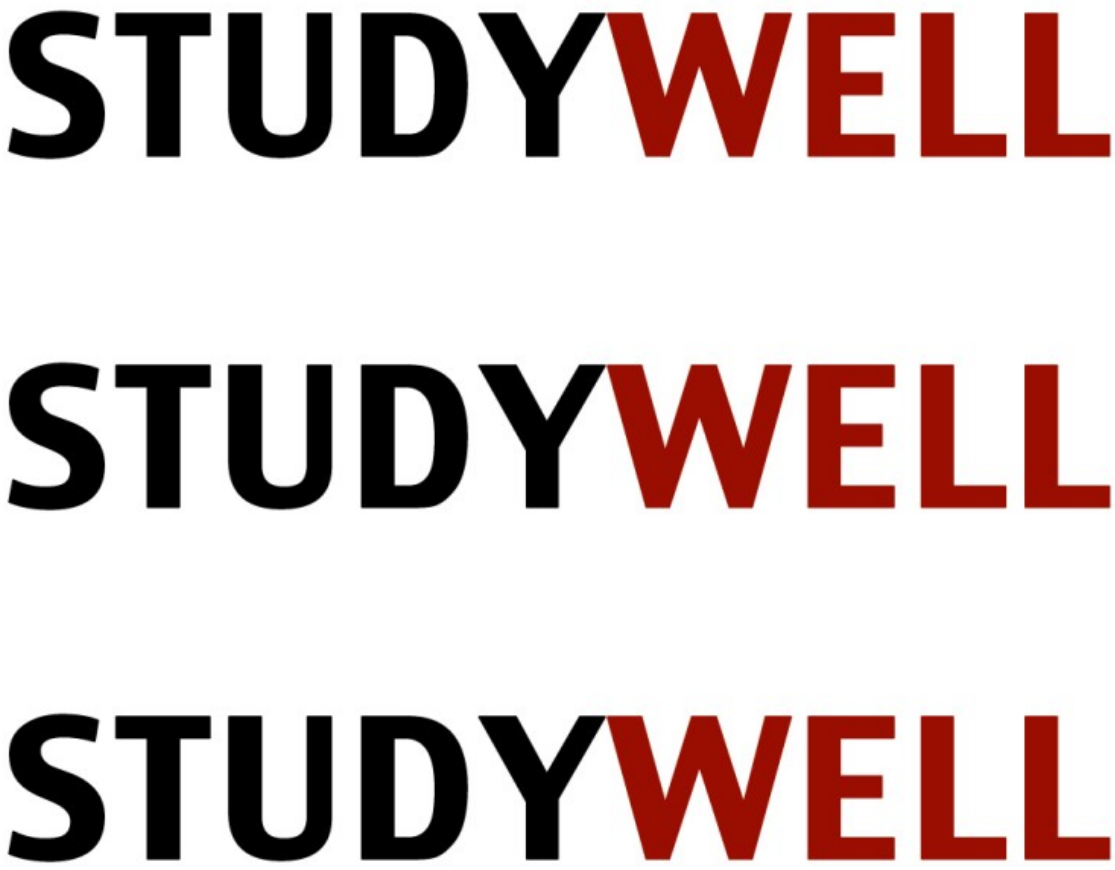


COMM 226

MODULE 1: IT for business and business professionals

Why IS matters

- Moore's law – is that computing power (as measured by the maximum number of transistors in an integrated circuit) roughly doubles every 18 months
- Information technology (IT) as a part of any IS, is a key enabler to all organizations (large or small, private or public sector) and impacts all business disciplines (accounting, marketing, etc.)
- Knowledge work – which involves the discovery, analysis, transformation, synthesis, and communication if data, information, and knowledge
- In today's environment, it is impossible to do knowledge work without technology

What is an information system?

- Information system (IS) – is an organized collection of people, information, business processes, and information technology (IT), designed to transform inputs into outputs, in order to achieve a goal
- Businesses design information systems to leverage the human ability to achieve goals through timely and appropriate application of technology, and the timely delivery of appropriate and useful data, information and knowledge
- Information systems enhance work, decision making, problem solving, communication and coordinating
- **Know page 10 – components of IS**

IS versus IT

- IT – is simply a collection of tools – hardware, software and connectivity – that enable individuals or businesses to achieve goals
- Without the context of a clear goal, processes and people, the information technology itself is irrelevant

The productivity zone

- The productivity zone occurs at the intersection of people, processes and technology
- A successful IS system integrates all three of these components to create business value

The internet

- The internet has become an integral part of personal and business lives for the following reasons:
    - Communication
        - Generates business value by making it possible for professionals to share information both between themselves and with business partners. (newsgroups, chat rooms, bulletin boards, text messages, email and IM)
    - Another key to generating business value for any organization and to increase personal productivity is the ability to both make information available, and to find information in a timely matter. This is done through the **world wide web** (www)
        - Search engines make it possible to locate information quickly
        - Ease of creating and distributing information also has the potential for **information overload**

- Commerce
  - The internet generates value by being an avenue for the buying and selling of goods (known as commerce)
  - E-commerce – is the use of information systems, technology, and computer networks by individuals and organizations to create business value
    - Occurs especially in information economy, such as travel, insurance and banking, where no physical product changes hands

What's in it for me?

IT for your personal productivity and entertainment

- how many times a day do you use technology?
- What technologies do you use and how does it facilitate your daily routines

IT is fundamental for your career

What's in it for an organization?

- Organizations use IT to increase revenue per customer, gaining new customers
- Organizations also use IT to increase efficiency and reduce costs
- This helps lower their input costs, which can then either be taken back in the form of higher margins on products and services sold, or by enabling them to reduce their selling price to preserve competitive advantage and retain market share or open new markets

Business organizations and the business environment

- When we refer to the word business, we mean any organization with one or more people who
  - Decide on common goals to pursue
  - Work together to locate and organize resources
  - Create processes to achieve the desired goals
- A business's primary objective is to generate economic value (make a profit)
- One of the most important factors influencing business is its environment

- A company's 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

- **Know table 1.2 on page 22 and table 1.3 on page 23**

What's in it for society

- Globalization means that modern businesses use information technology to expand their market to customers around the globe, to find the lowest cost suppliers regardless of location, and even to create 24 hour business days by shuttling work across time zones and nations
- Globalization of business and its worldwide reach is due to the use of the internet and internet related technologies

The economy

MODULE 10: Your BTM career guide

What is business technology management?

- The program combines in-demand technical computer skills with practical business knowledge to solve unique business issues

BTM unleashed

- Addresses business needs or opportunities using information technology
- Supports and improves business processes
- Gathers, processes, stores and presents vital information to the right people at the right time

CCICT

- The Canadian coalition for tomorrow's ICT skills is an industry-led association of employers, universities and industry organizations, founded by Bell in 2007
- CCICT's aim is to ensure that Canadian organizations can hire the information and communications technology (ICT)professionals they need to meet their workforce changing and diverse needs

BTM knowledge areas

- Projects, processes and change
- Technology in business
- Business
- Technology
- Personal and interpersonal
- Integrative learning outcomes

BTM is not ...

- Extensive computer programming
- Computer hardware and electronics
- Complex computer networking

Future jobs for you

- Chief Information Officer
- Information Systems Manager
- Information Systems Consultant
- Systems Analyst
- Business Analyst
- Database Administrator/Analyst
- Project Manager

op

- Webmaster
- Senior Technical Executive
- Business Technologist
- Electronic Commerce Expert
- Data Security Manager
- Information Systems Business Consultant
- Entrepreneur
- Technical Salesperson

BTM co-program

- Paid work terms in practical professional projects such as designing websites, building databases, evaluating information systems, conducting user needs analyses, and building digital libraries

Skills you will develop

- Identifying business tasks and their informational needs
- Critical thinking
- Ability to integrate information systems concepts
- Project management skills
- Interpersonal skills

BTM Certification

- Canadian Processing Information Society (CIPS) is the accreditation body.
- Student Certification Requirements:
  - Successful completion of BComm including all BTM courses
  - One year equivalent of related working experience (either through coop work terms, internships, stages, part-time or full-time work)

Salary and Employment Expectations

- $50,500 average salary after graduation ($32,000-$68,000)
- 77.8% of the graduates were employed three months after.

Module 2: technology essentials

The components of IT

- All IT devices are limited to the following capabilities:
    - Accepting and storing data and 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
    - 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
- 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

- The working parts of IT hardware consist primarily of electronic devices (mostly digital) with some electromechanical parts used with inputs, outputs and storage devices
- These general components can be categorized into six basic IT hardware categories
    - Processing hardware - directs the execution of instructions and the transformation of data using transistors
        - A transistor is an electronic switch that can be either on (represented by 1) or off (represented by 0)
        - Tiny chip made up of transistors is called a microprocessor
        - This chip contains most of the components that make up the central procession unit (CPU)
        - a common categorization scheme for processors used in IS is known as the computer hierarchy, which categorizes processors according to their power
        - embedded processors are programmable chips built into products to make them “smart”
    - memory – temporarily locates data and instructions before processing. there are two types of memory:
        - long term memory (ROM) – (read only memory) contains instructions and data tat only special devices can alter
            - there are fewer ROM chips than RAM chips in a computer
        - short term memory (RAM) – (random access memory) – stores data only until they are no longer needed, or until you shut down the computer
            - this type of memory is called random access memory because the CPU can access any item stored in RAM directly (randomly)
            - memory capacity is measured as the number of bytes that the ROM and RAM chips store
            - RAM is temporary, so anything in RAM is lost when computer shuts down
            - Increasing RAM capacity is the easiest way to increase a computer’s effectiveness

- both types of memory are stored on memory chips
- Both are measured in number of bytes stored:
  - Thousands (kilobytes – KB)
  - Millions (megabytes – MB)
  - Billions (gigabytes – GB)

o Input hardware – input hardware provides the interface used for data entry into a device

- Input devices provide one interface between the internal processes of an IS and its environment
- They allow us to enter data and commands
- Input devices include
  - Keyboards
  - Pointing devices like a mouse
  - Scanning devices like a barcode scanner

o Output hardware – provides the interface used to retrieve information from a device

- Output devices convert IT-processed information into a usable form for people or other machines
- Quality and speed of output are important when choosing an output device
- Common output devices include:
  - Display devices such as liquid crystal display (LCDs)
  - Printers, typically laser or inkjet as well as plotters
  - Speaker

o Storage hardware – stores data, information, and instructions for the long term

- Storage refers to hardware media and devices used to contain large amounts of data and instructions for the long term
- Storage is much slower to access than memory

- Examples of storage include:
  - Hard drive
  - CDs and DVDs
  - USB flash memory

- Communications hardware –connects one IT device to another
  - Communications hardware, such as the network interface card (NIC) provides the physical connection between a computer and a local network
  - They can either be wired or wireless
  - When you are not physically connected to a network, you can use a modem
  - 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
  - When receiving a signal, it converts (demodulates0 the analog signal back into a digital signal that your computer can recognize
  - Modem speeds, measured in bits per second (bps), significantly affect knowledge work activities

Software

- Software is information that specifies how a device should work with other data, information and knowledge
- Software is legally protected by copyright laws, just like music and books
- Firmware is software built into chips (hardware), like that in cell phones and PDAs
- Two main types of software:
  - System software
  - Application software
  - Middleware

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
- Operating system (OS) software – coordinates and handles the details of working with the computer hardware
- The OS software performs two main tasks:
    - Managing the hardware and software resources of the computer
    - 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

Application software

- Application software – is a complete, self contained program or set of programs for performing a specific job
- Application software is the software you use to get things done
- An important group of application software for business professionals is known as productivity software
- Productivity software – 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
- Middleware is 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
- It 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
- They are often free or have very low cost
- The combination of low cost, flexibility of use, and decreasing reliance on a single software vendor has made this software a very popular choice for many e-commerce applications
- Examples include:
    - Linux – operating system for servers
    - Apache – Web server software application
    - MySql – database management system
    - Perl, PHP, or Python – script programming languages
    - Ruby on Rails (RoR) – a Web application framework

Connecting over networks

- The fastest growing network today is arguably our global computer network, known as the internet
- A computer network consists of nodes that represent computer hardware and the network users, with various types of hardware, software, and communications media forming the links between nodes
- Networks consist of four primary components:
    - Data (the resource) that computers share on the network

- Special hardware
- Software that allows computers to communicate and share the data
- Communication media to link the computers together

Network categories

- A common method of describing computer networks relies on how much geography the physical size of the network covers
- The two extreme sizes are a local area network (LAN) and a wide area network (WAN)
- LANs – is confined to a relatively small area like a building
- WANs – connects computers over regions, countries and continents
- See table 2.2 on page 47-48 for networks table

Network hardware

- There are three basic categories of network hardware:
  - Hardware to connect a device to a network
    - Includes modems, cable modems, network interface cards (NIC), and wireless cards
    - A physical link hat forms a network connection is referred to as a carrier or communications medium
  - Specialized hardware for handling network traffic
    - Devices that help coordinate the data traffic on a network includes routers, bridges, repeaters, and hubs
    - A bridge is a device that lets you connect to networks or break a large network into smaller, more efficient networks
    - A router connects, translates and then directs data that cross between two networks
    - A hub, also known as a concentrator, serves as a central connection point for cables from the devices on the network
    - A repeater is sometimes needed to strengthen or amplify signals that are sent along a long transmission route
    - A wireless access point (AP) is a special bridge that connects between wireless devices and a wired network
    - All of these contribute to the speed of a network
  - 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)

- A file server is a fast computer that requires large amount of RAM and storage space because not only does it store and run the network operating system software, it may also store shared software applications and data files
- The file server manages all communication between the devices on the network
- Any computer connected to the file server on a network is called a client or a workstation

Network software

- Network operating system software manages network functions and the flow of data over a computer network
- Network application software provides the instructions that allow for the creation of data and for transformation to fit appropriate protocols for transmission over a network
- A **protocol** is a standard set of rules that allows the communication of data between nodes on a network

The internet

- Any computer network that connects several networks together is an internet
- Typically we refer to the single largest and most popular internet as the “internet”

What makes the internet possible?

- The internet uses the TCP/IP suite of packet switching protocols
- Any computer using software compatible with TCP/IP, regardless of OS, can connect and communicate over the internet

Accessing the internet

- At home, users access the internet through dial-up (over traditional phone lines) or broadband (through cable or ISDN)
- Most users connect through an internet service provider (ISP) using internet access software
- Internet access has moved into libraries, airports, or coffee shops using Wi-Fi
- Wi-Fi stands for 802.11 standards for wireless network access
- A hotspot refers to any public space within which a wireless device can connect

Beyond internet access

- Voice over internet protocol (VoIP) – allows making calls anywhere in the world
- VoIP uses the internets foundation technologies of pack 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

- Businesses can use VoIP to reduce costs, such as reducing the cost of phone calls over the telephone network
- Cloud computing – allows users to use any internet connection to access their resources on virtual computers
- 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

- The world wide web (WWW) is one of the two most popular internet applications (email is the other)
- 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
- Hypertext provides an easy way to publish information on a network in documents that incorporate hyperlinks to other information on the network
- Web browser software enables users to view hypertext documents and use hyperlinks to browse other related documents

Basic components of the World Wide Web

Client/server networks

- When you open a web browser on your computer, you start a client application
- Uniform resource locator (URL) – specifies a unique address for each page that indicates the location of a document
- If you type a URL into your browser or click a hyperlink, the browser sends a request out over the web that makes its way to the corresponding server
- **See page 54 for chart on bottom**

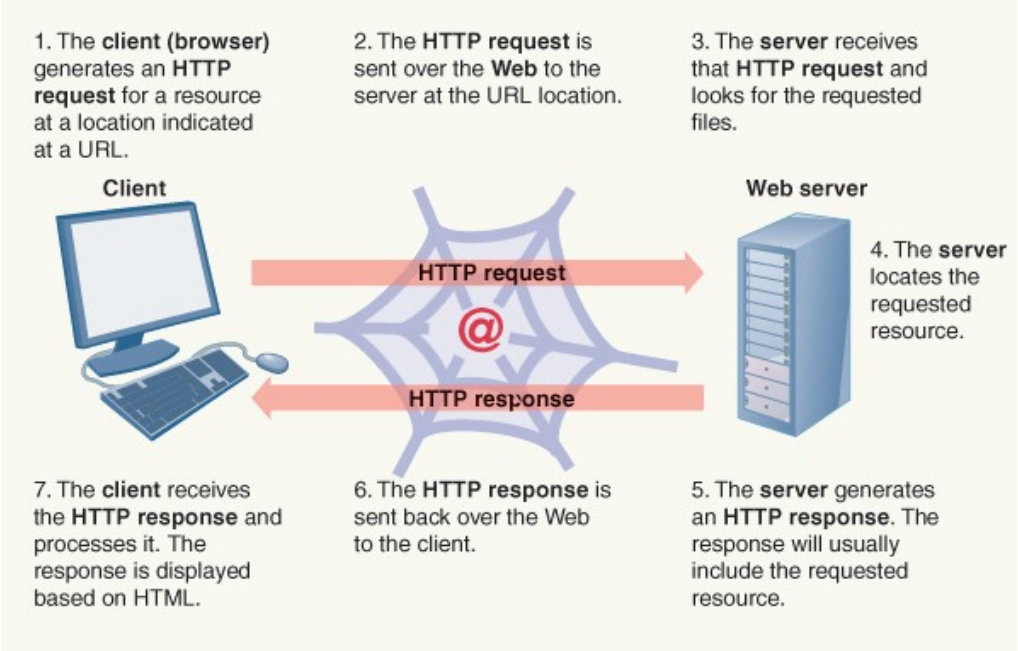


Figure 2.5: The sequence of activities on the Web over a client/server network

- Hypertext transfer protocol (HTTP) – which provides rules used by browsers and servers as they respond to each other
- Hypertext markup language (HTML) – which provides a language for encoding the information so a variety of IT devices can display it

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
- Hypertext organizes content into units that are connected using association called links

HTTP – hypertext transfer protocol

- Client and server communicate with each other using messages
- 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
- A web page usually consists of several different types of components, such as page layout instructions, formatted text, hyperlinks, tables, graphics, and form objects

Search technologies

- Users search the web to find new or updated web pages using search engines
- Following an algorithm, the submitted pages are organized and stored in a database
- Search engine tools let you query the database for sites that match your search criteria

- The main difference between search engines is how the data base of web locations is created and organized
- To search the web and compile location data in their databases, most internet search engines use either special software called web crawlers, human submissions, or a combination of both
- Many web pages incorporate special tags, known as meta tags, which contain information that describe what a site is about
- Metaseach engine, a web based tool that allows you to review the search results generated by other search engines

The technology of E-commerce

- E-commerce – is a transaction carried out using computer networks
- The growth in E-commerce results from the ease with which computer users can search for information on a wide variety of products, jump to those products web pages, and then purchase desired items with a few clicks of the mouse
- Even if you don't decide to buy an item over the web, you can find comparative data on products that can help you with your purchase

First generation E-commerce technologies: establishing a web presence

- In the first generation of e-commerce, the available technologies delivered static content through a web presence
- Static content – refers to fixed information, such as company information, online marketing, and electronic versions of company brochures
- Web presence – means the business has established its existence on the world wide web by creating a set of pages that users can access
- The standard web technologies to create a website with static content only are client server networks, web browsers, HTTP protocol and HTML
- These technologies represent a low cost and relatively easy way for new businesses to begin e-commerce transactions
- A term often used to refer to sites with only static content is brochureware

Second generation e-commerce technologies: providing interaction

- At some point in the mid 90s, newer technologies allowed for delivery of dynamic content, moving us into the second generation of e-commerce
- With dynamic content – information on a web page can change depending on a number of factors such as time and date, user profiles, or browser location
- In addition some other capabilities become available, such as delivery tracking and personalization of content to match user preferences
- Dynamics and interaction occur based on input data and programming instructions
- To create dynamic content, the following needs to occur:
    - Obtain input data

  - Pass data to server
  - Hold data in memory
  - And execute programming instructions to process the data
- Input data can come from several sources:
  - The header in the HTTP request contains data about the client requesting the page
  - The server system clock
  - Client data from a cookie along with the request
    - A cookie is a small bit of data, usually created by programs running on the server, stored on the client machine, and passes back and forth in the HTTP request and response
  - User input in an HTML form

Storing data on the client side

- To carry out e-commerce transactions, it is necessary to store data about the customer
- One way to do this is to use a cookie, a small bit of data stored on the client machine and passed back and forth between it and the web server (for example: remember me check boxes and remembering passwords)
- When data remain on the client machine for a period of time, it is known as persistent data
- Persistent data – allow web applications to benefit both users and the businesses that run the sites
- Cookies do create privacy concerns when they are used to track browsing habits

Making the client side dynamic and interactive

- A scripting language – is a high level computer language that another program interprets when executed
- Scripts are primarily used for simple processing tasks such as enabling those annoying pop-up windows
- To make the interaction with the client machine more dynamic, some sort of programming is required; this can occur on the client side or the server side
- Scripting languages like javascript are built into the web page to add dynamic interaction like data validation
- For more complex tasks, specialized components such as Microsoft's ActiveX technology, java applet and browser plug ins are used
  - ActiveX technology is used for sharing information among different technologies
  - An applet is a small program that a browser can download and execute
  - A browser **plug-in** is a small software module that can work with the browser

- Server side programming – programs that run on the server in response to browser requests
- It allows owner to retain control over their programs so that they can better manage their websites
- It is more powerful than client side scripting
- With server-side programming, a business can:
    - Deliver content that it customized for each user
    - Dynamically modify content for any page
    - Access data stored on a server-side database and send it to the client's browser
    - Take action on queries and data sent from the client
    - Provide access control and security for a website
    - Optimally manage traffic to the site
- See page 64 for the four tier e-commerce system

Third generation e-commerce technologies: supporting transactions

- The third generation of e-commerce saw demand for technologies that would extend to support real time, online transactions
- In the third generation of e-commerce, businesses recognized that they must deal with three issues to be successful:
    - Making it possible for customers to find information about companies, products and services
    - Making it possible for customers to order and pay online for goods and services
    - Providing secure and private transactions

Order and payment systems and e-commerce system security

- All e-commerce sites must have components for processing orders and accepting payments
- The four primary components of a typical e-commerce site are:
    - The shopping and ordering system
    - The merchant account
    - The payment gateway
    - The security system
- A site may use several methods to track the products that the user selects to purchase during browsing the site, and then record the order for those products so that the firm can gather and ship them to the user

  - A non secure HTML order form, with the results sent to the firm's email address
  - A secure HTML order form, with the results sent to the firm's email address
  - A "shopping cart" system that tracks customer orders using a database
  - A shopping cart provided by a third party
- Most e-commerce systems use a secure HTML order form or an in-house shopping cart system
- Business can allow payment in more traditional ways, such as billing for payment by cheque or by manually processing credit card information. Known as deferred payment
- Smaller businesses often use third party merchant accounts, like that available from PayPal. These sites process payments between the customer and merchant for a transaction fee
- The shopping cart system is the most popular e-commerce system for larger businesses where a customer wants to buy multiple products, usually using a credit card
- Merchant account – is basically a bank account that allows merchants to receive the proceeds of credit card purchases
- Secure gateway provider – is a company that provides a network to process encrypted transactions from a merchant's website
- A secure gateway provider will generally offer a payment gateway and a processor
- Payment gateway – links an e-commerce site with the banking network
- The processor handles the financial data submitted by the shopping cart application by accepting the data from the shopping cart, properly formatting it, and entering it into the banking network
- Steps in the E-commerce process
  1. The customer places order through e-commerce website.
  2. The payment gateway provider detects the placement of an order, securely encrypts the transaction data and passes an authorization request to the bank to verify the customer's credit card account and available funds.
  3. The gateway provider returns a response, indicating whether or not the transaction is authorized, to the e-commerce merchant; this process typically takes less than three seconds.
  4. Upon approval, the e-commerce merchant notifies the user and fulfills the customer's order.
  5. The gateway provider sends a settlement request to the merchant account's bank.
  6. The merchant account's bank deposits the transaction funds into the e-commerce merchant's account.
- Most e-commerce security technologies related to the secure socket layer (SSL)
- SSL allows a client and a server to communicate in a way that prevents eavesdropping, message forgery or tampering

Fourth generation e-commerce technologies: transforming payments

- Extensible markup language (XML) – organizes data based on its meaning rather than how it should appear
- XML and web services are moving us into the realm of automatic interaction between computers at one business with computers at another business
- For e-commerce, these technologies are improving the ability to exchange small amounts of data via the web and to standardize transactions
- HTML describes how to display data
- HTML and XML are often used together
- XML has become a major component in a set of technologies that are helping make the web more interactive

Web services

- Web services – are a standardized way for one computer program to request and run another computer program over the internet
- A web service is a platform independent software component that can be:
    - Described using a standard description language
    - Published to a public registry of services
    - Discovered through an application program interface (API)
    - Combined with other services and procedures to compose an application
- Web services give companies the ability to do more e-commerce business, with more potential business partners and in different ways than before at a reasonable cost
- Web services are based on a number of accepted standards that allow everybody to work for the same basic design
- Web services enable different systems to interact more efficiently and quickly link and share data
- Web services continue to gain in use and popularity as they save time and create value
- Mashup – is a web application that seamlessly combines information from more than one source into an integrated experience

Internet security

- Security threats
    - Malware
    - Scareware
    - Virus
    - Worm
    - Spam
    - Phishing
    - Denial of service attack (DoS)

- See page 71 for definitions of these terms
- Both individuals and organizations can take the following actions to minimize internet security threats:
    - Install, and keep up to date, antivirus software and a personal firewall
    - Update software to patch security holes or move to less vulnerable systems
    - Do not open e-mail messages or attachments from unknown sources
    - Follow safe computing practices, such as effective password policies
- Authentication – is the process of identifying individuals and ensuring they are who they claim to be
- To ensure your password is and remains as strong as possible, you should follow these guidelines:
    - Use at least eight characters
    - Include digits, punctuation, and nonprinting characters
    - Use both upper and lowercase characters
    - Use different passwords on different accounts
    - Change your password regularly and don't reuse passwords or make minor variations such as incrementing a digit

Meaningful applications of technology

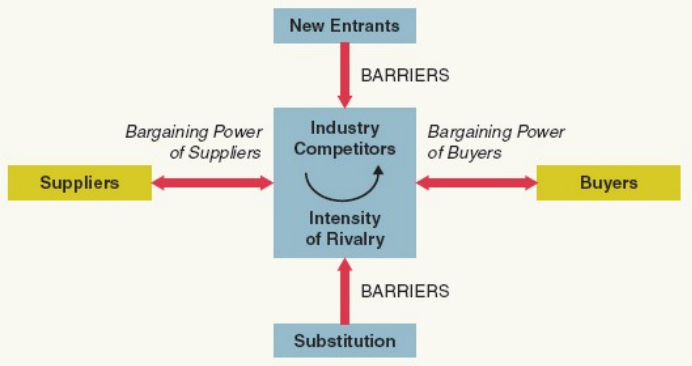
Collaboration

- Groupware – helps individuals and teams keep up with scheduled meetings, projects, share work files and conference online
- An intranet – is a set of services for distributing private information throughout an organization
- Instant messaging (IM) – is an online communication service allowing users to communicate in real time over the internet
- Virtual meetings – allow attendees to participate in online meetings for various locations using computers for presentations and communication through a chat function

Module 3: creating value

Business organization and business processes

- A number of different tasks need to be coordinated to deliver a product or service. A company therefore needs a business strategy
- Properly constructed, the strategy becomes a road map for what needs to be done to create business value and competitive advantage
- 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
- Attractive industry with few barriers to entry, more competitors will enter the industry, creating more competition and vice versa



- *Figure 3.1: Porter's five forces model*

Businesses as open systems

- Open system model – indicates that a business operates by transforming inputs into outputs and by constantly interacting with its environment
- Two significant components of the business environment: stakeholders and boundaries

Stakeholders and boundaries in the business environment

- Stakeholder – is a person or entity, that has an interest in and an influence on how a business will function
- A stakeholder can be external or internal relative to the business
- Influence may be actual or potential, big or small. It all depends on how the organization's decision makers perceive it in relation to a stakeholder's interests
- All open systems have an organizational boundary that separates them from their environment but still allows them to interact with their environment

How businesses organize to create value

- all business organizations possess structures that organize information, responsibility and authority
- types of organizational structures include functional, decentralized and matrix structures

- in functional and decentralized structures, the lines of authority (who has the right to tell whom to do what) and communication are vertically oriented
- the matrix strategy blends the functional and decentralized organizational structures. From top to bottom, the matrix is organized as a functional structure; from left to right, the matrix follows a product focused (or project or customer focused) structure that creates teams across business units
- in addition to the benefit of teams, a business might use a matrix structure to take advantage of the strengths, as well as make up for the weaknesses, of functional and decentralized forms. That is, the business would hope to combine the efficiency of a functional structure with the flexibility of a decentralized structure

Business process

- to transform inputs to their main outputs (products and services), organizations need to perform a series of steps known as a business process
- business process – a collection of activities that takes one or more kinds of input and creates an output that is of value to the customer
- a process is often shown as input process output
- a process receives input(s), undertakes some action(s), and then produces output(s)
- sub-process – is one or more tasks that accomplish a significant portion or stage of a process
- one method used to analyze and better understand processes is called **IGOE**
- this is a method used in process mapping that illustrates the inputs, guides, outputs, and enablers of a process
- inputs – to a process are those resources needed to start a process
- guides – are rules or policies within which a process must operate
- outputs – are the results of a process
- enablers – are a special kind of input or resource that facilitates a process
- feedback – is a special kind of measurement created by a business process that is then returned to the system 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
- business process reengineering (BPR) – is the study of business processes to find ways of making them more efficient
- the goals of BPR are usually to reduce costs, increase throughput and speed, and increase quality and service
- by undertaking BPR and achieving these goals, a business will likely increase its competitive advantage

Defining competitive advantage

- competitive advantage = quality of insight + speed of execution + cost competitiveness

Applying IT to create business value

- IT can be applied to value chain activities to create business value in three ways:
    - Automating
    - Informating
    - Transforming

Automating to do things faster

- Automating – uses technology to perform tedious or repetitive tasks faster, cheaper and more consistently
- The organization uses technology to do the same things as before, but with greater efficiency and accuracy, and also to do new things
- When applying automation within an organization to a single process, management considers questions such as:
    - What is the main goal, and what are the steps of the process?
    - What data and information are required to carry out the process? how does data flow between the steps?
    - How is the process affected by other processes? When should it occur? What starts it? how does the output affect other processes
- The most critical issues when applying IT automation are related to how the process fits the business organization and its goals

Informating to do things better

- Informating – is recognizing that executing processes also creates new data and information. An organization may then process the new data to improve its decision making and to change or improve the process itself
- With an informating view, IT can deliver more long term benefits than from automation alone
- Informating allows a business to identify flaws in the process and then use its new found knowledge to do things in entirely new ways
- To gain the benefits of informating when applying IT to a process, a business needs to step back from the details of executing the process and ask three crucial questions:
    - Does the IT store data so that it can also be used for learning and decision making?
    - Is the business process being IT-enabled already optimized for high performance?
    - How could IT enable a better (more efficient or more effective) business process or capability that delivers higher value or additional competitive advantage

Transforming to gain competitive advantage

- The primary goal of most for profit companies is to achieve a sustainable competitive advantage that results in high profits
- As a result, most businesses have a transforming view of IT; that is, they use IT to help them acquire or maintain a competitive advantage over or in line with their competitors
- Two different ways of obtaining competitive advantage: cost and differentiation
    - A company gains a cost advantage when it delivers the same benefits to customers as its competitors, but at a lower cost
    - A company gains a differentiation advantage over its competitors when it delivers superior benefits to customers
- A company gains competitive advantage through the development of distinctive competencies
- A company forms its distinctive competencies from a combination of its capabilities and its resources
- Distinctive competencies enable innovation, product quality, process efficiency and customer responsiveness

Decision making

- Rational decision – is a choice that you make about what actions you will take (or not take) in a given situation after analyzing the consequences of each option
    - It may involve tradeoffs between options, or tying to optimize an outcome given a set of current circumstances and preferences balanced with risk
- There may be legal or environmental factors or ethical or moral concerns about certain aspects of the decision

Classifying decisions by type

- Structured decision – is one that can be programmed; it is routine or repetitive
- Semi-structured decision – is one that involves some uncertainty or doubt about the outcome
- Unstructured decision – is a novel, complex situation with no obvious or single correct decision or decision process. it is one that involves a significant amount of uncertainty about the outcome

Using information in decision making

- Rational decision making is all about using information to reduce uncertainty in the outcomes of your decisions
- Information systems help businesses by providing information to decision makers
- Less uncertainty due to more complete information can lead to better decisions, thereby enhancing the creation of business value

How to make more informed decisions

- Good decisions require quality information
- Information characteristics:

- Complete
- Accurate
- Reliable
- Timely

The decision making process

- Initially, decision making requires you to engage in knowledge work activities so that you can make an effective choice about some issue or challenge
- To make the best decision you can, you need to carefully consider the quality of data, information and knowledge and put it into proper context
- During the analysis stage, you sort, transform, and organize data to define options
- The quality of the final output of this process (the decision) will likely be based on the quality of the inputs (the information and analysis you create)
- Once you have narrowed the options to a final decision, you create the conclusion so the organization can implement the decision

Problem solving

- A problem exists when we find ourselves in a current situation that fails to meet our goals, needs or expectations
- Problems are often the result of a past series of events or lack of events, that did or did not happen
- First step in problem solving is not only recognizing that a problem exists but why it exists
- Once we recognize that a problem exists, we have an opportunity to solve the problem
- Problem solving – refers to a series of steps or a process (a logical sequence of activities) taken in response to some event or activity

IADD model

- The IADD model consists of four major steps: investigate, analyze, decide, do
  - Investigate – determine if there is a problem or an opportunity, and if it is possible to solve the problem or take advantage of the opportunity
  - Analyze – gather data that are relevant to the heart of the problem, or that pertain to the benefits, challenges, and risks associated with a given opportunity
  - Decide – evaluate solutions and make choices regarding how to implement the solution
  - Do – implement the solution and monitor the results
- **Investigate**
  - Business professionals identify a challenge or problem and gather data to determine if meeting the challenge or solving the problem is possible.

  - Problems tend to be defined or identified in terms of what went wrong with a process or action.
  - Problems may be defined by comparing your current situation to a desired current or future state and noticing a difference.
  - Problems can also be defined as opportunities or challenges.
- **Analyze**
  - Look for clues that will help determine what has happened.
  - Generate alternative solutions and determine criteria that will be used in selecting a solution.
  - IS can help with analysis:
    - Databases and software are tools for organizing and storing data.
    - Tools are provided to manipulate data and ask questions of your database — querying and data mining.
- **Decide**
  - Choose the best solution from those available and describe how that solution will solve the problem, meet the challenge, or capitalize on the opportunity.
  - Synthesize the best ideas from the alternative solutions into a “best” solution.
  - How do business professionals actually decide which solution to pick? It all depends on the criteria they established and the agreed-upon decision-making process.
- **Do**
  - This step of the IADD model is where tasks and other physical activities are carried out according to your solution.
  - The do stage often requires planning, scheduling, managing and supervising; project management skills are often required.
  - Do it! Watch what happens, modify, revise and learn.

Module 6: database management and business intelligence

Database systems

Introduction

- A database is a structured collection of data, and is usually stored electronically to facilitate computer assisted search and retrieval

- Electronic format allows different users to have views of the data that serve their particular needs
- The database management software can ensure the consistency, integrity, and security of the database, provided the data needs of the organization have been correctly modeled and implemented

Data modeling

- Different kinds of models may exhibit the user interfaces, behaviours or data interchanges of the planned system
- Modern businesses depend heavily on timely, trustworthy and relevant data to provide a competitive advantage
- Data models describe the logical and physical structure of data that the information systems maintain and process
- The main goal of data modeling is to identify all of the data elements that the enterprise uses to manage its business, along with the structure and interrelationships of these elements
- data modeling typically follows activity modeling, which defines the functional requirements for the system
- it focus is to build a standard representation for the systems data elements with little regard for when components of the system may create, modify, or access the data
- the entity relationship diagram (ERD) is the most commonly used model for designing databases
- the ERD model identifies the important data elements and organizes them into a collection of entities and relationships
- an entity represents a separately identifiable subject of interest to the enterprise, typically a person, place, thing or event
- the ERD may also includes a set of attributes that describes each entity and identifies primary and foreign keys

Entities

- entities are concepts within the ERD model
- an entity might be considered a container that holds all of the instances of a particular thing in a system
- entities are equivalent to database tables in a relational database, with each row of the table representing an instance of that entity
- there a several notations to represent ERD diagrams as indicated in the diagram on **page 2**
- the most popular notation is crow's foot as it is supported by many popular software tools

Relationships

- relationships are represented by lines between entities

- relationship lines indicate that each instance of an entity may have a relationship with instances of the connected entity, and vice versa

- the diagram above now indicates that students may have some relationship with schools. More specifically, there may be a relationship between a particular student and a particular school
- if necessary, a relationship line may be labeled to define the relationship

optionality and cardinality (using crow's foot)

- symbols at the ends of the relationship lines indicate the optionality and the cardinality of each relationship
- optionality expresses whether the relationship is optional or mandatory
- "cardinality" expresses the maximum number of relationships
- A circle indicates that the relationship is optional – the minimum number of relationships between each instance of the first entity and instances of the related entity is zero
- A stroke (|) indicates that the relationship is mandatory – the minimum number of relationships between each instance of the first entity and instances of the related entity is one
- The second symbol indicates cardinality
- A stroke (|) indicates the maximum number of relationships is one
- A crow's foot indicates that many such relationships between instances of the related entities might exist
- The ERD may include attributes, primary and foreign keys in addition to the entities and relationships represented in the ERD diagram
- Each attribute represents a characteristic that should be recorded for each entity
- The term "entity" (or "entity type") refers to the general notation or class
- The term "instance" (or "entity instance") refers to an individual member of the class
- The combination of attribute values for any entity instance must be unique for that entity type

- Typically, one or two attributes guarantee uniqueness, and these are called the identifier (or key) for the entity
- The term “primary key” refers to the collection of key fields that uniquely identifies a row in a table
- The relational database represents relationships with common fields
- For one-to-many relationships, you usually include a copy of the primary key of the “one” side of the relationship in the table for the “many” side
- We call the copy a foreign key when used this way

Associative tables

- Associative tables are also known as bridge tables
- They are used to implement M:N relationships and they are composed of primary keys of each of the entities to be connected
- They may also contain additional attributes that play no role in connective process

Data dictionaries

- A data model may identify hundreds of different entities and attributes organizations typically gather the information about these elements (called metadata) in a data dictionary
- For each attribute the database administrators may record its name, description, type, format and length, constraints, and default value
- The data dictionary helps users to understand the intended purposes of each attribute
- During conceptual data modeling, this authoritative and central record of data definitions helps ensure consistency. Because the data dictionary has names for all the entities and attributes defined so far, data modellers can follow the patterns when they create new names and avoid conflicts with existing names
- A physical data model derives from the logical data model
- While the logical model concentrates on the semantics of data elements, their meanings and interrelationships, the role of the physical data model is to define specific database structures to implement the concepts
- The data dictionary can help guide this transition

Data queries

- Queries can combine, or join, rows from related tables and they can summarize or aggregate, data from multiple rows

Data warehousing

- A data warehouse is an integrated repository of corporate data, organised to facilitate decision making
- Warehousing typically merge information from the disparate transactional systems used by different divisions and locations of the enterprise
- So as to present a complete and accurate picture, data warehouses may also incorporate content from external sources, such as suppliers and even public records
- A star schema has two types of data – a fact table that represents the factual or quantitative data, linked by one-to-many relationships to a collection of dimension tables that describe the subjects of the business
- The dimension tables give decision makers and data mining software quick access to the data from a variety of perspectives

Model 11: the details of networking

Network architecture

- Network architecture – refers to the design of a computer system or network
- The term usually covers the overall combination of the hardware and software that makes up the network infrastructure
- An open architecture is one where anyone can know the design, thus allowing anyone to develop software and hardware to work with it
- A closed architecture network has a proprietary design, making it difficult for outsiders to design programs that work with the network

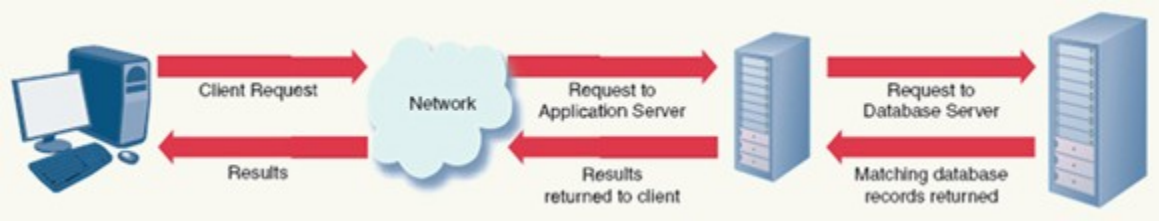
Client/server architecture

- The most common network architecture is the client/server architecture

- In the client/server architecture, each computer on the network is either running server software or client software, or both simultaneously
- Severs software provides data or resources to other computers in the network
- Computers running server software are typically referred to as servers, with each server typically focusing on a specific task
- Clients – are network computers running client software that request services from the servers
- Clients depend on servers for network resources like software, files, devices, processing power, and access to the internet
- Clients – typically PCs and workstations, a type of high powered small computer built for specialized applications
- It is possible to run several different types of client or server software on the same machine
- Because both the client and the server are capable of processing it is shared between the two computers
- Business professionals frequently need both the power of a central computer and the ease of use of a PC
- This combination of local and remote data storage and processing leads to four basic computing architectures
    - Remote job entry
    - Personal computer
    - Client/server
    - Host/terminal
- The simplest form of client/server computing involves a file server, which controls access to the network, manages communications between PCs, and makes data and program files available to the individual PCs
- If a large number of clients attempt to access the server, the client/server performance declines. Therefore, to increase processing efficiency, many client/server networks involve a three tiered architecture

Three-tiered architecture

- **Three-tiered client/server architecture**, which uses, a client, an application server and a database server
- in this client/server environment, a user working at a GUI-based client PC or workstation requests data or processing from an application server, which decides what data to supply. the application server then sends a query to the database server to retrieve those data. The database server processes the query and returns the matching data to the application server, which processes the data into the form required by the user



- one of the strengths of three-tiered client/server computing, is the capability to string together a series of servers to respond to a client's request while maintaining a single, central database
- this allows an organization to maintain data in only one place, which avoids the difficulties of partitioning stored data

Common types of servers

Server Type	Purpose
File	Provides both software and data files to users
Database	Handles queries to a large database and returns matching records
Application	Handles high-speed processing
Web	Handles requests for web pages
Mail	Sends and receives e-mail for the entire organization
Fax	Sends and receives faxes for the entire organization

Using client/server systems to increase knowledge work efficiency

- many organizations now use the application server to replace centralized computers for handling large scale processing tasks

- the primary advantage of client/server computing lies in its ability to share processing and data storage responsibilities among multiple machines and to use specialized servers to meet specific needs
- the primary disadvantage is the complexity inherent in sharing responsibilities among multiple machines
- overall, however, the trend is toward wider use of client/server computing because of its increased flexibility

Client/server advantages and disadvantages

Advantages

- computing burden can be shared among servers and clients
- servers can be specialized to one particular type of task
- upgrading system can be done in small steps
- loss of client from accessing server

Disadvantages

- programming relationship between clients and servers is more complex
- system upgrades require that all clients and servers be upgraded regardless of location

Peer-to-peer networks

- it is possible to set up **peer to peer network** where each computer in the network is on the same level as other computers, and each computer is equally responsible for overseeing the functions of the network
- any two computers in a peer-to-peer network can communicate directly with one another or through intermediate peer computers
- in a pure peer-to-peer network, the two computers that are communicating with each other share the responsibility for carrying out the communication
- today, many companies use peer-to-peer networks for the legitimate purpose of sharing data, information, and services
- peer-to-peer networks may be easier to set p, but are not as efficient as client/server networks
- client/server networks – resources are controlled and managed by the servers

- peer-to-peer networks – network operations are shared by peers

Network layer model

- network layer model – in this model, each layer handles part of the communications between computers
- the international organization for standardization (ISO) created the original version of the network layer model
- it consists of seven layers, where each layer of the standard defines a particular network functionality
- our simplest version of this model contains only three layers:
    - the application software layer
    - the network connections layer
    - the data component layer
- in this model, the application software generates the message, which the connections layer then relays to the data component of the network for transmission
- at the sender end of the network, a message moves from the application layer to the network connections layer, and then to the data component layer
- the reverse occurs at the receiver end of the network, with the message first traversing the data component layer, then the network connections layer, and finally the application layer

Application software layers

- application layer includes well-known software applications such as web browsers and email
- this software formats user data by adding information to make it conform to a specific standard or protocol, the specific set of rules for communicating
- application software is the software on each computer on the network that the user sees and uses to send and receive messages and data between computers (web browsers, e-mail, etc)
- application layer protocols
    - simple mail transfer protocol (SMTP) for e-mail
    - hypertext transfer protocol (HTTP) for web pages

- electronic data interchange (EDI) for large scale exchange of data between organizations

- application software may also encrypt that data (place the data in a secure, unreadable form) to protect it from unauthorized readers

Components of the application software layer for any message:

Network connection layer

- in the network connection layer, the application software layer formats the message according to the network protocol
- the protocol for the internet is the **transmission control protocol/internet protocol (TCP/IP)**
- with the TCP/IP internet protocol, the network connection layer conducts a series of operations to prepare the message for sending across the internet to a destination computer
    - it must first convert the address of the server at the destination from a text form to an IP address
        - converted using a conversion tables stored either on the users computer or on a computer with which the local computer can communicate
    - Next, the network connection divides the message into smaller digital units called packets or, datagrams in TCP/IP terminology, each of which contains a specific number of bytes. At this step, each packet receives a sequence number and a destination address
- IP address: a unique identifier given to each device directly connected to the network
- Consists of four groups of numbers in the range of 0 to 225 separated by periods
- The message is divided into smaller digital units called packets, each of which contains a specific number of bytes

- **Packet switching** – routes individual packets through the network based on their destination address
- it thus allows the sharing of the same data path among many computers in the network
- further, if a switching device on the network is inoperable, the packet finds another way to reach its destination
- a **router** is a special type of computer that has the sole purpose of accepting packets and determining the best way to send them to the destination computer
- the **sequence order** allows the receiving computer to reconstruct the message

the data component layer

- the sending of data from one computer to another over a channel using electronic signals is known as data transmission
- data transmission is concerned with ensuring that the data are sent and received correctly and efficiently
- data and information transmitted over networks travel over various media, including:
    - twisted pair wire – consists of twisted pairs of copper wires; similar to that used in telephone systems
    - coaxial cable – used to transmit cable television signals into your home; widely used in networks
    - fibre optic cable – consists of hundreds of glass fibre strands that can transmit a large number of signals at extremely high rates of speed
    - microwaves – high frequency radio transmissions that can be sent between two stations
    - wireless – several technologies that allow data to be transmitted without wires

signal type

- signal type – is how data are sent over the network
- a signal can be digital or analog
- digital transmission sends bits at different levels
- a computer can therefore transmit over a digital communications link without changing the data

- analog signals transmit bits as wave patterns, which requires modifying data before transmitting them
- modems convert digital signals from the computer into analog signals for transmission over the communication link
- see page 406 table c.4

data rate and bandwidth issues

- **data rate** is measured in bits per second (bps)
- **a digital subscriber line (DSL)** transmits computer data in a digital form along the same telephone line that is used for analogue voice communications
- **t-carrier circuits** are dedicated digital lines that are leased from a telecommunications company to carry data between specific points
- **transmission speed** (often referred to as latency or propagation delay) relates to how fast a single message can be transmitted between two nodes
- **transmission capacity** relates to how many bits can be transmitted per second
- the term **bandwidth** is often used in relationship to data rate and is a measure of how fast data flows on a transmission path
- the two extremes of bandwidth are:
    - baseband – which carries only a single digital signal
    - broadband – which transmits in a variety of different analog signals

Local area networks

- Local area networks (LANs): a network connected over a small geographic area
- LANs are popular for:
    - Sharing information
    - Sharing resources
    - Sharing software
    - Sharing hardware
- Most LANs are client/server networks
- LANs can be implemented through peer-to-peer networks

- Most organizations now us LANs to share information and resources among employees
- Sharing software avoids the need for an organization to purchase a copy of a software package for every computer in the organization
- Instead organizations purchase software licences for their employees, which allow multiple people to simultaneously use a software package
- Sharing hardware allows the use of printers, disk storages, scanners and so on through the network
- This can significantly reduce an organizations costs
- The vast majority of LANs use the Ethernet protocol to connect computers and move information between computers on their network
- With the Ethernet protocol, a computer on the network transmits a message that contains the address of the destination computer
- A client on a LAN can not only share information and software with other PCs on the same LAN, but also communicate through gateways and bridges with other types of computers and with other LANs
- A **gateway** is a combination of hardware and software that connects two dissimilar computer networks
- A gateway between a LAN and a WAN allows LAN users to send email over the WAN
- A **bridge** connects two different networks
- A **bus network** uses a main cable, called a bus to connect all clients and servers on the network

Wireless LANs

- Wireless LANs (WLANs) – replace cabling with wireless transmissions that use radio frequencies to transmit information between individual computer
- The individual computers do not communicate directly with each other, but instead through a wireless network hub or router
- Business professionals use WLANs to increase the efficiency of many activities in the workplace, including the following:
    - Pricing, labelling, handling orders, and taking inventory from anywhere in a store, and then communicating that information directly to the back office computer

  - Connecting a wireless device to a bar code scanner to scan items in a warehouse and thereby produce a list of items and their locations
  - Requesting medical tests, checking the results and then entering information into a patients electronic record from the patients room
  - Checking email on laptops and handhelds from anywhere without having to be connected by wiring

- Wi-Fi (wireless fidelity) – also called IEEE 802.11b standard, the current popular standard for wireless networking, supports data rate of 11 megabits/second, with a typical range through open air of about 200-1000 meters

Bluetooth and PANs

- Bluetooth is a form of personal area network (PAN)
- Personal area network (PAN) – a technology that enables devices to communicate over a short distance – less than 10 meters
- Bluetooth – embeds a low cost transceiver chip in each device, making it possible for wireless devices to be total synchronized without the user having to initiate any operation
- The chips communicate over a radio frequency at up to 2 Mbps
- The overall goal of Bluetooth is to enable pervasive connectivity between personal technology devices without the use of cabling

The internet: a network of networks

- Originally developed in the 1960s and 1970s as a way of sharing information and resources among universities and research institutions, the internet began its dramatic growth in 1991
- No one can say exactly how many people are using it, with estimates ranging as high as over 1.10 billion in 2005
- A primary reason for the explosive growth of the internet is the tremendous amount of data, information and resources that people can access

How does the internet work?

- The internet is a network of networks

- To connect to the internet, your computer will usually first connect to a LAN through a network interface card (NIC) or to an ISP through a modem and telephone line
- The LAN, mainframe or ISP is connected to a regional network via a high speed (T-1) telephone line. The regional network links into the backbone of the internet
- A **network interface card (NIC)** provides the physical connection between a computer and a local network
- Wireless client devices can communicate directly with each other or over the network through a wireless access point (AP)
- With each network, there is at least one host computer that is connected to the internet with full two way access to other computers on the internet and with a unique internet address
- Each host computer that connects to the internet uses the TCP/IP protocol for assigning addresses and uses packet switching for exchanging information
- The TCP/IP rule also govern email and other internet addresses
- An email address consists of two parts:
    - The username
    - The server address
- The username is assigned to a person or organization that is connected to a server
- The @ symbol separates the user name from the server address
- The server address, also known as the domain name, consists of groups of letters separated by periods
- These internet addresses are easy to remember versions of the numeric IP addresses that actually identify computers on the internet
- Top level domain (com, ca, org, etc.)
- The internet corporation for assigned names and numbers (ICANN), a not for profit company set up over 10 years ago specifically to administer the domain name system, creates top level domains for use around the world
- For servers located in another country, a two letter suffix may be used at the end of the server name as the top level domain

Using the internet to perform knowledge work activities

- The client computer must run two types of software to take advantage of the internet
    - Internet conversion software
    - And client software
- The internet conversion software enables the computer to work with internet packets
- Most operating systems, including windows, comes with this software built into the operating system
- Client software carries out the desired operation, such as sending email, downloading files from or uploading flies to a server, participating in discussion groups, working on someone elses computer or accessing the world wide web
- The most widely used internet operations are as follows:

Internet Operations	Purpose
E-mail	Asynchronously exchange electronic messages with other Internet users
FTP	Download files (software, documents, or data) from or upload files to a server located on the Internet
Newsgroups	Participate in a wide variety of online discussion groups
Telnet	Work on a computer elsewhere on the Internet
Internet relay chat	Synchronously exchange electronic messages with other Internet users
World Wide Web	Transfer text, images, video and sound to your computer; search for information on the Internet

Email

- Email if an asynchronous electronic method of exchanging information over a network
- Asynchronous means that the sender and receiver are not communicating at the same time
- Listserv – is a server software that can broadcast an email message from one member of a group to all other members

FTP

- Companies and individuals frequently need to make software, data or document files available to a wide audience over the internet
- Distributing files to a large audience is done by placing them on a **file transfer protocol (FTP)** server and having the users download them over the internet

Newsgroups

- The newsgroups internet application is a vast number of discussion groups on a wide range of topics
- A newsgroup consists of messages written on a series of news servers, each of which transfers messages to each other
- This results in replicating all postings to one newsgroup on all other news servers through the use of the network news transfer protocol (NNTP)

Telnet

Internet relay chat (IRC)

- IRC is a synchronous way to use the internet to communicate
- IRC allows users to communicate back and forth at the same time, similar to a telephone conversation
- Chatrooms and instant messaging are two widespread uses of IRC
- Instant messaging (IM) – provides a private link between two individuals over which they communicate
- In chat rooms, many individuals can send and receive messages simultaneously regarding a subject of interest to all of them; it is a group conversation

The World Wide Web

- the web is a special type of client/server network
- the web is a body of software and a set of protocols and conventions based on hypertext and multimedia that make the internet easy to use and browse
- hypertext is a method of linking related information in which there is no hierarchy or menu system
- multimedia is an interactive combination of text, graphics, animation, images, audio and video displayed by and under control of a computer

using a browser to access the web

- to access the web, a client computer uses software called a browser that initiates activity by sending a request to a web server for certain information
- the web server responds by retrieving the information from its disk and then transmitting it to the client
- browser – application layer software used for sending requests and displaying the results
- hypertext markup language (HTML) – tags in worldwide documents that are part of a special publishing language
- documents on the web are referred to as web pages, and their location is a website

browser operations

- a web browser retrieves web pages from web servers and displays them on a client computer
- in web terminology, the address of a web page is referred to as its **uniform resource locator (URL)**
- a URL is a standard means of consistently locating web pages or other resources, regardless of where the internet stores them
- every URL has three parts
    - the protocol
    - the internet address of the server that contains the desired resource
    - the path of the resource (sometimes hidden)
- for web resources, the protocol (also called the service resource) defines the type of resource being retrieved

internet protocols

Protocol	Purpose
http	Retrieve web pages
File	Retrieve files from local hard disk

telnet	Log on to a remote computer connected to the Internet
FTP	Download or upload files from an Internet FTP server
mailto	Send outgoing e-mail
News	Display newsgroup

- a cookie – is not an application or virus, but simply a data file that will be accessed by the related website the next time you visit it
- this data file tells the website any preferences you have registered with them

Wireless connectivity to the web and internet

- the fastest growing trend in networks consists of wireless networks, both WANs and LANs, because they enable devices connected to the network to go virtually anywhere
- in the case of wireless WANs, a mobile telephone client is the most popular method of connecting to the internet and web
- a number of mobile telephone companies have collaborated to create a special protocol, called **wireless application protocol (WAP)**, just so their telephones can connect to the internet
- another popular use of connecting mobile telephones to a WAN is short message service (SMS)
- short message service (SMS) is a service for sending text messages up to 160 characters long to mobile telephones
- global system for mobile communication (GSM) protocol is the most widely used standard mobile telephone protocol in the world
- a variant of SMS that allows images and audio to be sent via mobile devices is called multimedia messaging service (MMS)

Module 5 – E-commerce

E-commerce defined

- the internet created another revolution in commerce, specifically the arrival of e-commerce as a way of doing business around the world in an instant without the need for a physical business presence

- the internet also brought along the forces of build to order as a way for manufactures, such as dell and others, to directly solicit orders from consumers and deliver product directly, rather than relying on a global network of wholesalers and distributors/dealers as a way of bringing products to market

- e-commerce – transactions that involve buying and selling goods and services through the internet

- e-business – the broader use of internet technologies to reduce operating costs, such as extending the electronic supply chain to partners and suppliers

Beyond the basic definition

- wholesalers or business to business level is far larger and more important to the global economy than the retail level

- e-commerce – e-commerce is the use of information systems, technologies, and computer networks by individual and organizations to carry out transactions in order to create or support the creation of business value

- this general definition of e-commerce therefore includes all types of computer networks, all types of transactions, and all types of business relationships and models

    - electronic funds transfers

    - EDI over private networks

    - Retail sales and whole sale exchanges over public networks like the internet

- Most people think of e-commerce as electronic shopping over the internet or B2C e-commerce

- Types of e-commerce:

	Description	Examples of Websites
B2C	Online equivalent of retail store as well as other services	www.chapters.indigo.ca www.telus.ca www.amazon.ca
B2B	Electronic exchanges between companies	www.manheim.com www.boeing.com
B2G	Online sales to government agencies	www.ppitpb.gov.on.ca (Ontario government)

C2G	Electronic payment of taxes	www.netfile.gc.ca
C2C	Use of online auctions	www.ebay.ca auctions.yahoo.com

E-commerce and products: physical and digital

- Products can be divided into two primary categories: physical and digital
    - Physical products: include anything that requires an actual shipment of the item from a central distribution point to the buyer (whether an end-consumer, wholesaler, or to another company). This 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: consumers can receive digital products directly over the internet or other computer networks (such as downloading an album on iTunes versus going to HMV to buy it. this usually requires the use of a completely IT-enabled supply chain
- The main difference between physical and digital products is in the delivery process
- Even though computer networks can transmit information about the order, it obviously cannot ship the actual physical goods.
- Therefore, E-commerce companies must have back-office elements to handle order fulfillment and returns for physical goods
- This often requires substantial technology interfaces between the web and the enterprises existing computerized business system (know as web integration)
- Companies experienced in order fulfillment and returns have tended to be successful in e-commerce
- Pure online business may not be able to offer the ability to return something once it has been downloaded (music on iTunes for example)
- This often has to do with 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
- The web can becomes another channel (place) for customers to buy a company's physical products
- For digital products

- Company can send you electronic product directly over the internet, thereby avoiding any picking, packing and shipping issues
- There are also no return problems because if a problem occurs with the electronic product, the company sends a new one for you to download as a replacement, or restores your right to re-download the same content if it is accidently erased or otherwise compromised

E-commerce business models

- A **business model** defines how a company will meet the needs of its customers while making a profit
- An **e-commerce business model** combines a specific type of website with a successful revenue model that produces profits for the website owner
- The question of internet business models is one of the most important strategic questions for most internet related businesses, and is tied to the type of site that you plan to operate
- For online retailers: sell good products at good prices, delivered on time, that leave you with enough margin (the difference between the selling price and the cost of goods sold) to make a reasonable profit to pay for the websites operation
- The top ways in which most companies currently make money on the web are:
  - Displaying advertising and being paid for click throughs from the online community to those advertising products or services (the traffic monetizing or advertising model)
  - Selling goods and services online (typically a transactional, wholesale, or retail merchant model)
  - Earning royalties, access fees or revenue sharing from selling access to their platform to third party developers (known as the API or applet model)
  - Selling aggregate data about online users behaviour or selling controlled access to users with their permission through targeted offers; sometimes called infomediaries (the information or data aggregate model)
  - Getting users to subscribe to your service, usually on a monthly or annual basis (the subscription model)

- Selling upgrades to a premium subscription service by first offering a free service with more limited capacity or capability (the freemium model)
- 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)
- Charging a portion of any transaction that you facilitate for others either as a brokerage or as a reseller, if you are a traditional middle man (the revenue share or royalty model)
- 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)
- Selling your company to a strategic buyer (the build to sell model)

- The purpose of an e-commerce website is to bring in customers, or at least visitors
- No matter how good the business model is, it will not generate a profit if not associated with an appealing website
- Most online companies choose to focus on only one or two of the models to maximize their focus and their profits
- There are eight commonly accepted types of websites: portal, search engine, browse or search and buy, sales support, information service, auction, travel and special interest or services
- Websites Classified By Purpose

	Purpose	Examples	Business Model
Portal	A gateway to many other websites	Netscape, Yahoo!, MSN	Advertising, Affiliate
Search Engine	Finds websites that contain a word or phrase	Google, Yahoo!, MSN, DogPile	Advertising, Affiliate, Infomediary
Browse or Search and Buy	Sell goods and services	Dell, LandsEnd, iTunes	Merchant, Infomediary, Manufacturer Direct, Co-operative
Sales Support	Provide information on a product before or after the sale	Microsoft, BMW, McAfee, Telus	Community, Infomediary

Information Service	Provide news, information, commentary, etc.	National Post, TSN, Economist	Subscription, Community, Affiliate
Auction	Facilitate sales between third parties	eBay, PayPal	Brokerage
Travel	Sells travel tickets and tours	Delta, Travelocity, Orbitz, itravel2000	Merchant, Brokerage, Co-operatitive
Special Interest or Services	Provide information, product sales and support and contacts between visitors	Lavalife, Microsoft support groups	Community, Merchant, Affiliate, Infomediary, Advertising

The e-commerce advantage

- The use of computer networks, especially the internet, to carry out transactions between buyer and sellers is creating a significant e-commerce advantage in the world wide economy, especially with regard to:
    - Technology
    - Competition
    - Strategy
- This advantage is often referred to as 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
- Over 1.5 billion potential customers in the marketplace due to increasing internet access
- Universal standards make it work the same way no matter where in the world you are
- 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
- The innovation uses of the internet in business have produced truly global competition. Sellers can reach virtually any potential buyer in the world and can easily create a global electronic presence

- The global marketplace allows the almost instant creation of niche businesses targeting small markets that would not be dense enough in any single geography to support a small, local retailer
- Small business like this can compete by successfully targeting specific customers for one-to-one attention

Information clutter

- The expansion of global e-commerce has produced global competition with sellers being able to reach any potential buyer world wide
- 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
- Ability of buyers to obtain almost endless amounts of business information also creates new business challenges
- Some businesses have responded by choosing to create business value based on a customization oriented approach (mass customization or personalization) linked to e-commerce, rather than solely on a low cost producer strategy
- Having a good 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
- Customers can obtain product guides, reviews and prices from a number of websites due to online advertising and search engine optimization

Online advertising

Search engine optimization

- All search engines use a technology called spiders to crawl the web and catalogue its content

Partnering and traffic trading

- 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
- One response to information density is to create business value based on a customization approach to e-commerce

- Two approaches to customization are mass customization and personalization
- **Mass customization** – is the ability to create custom products or services on demand (for example, dell)
- **Personalization** – is a personalized marketing message for each potential customer based on searching, browsing, or buying habits (e.g., amazon.ca)
- by using customization, businesses can make marketing messages more effective and efficient

E-commerce competitive difference

- e-commerce is having a dramatic effect on competition between organizations in a number of ways, such as:
    - reducing barriers to market entry
    - preventing any company from “owning” the market
    - enhancing collaboration/alliances
    - multiplying market niches
    - changing marketplace drivers (forces that make things happen in the market, e.g., consumer preferences, number of suppliers a business can choose from, etc.)
- niche markets are one area where e-commerce has shown itself to be superior to almost any existing form of marketing
- time, distance and price all drive the traditional marketplace, but e-commerce can easily overcome these limitations. Now websites allow a business to stay open on a 24/7/365 basis, and the owner and potential renter can communicate almost instantaneously from virtually anywhere in the world, at any time

E-commerce and business strategy

- technology advances have changed business strategy
- strategy is a plan, pattern, position and perspective
- 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

- a change in either a company's performance in relation to the competition or a major change in competition (for instance, the emergence of a disruptive industry force, the emergence of a new competitor, innovations in business models or the introduction of new government regulations) could necessitate revisiting business strategy
- a strategy may start as a perspective (vision, direction) that calls for a certain position, such as being a low cost provider, and then evolves into a plan that is implemented, and emerges as a pattern that is evident in actions and decisions
- 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
- an **E-commerce strategy** is a general term for how a business is going to use web-based networks and information systems to compete in a global marketplace
- building a meaningful e-commerce strategy requires two different views of an organization's strategy:
    - what it wants to do (conceptual strategy)
    - how it will do it (technology strategy)
- an important strategy that many companies are using is to connect their online strategy to their existing customer relationship management (CRM) to create an integrated one-to-one marketing experience for their customers
- the web generates a huge amount of data on customer buying habits and preferences that can be stored and instantly recalled and applied with each new visit (using cookies or other technologies, for instance). With these data, 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
    - use of mobile technology

M-commerce

- possibly the largest new channel for many business (both online and traditional business models) is the use of mobile devices with wireless networks to access the internet
- this technology enables mobile commerce (M-commerce) application to become a reality, and ensures that consumer can immediately react in the moment to any marketing message(rather than waiting to get home to their computers to access the internet
- **mobile commerce** is the use of laptops, mobile phones and PDAs to connect to the internet and web to conduct many of the activities associated with e-commerce, but in real time and without regard to where the user may actually be at the moment

Benefits and limitations of e-commerce

- **benefits for consumers**
    - lower prices
    - shopping 24/7
    - greater searchability for products
    - shorter delivery times for digital products
    - more sharing of information with other consumers
    - improved customer service
- **limitations for consumers**
    - 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
- customizing individual web pages to the interests of customers also creates greater customer loyalty
- more direct communication with customers, even when an intermediary sells the product, results in better customer service

- **benefits for business**
    - 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
- **limitations for business**
    - 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

E-commerce between organizations

- B2B is by far the largest market in terms of volume of transactions and dollar amounts
- Doing business with other organizations (B2B) is by far larger than with consumers (B2C)
- It is also quite different in terms of the scope of the purchases and the complexity involved in them – especially in the decision making process required to make a purchase
- Interorganizational systems (IOS) are the information systems that handle the information flow between trading partners

B2B transactions and business models

- We can broadly divide B2B transactions into two types:
    - Spot buying
    - Strategic sourcing

- **spot buying** – purchases are made at market price from an unknown buyer
    - companies often use spot buying to purchase commodities (gasoline, paper, cleaning supplies)
- whenever a company engages in spot buying, it needs to find a public marketplace or exchange that sells these desired products and services
- although it can be a physical marketplace, most B2B e-commerce exchange transactions occur through an online intermediary
- **strategic sourcing** involves forming a long term relationship with another company
    - prices are set through negotiation in a long term relationship with a company known to the buyer
    - a company's large scale computer purchases often result from strategic sourcing
- strategic sourcing often relies on a one to one business model, although company-centric and exchange models are also used
- in the **one-to-one marketing model**, two companies collaborate to create a trading relationship that is good for both of them. Neither company dominates the trading relationship
- with the **company-centric model**, a company is either a seller to many other companies (one-to-many) or a buyer from many companies (many-to-one)
- in either case, the single company tends to dominate the market. It often controls the information systems that support the transactions, including the supply chains between it and its smaller trading partners
- in this model, the larger buyer or seller want to use e-commerce to improve its profitability by increasing prices and/or reducing costs of doing business with the many smaller trading partners
- with one to many model, the seller often provides a web based private sales channel through a private network, called **electronic data interchange** (EDI), or through a protected form of the internet, call an extranet to link trading partners while keeping others out
- because the many-to-one model provides a single buyer with products that it needs to carry on business, this is a part of the procurement process. when using e-commerce it is commonly referred to as e-procurement

- a buyer can conduct this process in a number of ways, including reverse auctions, aggregating catalogues or group purchasing
- with reverse auctions, the buyer posts project to a secure website to which sellers respond with bids for providing goods and services for that project
- the aggregating catalogues model assembles together the catalogues from all suppliers on the buyers server. Buyer then uses them to make all purchases
- with group purchasing, two or more buyer work together to achieve lower prices from their suppliers. Smaller buyers can do this through websites that aggregate demand and then negotiate prices with suppliers
- in the **exchange model**, many companies use an exchange to buy and sell from each other through spot buying transactions. The exchange can be a co-operative venture among a number of the companies, owned by an independent organization
- we can categorize exchanges into two groups:
    - verticals
    - horizontals
- vertical exchanges meet the needs of a single industry
- horizontal exchanges deal with products and services that all companies need, regardless of the industry (like office supplies)

using B2B E-commerce to improve supply chain efficiency

- a **supply chain** is a system of organizations, people, technology, activities, information and resources involved in moving a product or service from supplier to customer.
- More specifically, it is a network of facilities and distribution options that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers
- Procurement plays a large part in any supply chain, and the use of e-commerce for procurement is an important way for organizations to save money

Traditional procurement process

- For procurement to occur between businesses there must be an information flow between the entities in addition to the flow of goods

- In the traditional procurement process, there are five steps involving three elements – purchase order, invoice and receipt of goods

    1. The buyer sends a purchase order to a vendor.

        - A purchase order (PO) is a document from an organization requesting another organization to supply something in return for payment. It typically provides product specifications and quantities, with this information often coming from the suppliers catalogue

    2. The vendor responds to the PO by sending the goods to the buyer along with a bill of lading (BOL), which describes the contents of the shipment

    3. After receiving the goods and BOL, the buyer sends back a signed copy of the BOL to the vendor and internally files a receipt of goods

    4. The vendor sends an invoice to the buyer

        - An invoice is a detailed list of goods shipped from the supplier, along with a list of all costs and discounts. It essence, it is a detailed bill and requests for payment

    5. The buyer's accounting department compares the original PO with the receipt of goods and the invoice to ensure they match. After confirming a match, the buyer pays the vendor

Using E-commerce to improve the procurement process

- E-commerce, with its digital information, replaces the paper documents in traditional procurement systems
- Employees can quickly compare the digital files with far fewer errors and less opportunity for fraud
- E-procurement is also evolving into a tighter integration and coordination of the activities of a supplier-buyer relationship through the creation and use of interorganizational systems
- An **interorganizational system (IOS)** is a networked information system used by two or more separate organizations to perform a joint business function
- An IOS often involves electronically linking a production company to its suppliers or its customers in such a way that raw materials are ordered, production takes place, and finished goods are sent to the customer with little to no paper changing hands

- The two most common forms of IOS in use today are based on **electronic data interchange (EDI)**, which uses valued added networks (VANs) or private networks instead of the regular telephone system, and **extranets**, which are collaborative networks that use internet technology to link businesses with their suppliers, customers or other businesses that share common goals
- EDI allows the exchange of structured information between two computer applications, using a minimum of human involvement
- The organizations that send or receive documents from each other are called trading partners
- These partners agree on which specific information to exchange and how to use it
- Benefits of EDI
    - Replace the exchange of paper based documents with more efficient and flexible electronic documents
    - Save unnecessary recapture of data, which leads to faster data transfer, fewer errors and a more streamlined business process
    - Platform for automating existing processes. This can help to reduce costs further, as well as improve the quality and speed of services
    - Since EDI requires co-operation between trading partners, it can also serve as a catalyst for improving interorganizational processes and improving overall supply chain efficiency
- Even though often overshadowed by newer technology, EDI remains the engine behind the majority of e-commerce transactions worldwide
- It is too expensive for most small businesses, however
- An extranet uses internet technologies to interconnect the intranet of an organization with the intranets of its business partners
- Through the extranet, customers, suppliers, consultants and other trading partners can access selected sites and data available on the internal intranet
- Extranet is still a private network
- Security measures, such as usernames and passwords, usually control access to the extranet. Companies can also use encryption and firewalls

- Security measures keep data secure and XML is used to transfer the data
- An extranet can be thought of as two connected intranets

Comparing EDI and extranets-enabled B2B e-commerce

	EDI	Extranet
Security	More secure because uses private networks	Less secure than EDI because uses the Internet
Cost	More costly because of proprietary software and private networks	Less costly because it uses existing networks and Internet apps
Flexibility	Less flexible — proprietary software limits use	More flexible because the Internet allows for greater customization
Trend	Gradually being replaced by extranet-based apps	Gaining wider acceptance because of lower costs

Module 7 – creating IS solutions and managing IS projects

Critical pre-development questions

- Problems in an organization may be related to strategic choices or forces, flawed or inefficient business processes, or an unsuccessful business model. information systems will not solve these problems
- Before implementing a new system, an organization needs to address four critical questions. We call these questions “pre-development” questions because they happen before an organization decides to start a system design project – referred to as the concept design and inception stage
- The questions you need to consider, in order, are:
    - What are we planning and why?
    - Is the project feasible?
    - Should we build or buy/lease?
    - If we build, should we do it in-house or outsource it?

What are we building and why?

- Organization can plan to improve performance of its business process by automating, informating and transforming
- It should also look for ways an IS could add value to its new or existing products and services
- When an organization recognized that IS can help it exploit an opportunity or solve a problem, the process of determining the best IS design for its needs beings
- Process starts with the all important question, what is it building and why?
- By answering this question early on in some detail, an organization begins to understand its high level system requirements and also the business case for why it makes sense to build a system

Is the project feasible?

- If it is decided that an IS is needed, a feasibility study is conducted
- Feasibility study – is a detailed investigation and analysis of a proposed development project that is undertaken to determine whether it is technically and economically possible to successfully build the proposed system
- Project is technically feasible if the required technology is available (or can be created)
- The study must conclude that the company is technically capable of both acquiring and deploying the required technology for the IS solution it envisions
- Organization can determine technical feasibility by examining potential solutions and evaluating these solutions based on its capabilities and the capabilities of any technology partners it may choose to work with
- A project is **financially feasible** if the organization can pay for the project, and the project presents a sound investment of the organizations limited resources
- To determine financial feasibility, an organization must show that it can afford to build or buy an information system, and that the IS will financially benefit the organization
- Several financial measures used by organizations:
    - Return on investment (ROI)
    - Net present value (NPV)
    - Internal rate of return (IRR)

    - Payback period

- Difficulty in calculating the financial measures is in obtaining the exhaustive list of all cost and benefits, then placing monetary value on each of them
- Some costs and benefits are tangible, which means that a value can easily be applied
- Other costs and benefits are intangible, meaning they are difficult to measure in monetary terms
- Sometime company can undertake IS for offensive or defensive strategic purposes that are difficult to justify on a purely economic basis
- Due to the many intangibles that an organization must often consider in a major IS development project, the financial measures are, at best, good proxies for the project's final costs and benefits
- Some of the decision making around IS investments will be based on the judgement and intuition of executives and managers

Should we build or buy/lease?

- An organization usually chooses one of three primary options for obtaining an IS:
    - Buying
    - Leasing
    - Building
- To select the option in any set of circumstances, the organization needs to examine its requirements and the advantages and disadvantages of each option
- Building an IS from scratch ensures the best match of IS with an organization's requirements and is the best option for obtaining competitive advantage, because the systems capabilities cannot easily be copied by competitors if they are custom built
- Building is a long and costly process
- When time and cost are the most important criteria, organizations pursue acquisition or leasing
- If there is a time to market factor in the decision (unless we get to market fast, we will lose the opportunity), this may be the most important factor in any decision about buying or building the new system

- Leasing refers to using software as a service (SaaS) or using an application service provider (ASP)
- Advantages and disadvantages of buying leasing or building:

	Advantages	Disadvantages
Buying	▪ Generally faster and less costly than building entire system from scratch	▪ Little or no competitive advantage ▪ May need to compromise on some features ▪ Dependent on vendor for product updates
Leasing	▪ Lowest cost and fastest ▪ Vendors handle maintenance and updates ▪ Does not require IS staff	▪ No competitive advantage ▪ No control over features ▪ Dependence on vendor ▪ Can get bad contract
Building	▪ Provides competitive advantage ▪ Retain control over system ▪ Customization of systems	▪ Takes the longest time and highest cost ▪ Requires IS staff with time and development knowledge

Should we develop in-house or outsource?

- If an organization chooses to build, the next question is whether to use its own staff (in-house development) or hire another company to do it (outsourcing)
- Dimensions to be considered in this decision include any time-to-market imperative (which puts priority on speed), current financial performance (businesses in crisis or that are underperforming must pay closer attention to costs), and an organization's risk tolerance (which must be greater to take on building a system from scratch versus compromising by buying a system that is not perfect or customized, but meets the most important requirements of the system

	Advantages	Disadvantages
In-house	▪ Firm retains control ▪ Process builds internal knowledge	▪ More time and costs ▪ Distraction of in-house staff

Outsource	▪ High level of skill and expertise ▪ Internal project oversight ▪ Lower time and costs	▪ Lost control of project ▪ Less opportunity for internal staff to learn ▪ Requires good contracts and oversight

IS development teams

- People associated with an IS project usually fall within one or both of two groups:
    - Those on the actual project team
    - Those who are stakeholders in the IS

The importance of stakeholders

- Stakeholder attitudes toward a project can dramatically impact the project's eventual success or failure
- Various stakeholders who are the subject matter experts (SMEs) can best inform you about various aspects of the system in which you are not an expert
- As a result, a **stakeholder analysis** should begin as part of the project feasibility study and should continue during the course of the project to reduce the risk of negative stakeholder attitudes
- A stakeholder analysis begins with a list of stakeholders, what each has at stake and the degree of impact each stakeholder could have on the project. The analysis should also consider whether the team can expect resources from the stakeholders and identify each stakeholders attitude toward the project and any risk
- A project manager should assign team members to different stakeholders with an anticipated strategy for dealing with each one

A typical IS project team

- Size of IS development team varies depending on the project
- Most IS development teams possess the following:
    - Project sponsor – this individual ensures that the project goals correspond to the organizations business objectives and is often a senior executive or someone in a position of authority

- Project manager – this role demands knowledge of methods and techniques to ensure delivery of the project on time and on budget, and the ability to communicate project goals and requirements to the project team and to co-ordinate the workflows of everyone on the project team
- Account management – this group is part of the development team when the project team works as an outsourcer. This team is responsible for the sales and services of the project team. provide initial point of contact to the client as well as daily communication with the client
- Architecture and design – the members who work in this group must provide a well designed user interface. Many user interfaces include multimedia components that require special skill in art and design
- Analysts – they provide the methods and processes to translate high level requirements in their particular area into lower levels of detail that can be turned into code by programmers.
  - System analyst – deal with technical requirements
  - Business analyst – deal with process and system design
  - Database analyst – handles data mapping, data dictionary, data structure, etc.
- Developers – creates the system itself by coding and deploying the technical infrastructure of the system and programming it to perform required tasks. Requires both knowledge of hardware and software needed by the system to function
- Specialists – handles unique aspects of the project and members are often called SMEs (subject matter experts)
- Client interface – a client may be an internal or external customer of the teams organization. Client has responsibilities towards the successful completion of the project. Client must define system requirements, negotiate contract terms, and maintain oversight of the teams as the project progresses. Client may also have to supply resources to project team

The stages and importance of the system development life cycle (SDLC)

- The system development life cycle (SDLC) is the common term used for the stages and activities

- 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 retired and likely replaced with something new
- Thos involved in the systems analysis and design process need to remember there are four distinct pillars that impact an IS project, and all four must be addressed for you to succeed
    - You need the right people with the right skills
    - They must have the right tools and methods to build the system
    - You need to manage the process carefully to ensure success
- Stages of the SDLC:
    - Concept (pre-inception or idea phase) – this phase involves the environment within the organization that either promotes or inhibits the development of ideas for systems. An organizations prefers to foster an environment that promotes ideas that can improve its bottom line
    - Inception (feasibility or planning phase) – the organization has an idea; focus is on understanding the problem and planning the project
    - Elaboration – systems team finalizes requirements for system and creates conceptual models of the system
    - Construction – the team builds the initial running system. Team usually implements core functionalities first, then incorporates additional features
    - Transition – team finalizes system and puts it in place; final training of users and management is completed
    - Production – after system is up and running, it must be monitored, maintained, and evaluated; system must be kept up to date
    - Retirement – system loses its value to the company and must be replaced

Standard IS methodology

- A **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

- Provides a project team with structure to ensure that everyone is working toward the same project goals
- Will define most of the development activities that are part of the plant developed by the project manager
- Initially, system developers used an ad hoc approach called the build and fix model, in which the system is built based on customer interviews and then tested

The traditional IS methodology: the waterfall model (see page 249 adv and disadv)

- The first development model to gain wide acceptance among system developers was based on the waterfall model
- In this model there are a number of phases, and a new phase begins only after the preceding phase is acceptably completed
- If problems are found, it is possible to cycle back to a previous phase
- Development activities tend to move downstream through the phases in a formal, detailed manner
- The idea is that if things are done right in each phase, there will be little or no need to move back upstream to an already completed phase, thereby achieving one of the primary benefits of a structured methodology
- The waterfall model is a document driven and highly structured process
- Work during each phase generally produces a document or another type of deliverable
- The waterfall model does have weaknesses
    - The model is usually only effective when users can express their exact needs
    - Users often cannot adequately express their requirements until they have something to work with and see
        - This is called a prototype
    - The sequential nature of the waterfall process can delay progress

Modern IS methodologies

- An **evolutionary model** is an approach to development whereby developers produce a partial running system that is evaluated, revised and enhanced

- With an evolutionary model, developers firs 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
- A common approach to the evolutionary model is to use prototyping
- With 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
- The final system essentially evolves from that initial prototype
- The process helps team members and users better understand the requirements
- A problem with the evolutionary life cycle model can be the failure to create a well defined set of documents, making it difficult to monitor and control the project
- A current trend is to develop systems using an agile development methodology
- Because an 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:
    - Develop iteratively
    - Manage requirements
    - Use component architecture
    - Model visually
    - Verify quality
    - Control changes

- The greater the complexity and importance of the project to the strategic mission of the company, the more formality is needed in the development process

IS modelling

- You can think of a model as a simplified representation of something real (e.g. a building, a weather pattern, or an information system
- Models can be a set of mathematical equations, a computer simulation, a graph or chart, or a number of other types
- Usually includes one of more diagrams that developers use to examine, evaluate and adjust to understand the system requirements and performance requirements derived from the design of the underlying business process that the system is trying to automate or support

UML diagrams

- **Unified modelling language** (UML) has become a very popular modeling tool, as it works particularly well for developing object oriented systems
- The UML is made up of several graphical elements that are combined to form a set of diagrams
- Purpose of UML diagrams is to show multiple views of a system
- Together, the set of UML diagrams is known as the system model
- The most commonly used UML diagrams include class, object, use case, state, sequence, activity, communication, component, and deployment diagrams
- The UML use case diagram notation captures all the possible ways to use a system
- A use case describes a system's behaviour from a user's standpoint
- Sequence diagrams,, which shows the order of various activities and by who, and how they interact with the various system components as they occur in order

IT tools for IS development

IS development tools

Integrated development environments (IDEs)

- Today most software programs rely on IDEs

- Instead of using separate software packages, an integrated development environments (IDEs) allows developers to complete several programming tasks within the same software application

- They typical IDE includes a text editor to allow the user to write program code, a file system to store programs, a complier to translate the program into machine language, and debugging tools to find the correct errors

Modelling tools and code generation

- Developers use graphical diagrams to define system components and how they are related with code generation

- With code generation, a developer can use graphical diagrams to define a systems components and how they are related

CASE tools

- **Computer aided software engineering (CASE)** is the use of computer based support in the software development process

- CASE tools support the creation and maintenance of the many documents, diagrams, and data that the project team creates over the course of the IS development life cycle and integrates them in a CASE environment accessible to all users

- There are some risks to using these tools:

    - One common error is to focus on managing the software tools rather than the content of the project itself – which can lead to a quantity over quality outcome where the final product is not going to accomplish the systems objectives, even if it's on time

    - Another common problem is known as the silver bullet syndrome. This occurs when there is an overreliance on the tools for the success of the project, while neglecting the other pillars of a development project

- For a successful project, it is important to keep the tools in perspective and view them as support for the primary activities of the project

Managing an IS project

- **Project management** is the application of knowledge skills, tools and techniques to project activities to meet project requirements

- for IS development, a project manager oversees three main project elements:

  - the scope of the project: what the project should accomplish
  - resources needed: people, equipment, material and money
  - time to complete it
  - all balanced with a view toward accomplishing the organizations strategy though successful project delivery

- a manager often makes decisions to actively set the levels of two elements, and then calculates the third accordingly while always realizing that all three are important and must be accomplished
- you can think of the three project management elements as the three sides of a triangle (could be referred to as triple constraint or iron triangle, because of its immutable nature and because it was perceived as nearly impossible to deliver on all three components successfully (on time, on budget, and on scope)
- project scope is most important to manage
- increases in scope drive increases in time and/or resources needed

Overview of project management tasks

- a project has a beginning and an end
- the SDLC is a continuous stream of activities over time
- the following four core functions lead to specific project objectives:
  - time management – estimating the duration of the project, developing an acceptable schedule, and managing the project to ensure timely completion
  - cost management – preparing a budget and managing the costs of the project to stay within budget
  - scope management – identifying and managing all the tasks required to complete a project
  - quality management – ensuring that the finished project satisfies its defined goals
- the facilitating functions support the project activities
  - human resource management – focuses on making productive use of the team members

  - communications management – involves the supervision of shared project information
  - risk management – the project manager seeks to identify and prioritize potential risks, and develop contingency plans in case a risk occurs
  - procurement management – involves acquiring the resources needed for the project

- project management should not only be about doing the projects right, but also about doing the right projects
- **project management integration** includes the development of the project plan, execution of the plan, and the coordination of changes to the plan as they occur

Project time management

- after budgeting, the most important function for the project manager is developing and controlling the project schedule
- for many IS projects where gaining a competitive advantage is a goal, creating and maintaining a schedule that produces a quality project as quickly as possible can be more important than costs
- 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
- to manage all of these activities, project managers often use a Grantt chart

- Grantt charts provide a standard format for displaying the results of the first four time management activities
- Chart lists the project activities, along with the start to finish dates in a calendar format

Risk management

- The job of **risk management** is, therefore, to recognize, address, and eliminate sources of risk before they threaten the successful completion of the project
- Risk management tasks fall into one of two main categories:
    - Risk assessment
    - Risk control
- The first step in risk assessment is to identify potential project risks
- Since the greatest risks occur where there is an interface, such as between systems, departments, processes or organizations, particular attention is paid to these areas
- This is where the input of business team members becomes crucial
- After obtaining a list of potential risks, the next step is to actually assess these risks; that is, to analyze each of them for likelihood and potential impact to the project
- Responses to risk:
    - Risk transfer – move the risk to somebody better able to deal with it
    - Risk deferral: adjust the schedule to move some activities to a later date when the risk might be lessened
    - Risk reduction – either reduce probability of the risk occurring or lessen the impact
    - Risk acceptance – accept the risk, but make sure contingency plans are in place
    - Risk avoidance – eliminate the possibility of the risk occurring

Program and portfolio management

- Sometimes it may be useful to either break down a very large project into a series of smaller, interrelated projects, or to group a series of related projects into a single work effort. The result is often called a **program** and the activity of managing several projects

together is known as **program management** – essentially the same tasks as involved in managing a single project but across multiple teams

- Programs are often created because there are dependencies between projects
- Organizations make choices not only about time, cost, scope and quality, but even the choice of which projects to undertake in the first place. The selection of projects aligned to an organization's overall strategy that provide the company with a benefit is of utmost importance. This is known as portfolio management and is ultimately about selecting and approving projects that will accomplish the organization's strategic objectives. While often considered as part of project management, it is actually a planning process that precedes the project management process by defining which projects will get activated and assigned to a project manager and project team.

Project management software

- **Project management (PM) software** is designed to support and automate the tasks of project management and to help project managers make decisions
- PM software is usually classified into three levels:
    - Low level packages – include tools for basic scheduling, project control, reporting, filtering and sorting
    - Mid-level packages – add resource leveling, resource allocation, cost control and flexible charting
    - High level packages – add advanced functions like scheduling by user-defined rules, programming languages, resource management for multiple projects and risk management
- **Program evaluation review technique (PERT) chart** – a project team use a PERT chart to schedule and manage the tasks within a project
- Advantage to the PERT chart is that it clearly shows the sequence and dependencies between tasks
- Important use of the PERT chart is to identify the critical path
- The critical path is the sequence of tasks that determines the overall completion time of the project
- Tasks not on the critical path may have the luxury of extra time, called slack, for completing the work

Module 8 – web 2.0, social media, and online trends

- **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
- Interactive sites are supported by audio and video capabilities combined with **user-generated content (UGC)** such as blogs and conversation threads
- 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

New technologies for web 2.0 social media

- Adobe flash allows interactivity, animation and audio and video streaming
- Javascript is the communicator between the computer and the internet
- Through the use of **application protocol interface (API),** developers can access established programs and use their functionality

Defining social technologies and utility

- Developers are trying to replicate the paradigms of human social interactions and enable them to occur online with technology by linking form to function
- 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
- The primary purpose of social websites is to connect us with friends, family, partners and colleagues
- Some of these sites may be oriented towards specific demographics (for example, business networks and colleagues in the case of linkedIn) or aimed more generally at the world (in the case of facebook)
- Social networking is the fourth most popular online application overall (after search, dating/adult sites, and gambling) and is now ahead of email
- Social utility – this 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. Otherwise, you wouldn't do it

- The only reason people spend any time on facebook or similar sites is that they provide something of social value in return for spending valuable time creating profiles, updating entries and so on
- To invest time on a site, you need to feel like you get a return or else you will go elsewhere
- The three pillars of sociability apply to both real life and the online world
- The concepts attached to each pillar are rooted in social psychology, they study of how people congregate and why – often demonstrating almost tribe like behaviours
- The desire to affiliate, participate and be validated by others
- Social networking sites allow users to do this online

Affliction

- **Affiliation** is essentially the need to belong
- 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
- for example, want to belong to something because it is popular or will make a person popular, or it may be the opposite and rooted in exclusivity and the fact that only the chosen or a few belong

Participation

- **participation** involves the understanding of rules of behavior and conduct
- once they have made the leap to wanting to join your site, you must help users easily understand the rules of participation
- every group of humans, no matter how large or small, has both spoken and unspoken rules regarding conduct in the group
- if it is important for the growth of your online community that users understand rules of behaviour and conduct (both formal and informal), you have to find ways to make participation socially safe
- 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

Validation

- experiencing social comfort and involvement leads to a user's **validation** and increases their confidence to interact
- 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
- this may not be the same for each user, since each user will have a different level of social comfort, involvement and confidence
- but it does mean finding tangible ways of demonstrating social value – perhaps even involving elements of competition, and age-old concept that human beings have willingly engaged in for centuries

Design and usability

- design esthetic and easy usability are critical components to building a successful interactive media site, and that the most powerful of these become almost addictive to users
- a site has to look good and be attractive to users, while also functioning well and being intuitively obvious to users
- if you make it easy to navigate, people will use it, if you don't, they won't
- simple navigation as well as changing and refining the technology flow encourages use
- 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 that users can easily find and use a specific function

Business utility

- translating online social utility into business utility help drive value for companies and organizations
- essentially, this means 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 and clients will share information if they get something back in return that they want (e.g. products and services, information, access to other buyers)

Technology implications

- the first (and least obvious) issue is the sheer cost of accumulating and storing all of this often multimedia intense content
- running a site oriented toward interactive media requires significant bandwidth and also massive amount 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
- 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

Privacy and security

- users must trust that sites where they post and share public and private information are secure
- if you lose your users' trust because of a security breach or because you cannot help them keep their private information protected, you will not succeed at retaining them
- 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

User-generated content

Creating content

- an essential ingredient that most experts agree is fundamental to most social media applications is the concept of user generated content
- this suggests that in most instances, true social sites focus on providing the context in which users generate the content themselves, rather than providing the actual content

- 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
- successful site 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**
- creating a **participating identity** allows the user to create and post content
- when you join various social sites, you may also face restrictions such as user or member agreements, codes of conduct or requirements to participate only in certain ways
- 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 content

- to make your own content useful to other users, you must label or tag it
- **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, that helps users access information quickly and efficiently
- **viral social interactions** occur when content instantly spreads online around the world

User-generated content and brand risk

- in keeping with psychological concept of schadenfreude (drawing happiness from others misery or misfortune), negative stories go viral more often than positive ones
- one essential element of any company's **online social strategy** should be an awareness of the risks of undertaking any kind of online campaign that might backfire

- **brandstorm –** a situation where a traditional brand faces an online storm that can quite literally damage the value of its brand overnight
- **mashups** and **brandstorms** can be very negative and damaging to companies as they are created by implications, not on the basis of fact
- indirect messages, whether based on fact or fiction, are increasingly more potent than any equivalent direct message from the company itself, and this can put brands at risk

Creating business utility using social media tools and E-marketing

- **direct marketing** means messages, offers or promotions that come directly from the company to the consumer in some form (e.g., advertising, mail, targeted events, or samples)
- early on, marketing's use of IT technology rested solely on gathering and using e-info data
- As the web began to grow, most companies began to use IT as a way to communicate directly with their customers. However, the communication was still only one way – from company to consumer
- as the social web began to take over, marketing became e-dominated, where use of the web is an integral part to marketing's communications with consumers
- What others were saying or doing with products became more important and consumers began to seek out **indirect** sources of information (e.g., product and ranking review sites, relying on word of mouth the find new products, etc.)
- e-dominated marketing emerged as a new paradigm as every company, organization or entity was affected by these trends and had to effectively navigate the risks and rewards of this new online social world to succeed

Harnessing the power of social media

- How should companies strategically use social media technologies in their business?
    - To facilitate employer/employee engagement
    - To create brand-related clubs/forums
    - To manage online communities
    - To facilitate online review sites
    - To promote geo-purposed sites

- Each of these sites has the features that appear to make social media sense for a business
- They have a purpose attached to community, common membership or interests, and they support a specific brand or product and/or a geographical overlay that helps draw local traffic
- Micro-markets – these are purpose built sites (or forums or groups) designed to meet a specific need
- **Media transparency** – making sure your brand and advertising messages are coherent and consistent – has also become increasingly important in this context

The social and business impacts of web 2.0

- Another important development for business has been the generational impact of the web on entertainment choices
- Traditional marketing and advertising are changing as a result of web 2.0
- Companies are realizing the importance of social media in their marketing efforts
- Advertising dollars are moving from search and banner ads to social media sites

Social business models

- List of some recent things being done in the social web to great advantage, and which begin to help define the business benefits of social computing in new ways:
    - Conducting online focus groups for new product development (faster, easier)
    - Running viral campaigns to launch new products (innovative, cheaper)
    - Holding virtual recruiting and job fairs in second life (hipper, more targeted; attracts a different demographic; cheaper than head hunters)
    - Replacing annual online employee engagement or satisfaction surveys with new virtual equivalents that run 7/24 (more cost effective, up-to-date, and interactive)
    - Using social media tools to move from a broadcast to podcast model for training and development and internal communication with employees (on-demand, more flexible, just-in-time)
- As shown in the list above, the opportunities to apply social media tools, both internally and externally, are vast for any business regardless of its size, geography, or industry

Module 9 – ethics and professional practice in IT

- **Ethics** is closely linked to morality and a society's widely shared understanding of what is right and wrong
- your morals are closely linked to your **personal views**
- **personal views** – fundamental beliefs that you hold as true about the way the world works and your role in it
- your ethical position on any decision is informed by your own values, moral code, and life experiences
- a country's or society's **legal codes** also help define what is right or wrong
- dissonance – simple disagreement between the law and your morals or values)
- very few of the ethical dilemmas you face are so simple that your values and the law make the answer clear
- ethical dilemma – where the complexity of issues 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
- when you find yourself facing an ethical dilemma, you need to create your own **hierarchy of values** that help inform your personal decision making so you remain ethical, even when confronting difficult and complex issues

Business ethics and conduct

- businesses are very similar to people in many ways – they are born and die (registration and bankruptcy), they have the right to enter into agreements and own property, and indirectly they vote (although mostly through political donations, advocacy, and influence)
- this is an important principle of business ethics, because it suggests that 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

- there are also a number of tangible business benefits to ensuring that your organization remains vigilant and within the boundaries of ethical behaviour expected in your community. Some of these include:
    - 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
- an ethicist would argue persuasively that you should not need benefits to act ethically, but rather should do so out of moral imperative
- occasionally you might find this ethical intent in conflict with the profit maximizing motive of capitalism
- this is the primary reason why so many business leaders are now talking publicly about **corporate social responsibility (CSR)**

What causes ethical misconduct in business?

- Unbridled by any constraint of what is right or wrong, many businesses could make more money by acting illegally or unethically
- It is also true that the system of separating management from shareholders might also prompt gaps where actions are undertaken to benefit management more than to benefit shareholders
- 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

Remedying ethical breaches

- See page 312

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
- Peter Weill estimates that businesses with strong governance create 20% more business value than similar firms with less robust governance
- Corporate governance means that leadership and management of a business are directly accountable to its owners (i.e., shareholders) for proper operation and financial control of the organization
- **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"
- This means that IT governance begins as a very high level process that specifies:
    - How the organization will set goals, objectives, priorities and policies for IT
    - How it will integrate IT with business strategies and goals
    - Which organizational members will make decisions regarding, and be responsible for, the successful completion of these tasks (the "who" of IT governance)

The CIO: managing IT governance

- **The chief information officer (CIO)** 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
- The CIO:
    - Leads the organization's information and technology efforts
    - Ensures proper and secure use of all the organization's information resources
    - Understands both business and technology
    - Communicates IS goals and aligns them with business strategies
- 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

related law and regulations

- Personal information protection and electronic documents act (PIPEDA)
- Bill 198
- EU data protection directive
- Basel II accord: international convergence on capital measurement and capital standards
- Sarbanes-Oxley act
- Multilateral instrument 85-109

Professional codes of conduct and practice

- Industry associations, professional bodies, and industry think-tanks for many professionals – IT included – often develop, publish, and promote **codes of conduct**
- These 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 (medicine, law, accounting and engineering) where the consequence of not following them normally results in expulsion and the payment of compensation for malpractice
- Many large private companies in Canada also have internal codes of conduct that relate to employee conduct and maintaining high ethical standards
- Codes are often in place in organizations with high risk profiles where unethical behaviour has high financial and human costs
- Examples of code of conduct principles:
    - Upholding the law
    - Confidentiality
    - Fairness
    - Corporate responsibility
    - Honoring our trust in you
    - Objectivity
    - Integrity
    - Individual responsibility

Common ethical dilemmas involving IT

Copyright and piracy

- It should be clear to any professional that copying any protected software, which the license clearly does not permit is an unethical practice
- It hurts the costs of software in the marketplace (because vendors factor in these costs and pass them along to consumers and businesses alike), does not encourage innovation (why bother if people are simply going to steal your stuff anyway?), and diminishes opportunities for IT professionals (because of less profit to invest in new product development)

Patent violations

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

Spam and privacy codes

- The ethical dilemma is not the practice of sending promotional email itself; it is seeking permission to do so rather than collecting or buying email addresses where individuals have not provided their consent

Security breaches

Competitive intelligence

- Competitors want insight into what others in the industry are doing so they can respond to the market and maintain market share

- Gaining such insight 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

- For instance, 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 that have been seen or documented in the IT and other industries

Hiring practices, equity and equal opportunity

Green IT

- Some of the 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

- Silence or tolerance is a form of **complicit or implicit consent,** which means, despite our inklings to the contrary, you did nothing

- Any situation involving disclosure takes you dangerously close to the issue of **whistle blowing**, which is, in and of itself, fraught with ethical dilemmas of its own

- The question of whether or not you should report your suspicions to relevant authorities or the media (an **external conduit)** often seems to depend on the extent to which you

can back up any claims you make with supporting evidence to ensure you have a credible claim before proceeding

- Ethical thinking relies on each person having values, morals and knowledge of the law
- Ensure that you are prepared to confront ethical dilemmas when they arise
- Take responsibility to protect your personal character and reputation
- In some areas, it is up to the IT profession to ensure that the industry acts ethically
- The desire to act ethically as a person is what society relies on to ensure that organizations also conduct themselves ethically