Outsourcing can also shift risk outside of an organization to another business that may be better equipped to mitigate risk.

In-sourcing refers to the strategic decision made by a business to bring various services or functions back in-house, or keep them in-house, rather than globally source them.

Risk Deferral

As we approached the year 2000, companies became aware that their existing systems would not be able to handle the year format ending in "00." This created frantic activity to investigate new systems to install to avoid any adverse effects. As many of the systems available at the time were too complicated and difficult to install prior to the year 2000, many companies hired programmers to alter existing programs—sometimes coding line by code line—to defer the risk of adverse activities at the turn of the century.

Risk deduction

Many organizations have developed disaster recovery, or business continuity, plans. A **disaster recovery plan** allows an organization to resume operations after a major event that interrupts normal business processes.

- Such events may include data corruption, software bugs, network failures, network attacks, or natural and man-made physical disasters. Even small amounts of downtime could result in lost transactions, diminished productivity, and reduced customer satisfaction.

A **business continuity plan** addresses problem prevention, response to crises, resumption of business, recovery of losses, and restoration of systems and processes.

When developing a plan, a company needs to determine its critical functions, the level of disaster, and appropriate procedures for recovery. In a disaster recovery situation, IT focuses on having and making available the important data needed to resume business. Reliable data storage and consistent backup procedures are essential in maintaining data integrity.

Risk acceptance

Not all risks can be transferred, deferred, proactively reduced, or avoided. In the case of system changes, one contingency plan is to have a roll-back strategy.

A **roll-back strategy** essentially involves being able to reverse every action that took place to make the change happen such that everything is returned to its original state with no damage done. Another common contingency plan is to plan a budget contingency should an unexpected expenditure occur on a risky venture.

Control and Controls

Control advantage as the strengthening of internal controls and compliance through the application of IT-based controls to business processes, policies, and procedures.

Defining Control and Controls Businesses generally base control around three key concepts:

- 1. Control is a process that runs throughout the organization.*
- 2. Control influences how people behave at work.*
- 3. Control can only provide reasonable, not absolute, assurance of achieving objectives.*

Controls are specific actions, including policies and procedures, designed to ensure the achievement of business objectives.

COSO defines internal control as a process effected by an entity's board of directors, management and other personnel, designed to provide reasonable assurance regarding the achievement of objectives in the following categories:

- *effectiveness and efficiency of operations*
- *reliability of financial reporting*
- *compliance with applicable laws and regulations*

Three broad types of controls: preventive, detective, and corrective.

- 1) **Preventive controls** are designed to prevent increased exposure to risk by stopping some action or process before it occurs.
Example: is requiring employees to change their corporate network password every 30 days
- 2) **Detective controls** reduce risk by discovering when preventive controls have failed and providing notification that action must be taken.

Example : if an employee has not changed his or her password in 25 days, then the employee may get a warning email message asking him or her to do so immediately.

- 3) **Corrective controls** aim to remedy the situation and try to keep it from recurring.

Example: *If the employee has not changed his or her password by the 30th day, then he or she could be locked out of the system*

Specific Internal Control Processes

The seven categories are:

- 1) **Segregation of duties** means that jobs do not span lines of control that would allow mistakes or fraud to go undetected.
Example: *Say you only have one programmer who creates your critical e-commerce applications. A problem can arise if she is also the only person responsible for testing, debugging, and certifying the system. Further, if she leaves the company, who would know if she had created a back door in the e-commerce software.*
- 2) **Authorization controls** prevent scope creep and cost overruns in various situations, such as major projects or operations management. Allowing an individual programmer to make minor system changes is efficient. But some changes to the system can be very costly and may commit resources that are already assigned. As a result, another person, such as the project team leader, should sign off (authorize) any significant changes.
- 3) To provide **security** for the production database, application developers should therefore log in separately to the development and production databases.
- 4) It is also a good idea to track the login IDs and activities of all users, as login IDs are a useful type of **ID code** (as is your student ID number). Tracking login IDs and other ID codes creates an audit trail that organizations can follow to ensure proper controls are in place and working. Organizations can also use them to detect and document attempts at unauthorized use.
- 5) Depending on how the application is implemented (“goes live”), **verification controls** can confirm that the application is accomplishing e-commerce functions (e.g., order placement, payment) without error. For example, verification controls can monitor return of merchandise counts to ensure that the new system is sending customers what they ordered.
- 6) **Control totals** can help detect fraudulent actions. Imagine that you return a product. Now say a dishonest employee credits not your account but a fictitious.
- 7) Finally, supervisors should periodically audit and review processes and transactions. In the case of your e-commerce system, **supervisory review** could consist of ordering an item, calling customer service, returning the item, receiving credit for the item, and documenting the process.

System Development Life Cycle (SDLC)

System development life cycle (SDLC) is the common term used for the stages and activities of system development. The SDLC is composed of processes that occur from the beginning stages of a system to the end of its useful life when the system is then re-tired and likely replaced with something new.

The four pillars of a system analysis and design project; failures in any one of these areas can cause the whole project to come crashing down.

- People
- Tools
- Management
- Methodology

This also suggests that each stage of the SDLC is associated with a set of activities within both the project team (as we have discussed) and the development team (usually housed in an IT department or outsourced). Therefore, throughout the life cycle, various departments or functions will be doing different things to support the IS as it progresses through the stages of the SDLC.

1. **Concept** (also known as pre-inception or idea phase)—This phase involves the environment within the organization that either promotes or inhibits the development of ideas for systems. Obviously, an organization prefers to foster an environment that promotes ideas that can improve its bottom line.
2. **Inception** (also known as the feasibility or planning phase)—This phase begins when an organization has the idea to build an information system. The focus is on understanding the problem to be solved or the opportunity to be addressed and planning the project. Early interactions with stakeholders of the system take place at this time.
3. **Elaboration**—In this phase, the project team finalizes the requirements for the system and the project plan, and designs the system architecture. The team also creates conceptual models of the systems and sub-systems.
4. **Construction**—During this phase, the team builds the initial running system. The team usually implements core functionalities first, and then incorporates additional features.
5. **Transition**—At this time, the team finalizes the system and puts it in place. In addition, the team completes the final training of users and management of users during the transition.
6. **Production**—Once the system is up and running, the organization must continuously monitor, maintain, and evaluate it. The organization must also keep users of the system up to date with the latest modifications and procedures.
7. **Retirement**—At some point, the system may lose its value to the company. This phase often marks the concept of a new system to replace the obsolete one. The old system may retain some usefulness as it is phased out over time by the replacement system.

Standard IS Methodology

Methodology provides a framework for executing both the project management and technical processes of an IS project throughout the life cycle. Selecting a methodology that matches a project's needs helps to ensure the successful completion of the development project.

Why Do Organizations Needs an IS Methodology

- Build and Fix Model

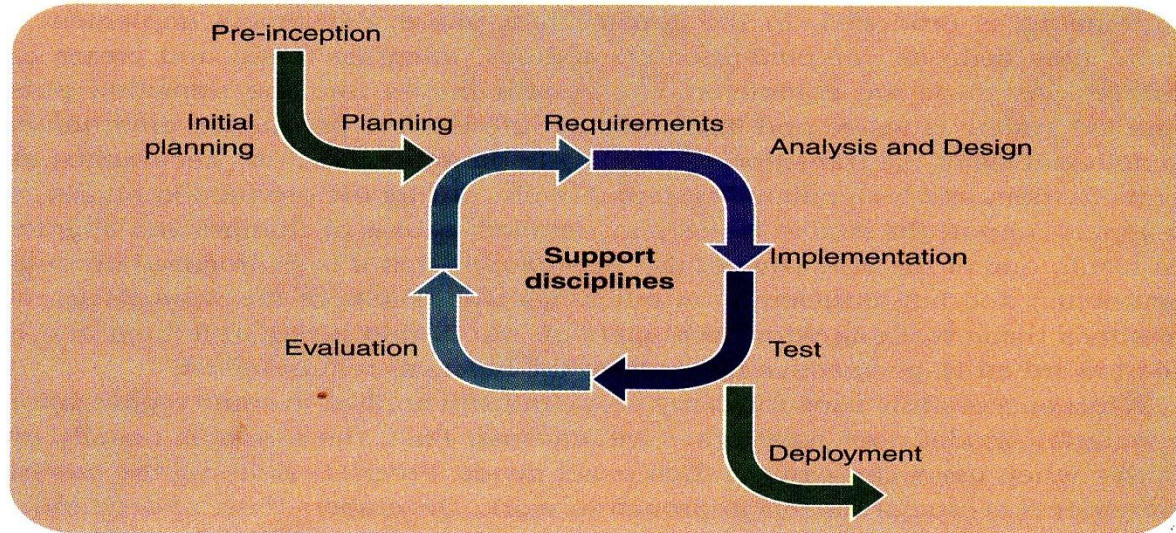
The traditional IS Methodology

Waterfall Model - defines a set of phases and a new phase begins only after acceptable completion of the preceding phase

Modern IS Methodologies

An evolutionary model fits this approach to development. With an **evolutionary model**, developers first investigate, specify, and implement an important core part of the system with minimal functionality. The team then tests and evaluates this version of the system to plan for the next version. On each iteration of the cycle, the team adds new functionality and features to the system. Figure 7.6 broadly depicts an evolutionary development method.

Advantages	Disadvantages
<ul style="list-style-type: none">• Improvement in fundamentals—methodologies can help team members understand and apply best practices• Avoidance of rework—the process can be oriented toward avoiding repeating tasks in the event of changing requirements• Risk management—because of its structured approach, a methodology systematically helps identify and manage risks• Quality assurance—helps detect errors earlier, when they are easier to correct• Customer orientation—focuses the development team on customers' needs and requirements rather than on building technology for technology's sake• Planning improvement—makes it easy to identify and organize the activities required by the project and helps target resources toward the activities that need them the most at the right time	<ul style="list-style-type: none">• Increased bureaucracy—can be overly rigid and bureaucratic• Increased cost—commercial products and services have a substantial cost and often involve training or require hiring in-house experts to support it• Increased structure—because by definition methodologies are designed to avoid ad-hoc development processes, sometimes customers who are developing system requirements may find the process too structured and get frustrated about why IT cannot "simply get it done"; however, without structure the methodology cannot deliver on its benefits



Prototyping - the project team works with customers to progressively build the system from an initial outline specification using visual mock-ups of screens, diagrams of data relationships, and similar tools that help users see what is going to be built.

Agile development - agile process is designed to satisfy continuously changing requirements, the team develops software in short development cycles or increments. Each cycle may include all of the primary phases of the process

Evolutionary and agile development methodologies are an attempt to reduce the somewhat constricting formality of the pure waterfall approach. A well-known agile development method is the rational unified process (RUP).

RUP is built on six best practices that occur in each development phase:

- (1) Develop iteratively
- (2) Manage requirements,
- (3) Use component architecture
- (4) Model visually
- (5) Verify quality
- (6) Control changes.

IS Modeling

Modeling system requirements is an important part of any IS development methodology. A model is a simplified representation of something real, such as a building, weather pattern, or information system that business professionals can manipulate to study the real item in more detail.

Unified Modelling Language (UML) has become a very popular modelling tool, as it works particularly well for developing object-oriented systems. The UML consists of several graphical elements that, when combined

- purpose of UML diagrams is to show multiple views of a system. Together, the set of UML diagrams is known as the system model.

Integrated Development Environments (IDEs)

Today most software programs rely on integrated development environments (IDEs). Instead of using separate software packages, an IDE allows developers to complete several programming tasks within the same software application. The typical IDE includes a text editor to allow the user to write program code, a file system to store programs, a compiler to translate the program into machine language, and debugging tools to find and correct errors.

Project management

Project management is “the application of knowledge skills, tools, and techniques to project activities to meet project requirements.”² For IS development, a project manager simultaneously oversees three main project elements: the scope of the project, the resources needed, and the time to complete it, all balanced with a view toward accomplishing the organization’s strategy through successful project delivery. The project scope defines what the project should accomplish. Resources can include people, equipment, material, and money.

Good People + Good Process + Good Strategy = Extraordinary Results

The main activities of project time management include:

- Define activities—identifying the activities required to produce project deliverables
- Sequence activities—identifying and documenting relationships between project activities
- Estimate activity resources—estimating the type and quantity of material, people, equipment, or supplies required by each activity
- Estimate activity durations—approximating the number of work periods needed to complete individual work activities with estimated resources
- Develop schedule—analyzing activity sequences, durations, resource requirements, and schedule constraints to create the project schedule
- Control schedule—monitoring the status of the project to update project progress and managing changes to the schedule baseline

THE COMPONENTS OF IT

When you think about it, all IT, including computers, mobile phones, and PDAs, are actually limited to the following capabilities:

- accepting and storing information
- performing mathematical calculations
- applying logic to make decisions

- retrieving, displaying, and sending information
- consistently repeating the above actions many times

Information technology consists of three basic categories: hardware, software, and networks.

Hardware is the electronic and mechanical components that you can see and touch, such as your computer monitor.

Software is the set of instructions that direct the hardware. While not necessary for all IT devices, **network** technology increases their power by allowing users to share resources, including hardware, software, and information.

The three basic categories (hardware, software, and networks) together create a **platform**,

Hardware – is the electronics and mechanical components that you see and touch

- the physical parts of the system, from more adjustable part , the software

6 Basic IT Hardware categories:

Input, Output, Storage, Communication, Memory, Processing

Processing Hardware

- directs the execution of instructions and transformation of data using transistors
- **Transistors** is a electronic switch that can either be on (1) or off (0) are referred to as digital data

A transistor is a very small device made out of semiconductor material that acts as a switch to control electronic signals.

- A tiny chip made up of transistors is called a microprocessor
- Microprocessor chips carry out many different processing operations within a computer, including handling input and output as well as the actual conversion of data into information.
 - o Contains most of the components that make up the central processing unit (CPU)
 - o The speed of called the clock speed
 - Measured in megahertz, millions of cycles per seconds
 - Measured in gigahertz, billions of cycles per second

Computer Hierarchy – categorizes processors according to their power

Computer Type	Relative Processing Power	Purpose	Example
Supercomputers	Largest and fastest	Performs processor intensive computations using parallel processing	Environmental Canada
Main frame	Large	Carries out many of the organizational processing needs using high-speed processing chips	Health Canada

		and large amounts of memory	
Server farms	Medium/Many	Allow multiple server to handle network processing activities	Google, Yahoo
Personal Computers (PC)	Small to medium	Enables users to carry out processing tasks needed to perform their job; usually networked together	Banks, People

Memory

- Temporarily locates data and information before processing
- Memory chips also use transistors to store data within the computer.
- The amount of internal memory stored on chips has also risen dramatically as more transistors are built into the memory chips.
- There are two types of memory, short and long term memory

Long-term memory

- o Help you keep track of facts

Short-term memory

- o Is only for items that you need to remember for a relatively short time
- Computers have long-term memory (ROM) and short-term memory (RAM) stored on chips

Read only memory (ROM) contains instructions and data that only special devices can alter.

Random access memory (RAM) stores data only until they are no longer needed, or until you shut down the computer.

Input Hardware

- provides the interface used for data entry into a device. The choice of input device should be tailored to the task to be performed.
Example: A touchpad or mouse and keyboard

Output Hardware

- provides the interface used to retrieve information from a device. Output devices convert IT-processed information into a usable form.
Examples: Such as speakers or MP3 players

Storage Hardware

- stores data, information, and instructions for the long term.
- Examples of storage include the computer hard drive, CDs, DVDs, USB flash memory, and external hard drives.

Communication Hardware

- connects one IT device to another.

Network interface card (NIC), provides the physical connection between a computer and a local network. This ability is vital to many knowledge work activities.

Modems, both wired and wireless, allow you to connect to a remote network over a telecommunications line, such as the telephone or cable TV service. A modem converts (modulates) the digital signals going out from your computer into an analog signal appropriate for the connection medium used

Software – is the set of instructions that direct the hardware

System Software

System software includes any software required to control the hardware components and to support the execution of application software.

System software includes the operating system and utility software.

The operating system (OS) software coordinates and handles the details of working with the computer hardware. The OS software performs two main tasks:

1. Managing the hardware and software resources of the computer
2. Providing a stable and consistent interface between application programs and the hardware

Utility software provides additional tools that you can use to maintain and service your system.

Example: users often add utilities such as file management software and security programs.

Application Software

Application software is a complete, self-contained program or set of programs for performing a specific job.

Example, you would use word processing application software, like Microsoft Word, to write your term paper.

Business professionals frequently use productivity software to more efficiently and effectively work with data, information, and knowledge, as follows:

- *Document preparation software*, for creating documents composed of text, images, and supporting graphics
- *Electronic spreadsheet software*, for performing general calculations and analyses, such as financial analysis, budgeting, and forecasting
- *Presentation graphics software*, for preparing professional-quality slides and graphics for business presentations; often requires a business professional to be able to access and manipulate large amounts of data
- *Database management system (DBMS)*, for designing, creating, updating, and querying data
- *Personal information management (PIM)*, for managing personal information, such as to-do lists, schedules, and email

Middleware

Middleware is software that is more common in enterprises. Its purpose is to link applications that use dissimilar software or hardware platforms and act like a specialized messenger/translator to manage the exchange of information.

- often essential when an organization is implementing new types of software that need to communicate with existing systems.

Open Source Software

Open source software is software that can be used, modified, improved, and redistributed. Open source software is usually developed by a community of developers that are interested in the subject matter of the software and want to share their work with others.

Examples: Linux, Apache, MySql, Perl, PHP, or Python and Ruby on Rails (RoR)

Network – technology that that increases the power to allow people to share resources including hardware, software and information

The three categories together create a **platform**

A computer network requires four primary components:

1. Data (the resource) that computers share on the network
2. Special hardware
3. Software that allows computers to communicate and share the data
4. Communication media to link the computers together

Network Categories

Organizations use all sizes of networks, including PANs, LANs, MANs, WANs, and the Internet, as well as networks based on the Internet protocols.

Network	Size	Purpose	Network
PAN	Covers a very small space that ranges from the size of a human body to a small office	Communication among computer devices in close proximity	A PAN allows your MP3 player to connect to a wireless headset, your PDA to “sync” with your PC, and your car to respond to commands from a Bluetooth-enabled mobile phone
LAN	Within the immediate location or building	Share files, resources, servers, and other hardware among the members of an organization	Common LANs include university computing labs, small office or household networks, and a wireless hotspot.
MAN	Ranges in size from a few blocks to an entire metropolitan area	Provides data and voice transmission typically at high speeds (≈100 Mbps)	A university may use a MAN to connect LANs across campus; many city libraries use MANs to support centralized cataloguing and searching of resources

WAN	Over a large geographical area	Share data, information, and resources among units of an organization distant from one another	A WAN connects various university MANs/LANs to share research; a corporate network uses a WAN to link national and international locations.
Internet (Public)	Worldwide	Share data and information with all stakeholders in the organization, as well as with the general public	The Internet is the largest public WAN; sometimes known as a global area network (GAN).

Network Hardware Forming a network requires a number of devices for making network connections as well as for managing data transmission over the network. There are three basic categories of network hardware:

1) **Hardware to connect a device to a network:** Hardware that connects computers or other devices to a network includes modems, cable modems, network interface cards (NICs), and wireless cards. Each of these devices serves to connect your computer or device to a specific network.

2) **Specialized hardware for handling network traffic:** Devices that help coordinate the data traffic on a network include routers, bridges, repeaters, and hubs. A bridge is a device that lets you connect to networks or break a large network into two smaller, more efficient networks.

3) **Specialized computers that control the network and the delivery of data on the network:** On most networks, specialized computers, called servers, manage the various functions of the network. Servers are often assigned a specific task, such as handling email (email server), Web traffic (Web server), or running programs (application server).

Network Software

Like PC software, we can divide network software into operating system software and application software. Network operating system software manages network functions and the flow of data traffic over a computer network. Network application software provides the instructions that allow for the creation of data and for this transformation to fit appropriate protocols for transmission over a network. A protocol is a standard set of data between nodes on a network.

The Internet

The Internet uses the TCP/IP suite of packet switching protocols. This is a very general, non-proprietary set of communication rules. By adopting these rules and making use of software compatible with the TCP/IP standards, any computer, regardless of the platform, processor, and OS, can connect and communicate over the Internet.

Accessing the Internet

Most users do not connect directly to the Internet. Instead, they contract with an **Internet service provider (ISP)**. ISPs, like Sympatico, Primus, Shaw, and Rogers, purchase the expensive equipment needed to connect to the Internet. ISPs then provide connections for customers to use via dial-up or cable.

The Internet also uses software: used to make the connection includes OS utilities and special software that the ISP usually provides. To access and process content, Internet users also need application software, such as an email client and a Web browser.

Wi-Fi is the popular name for the 802.11 standards for wireless network access. A hotspot refers to any public space within which a wireless device can connect. With Wi-Fi and other forms of wireless access, business professionals can now go mobile and stay connected to the Internet using laptop, cell phones computers and PDA

Voice Over Internet Protocol (VoIP) to make calls anywhere in the world and bypass traditional switched telephone networks. VoIP uses the Internet's foundation technologies of packet switching and TCP/IP to carry voice instead of data. VoIP does this by converting the analog voice signal to digital, creating packets and sending the packets over the same infrastructure as you do your email or Internet searches.

Examples: Skype

Cloud computing - simply means computing over the Internet. The Internet has made it easy to remotely access computing resources, separating users from the infrastructure they are working on. That is, users can use any Internet connection to access their resources on virtual computers anywhere in the cloud.

There are several benefits to cloud computing:

- **Reduced cost because technical infrastructure is not required**—Cloud computing is often paid for on a usage, user, or flat fee basis that is significantly cheaper than building and maintaining a technical infrastructure.
- **Scalability on demand**—The cloud has many resources available to it, including the ability to increase bandwidth and access common application protocol interfaces (APIs) for extending services.
- **Accessibility**—Cloud computing is accessible from anywhere there is Internet access.

The World Wide Web

Some very basic technologies are required to make the Web work:

- Client/server networks—the networks over which data travel
- Browser—application software that lets users request and view web pages
- HTTP protocol—the standardized rules for exchanging data over the Web
- HTML—the language that guides the display of a requested page

Basic Components of the World Wide Web

Client/Server Networks

If you type a uniform resource locator (URL)—which specifies a unique address for each page that indicates the location of a document— into your browser or click a hyperlink, the browser sends a request out over the Web that makes its way to the corresponding server.

1. The client (browser) generates an HTTP request for a resource at a location indicated at a URL.
2. The HTTP request is sent over the Web to the server at the URL location.
3. The server receives that HTTP request and looks for the requested files.

Web server

4. The server locates the requested resource.
5. The server generates an HTTP response. The response will usually include the requested resource.
6. The HTTP response is sent back over the Web to the client.
7. The client receives the HTTP response and processes it. The response is displayed based on HTML.

Web Browsers

A Web browser is a software application that allows you to easily navigate the Web and to view the content that you find there. At its most basic, a browser will let you request, either by typing a URL or clicking a hyperlink, and display a hypertext-based file. Hypertext organizes content into units that are connected using associations called links. Figure 2.6 shows an example of a browser displaying a web page and identifies the typical components of a browser.

HTTP—Hypertext Transfer Protocol

A client and a server communicate with each other using messages. To do this, they need a standard set of rules for formatting and transmitting these messages. That is where HTTP comes in. The hypertext transfer protocol (HTTP) comprises the set of rules for exchanging messages on the World Wide Web. HTTP governs both the request (HTTP request) for a file and the transmission (HTTP response) of the requested file.

HTML—Hypertext Markup Language

Hypertext markup language (HTML) is the primary language for creating web pages. It is not a true programming language, as the computer does not generally process HTML instructions. Instead, browser software interprets HTML instructions through the use of tags, which are interspersed with content. The tags, surrounded by angle brackets (<and>), mark the placement and appearance of the various components of the page

A **transistor** is a very small device made out of semiconductor material that acts as a switch to control electronic signals.

Microprocessor chips carry out many different processing operations within a computer, including handling input and output as well as the actual conversion of data into information. Over time, the number of transistors on a microprocessor chip has expanded, resulting in increasingly powerful computers.

Memory chips also use transistors to store data within the computer. As with microprocessor chips, the amount of internal memory stored on chips has also risen dramatically as more transistors are built into the memory chips.

How Transistors Work

You can represent the two states of a transistor using binary mathematics, which uses ones (on) and zeros (off), referred as a digital data

Character Encoding

Binary codes represent letters and numbers through character encoding. **Character encoding** permits a specific combination of bits to represent each character.

Standard ASCII

The oldest encoding system used on mainframe computers is the Extended Binary Coded Decimal Interchange Code (EBCDIC), which is an eight-bit coding system. For personal computers, the first encoding system was the **Standard ASCII (American Standard Code for Information Interchange)**.

Machine Instructions

Hardware devices, such as a computer or PDA, execute instructions as a sequence of binary strings known as **machine instructions**. The sequence used to represent a specific instruction is assigned in a similar manner as that used to assign binary sequences to character data (e.g., the ASCII code).

PROCESSING HARDWARE

The **CPU** works together with memory to control the execution of all instructions and the processing of all data. The CPU is located on the system's **motherboard**, the main circuit board in an electronic device. The motherboard contains the microprocessor as well as other chips and circuits. The motherboard and CPU chip are found in the **system unit**, the box that we often think of as the computer when we look at it.

The CPU consists of several components,

- Control Unit (CU)—Performs the following four basic functions: fetch, de- code, execute, and store. One time through each of these tasks in a sequence is called a cycle.
- Arithmetic Logic Unit (ALU)—Executes mathematical and logic calculations. Logic calculations make comparisons between values.
- Floating Point Unit (FPU)—Executes mathematical and logic calculations on non-integer values (values that may have a fractional portion after the deci- mal point).
- Decode Unit—Fetches machine language instructions from the instruction cache and translates them into binary code that the ALU processes.
- Cache Memory—Provides a staging area for instructions and the data. Because cache memory is faster than RAM, the processor can keep working without waiting on data.

- Prefetch Unit—Provides a small amount of memory that stores incoming instructions in a queue while awaiting execution, thereby reducing CPU waiting time.
- Registers—Small sections of memory that store data while the microprocessor needs it. A register address is expressed with a small number of bits, making it much faster to access than normal memory.
- Clock—A crystal that sits on the motherboard and vibrates regularly, many times per second. The clock speed refers to the number of cycles a CPU performs in the span of a tick of the computer's internal clock.
- Bus—A set of wires that transports data from one location to another. A CPU can have internal buses and address buses. Figure B.2 shows the bus as yellow lines.
- Instruction Set—A collection of machine language instructions that governs

The Instruction Set

Each microprocessor has a permanently stored set of machine language instructions called the instruction set. The instruction set governs how the CPU interprets and executes the tasks that it performs to run computer software. There are two main types of instruction sets: complex instruction set computer (CISC) instructions and reduced instruction set computer (RISC) instructions. RISC processors tend to be used in small electronic devices.

Bandwidth

The size of a CPU's buses determines its **bandwidth**, which is the number of bits the CPU can process in a single instruction. Recall that a **bus** is a set of wires over which data travel from one location to another. In a computer, the main bus is the data or system bus, which sends and receives data to and from the CPU to other components. However, the internal buses control the bandwidth. Internal buses carry data between the components that reside within the chip and address buses, which then connect them to main memory.

Clock Speed

The clock speed is probably the most common measure of CPU performance.

CPU Performance Characteristics

Microprocessors are typically differentiated by their instruction set, their clock speed, and their bandwidth. As noted above, the clock speed is the most commonly used performance characteristic. All other things being equal, *the faster the clock speed, the faster the capability of the CPU chip to process instructions.*

Internal Memory

Computers require a greater capacity of short-term, temporary memory than long-term memory

The main purpose of ROM is simply to hold instructions that control the device's start-up processes (booting up). This small set of instructions, known as the BIOS (basic input/output system), activates the hardware components and loads the operating system.

RAM

Personal computers usually have two types of RAM: dynamic RAM (DRAM) and static RAM (SRAM). RAM can also be found in other components of your computer system, such as the printer and video and sound cards. This type of RAM is often referred to as peripheral RAM.

Main memory usually refers to the DRAM in your computer. Like the CPU, **dynamic RAM (DRAM)** has improved over the years to provide faster access and greater capacity. It turns out that one of the easiest and least expensive ways to upgrade an older system is to increase the amount of main memory (DRAM).

Static RAM (SRAM) is so called because it does not need to be constantly refreshed to maintain the data that it stores. This makes it faster and less volatile than DRAM, but it also makes it much more expensive

RAM can also be found in other components of your computer system, such as the printer and video and sound cards. This type of RAM is often referred to as **peripheral RAM**. Peripheral RAM serves as a buffer area between the main system and a peripheral device.

RAM Performance

Two factors affect RAM performance: (1) capacity and (2) address bus bandwidth.

Input Hardware Devices

Examples: Keyboard, mouse, touchpad, microphone, touch screen and trackball, scanner, and magnetic strip reader

A way to measure performance is to determine the accuracy of the device being used. You can gauge the accuracy of a device by its resolution and tracking. Resolution refers to how precisely the device can pinpoint a location on a screen or the clarity and level of detail of an image rendered. Tracking refers to how close the screen cursor follows the movement of the device. For example, an optical mouse usually tracks better than a mechanical mouse, but can provide less resolution.

Output Hardware Devices

Display Device

The Technology Behind LCD Monitors Display devices vary in shape, size, and underlying technology. Most monitors in use today are LCD monitors. At the heart of an LCD monitor is a piece of liquid crystal material placed between a pair of transparent electrodes. This combination of materials takes advantage of four facts from physics:

- 1. Light can be polarized.*
- 2. Liquid crystals can transmit and change polarized light.*
- 3. Electric current can change the structure of liquid crystals.*
- 4. Transparent materials can conduct electricity.*

Display Device Performance

Display device performance depends on the resolution; that is, the maximum number of pixels that the screen can show, typically measured by dot pitch. The dot pitch of a display is the distance between a pixel and the closest pixel of the same colour. For LCDs, the voltage to each pixel is refreshed many times a second. How often this occurs is called the refresh rate, measured in hertz (Hz).

Printed Output Device Performance

- Centre's on colour, resolution, speed and memory

- The sharpness of text and images on paper is usually measured in dots per inch (dpi)
 - Higher dpi, higher quality printing
- Printer speeds is measured as the pages per minute (ppm)
 - Most expensive printers are 20-30 ppm
 - Normal printer are 8-10 ppm
- Most printers come with a small amount of memory which is called *buffer*

Storage Hardware

Secondary Storage – usually comes as a magnetic storage media, optical disks, or chip based flash drive

Examples: CD's, DVD's, Hard drives, Tapes, USB

Magnetic disks

- Are forms of direct-access storage
- Are disks that spins while reading and writing information onto it using a *read/write head*
- Hard drive serves as the main storage device for programs and data
- The hard drive stores from 10mb – 200gb or more on the latest drives

Direct-access storage - Information may be accessed in any order, regardless of the order in which the information was store

Examples: Hard Drive drives, High capacity diskettes and Tapes

Optical Disks

- Use electromagnetism to encode data, optical disk systems use a laser to read and write data
- Very large storage capacity, but they are not as fast as Hard drives
- Two main categories compact disk (CD) and digital versatile disk (DVD)

Compact Disk

- Small, portable plastic medium that includes a reflective surface in its makeup
- To record bits of data, the surface of the disk is altered how light is reflected when applying the laser
- CD's are commonly used for storing large data to be portable such as software, music and video files

DVD

- Is an optical technology tht is replacing CD technology
- Capacity of 4.7 GB, enough to hold a entire movie and now some DVD's can hold 17GB which are the same size as a CD

Chip-Based Storage

- Flash memory is a special type of chip-based memory that can be written to as well as read into internal memory which known as a USB Flash Drive
- Universal Serial Bus (USB), an external bus standard that supports transfer rates of 12 Mbps
- They have high capability, small dimensions, high reliability, and noiselessness

An Overview of Operating Software

Operating System – serves as the computer's “traffic cop” “office manager” and “chauffeur”

- Is the least visible from the software
- OS manages all of the messages traffic that flows from the user, to the applications software, to the computer and back to the user

- Controls the operations of the secondary storage to transfer data back and forth between secondary storage and memory and also controls the execution of application programs
- Popular OS are Windows, Macs, Linux and in Smartphone

Comparing of Operating Systems

Table B.7 Comparison of Operating Systems				
Feature	Mainframe	Network	Personal Computer	Mobile Device
Number of simultaneous users	Multiple	Multiple	One	One
Security	Sophisticated	Sophisticated	Minimal/user-enabled	Minimal/user-enabled
Peripherals	Complex	Numerous	Few	Few
Number of tasks	Many	Many	Many	Few
Support	Systems programmers	Networked-certified personnel	User	Provider
Example	OS390	Novell NOS	Windows XP	Windows Mobile

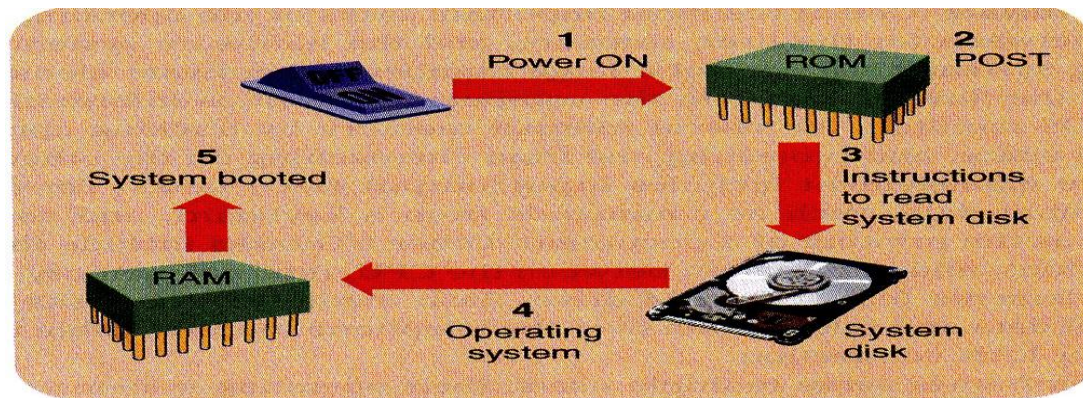
How the Operating System Works

- All operating systems consist of two parts: the kernel and command interpreter
- The **kernel** is the essential part of the operating system that internal memory must always include. It handles requests from either application programs or hardware (often printers or input devices) and then determines the processing order of the requests.
- The kernel also handles demands for internal memory from competing applications by parcelling out the limited amount of internal memory as needed.
- The **command interpreter** (often referred to as the shell in UNIX operating systems) accepts commands from users and translates them into language that the kernel can understand.
- Users typically communicate with the command interpreter through a **graphical user interface (GUI)**, like that used in Windows or Macintosh operating systems.
 - o GUI acts as a shell to interact with the command interpreter. For UNIX systems, the GUI converts the user's mouse clicks into the appropriate text commands that the operating system understands.
- The operating system also accepts commands from application programs through its **application program interface (API)**.
 - o a specific process that allows the application program to make requests to the operating system or another application.

What does the Operating System Do?

- The operating system is a collection of software programs that manages the following tasks:
 - o Starting the computer
 - o Managing hardware
 - o Controlling access to the computer
 - o Providing an interface for the user
 - o Ensuring efficient use of the CPU
 - o Providing services to application software

1) Starting the computer



1. Turning on the computer's main power sends a flow of electricity to ROM.
2. The flow of electricity to ROM causes the BIOS (basic input/output system) to provide instructions to the CPU to perform a power-on self-test (POST), which checks the various components of the computer, including memory, to ensure that they are working correctly.
3. After the POST, ROM/BIOS tell the CPU to find the system disk (usually the hard disk) and read operating system programs from secondary storage.
4. The CPU loads operating system files into internal memory (RAM).
5. The CPU implements instructions in the operating system files and then displays the OS interface.

2) Managing Hardware

- Hardware management includes input/output (I/O) tasks.
- For example, the OS accepts input data, such as commands from a keyboard, and coordinates its output, such as the printing of a document.
- Other I/O tasks include the transfer of data, instructions, and information between the CPU, internal memory, and secondary storage elements (e.g., CD-ROM drive, flash memory).
- I/O tasks also include the transfer of data and information over the telephone modem, cable modem, DSL connection, or LAN connection.

3) Controlling Access

- Once the computer is up and running, unless it is a stand-alone PC, the OS must control access to it.
- For mainframe computers or networked PCs, the operating system must provide security to users' data, information, and programs against unwarranted intrusion. The most recent operating systems require users to enter a password to access the computer, limiting their access to specific areas.

4) Efficient Use of CPU

- The CPU always works much faster than the I/O operations.

- As a result, a key task of the operating system is to ensure that the slow I/O does not hold up the CPU. This is especially important for a main-frame, so that the processing for one user does not delay other users' I/O.
- Even on a personal computer, it would be inefficient for the CPU to wait on one task—for example, printing a job—before continuing its work.

5) Providing Services to Applications Software

Operating systems provide a number of services to applications software, include the following:

- running the application software and ensuring the availability of needed resources
- determining the processing order of concurrently running programs
- coordinating file/disk management
- providing memory management

6) Running Application Software

- The operating system must make it possible for the user to run application software.
- It does this by interpreting the instructions from the other software to the CPU and providing resources in the form of hardware devices when needed by the other software program.

7) Determining the Process Order

- Modern computers are multitasking machines running multiple programs concurrently.
- For example, you may create a document, work with a spreadsheet, query a database, and print a series of presentation slides, all seemingly at the same time.

8) Coordinating File/Risk Management

- The operating system must manage files on secondary storage (usually some form of hard disk) in such a way to make them available when needed, while also protecting them from unwarranted use or loss.
- A variety of file types are necessary to use application software, including data files, program files, and utility files.
- For example, program files execute application software, data files include specific information already entered by the user, and utility files provide assistance, such as spell-check ability.
- Examples : Letters, run a word processor
- The operating system must know the location of the word processor program files, as well as the location of a variety of utility files, *known as dynamic link library (dll) files*
- The operating system must be able to reassemble the parts of a file from many separate locations on the disk. The OS handles this via a table of the various files parts and their locations on the disk, called the *file allocation table (FAT)*.
- The OS also provides file management tools to help users organize files for easy access and retrieval. Virtually all operating systems now use a hierarchical (tree) structure that divides a long list of files into several shorter lists, called folders. For example, assume that a company stores personnel files on disk for the employees in its 12 branches around the world.

9) Providing Memory Management

- One technique, which began with mainframe computers in the mid-1970s, provides the appearance of additional memory: virtual memory.
- Virtual memory divides the internal memory into pages, or sections, that match equal-sized sections of memory on disk.

- The process then exchanges, or swaps, internal memory with the disk or virtual memory when needed. As long as the processing needs only data or instructions that are currently in internal memory, it proceeds as usual. However, when the needed information is on disk, virtual memory swaps a page into main memory.

AN OVERVIEW OF APPLICATION SOFTWARE

The most widely used commercially developed software categories used by business professionals include the following:

- Word processing programs to create documents
- Spreadsheets and accounting software to carry out financial and other quantitative analyses
- Database programs to manage lists and tables of data
- Presentation programs to create electronic slide shows
- Web browsers and other Internet-related software
- Specialized software for specific industry needs

Word Processing Software

Word processing software, part of a larger category known as document preparation software, allows you to easily compose, edit, save, and print various types of documents.

Desktop publishing software takes word processing one step further. It combines word processing, graphics, and special page definition software to create documents that rival those available from professional typesetting companies.

Spreadsheets

To start, a spreadsheet is an electronic table of rows and columns, with the intersection of a row and a column called a cell. The column letter and row number identifies each cell.

- The replacement of the calculator\

Database Software

Another popular way to transform data into a usable form is to organize them by entering the data into database management software.

- Microsoft Access
- a database locates information that matches some criteria. That is, it can be difficult to alter a database table to calculate margin as easily as you can change a spreadsheet, but you can use it to easily search for all sales of a particular item, say, the backpack.
- A query is a specially structured request to a database to locate a desired set of records. In our example, say you want to locate information on backpacks. You would therefore enter a query to find and display—or in database terminology, return—all records with the BP item code

Presentation Software

Presentation software allows business professionals to use text in many sizes and fonts, graphics, photos, and even audio and video files to inform an audience. Because of its ease of use, presentation software has become extremely popular for making business, academic, and instructional presentations.

- PowerPoint

Web Browser and Internet Related Software

Once you have a web page on the screen, you can jump to other related pages by clicking on content that is either underlined or otherwise highlighted in some way, called a **hyperlink**.

Specialized Software

In many cases, business professionals rely on other developed software to handle specific situations. For example, while spreadsheets are the most general form of financial software, most organizations use other financial packages. These include accounting packages, real estate calculators, online stock and bond trading software, and retirement-planning software.

Develop Customized Software

- A good way to achieve competitive advantage

First Step: An **algorithm** is a detailed sequence of actions that, when followed, will accomplish some task.

Second Step: is known as programming. A computer programmer takes the algorithm and translates it into instructions written in a programming language that the computer can understand. The set of instructions that follow the algorithm, written using the programming language, is known as a program.

Types of Languages

- C (including C++ and C#), Java, PHP, SQL (Structured Query Language), VB.NET (Visual Basic .NET)

Of special interest is the Java language, originally developed to run on net-works. Programmers now use it in many different ways, particularly in e-commerce applications. It actually runs differently than many other programming languages, in that it is platform independent.

Open Source Software

Open-source software refers to programs for which the authors allow anyone to view the source code—the programming instructions—and make changes. Many open-source software applications are freely available for downloading over the Internet.

Proprietary software requires a purchased license and typically restricts access to the source code to the company employees. Examples of proprietary software are the Microsoft Windows operating system and IBM's DB2 database software. Proprietary software is supported by the company that sells it through technical support centres and websites.

Chapter 5

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E-commerce - the use of information systems, technologies, and computer networks by individuals and organizations to carry out transactions in order to create or support the creation of business value.

Types of E-Commerce Transactions and Example Websites

Transactions	Description	Examples
Business to Customers (B2C)	Online equivalent of the retail store as well as other services	www.chapters.indigo.ca, www.barnesandnoble.com, www.telus.ca
Business to Business (B2B)	Electronic exchanges between companies	http://wwre.globalsources.com/ for the Worldwide Retail Exchange
Business to Government (B2G)	Online sales to government agencies, as well as electronic payment of taxes	www.doingbusiness.mgs.gov.on.ca/mbs/psb/psb.nsf/index/english?openDocument for businesses wishing to provide goods or services to the government of Ontario
Customer to government (C2G)	Electronic payment of taxes as well as purchase of various types of licenses	www.netfile.gc.ca/ to electronically file and pay taxes to the federal government
Customer to Customer (C2C)	Use of online auctions like eBay and similar other sites	www.ebay.com or www.ebay.ca www.craigslist.com or craigslist.ca www.kijiji.com or kijiji.ca

E-Commerce and Products: Physical and Digital

Think about the wide range and types of products that consumers can buy. We can divide such products into two primary categories: physical and digital

Physical Products

- anything that requires an actual shipment of the item from a central distribution point to the buyer also requires an *off-line supply chain* to handle the sales, order processing, and delivery of these goods, even if they are discovered and purchased online

Digital Products

- Digital products directly over the Internet or other computer networks (such as downloading an album on iTunes versus going to HMV to buy it) and it usually requires the use of a completely *IT-enabled supply chain*.

Difference between Physical and Digital Products

Physical Products

- Even though a computer network can transmit information about the order, it obviously cannot ship the actual physical goods,
- The business must have *back-office elements* in place to handle order fulfillment.
 - o This often requires substantial technology interfaces between the Web and the enterprise's existing computerized business systems (known as web integration)
- There is also a possible chance that the customer may return the products

Examples: Chapter/Indigo, Dell, Lands' End, telephone and mail-order companies

Digital Products

- The return process is not applicable to a pure online business
 - o It's because of the fact that once downloaded, electronic products or services have immediate value and often cannot be *off-loaded* (deleted or otherwise disabled) with any certainty by the vendor.
- Instead of receiving an actual DVD (Physical Product), the company sends the customers a movie file and there is a problem simply sends a new one for you to download as a

replacement, or restores your right to re-download the same content if it is accidentally erased or otherwise compromised.

E-commerce often simply means extending an organization's existing business model and also a direct channel for interacting with customers—that is, the Web simply becomes another channel (place) for customers to buy your physical goods.

Process for Ordering Physical Good over the Web:

Order is generated by customer → Order sent over Internet → processing of order at retailer website → Transmission of order to warehouse or wholesaler → Warehouse or wholesaler picks, packs and ships item → item is shipped to the customer

Process for ordering an electronic Product over the Web:

Order generated by customer → Order sent over the internet → Processing of order at retail website → Order "shipped over the internet" → Order is received by the customer

- More simple

E-Commerce Business Models

E-commerce **business model** combines a specific type of website with a successful revenue model that produces profits for the website owner.

- A way to achieve value

The top ways in which most companies currently make money on the Web:

1. **Displaying advertising** and being paid for click through from the online community to those advertising products or services (the traffic monetizing or advertising model)
 - a. Facebook,
2. **Selling goods and services online** (typically a transactional, wholesale, or retail merchant model)
 - a. iTunes
3. **Earning** royalties, access fees, or revenue sharing from selling access to their platform to third party developers (known as the API or applet model)
4. **Selling aggregate data** about online user behaviour or selling controlled access to users with their permission through targeted offers; sometimes called infomediaries (the information or data aggregation model)
5. Getting users to **subscribe** to your service, usually on a monthly or annual basis (the subscription model)
6. **Selling upgrades** to a premium subscription service by first offering a free service with more limited capacity or capability (the freemium model)
 - a. Prezi
7. Imposing a very slight fee for specific transactions that add value beyond some kind of initial free access, which are added up and billed or deducted from a user account (**the micro-payments model**)
 - a. Classmates.com
8. Charging a portion of any transaction that you facilitate for others either as a **brokerage** or as a re-seller, if you are a traditional middle man (the revenue share or royalty model)
 - a. Compare products
9. Using an auction or co-operative model that is a derivative of a transactional or retail site, but with pricing controlled by the marketplace and the variations in supply and demand (the auction or co-operative model)

10. Selling your company to a strategic buyer! (the build to sell model)

Another way to understand e-commerce is to look at the purpose of the website used to implement the various business models. That is, having a great e-commerce business model will not generate a profit if it is not associated with a website that brings in customers or visitors.

Websites Classified by Purpose

Website Type	Purpose	Example	Business Model
Portal	Provide a gateway to many other websites	Yahoo, MSN	Advertising, affiliate
Search Engines	Find websites that contain a word or phrase	Google, Yahoo , MSN and Dogpile	Advertising, affiliate, infomediary
Browse or search and buy	Sell goods and services	Dells, iTunes, VRBO	Merchant, infomediary, manufacturer direct, cooperative
Sales support	Provide information on a product before or after the sale	Microsoft, Dell, McAfee, Telus	Community and infomediary
Information Service	Provide news, information and commentary	National Post, TSN, Economist	Subscription, community and affiliate
Auction	Facilitates sales between third parties	Ebay, Priceline, Paypal	Brokerage
Travel	Sells travel tickets and tours	Expedia, Travelocity	Merchant, brokerage and co-operative
Special interest or service	Provide information, product sales and supports, and contacts between visitors	Lavalife, Craigslist, Google Groups, Microsoft support group	Community, merchant, affiliate, infomediary, advertising

THE E-COMMERCE ADVANTAGE

Frictionless transactions—the ability of the consumer to move from thought to action (i.e., buying to instantly fulfilling the product) creates new opportunities for businesses to operate at lower costs by easing the burden of the supply chain electronically.

- Craigslist , Toronto Kijiji
- Ubiquity and accessibility, customization, higher information density, universal standards, and global reach
- Internet users are a fast- growing group with significant buying power.
- When combined with open source software applications and development tools, universal standards increase accessibility to the marketplace while also lowering entry costs and encouraging innovation
- However, when aggregated online, these businesses produce a viable volume of sales to support a global Internet retailer. Smaller businesses like this can compete successfully by targeting specific customers for one-to-one attention.
- With e-commerce, both buyers and sellers have access to the world’s marketplace

Information Clutter

The expansion of global e-commerce has also increased buyers’ level of **information density**; that is, the quality and quantity of information about products and services of interest to them. For example, websites like PCMag.com or CNet.com

It is clear that simply having a great website is not enough; you have to make it easy for potential customers to find it. Online merchants use a number of important strategies to accomplish this goal.

Online Advertising

- Google AdWords (see <https://adwords.google.com>) is a way of linking your paid advertising to searches of keywords by consumers.
- If you want to be less specific but have a target budget in mind, you can also buy coverage in the form of **cost per click (CPC) maximums**, which work almost like an auction of those competing for placements against popular words and phrases.

Search Engine Optimization

A variety of techniques are related to making your web- site both more visible to search engines:

- is ensuring that your site uses technologies that are easy to search
- creating lots of links between your site and others
- making good use of meta-tags and content density to appear like a site that offers lots of information and value
 - o Search engine practices may change as companies develop newer and better ways of providing search results.

Partnering and Traffic Trading

You can almost always think of complementary business partners in the offline world that target a similar market as you, but with different products and services, or perhaps different price points and features

- in the online world you can partner with other sites and each of you can cross-list the others' website and trade potential traffic that comes to one site
- You have managed to get a potential customer, or prospect, to your site, you must find a way to capture his or her interest and, hopefully, encourage a purchase.
 - o **Mass customization**, or the ability to create custom products or services on-demand, is one way that Dell has succeeded in the consumer PC business. Through its website, customers can choose from a wide variety of ways to customize a standard Dell PC to match their needs and desires
 - o **Personalization** is a marketing message that a business customizes for each potential customer's interests, based on his or her searching, browsing, and buying habits.
 - Personalization of this nature is often only possible because you previously shared information with the website through a registration or sign-up form, or through the data you provided to purchase items from the site.
 - For example if you register with Amazon.ca, you can view a list of book recommendations and why Amazon recommends the books to you.

Frictionless transaction - providing products/services efficiently and reducing cost and involvement of the provider

Web Usage and Statistic

Many Web statistics reporting software programs are available, many for free. Some require that you install software on your Web server; others operate as SaaS (software as a service). All of these software programs contain the basic required Web metrics for various timeframes,

including number of unique visitors, number of page views, where users are coming from (a way to measure the effectiveness of partnerships), which page users exit from on your website, which search engines visitors use to find your website, and more. Some Web statistics programs offer advanced logging functions, graphing, trend analysis, and integration with other Web programs.

E-Commerce Competitive Difference

E-commerce dramatically affects competition between organizations in a number of interesting ways, such as:

- reducing barriers to market entry
- preventing any company from “owning” the market
- enhancing collaboration/alliances
- multiplying market niches
- changing marketplace drivers

E-commerce solution to this problem is the use of a **co-operative website**, like VRBO.com, canadavacationrentals.ca, and homeaway.com, where owners of vacation properties co-operate by advertising on the same site. Such websites serve as a meeting place between property owners and renters

- have reduced barriers to entry by not requiring that a rental agent have an expensive building in a well-travelled location near the vacation area

Niche markets are one area where e-commerce has shown itself to be superior to almost any existing form of marketing.

E-Commerce and Business Strategy

- Henry Mintzberg, a professor at McGill University and a leading thinker on strategy and leadership, suggests that strategy is a plan, pattern, position, and perspective
- He argues that strategy emerges and evolves over time in natural response to a constantly emerging competitive landscape and the individual performance level of any competitor in that market space.

E-commerce strategy is a general term for how a business intends to use computer Web-based networks and information systems to compete in its global marketplace.

- Building a meaningful e-commerce strategy requires two different views of an organization’s strategy: what it wants to do (conceptual strategy), and how it will do it (technology strategy) and they two views are interlinked

An important strategy that many companies are using is to connect their online Web strategy to their existing **customer relationship management (CRM)** to create an integrated one-to-one marketing experience for their customers.

- Companies can use CRM to tailor the products on their website to the individual buyer, or perhaps create customer-specific offers and campaigns or keep track of specific discount levels or specific inducements or entitlements offered to repeat buyers.

Other e-commerce strategies that companies use to increase business value to consumers include use of virtual showrooms, increased channel choices, wider component choice, and use of mobile technology. Of course, just as the Web itself was a disruptive technology, the rapid expansion of mobile data networks and phones is another current example of a technology innovation that demands a strategic business response.

M-Commerce

Mobile commerce is the use of lap- tops, mobile telephones, and PDAs to connect to the Internet and Web to conduct many of the activities normally associated with e-commerce, but in real time and without regard to where the user may actually be at the moment

- Possibly the largest new channel for many businesses (both online and traditional business models)
- Enables mobile commerce (m-commerce) applications to become a reality, and ensures that consumers can immediately react in the moment to any marketing message (rather than waiting to get home to their computers to access the Internet)

Benefits and Limitations of E-Commerce

- Porter’s model suggests that e-commerce increases competition
- Amazon.ca has turned this into a key advantage that keeps customers coming back, since they don’t have to train a new website to know their interests. The use of niche marketing helps companies react to changing com- petition.
- Another way companies are attempting to increase consumer comfort levels with e-commerce is through the use of technology provided by credit card companies.
 - o E-commerce sites often ask for credit card security codes during a transaction to provide a higher level of security.

Benefits and Limitations of B2C E-Commerce

	Benefits	Limitations
Consumers	<ul style="list-style-type: none"> • Lower prices • Shopping 24/7 • Greater search ability of products worldwide • Shorter delivery times for digital products • More sharing of information with other consumers • Improved customer service 	<ul style="list-style-type: none"> • Delay in receiving physical products, plus shipping charges • Slow download speeds in areas without high-speed Internet • Security and privacy concerns, especially with the rise of phishing (a scam intended to gain private information for fraudulent use) • Inability to touch, feel, smell, try out, or try on products prior to purchasing • Unavailability of micropayments for purchases of small-cost products
Business	<ul style="list-style-type: none"> • Expansion of marketplace to global proportions • Cheaper electronic transactions • Greater customer loyalty through customized web pages and one-to-one marketing • Expansion of niche marketing opportunities • Direct communications with customers through website, often resulting in better customer service 	<ul style="list-style-type: none"> • Increased competition due to global marketplace • Ease of comparison between competing products drives prices down • Customers want specific choices and will not accept substitutes • Customers control flow of information instead of companies

Web 2.0

- Web 2.0 was first coined by Tim O'Reilly (founder of O'Reilly Media) and used publicly at a trade conference in 2004
- Web 2.0 has come to represent what most people refer to as the interactive web—that is, moving from a passive site that basically displays information to a site that permits interaction with visitors or users.
 - o Interactive site is often supported by significant multimedia capability such as audio and video, combined with some form of **user-generated content** (UGC) such as blogs and conversation threads.
 - o Often associated with websites that expect higher levels of user engagement and involvement to promote self-expression.

The **semantic web** is a next-generation—but not separate—web that makes information sharing and exchange easier by focusing on content, searchability, and interpretability at a technical level. This opens up new possibilities in the future for even more amazing information-sharing applications.

- Adobe Flash
 - o Streaming video and audio quickly
- Java Script
- API
 - o Application Process Interface
 - o A programmer can take information, and put it on their website

DEFINING SOCIAL TECHNOLOGIES AND UTILITY

- There is nothing that is purely “technology” in the traditional sense
- These sites are purpose-built collections of existing capabilities and tools, in most cases simply bundled together to create a novel technology-enabled online experience paralleling offline socializing.
- linking of form to function is an important point regarding the social web
- When you think about the social web, you are really only thinking about doing something that human beings have done forever (converse, connect, gather, join, belong) and translating that into an online context.
- Examples of websites that belong to this category include Facebook, MySpace, Orkut, Hi5, LinkedIn, or Twitter

Social Unity

We have coined the term **social utility** to address this. This term suggests that you only spend time on sites that are useful to you, and that the time invested on the site somehow contributes to your happiness or social satisfaction, or creates social opportunities for you.

Three Pillars of Sociability, shown in Figure 8.3. The concepts attached to each pillar are rooted in social psychology, the study of how people congregate and why—often demonstrating almost tribe-like behaviour.

1) Affiliation

- The first step, beyond simply being aware of the opportunity to join something, is to ensure that users want to be affiliated with your group.
- The underlying psychological driver of this is the need to belong.

- This may include wanting to belong to something because it is popular or will make a person popular, or it may be just the opposite and rooted in exclusivity and the fact that only the chosen or a few belong.

2) Participation

- Once they have made the leap to wanting to join your site (that is, to publicly declare their desire to affiliate), you must help users easily understand the rules of participation.
- These kinds of rules are often printed or implied and are easily mastered by users. Example: if you join a photo sharing site, you likely want to indulge in photo sharing and understand that others will in turn view your photos
 - Perhaps it is not all right to follow-up with emails or pokes asking them to comment on them (a common complaint of many sites with an emphasis on sharing).

The most successful social networking sites focus on ensuring an **invitational design**, borrowing a psychological term for finding online ways to welcome new people into a group and making it safe for them to learn and master the norms.

- The best sites encourage play and discovery and make the site design intuitive.
- This is an essential consideration in the design and marketing of any social networking site.

Validation

- The third pillar of sociability to consider is how to validate the user's social experience, thereby constantly reinforcing the social utility of your website.
- Each user will have a different level of social comfort, involvement, and confidence.
- But it does mean finding tangible ways of demonstrating social value
- Why is Facebook better than Friendster
 - Because
 - Facebook initially appeared to be a focused and targeted site that had exclusivity, it was essentially for a single user, and you need specific requirements
 - Friendster on the other hand, was allowing everyone on the join
 - The friend feature in Facebook enabled an instant form of social validation for its participants. In fact, others can easily see how many friends you have and you can find validation by inviting friends to connect with you.

Design and Usability

It is becoming clear that design esthetic and usability are critical components to building a successful interactive media site, and that the most powerful of these become almost addictive to users and intuitive navigation

- If the website looks good, attractive and easy to use, people use it and if not they won't use it
 - It is very hard to create this seamless combination because both the designer and developer have to work together on the development phase
 - They also have to be both concurrently and rapidly, and changing the site technology, flow and architecture based on customer feedback

- Successful sites also normally employ a minimalist design perspective that simply says that everything must matter and be just a short click away. This means eliminating the layers, barriers, and complexities of navigating the site by making sure those users can easily find and use a specific function.
- Sites have to be that both encourage interaction and make it easy for users to do so. Keep in mind that users are often not very sophisticated in their use of technology.

Business Utility

- Exploring how to deploy social media platforms and technologies to create business outcomes (e.g., increased sales, higher customer loyalty, lower transaction costs, etc.) that have real value for an enterprise, but are also acceptable to users.
- Consumers or clients will share information with you because you want them to is naive—they will only do so when there is utility, when they get something back in return they want (e.g., products and services, information, access to other buyers, etc.).

Technology Implications

- The first (and likely least obvious) one is the sheer cost of accumulating and storing all of this often multimedia intense content
- Running a site requires significant bandwidth and also massive amounts of storage to keep it all instantly available and properly tagged and indexed.
 - This has a direct operating cost for social media sites, since both bandwidth and storage become more expensive the more volume a site receives.
 - This means that Web 2.0 sites are more expensive to create and run than traditional websites.
 - It also means increasing demand for **compression technologies**, which help reduce the costs of storage and transmission (particularly of image and video-based formats), and developers who know how to code and implement systems that efficiently handle large amounts of information.
- Another concern is what it says about social computing—that it does not belong in the business realm. Yet businesses or organizations will not survive unless they begin to understand the social web.
- A technological concern also arises from banning social networking sites: many employees will find a way to get around the ban and access the sites anyway
 - Many employees are becoming technological-savvy, and they can easily deploy proxy servers and other techniques to get around site-specific bans (for instance, check out hidemyass.com)

Privacy and Security

There are also implications for privacy and security for any social website

- These issues have a direct implication for sites where users post and share both public and private information of various types, formats, and levels of risk if they are shared by accident
- If a sites can protect customer information, the will lose customers and will fail the attract new customers

This is also an area of great legal risk since various codes around the world related to privacy protection (such as the Freedom of Information and Privacy Protection Act or FIPPA, and other related codes such as PIPEDA) create obligations that companies and organizations must adhere to by law to operate.

- The sites have to know the legal codes that they are dealing with, because codes are different everywhere

Example: This was proven recently when the privacy commissioner of Canada engaged in very significant discussions and negotiations with Facebook to ensure its site met Canadian privacy laws. If Facebook does not comply, the commission has the ability to prevent it from operating in Canada or accepting Canadian registrations—a significant business and technical risk for a global firm.

USER-GENERATED CONTENT

Creating Content

- Essential ingredient that most experts agree is fundamental to most social media applications is the concept of **user-generated content**.
 - o Suggests that in most instances, true social sites focus on providing the context in which users generate content themselves, rather than providing the actual content.
 - o Participants in social media sites must register, identify themselves, and decide how to present themselves.

Examples: LinkedIn, Facebook, Second Life

- The primary purpose of a social site is to have participants interact, which means they must actively join and self-identify in some form before they can participate.
- Good psychology suggests that before you affiliate with a group, you must discover and trust its social motives and intentions.
- Most successful social media sites permit some form of restricted observation or discovery before requiring registration or identification.
- Successful sites restrict visitors to watching, observing, or learning about the site, its intentions, and user behaviour by limiting what non-registered users can do.
- Using this method, before new users can participate fully they must demonstrate a willingness to disclose or create a **participating identity**. They will use this identity to create and post additional content or take the actions required to begin to fully participate in the online community.
- The community might also be **self-regulating**, where members report conduct they feel is outside the group norms to a moderator who is responsible for drawing the inappropriate behaviour to the attention of the member or removing or restricting the member's privileges.

Finding Context

- **Tagging** involves associating keywords with your content to make it searchable so that other users can locate it and interact with it.
- In turn, by using collaborative tagging and comparing and coalescing how other users tag the same or similar content, you derive a **folksonomy**, or collective cloud tag, t

- How the technology is deployed to permit **viral social interactions**, where something that is funny, unusual, shocking, interesting, or newsworthy almost instantly spreads online from its origins to nearly every corner of the world.

User-Generated Content and Brand risks

Psychological concept of **schadenfreude** (drawing happiness from others' misery or misfortune), negative stories go viral more often than positive ones.

Online social strategy should be an awareness of the risks of undertaking any kind of online social campaign that might backfire.

Mashup -

Brandstorm—a situation where a traditional brand faces an online storm that can quite literally damage the value of its brand overnight

- o the online world was imposing media transparency

CREATING BUSINESS UTILITY USING SOCIAL MEDIA TOOLS AND E-MARKETING

Direct marketing means just that: messages, offers, or promotions that come directly from the company to the consumer in some form (e.g., advertising, mail, targeted events, or samples).

- This moved companies into a new phase of computer-enabled marketing where the two disciplines began to work more closely in tandem.
- This phase is associated with the creation of mostly passive websites and the slow beginning of basic online marketing techniques such as email lists (and the associated plague of e-spam).
- In order to understand customer behaviour they had to track stats and refine marketing campaigns and they also began to offer methods of buying products, services online, or at the minimal, introducing stores to buy goods
- After the arrival of the social web, Consumers began to realize the power of interacting online, and began to demand that companies operate with a view to how they wanted to access product and service information and buy online when and how they wanted.

Consumers began to seek out **indirect** sources of information (e.g., product and ranking review sites, relying on word of mouth to find new products, etc.)

- This meant an emerging distrust in some instances for the direct marketing messages coming from companies, and more emphasis being placed on validating what companies were saying about their brands and products.
- Consumers were able to share information at such a rapid rate, it was hard for traditional marketing to catch up.
- Example: www.tweetedbrands.com.

Chapter 8

Pp 205 – 216, Pp 220 – 226 and Case: BI at Canadian Tire

The Data–Information–Knowledge Continuum

Data are raw unorganized facts, numbers, pictures, and so on.

Information is data that have been organized/processed/transformed and are useful to a person. **Knowledge** is created when a person combines experience and judgement with information. Applying knowledge is how business people create and add value to organizations.

Example:

You probably looked on your schedule and found the building name and/or number (**data**).

Once you knew this, you looked at your campus map (**information**).

Now when faced with the “when- to-leave-for-class decision,” you use **knowledge**, which combines your class time, classroom location, and parking lot location with your “finding-a-space” experience.

You can extend the data-to-knowledge continuum even further to include wisdom. **Wisdom** adds insight and ethics to the experience and professional judgement inherent in knowledge.

- Wisdom enables business leaders to perceive the underlying meaning and nuances of a business situation and ensures that knowledge from all relevant perspectives, disciplines, and sources is considered in the final decision.

Cost and complexity of the tasks to be accomplished increase as you move up the pyramid from simply accessing data to applying wisdom

- Information technology and systems assist primarily with collecting, collating, and analyzing data and information.
- Information systems transform data into information

Lifelong Knowledge Creation

Explicit knowledge is knowledge that is readily codified, such as the knowledge in this textbook.

- Websites, books, journals, newspapers, sources

Tacit knowledge is knowledge that you gain through experience, insight, and discovery.

- Past experiences, wisdom

These two types of knowledge are complementary halves of a lifelong knowledge creation process.

Knowledge Work Activities

Knowledge work involves the discovery, analysis, transformation, synthesis, and communication of data, information, and knowledge.

- **Making good decisions**

Discovery: Finding Data, Information, or Knowledge

Discovery is the finding of data, information, and knowledge relevant to a task, problem, issue, or opportunity (the context).

- You begin with an idea of what to look for, and then reflect on where information related to the task may exist. You then retrieve relevant data from those various sources and assess its value to the decision at hand.
 - o Internet
 - o Intranet, contains data about the company that only authorized employees can access

Analysis: Investigating and Examining the Available Data, Information, and Knowledge

Analysis is a critical knowledge work activity that will help you answer questions and gain understanding through a thoughtful investigation and examination of the available data and information.

- Contains on three roots of analysis

- Process mapping (if you are analyzing a business process),
- Quality assurance (if you are analyzing product quality),
- Performance testing (if you are assessing fitness or standards).
 - o Help answer: “What is happening and why?”
- “What type of equipment sold the most units?” “What was our total profit?”
 “How did the sales of each type of equipment contribute to that profit?”

Transformation: Organizing Discovery Results

Transformation is knowledge work that requires you to use the results of your analysis to deepen your understanding of the data and information.

- Spreadsheets, databases and database software’s are effective tools for organizing and storing information
- Context of the information

Synthesis: The Sum of the Parts

Synthesis allows you to interpret trends or patterns that seem to explain the past and the present, and may suggest courses of action likely to favorably influence the future.

Communication: Sharing Analysis with Others

To help your employer create business value, you must have strong **communication** skills; that is, the ability to share your analyses, ideas, and solutions with others.

- Individuals and organizations can and do use information systems and technologies to help them communicate
- Individuals use focus on physically sharing the message, such as email and instant messaging.
- Microsoft PowerPoint, Groove, Inspiration, Visio, GotoMeeting.com
- Very important

Technological people are not good communicators

Examples of Knowledge Work Activities

Knowledge Work Activity	Manager’s Request	Helpful IT Tools and Activities
Discovery	Find our company’s and our competitors’ weekly sales data.	Use data from check-out/point-of-sale (POS) terminals, search tools (e.g., Google), and Web searching.
Analysis	Compare the sales data for the first week of May to similar data from our company for the previous two months.	Import the data into a database or spreadsheet application, and use its features and tools to organize the data. Find the previous months’ data and import these as well. - Excel
Transforming	Identify any trends in the data by week, month, and day of the week. Indicate	Use the data analysis tools in the spreadsheet application to examine the data from

	<p>how our company's results compare with our competition and with the industry as a whole.</p> <ul style="list-style-type: none"> - Compare the information 	<p>different aspects. Consider what your analysis of the data revealed and combine this with your knowledge of your company's goals to add focus to your analysis. Search the Web for other analyses of your company, industry, and competitors. Integrate this with your interpretation of the sales data.</p>
Synthesis	<p>Given your analysis of our company's relative success or failure, suggest ways to capitalize on our strengths and overcome our weaknesses.</p> <ul style="list-style-type: none"> - recommendations 	<p>With analysis in mind, obtain feedback about specific company products and services. Arrange a brief Web meeting (e.g., with NetMeeting) of the top sales associates in your company.</p>
Communication	<p>Present your findings and suggestions to management.</p> <ul style="list-style-type: none"> - Share Ur ideas 	<p>Import your spreadsheet data into presentation software. Add the insights gained from your Web meeting.</p>

DATABASES: THE PRIMARY DATA STORAGE FOR ORGANIZATIONS

A **database** consists of interrelated data that are stored in files and organized so that computer programs can quickly and easily access specific pieces of data.

- people who create and manage the database, sometimes known as database administrators (DBA)

A **database management system** (DBMS) is a collection of software that allows users to create and work with a database.

- The DBMS controls access to the data stored in the database.

Together, a database and a DBMS make up a database system.

- Business professionals who need to access the database typically do so through other application software that can connect to the DBMS and query the databases that it manages.
- More prevalent databases used today are provided by Oracle, Microsoft, and IBM.

The Data Hierarchy

To organize data in a database, most users rely on the **data hierarchy**

- Data hierarchy organizes stored data in increasing levels of complexity
 - There are six levels which are bits, characters, Field, File (Table) and Database
- 1) The top level compiles the organized collection of files into a database.
 - 2) At the next level up, the data hierarchy assembles records into a collection called a **table or file**. For instance, at this level you would find a set of records listing the age and gender of all customers, not just Bob Smith.
 - 3) The next higher level of the data hierarchy stores collections of fields known as records.
 - Have means
 - 4) By using a record that includes fields holding values for FirstName, LastName, Gender, and Age
 - Have meaning when grouped
 - 5) A combination of characters representing a data item, such as a name or a price, is known as a field.
 - 6) A specific combination of bits represents each data character. The exact number of bits needed for a character depends on the type of data and the encoding scheme.
 - Standard ASCII and Unicode
 - 7) At the lowest level, the data hierarchy stores all data using electronic bits that can be 1 (on) or 0 (off).

Using a database system to organize data provides several advantages:

- The organization of the data is independent of any one software application. This allows all applications to access the data in a standard manner.
- The organization of the data reduces data redundancy; a DBMS may need to store only one record of data for a particular product.
- The DBMS can include features for maintaining the quality of the data, handling security, and synchronizing access by simultaneous users.
- The database system allows for capabilities such as improved data access, allowing different views of the data for different users, and report generation.

Storing and Accessing Data, Information, and Knowledge

Data Warehouses

A **data warehouse** is a means of storing and managing data for information access, typically composed of data from one or more transaction data- bases.

- Large volume transactions, transactional data
- It thus consists of transaction data, cleaned and restructured to fit the data warehouse model and to support queries, summary reports, and analysis.
- Data warehouses are very large compared with the typical database, they work with tools that allow users to more easily deal with these vast amounts of data.
- A **data mart** extracts and reorganizes subject-area-specific data to allow business professionals to focus on a specific subject area.

- Data warehouses often provide support for organizing multidimensional data, which are based on two or more characteristics (dimensions), such as time and place. Organizing data in this way allows businesses to more easily identify trends.

Businesses access and use a data warehouse for four main reasons:

1. *Automatic production of standard reports and queries*—When users need a particular report, they simply view the report that the data warehouse already generated rather than creating one.
2. *Queries against summary or detailed data*—Data warehouse tools include simple query tools like those used with databases. Queries can involve summarized data or be drawn against stores of detailed data.
3. *Data mining in detailed data*—**Data mining** includes a set of techniques for finding trends and patterns in large sets of data. Data mining tools can incorporate advanced technologies such as artificial intelligence. Some provide aids for data visualization—organizing and presenting data in ways that allow humans to spot and analyze the patterns better.
4. *Interfacing with other applications and data stores*—A company will often connect a data warehouse to applications that use it as the source of data. A data warehouse may feed data to other data warehouses, data marts, or application programs.

A Comparison of Database and Data Warehouse Technology

	Database	Data Warehouse
Supported Activity	Operational (transactions)	Analytical (knowledge work)
Respond Time	Fast response time (seconds)	Can be slower (minutes, sometimes hours)
Age of Data	Mostly data for current transactions	A lot of historical data
Scope	May support a limited area within the organization	Should provide view of entire organization
Data Variability	Most dynamic, changes often	Most static, infrequent changes
Source	Transactions from operational domain; business rules	Combined from multiple sources (including operational databases)
Data Model	Based on business rules of operational application	Aligns with overall business structure

BUSINESS INTELLIGENCE

Business intelligence (BI) is a process for gaining competitive advantage through the intelligent use of data and information in decision making.

- A key part of a corporate information strategy. It enables business leaders to make better decisions, which often translate into increased profitability.

The Stages of Business Intelligence

Stages	Description
Data sourcing (Acquisition)	Mining data and information from text documents, databases, images, media files, and web pages
Data analysis(Organization)	Producing useful knowledge from the collected data and information, using tools such as data mining and text/image analysis techniques
Situation Analysis	Culling out and relating the useful facts and knowledge ,while filtering out irrelevant data
Risk Assessment (Analysis)	Identifying decision options and evaluating them based on expectations of risk and reward
Decision Support (Decision)	Using interactive software tools identify and select intelligent decisions and strategies

How IT supports these business intelligence stages

Acquisition: The transaction processing systems (TPS) at the base of the pyramid represent the primary source of data from business operations.

Organization: Businesses store and organize the data in databases and, at times, data warehouses.

Analysis: Specialized BI and online analytic processing (OLAP) systems can help analyze, synthesize, and create knowledge.

- The BI systems in the third level of the pyramid, decision support systems (DSS), allow rapid and creative knowledge creation by decision makers. Also at this level of the pyramid, you might find knowledge
- KM systems facilitate access and distribution of knowledge throughout an organization or a management information system (MIS), which stores management reports. DSS, KM, and MIS
 - o A common way of organizing these systems is using a balanced scorecard, dash- board, or measurement matrix

Decision making can occur at a number of levels

Most fundamental level: **Tactical decisions** are made every single hour of every single work day within organizations

- Usually made by someone doing the actual work, might make choice
- Systems are not used
- Decisions are not complex or multi-faceted

Operational Decisions:

- Decision is made by the manager rather than the individual worker
- Some overall analysis of shipping patterns, perhaps informed by systems that report on these trends by vendor, product type, date ranges, or similar analysis.
- The value of having data and information on overall shipping patterns and trends available to that manager as these decisions are considered.

- Short Term decisions

Highest Level of the Organization:

Strategic Decisions

- Executives don't know whether or not to continue
- Self-serve model where the customer interacts directly with the organization's systems, makes product choices and payments, determines how they are to be shipped, and so on.
- Data and information are not only critical, they may come from both internal and external sources, and might include actual data along with modeling, forecasting, or other intelligent extensions of data to improve decision making.
- More complex than tactical or operational systems, and requires a significant understanding not only of IT
- Use of statistical analysis, data modeling, and other complex skill sets, in addition to an obvious understanding of database and related kinds of technologies

1. Strategic. Strategic decisions are the highest level. Here a decision concerns general direction, long term goals, philosophies and values. These decisions are the least structured and most imaginative; they are the most risky and of the most uncertain outcome, partly because they reach so far into the future and partly because they are of such importance.

For example: Decisions about what to do with your life, what to learn, or what methods to use to gain knowledge (travel, work, school) would be strategic. Whether to produce a low priced product and gain market share or produce a high priced product for a niche market would be a strategic decision.

2. Tactical. Tactical decisions support strategic decisions. They tend to be medium range, medium significance, with moderate consequences.

For example: If your strategic decision were to become a forest ranger, a tactical decision would include where to go to school and what books to read. Or if your company decided to produce a low priced product, a tactical decision might be to build a new factory to produce them at a low manufacturing cost.

3. Operational. These are every day decisions, used to support tactical decisions. They are often made with little thought and are structured. Their impact is immediate, short term, short range, and usually low cost. The consequences of a bad operational decision will be minimal, although a series of bad or sloppy operational decisions can cause harm. Operational decisions can be preprogrammed, pre-made, or set out clearly in policy manuals.

For example: If your tactical decision is to read some books on forestry, your operational decision would involve where to shop for the books. You might have a personal policy of shopping for books at a certain store or two. Thus, the operational decision is highly structured: "Whenever books are needed, look at Joe's Books."

AN INTRODUCTION TO ETHICS AND MORALITY

Ethics is closely linked to morality and a society's widely shared understanding of what is right and wrong

Personal values—fundamental beliefs that you hold as true about the way the world works and your role in it—which are shaped by those same factors, and also to a large extent by how you were raised as a child

Moral Code - it is something you know you shouldn't do, and you learn this fast and at an early age

Stealing is also against the law. Society imposes consequences on any member who is caught and proven to have violated certain rules and codes. Therefore, a country's or society's **legal codes** also help define what is right or wrong

Dissonance - disagreement between the law and your morals or values

Where the law and some people's moral or religious codes do not coincide to create an easy answer that everyone will agree to and accept, which results in a **ethical dilemma**

Hierarchy of values - refers to an ordered list of social values that influence judicial decision-making

BUSINESS ETHICS AND CONDUCT

Society relies on the individual personal ethics of those in business to make the right decisions rather than relying on the business itself to be ethical

THE BUSINESS BENEFITS OF ACTING ETHICALLY

- Shielding you and your employees from harmful and costly litigation and the associated negative publicity that it draws
- Reducing long-term compliance and audit costs as your organization begins to reliably follow a consistent code of ethics and conduct
- Creating a brand built on integrity and ethical conduct that can increase sales and encourage long-term customer loyalty
- Gaining goodwill in your local community as an ethical and responsible corporate citizen
- Ensuring your organization will be embraced and accepted as it expands to other jurisdictions
- Attracting quality employees and supporting an excellent employee brand

Corporate Social Responsibility - is the continuing commitment by business to behave ethically and contribute to economic development while improving the quality of life of the workforce and their families as well as of the local community and society at large

An **externality** is an effect of a purchase or use decision by one set of parties on others who did not have a choice and whose interests were not taken into account.

- *Negative externality*: pollution, generated by some productive enterprise, and affecting others who had no choice and were probably not taken into account.
- *Positive externality*: Purchase a car of a certain model increases demand and thus availability for mechanics who know that kind of car, which improves the situation for others owning that model.

What Causes Ethical Misconduct in Business?

Once an initial immoral, illegal, or unethical act is committed, a pattern of cover-ups and systemic deceit or **corruption** occurs to ensure the first occurrence remains hidden.

- o An illegal practices to further one business interest

Inherent conflicts –

1. True or **False**. The law prevents business leaders from acting unethically.
2. Fill in the blank. When the law and an individual's moral code are not in sync, it is a situation known as an *ethical dilemma*.
3. It is widely accepted that acting ethically
 - a. increases profit
 - b. **offsets risk**
 - c. eliminates threats

Remedying Ethical Breaches

Sarbanes-Oxley Act of 2002. Often referred to as Sarbox or SOX

- Section 302—Requires CEOs and CFOs to personally certify financial statements and disclosures in periodic reports, as well as the effectiveness of the company's internal controls. In Canada, Ontario's Bill 198 was enacted to allow the Ontario Securities Commission (OSC) to issue rules related to information certification.
- Section 404—Requires a separate annual internal controls management report and mandates internal controls that are well-defined, documented, and periodically evaluated by internal (management) and external audits. In Canada, this area is also covered by Ontario's Bill 198.
- Section 409—Decreases the time between reporting deadlines into a potentially "real-time" reporting environment, and increases reporting requirements for material changes to business operation that affect financial reporting (e.g., if a main factory burns down, current financial projections are no longer valid).
- Section 906—Requires additional CEO/CFO personal certifications of financial reporting and imposes criminal penalties of up to \$5 million in fines and up to 20 years in jail for knowingly falsifying certifications.¹
- Section 201—Prohibits a public accounting firm from performing both audit and non-audit services for the same client. Compliance with this section caused several major accounting and IS consultancies like PricewaterhouseCoopers (PwC) to restructure their organization. In 2002, PwC sold its existing global management consulting and technology services practice to IBM, in part to comply with this section of SOX. The Canadian Institute of Chartered Accountants (CICA) has made several amendments to its handbook in line with the rules contained in Section 201.
 - It adds a layer of cost and complexity, potentially hinders economic growth in the long-term, and costs everyone something over time.

CORPORATE AND IT GOVERNANCE

Corporate governance can be simply defined as the highest level of decision making, involving basic questions of status, strategy, and compliance within an organization

- Effective governance is a critical enabler for success in the global economy, for securing the enterprise's information resources, and for creating competitive advantage.
- All companies are re-evaluating their governance in light of high-profile corporate scandals, such as Enron and WorldCom, to bring it in line with emerging global standards and legislated requirements. This is generally improving the overall state of corporate governance globally.
- The leadership and management of a business are directly accountable to its owners (i.e., shareholders) for proper operation and financial control of the organization.
 - o Deliberate and complete disclosure and reporting of results for a public company
- Given the global expansion of businesses and public demand to control what many see as massive corporate excess and global fraud, it is no surprise that stakeholders

- national governments have increased their involvement in ensuring effective governance
- are the business professionals who implement and follow governance policies and processes, they need to understand technology and its impacts on both corporate and IT governance.

IT governance is the “distribution of IT decision-making rights and responsibilities among enterprise stakeholders, and the procedures and mechanisms for making and monitoring strategic decisions regarding IT.”

IT governance begins as a very high-level process that specifies:

- (1) How the organization will set goals, objectives, priorities, and policies for IT
 - (2) How it will integrate IT with business strategies and goals
 - (3) Which organizational members will make decisions regarding, and be responsible for, the successful completion of these tasks (the “who” of IT governance)
- To be better professionals one of our obligations is to continually enhance the role of our profession as it relates to contributing to society and not just remaining self-interested.

The CIO: Managing IT Governance

Chief information officer (CIO) - usually leads the organization’s information and technology efforts, especially as it relates to the creation of business value.

- must ensure proper and secure use of all the organization’s information resources, and particularly the organization’s compliance with privacy laws and regulations in every jurisdiction in which it operates

However, since not all organizations have a formally designated CIO, the role of ensuring that IT governance is properly in place is actually the responsibility of the senior executive team and the board of directors. Ultimately, it is up to them to decide who will be responsible for IT governance within their organization. The most basic point here is simply to ensure that IT governance is not an afterthought, but rather forethought.

Professional Codes of Conduct and Practice

Industry associations, professional bodies, and industry think-tanks for many professions—IT included—often develop, publish, and promote **codes of conduct**.

Code of Conduct - set of rules outlining the responsibilities of or proper practices for an individual or organization. Related concepts include [ethical codes](#) and [honor codes](#).

- Are relevant to any profession and help guide the professionals within the field in terms of what is and is not acceptable and ethical behaviour.
- Many professions have very strict codes of conduct where the consequence of not following them normally results in expulsion and the payment of compensation for malpractice
- IT-related professions have looser guidelines or lesser means of imposing sanctions and are considered as more voluntary rather than punitive codes of conduct.
- codes are often in place in organizations with high risk profiles where the risk of unethical behaviour has high financial or human costs.

Examples of Code of conduct:

- upholding the law
- confidentiality
- fairness
- corporate responsibility
- honouring our trust in you
- objectivity

- integrity
- individual responsibility

Common Ethical Dilemmas Involving IT

Copyright and Piracy

- One of the biggest plagues of the software industry is piracy.
- It should be clear to any professional that copying any protected software, which the license clearly does not permit, is an unethical practice.
 - Hurt the cost of the software, doesn't encourage innovation and diminishes opportunities for IT Professionals
- Sometimes fall into the trap of simply "cutting and pasting" something without referencing it or sourcing it properly.
 - This is another aspect of copyright infringement that is made easier by having access to the Web

Patent Violations

Patent - normally means acknowledging the use of and paying royalties on any invention you use as prescribed under various patent regimes in place around the world.

- Result of ignorance (in and of itself a potential violation of ethics, since it is easy enough to search for pre-existing patents), much of this is intentional
- If you use someone else's work, you should pay for it and almost every developed nation has its own patent codes, arrangements, and royalty requirements
- To use someone else's invention without paying is not only unethical, it is theft of intellectual property.

Reverse Engineering

- Reverse engineering is used most often to find out how another manufacturer created a product (software or hardware), and then attempting to learn from this to either make a better one or find a way to replicate it in a different way to avoid infringing on copyright or paying royalties on a patent.
 - If this used a education tool, there are no ethical dilemmas
 - If used for any other purpose to evade respecting other people's originality and intellectual property rights, there is considerable ethical debate about the integrity of this practice.

Spam and Privacy Codes

- Spam emails are used by organizations as a marketing tactics and by criminals organizations use it in phishing schemes (lottery winner)
- The ethical dilemma is not the practice of send- ing promotional email itself; it is seeking permission to do so rather than collecting or buying email addresses where individuals have not provided their consent.
- This common practice requires IT professionals to implement the systems.

Security Breaches

- News stories often describe breaches in protocol, usually in IT, or how intrusions or security breaches resulted in the loss or disclosure of valuable personal information.

- This behaviour is unethical; a privacy breach is a serious matter and must be taken seriously. The law is the law—as inconvenient as it may be—and it should be followed.

Competitive Intelligence

- Competitive intelligence is a common practice in business, including in the IT industry. Competitors want insight into what others in the industry are doing so they can respond to the market and maintain market share.
- Gaining such insights from customers or partners, or from observation and deduction are all fine, but beyond that there are a whole host of practices that clearly skirt the boundaries of ethical practice.

Example: having someone pose as a potential customer to get pricing information, hiring away a competitor's employees with the sole purpose of obtaining competitive information, hiring a head hunter to seemingly solicit interest for a non-existing job so employees will disclose confidential plans, or hiring investigators to snoop and obtain private information are all clear examples of unethical practices

Hiring Practices, Equity, and Equal Opportunity

- There is some evidence that these visa workers are frequently mistreated, not paid fairly, or exploited because they have a limited ability to change employers without affecting their immigration status. They also have to work for a number of years to qualify for citizenship
- People come to Canada to study advanced technical programs because it is not the same in their home country and even though they receive training, they often report having a less than equal access to opportunity
- This is a problem within the IT profession; practices that are not completely merit-based are unethical and should be questioned and rectified. All IT professionals should be concerned about this issue.

Green IT

- IT is a contributor to environmental damage.
- Major steps all IT professionals should take are to promote recycling and reduce consumption to create a more sustainable global IT industry.

THE PERSONAL IMPLICATIONS OF ETHICS AND GOVERNANCE

Because you have chosen to become a professional working in an organization, you are now in an ethical dilemma with potential moral, legal, and personal consequences.

- Many in the IT profession would suggest that, providing you have proper documentation of the fact that you were asked to do this and you have no *direct proof* that it is illegal or unethical, you are immune from any consequences and should do as you are told.
- When told to do something in an employment, military, or government context that is considered lawful, you must comply with those directions regardless of the outcome.