

ADMS 2511 MIS Notes

Ch 1 – Modern Organization in the Global, Web-Based Environment

Management information systems (MIS)- deals with the planning of info tech to help people perform tasks related to info processing and management

Information technology (IT)- any computer-based tool used with info to support the needs of an org

Importance of Planning for IT

-a new info system can apply to the whole org, or a specific area of the org

Application portfolios- are groups of new system proposals (apps that have to be added/modified)

IT Planning

-begins with an **organizational strategic plan**

-states the firm's mission, goals, and steps to reach those goals

-**IT architecture** describes the way an org's info resources should be used to accomplish its mission

-includes both technical (hardware operating systems) and managerial aspects (managing the IT dpt, how area managers will be involved)

IT strategic plan- LT goals that describe the IT infrastructure and major IT initiatives to achieve the organization's goals

-it must meet three main objectives:

-must be aligned with the org's strategic plan

-must provide for an IT architecture that networks users, apps, and databases

-must efficiently allocate IS resources among different projects so they can all be completed on time, within budget, and function properly

IT steering committee- composed of managers/staff who rep diff organizational units

-they establish IT priorities to ensure MIS function is meeting the org's needs

-it links corporate and IT strategy, approves resource allocation for MIS, establish performance measures for MIS to make sure they are met

-ensures that employees get the resources they need to do their job

After the IT strategic plan, next is **IS operational plan**; set of projects in support of the IT strategic plan

-includes the mission, IS environment (summary of info needs of functional areas), objectives (goals), constraints (tech'l, financial, personnel), application portfolio (inventory of present apps, plan of projects to be developed/continued), resource allocation

-IT planning is crucial when developing a new product or service

Business Processes and Business Process Management

Business process- collection of related activities that produce a product or service

-many processes cross functional area, some involve only one

-excellence in this is the basis for measures of competitive performance

-customer satisfaction, cost reduction, cycle and fulfillment time, quality, product differentiation, productivity

-**business process reengineering** improves the efficiency and effectiveness of an org's business processes

-for many orgs when they tried this it was too difficult; impact on employees was too much

Business process management (BPM)- tools that support the design, analysis, implementation, management of business processes

-BPM helps decrease costs and increase revenue, and can create a competitive adv over time

Information Systems: Concepts and Definitions

Data, Information, and Knowledge

Data items- elementary description of things that are stores but not organized

-numbers, letters, figures, sounds, images

Eg. Student grade, number of hours an employee works

Information- data that has been organized to have meaning

Eg. A student's name along with their GPA

Knowledge- organized data that conveys understanding as it applies to a business problem

Eg. Recruiting company finds that most success is found in hiring students with a 3.0 GPA so they only choose to interview those with a 3.0

Information Technology Architecture

IT architecture- high-level map of the info assets in an organization

-integrates org's business needs for info, IT infrastructure, and all applications

-shows how all aspects of info tech in an organization fit together

Information Technology Infrastructure

IT infrastructure- physical facilities, IT components/services/personnel that supports the whole org

-IT components are the computer hardware, communication technologies

-IT personnel are the people

-IT services include data management, systems development, security concerns

Global, Web-Based Platform

Globalization- integration of economic, social, cultural, ecological factors of life that is enabled by IT

The 3 Stages of Globalization

Thomas Friedman separated it into three generations;

Globalization 1.0 → 1492-1800

-muscle, horsepower, focus was on countries

Globalization 2.0 → 1800-2000

-multinational companies (headquarters in one, operated in others), telephone, WWW, comps

-focus was on companies

Globalization 3.0 → present

-driven by Friedman's 10 flatteners; global, web-based platform

-focus was on groups and individuals

Business Pressures, Organizational Responses, IT Support

Business Pressures (3 types)

Market Pressure

Global Economy and Strong Competition- NAFTA, introduction of euro, rise of India and China

-cost of labour is low in developing countries, developed countries offer greater benefits

-many industries moved operations to countries with low labour costs; IT makes these moves easier

Need for Real Time Operations- immediate processing of info; in store or online, credit card payments

-orgs must have adequate info systems to provide real time processing

Changing Nature of the Workforce- greater participation from women, single parents, visible minorities, disabled, those working from home; IT eases the integration of these workers

Powerful Customers- their sophistication and expectations increase

-they can find detailed info, can compare prices online

-firms will try to know as much about their customers (customer intimacy), which further increases the customer relationship management (CRM)

Technology Pressures

Technological Innovation and Obsolescence- new and improved techs bring substitutes for products, alternative service options, and greater quality

Information Overload- info is found on the Internet; flood of info to managers

-IT eases this through search engines, data mining to help managers access the data

Societal/Political/Legal Pressures

Social Responsibility- state of the physical environment to company, indiv philanthropy

-known as organizational social responsibility/individual social responsibility

Digital divide- gap b/n those who had access to info/communications tech and those who don't

Compliance with Government Regulations and Deregulation- regulations regarding health, safety, environmental control, employment equity

-businesses see regulations as constraints on their activities; deregulation can intensify competition

-the enforced laws affect business operations, income taxes, payroll taxes

-Canada have passed laws to govern business activities; Budget Measures Act to improve investor confidence; PIPEDA

-orgs rely on IT support to provide the needed controls and info compliance

Ethical Issues- if handled poorly, an org's image can be damaged

-the use of IT raises many ethical issues (monitoring e-mails, customers' privacy invaded)

-IT can also be used to improve the methods of processing

Protection Against Fraud of Terrorist Attacks- computer systems can be used to create fake transactions

-orgs need to protect their info to reduce identity theft

-since 9/11, increased pressure to protect businesses

-IT helps through security systems; finding patterns of behaviour to suggest terrorism

Organizational Responses

Strategic Systems

-enables orgs to increase market share, better negotiate with suppliers, to prevent competitors from entering their markets

-requires a close alignment b/n business and IT

Customer Focus

-IT tools have been used to enhance customer service

-remembering you by name, suggesting recommendations, providing useful info to make decisions

Make-to-Order and Mass Customization

Make-to-order- customized products and services

-business problem is manufacturing efficiently and at a low cost; so there was a switch from mass production to mass customization

Mass customization- producing a large quantity of items but customized at the same time

E-business and E-commerce

-doing business electronically

-to plan for the most effective responses, companies formulate strategies

-these strategies rely on IT (especially strategic information systems)

Why are Information Systems Important to Me?

-can help register for classes, pay bills, conduct banking, research papers

-the switch from a wire line telephone to a smart phone

-blog, YouTube, CDs, DVDs

-it offers career opportunities

IT is used by all Departments

Finance & Accounting → forecast revenues, business activity, uses of funds, performing audits

Sales & Marketing → product analysis (developing new goods), site analysis (best location), promotion analysis (finding best ad channels), price analysis (setting product prices)

Marketing managers → managing r/ns with their customers

Manufacturing → process customer orders, production schedules, control inventory levels

-they use comp-assisted design (CAD) and comp-assisted manufacturing (CAM) to manufacture products

HR → recruiting process, analyze and screen job applicants

Ch 2 – Information Systems: Concepts and Management

Information Technology (IT) Governance and Management

IT governance- structure of relationships and processes to control the enterprise to achieve its goals by adding value while balancing risk vs return over IT and its processes

- relationships and processes
- taken actions to meet the organization's goals
- actions are to add value
- balance between risks and profits

-is also about managing IT throughout organization

-includes planning, acquisition, implementation, support and evaluation

Types and Purposes of Information Systems

Computer-Based Information Systems

Information System- collects, stores, analyzes information for a specific purpose

Computer-based IS (CBIS)- uses computer technology

- most IS are computerized today

Hardware- accepts data and information, process it, displays it (monitor, processor)

Software- enables the hardware to process data

Database- collection of related files that contain data

Network- connecting system that permits diff computers to share resources

Procedures- instructions to process info

People- individuals who use the hardware and software

Application Programs

Def'n- designed to support a specific task or business process

-each department uses dozens of application programs

Breadth of Support of IS

-certain info systems support parts of orgs, some support whole orgs, some support groups of orgs

Functional area IS (FAIS)- each supports a functional area in the organization

Enterprise Resource Planning (ERP)- designed to correct lack of comm'n among functional area ISs

-tightly integrates functional area ISs via a common database

-nearly all ERP systems are transaction processing systems, but transaction processing systems aren't all ERP systems

Transaction Processing System (TPS)- supports the processing of data from the organization's basic business transactions

-it collects data continuously in real time (Wal-Mart price scanner)

Interorganizational Information Systems (IOSs) connect 2+ organizations

Supply chain- flow of materials, info, money, services from raw material to the end customers

Electronic commerce systems- enable orgs to conduct transactions, called B2B commerce

- also lets customers to conduct transactions with orgs, called B2C commerce
- are usually Internet-based

Support for Organizational Employees

Clerical workers support managers and work groups at all levels of the org

-lower level managers deal with day-to-day operations

Middle managers make tactical decisions (ST planning, organizing, control)

Knowledge workers- experts in a particular subject area; they create info that integrates into business

Executives make decisions that deal with situations that can change the manner that bus is done

Office automation systems (OASs) support the clerical staff, lower/middle managers, knowledge workers

-are used by employees to create documents, schedule resources, and communicate

Business intelligence (BI) systems- provide support for complex decisions for middle managers and knowledge workers

Expert Systems (ES)- duplicate the work of human experts to support knowledge workers

Dashboards- support all managers; gives quick access to info and direct access to structured info in the form of reports

-executive dashboards are tailored to the needs of executives

Competitive Advantage and Strategic Information Systems

Competitive advantage- a business that can outperform its competitors in cost, quality, speed

Strategic Information Systems (SISs)- helps an org implement its strategic goals, increase its performance

Porter's Competitive Forces Model

Threat of entry of new competitors

Entry barrier- service feature that customers learned to expect from orgs

-the web increase the threat that new competitors will enter

Bargaining power of suppliers

-supplier power is high when buyers have few choices from who to buy

-Internet's impact on suppliers is mixed; it lets buyers find alternative suppliers

-as companies use the Internet, suppliers also prosper by locking in customers

Bargaining power of customers (buyers)

-buyer power is high when buyers have many choices from whom to buy

-loyalty programs reduce buyer power

-info tech allows companies to track the accounts of customers, thus reducing buyer power

Threat of substitute products or services

-new techs create substitute products quickly

-info-based industries are in the greatest danger from substitutes

-internet is a threat; can create a profile of your shopping habits, personalize/suggest ideas

Rivalry among existing firms in the industry

-intense competition among many firms in an industry

-IT-enabled loyalty programs

-RFID to speed the checkout process, low variable cost of digital products

-costs in a physical distribution channel are higher than in digital form

Porter's Value Chain Model

Primary activities- relate to the production and distribution of the firm's products and services

- purchasing materials, processing it into products, delivering products to customers
- inbound logistics (inputs); operations (manufacturing/testing); outbound logistics (storage/distribution); marketing and sales; after-sales services

Support activities- do not add direct value to the firm's products/services; supports primary activities

- firm's infrastructure (accounting, finance, management); HRM; product and tech R&D; procurement
- each support activity can be applied to any or all of the primary activities

Value system- includes the suppliers that provide the inputs necessary to the firm and their value chains

- once the firm creates products, these products pass through value chains of distributors to customers

Strategies for Competitive Advantage

Cost leadership strategy- produce products/services at the lowest cost in the industry

Differentiation strategy- offer diff products, services, product features

Innovation strategy- introduce new prods/services, add new features, develop ways to produce them

Operational effectiveness strategy- where a firm performs activities better than its rivals

- increases quality, productivity, employee and customer satisfaction

Customer orientation strategy- concentrate on making customers happy

Importance of Information Systems and their Management

IT Affects Management

IT will Reduce the Number of Middle Managers

- makes managers more productive; ultimately decrease the number of managers/experts

IT will Change the Manager's Job

- gives them time to get out the office and into the field
- can spend more time planning activities
- can gather info for decision making much quicker
- can complete tasks efficiently and effectively

IT Affects Employees

Perceptions of Job security- replacing people with machines is increasing

Psychological effects- loss of identity; just another number, depression and loneliness

Health and Safety- increase in workload/responsibilities can trigger job stress

- workers feel overwhelmed; increases stress and anxiety
- increase in exposure to video display terminals, radiation exposure; carpal tunnel syndrome

Ergonomics- adapting machines to people

Opportunities for people with disabilities/impairments- computers can create new employment opportunities by integrating speech and vision recognition capabilities

- adaptive equipment for computers lets people with disabilities to work

IT Provides Quality-of-Life Improvements

-workplace can be expanded from 9-5 to 24hrs/day at any location

Robot Revolution

-robots that can do practical tasks are becoming more common

-are being developed for military purposes

Improvements in Health Care

-medical personnel use IT to make quicker diagnoses to monitor ill patients

-developing new drugs; surgical robot to perform long-distance surgery

Managing Information Resources

-includes all the hardware, software, data, networks in an org

-appls have enormous strategic value

-when they're not working, an org can't function

-these ISs are costly to acquire and maintain though

-becoming more difficult to manage and org's info resources effectively; reason comes from MIS

-today, almost all employees use computers (end-user computing)

-end-user computing has two components:

Users → end-user data entry, reporting, inquiry

End-user development → users that develop usable systems

Which IT Resources are Managed and by Whom?

-managing info resources are divided between ISD and the end users

-major categories include hardware, software, databases, networks, procedures, security facilities, physical buildings; are scattered throughout the org (thus hard to manage)

-dividing responsibility depends on the size of the org, amount and type of IT resources, amount and nature of outsourced IT work

Role of the IS Department

Chief Information Officer (CIO)- role of the director of the ISD changing to a senior exec

-ISD now responsible for managing outsourcing of projects and creating business alliances with vendors

-ISD reports to a senior vice president or CEO

-ISD works closely with external orgs like vendors, business partners, consultants

-inside the org, ISD and end-user units must be close partners

-ISD sets standards for hardware and software purchases

-it also monitors user hardware, and acts as a gatekeeper in regard to illegal downloads

Ch 3: Ethics, Privacy, and Information Security

Ethical Issues

Ethics- principles of right and wrong to guide people's behaviours

Code of ethics- collection of principles to guide decision making by members of an organization

Responsibility- accepting the consequences of one's decisions and actions

Accountability- determining who is responsible for the taken actions

Liability- giving individuals the right to recover the damages done to them by other individuals

-improvements in it are increasing ethical problems

-orgs are more dependent on their info systems; can store more data about individuals for longer time

There are a variety of ethical issues:

Privacy→collecting, storing info about individuals

Accuracy→authenticity of info that's collected and processed

Property→ownership and value of info

Accessibility→who should have access to info, whether they should pay for it

Protecting Privacy

Privacy- right to be free of unreasonable personal intrusions

Information privacy- right to determine when info about yourself can be gathered to others

Two main rules of privacy:

1) Right of privacy isn't absolute; it must be balanced against the needs of society

2) The public's right to know supersedes the individual's right to privacy

-surveillance is used; credit card, banking transactions, search engines

Digital dossier- electronic description of a person and their habits

Profiling- process of forming a digital dossier

Eg. Data aggregators; they sell their dossiers to law enforcement agencies, or companies who want to know their customers better (customer intimacy)

Electronic surveillance- done by employers, gov, other institutions

-the law supports employers to read their employees' e-mail

-software is also used to block connections to inappropriate websites (URL filtering)

-a lot of info is kept in many databases, like credit reporting agencies

-others include banks, cable TV, telephone companies, employers, gov agencies

Privacy policies/codes- org's guidelines for protecting customers, clients, employees

Opt-out model- allows the co to collect personal info until customer requests otherwise

Opt-in model- prohibits a business from collecting personal info until customer requests otherwise

International Aspects of Privacy

-there are a large number of inconsistent security laws around the world

-the complex global legal framework causes regulatory problems for companies

-many of these laws conflict with other countries' laws

-the transfer of data in and out of a nation without the knowledge of either the authorities or the individuals involved raises privacy issues

Threats to Information Security

Today's interconnected, wirelessly networked business environment

-Internet allows computer networks to communicate with one another

-trusted network → any network that's protected

Government legislation

-requires that many types of info be protected by law

Smaller, cheaper, faster computers and storage devices

-easier to steal a computer

-more people are able to afford powerful computers

The computer skills to be a hacker are decreasing

-Internet contains scripts that amateur users can download to attack any info system

Cyber crime is taken over by international organized crime

Cyber crime- illegal activities over computer networks

cyber extortion- when individuals attack an org's website and demands money

Downstream liability

-if A's info systems were used to attack B, A could be liable for damages against B

Increased employee use of unmanaged devices

-customer computers, business partners' mobile devices, computers in hotel lobbies

Management support

-senior managers must set the tone so security policies are taken seriously

Threat- any danger to which a system may be exposed

Exposure- the loss or damage that results if a threat compromises that resource

Vulnerability- possibility that the system will suffer harm

Risk- likelihood that a threat will occur

Information systems controls- software aimed at preventing a compromise to the system

Threats to Information Systems

Unintentional acts

-acts with no malicious intent; three types

Human Errors

-diff categories of organizational employees;

Regular → mail clerks to the CEO (the higher the level, the greater the threat)

-those in HR or info systems pose greater threats as well

Contract labour & consultants → they have access to co's network, info systems

Janitors & guards → keys to office

-human errors pose an issue due to laziness, lack of awareness, poor training efforts

Social engineering- perpetrator uses social skills to trick employee into giving confidential info

-they can impersonate somebody else; exterminator, technician, fire marshal

-attacker approaches employees

Reverse social engineering- employees approach the attacker

-attacker may gain employment and allow others to entrust him

Social data mining- attackers learn who knows whom in an organization and how

Deviations in the quality of service by service providers

-service isn't delivered to the org as expected

-service disruptions from various providers

Environmental hazards

-dirt, dust, humidity, static electricity

Natural disasters

-floods, earthquakes, hurricanes, tornadoes, lightning

-catastrophic losses of systems and data

-companies must engage in proper planning for backup

Technical failures

-problems with hardware and software

-crash of a hard disk drive, bugs in computer programs

Management failures

-lack of funding

-lack of interest, lack of leadership from management

Deliberate Acts

-deliberate acts by organizational employees

Trespass

-individual tries to gain illegal access to org'l info

-competitive intelligence; gathering info in legal ways such as the co's website or press releases

-industrial espionage is the opposite

Information Extortion

-attacker threatens to steal information from a company

Vandalism

-causes the org to lose its image and experience

-hactivist or cyber-activist operation: protesting the policies of an organization

Theft of Equipment and Info

-the growing number of small storage devices makes it easier for attackers to steal info

-pod slurping; using USBs to download huge amounts of info from a computer

-dumpster diving; going through garbage to find discarded info (paper files, memos)

Identity Theft

Def'n- assumption of another person's identity

-recovering from identity theft is costly, difficult and time consuming

-makes it harder to obtain credit, jobs, insurance

Compromises to Intellectual Property

Intellectual Property- property created by individuals that's protected under certain laws

Trade secret- work that is company secret and not based on public info (business plan)

Patent- grants holder rights on an invention for 20 years

Copyright- gives the creators of intellectual property ownership of the property for as long as the creator lives, plus 50 years

Piracy- copying programs without paying the owner; major problem for software vendors

Software Attacks

-malware attacks use complex attacks via the Web

Alien Software

Def'n- software that's installed on a computer through duplicitous methods

-not as malicious as viruses or Trojan horses

-software can be considered pestware/alien software if there isn't an uninstaller program

Adware- helps pop-up ads appear on a comp screen

Spyware- collects personal info about users without consent

Keystroke loggers- records keystrokes and web browsing history

-CAPTCHA (entering wavy, distorted letters) is a test to know that it is not a software program run by an unauthorized person

Screen scrapers- records a continuous movie of a screen's contents rather than keystrokes

Spamware- uses the computer as a launchpad for spammers

Spam- unsolicited e-mail for the main purpose of advertising

-spam wastes time and money; productivity losses, clogged e-mail systems, additional storage

Cookies- small amounts of info that websites store on a comp

-remembering passwords and IDs so retyping isn't needed

-tracking cookies are usually for marketing purposes

-most cookies can only be read by the party that created them

Supervisory Control and Data Acquisition (SCADA) Attacks

-SCADA is a large scale control system; monitors chemical, physical processes such as oil refineries, sewage plants, electrical generators

-consists of multiple sensors, master computer, communications infrastructure

Cyber terrorism/warfare- attackers use target's comp systems to cause harm due to political reasons

-ranges from gathering data to attacking critical infrastructure (via SCADA)

Distributed denial-of-service (DDoS)- sends a flood of data packets from many computers simultaneously

-terrorist groups have expanded their activities on the Internet

-US military also expand their training in response to cyberwar tactics

What Companies are Doing

- developing services that deliver early warnings of trouble on the Internet
- hackers are also now producing new viruses in a much shorter time; in hours
- allocating funds to have appropriate hardware and software protection
- info security experts are also hired

Penetration test- evaluating the security of an info system by attack-mocking by malicious perpetrator

Protecting Information Resources

Risk management- goal is to identify, control, minimize the impact of threats

- tries to reduce risk to acceptable levels; there are three processes:

1) **Risk analysis**- where an org compares the costs of the assets being compromised with the cost of protecting the asset

-orgs perform this to ensure their info systems' security programs are cost effective

2) **Risk mitigation**- implements controls to prevent identified threats from occurring

- develops a recovery method if the threat does occur

Most common risk mitigation strategies:

Risk **acceptance**- operating with no controls; takes any damages that occur

Risk **limitation**- implements controls to minimize the impact of the threat

Risk **transference**- transfers risk by using other means to compensate for the loss

3) **Controls evaluation**- calculates the costs of implementing control measures

Controls

Def'n- safeguarding assets, preventing or detecting errors or fraud

-orgs protect their systems using layers of control systems

Control environment- management attitudes and actions; stated policies and procedures

General controls- apply to more than one functional area; passwords

Application controls- specific to one app; payroll

-info systems security includes all the types of controls

-functional mgrs who control info resources have large role in organizing appropriate defence system

-there are three categories of general controls;

Physical Controls

Def'n- prevent unauthorized individuals from gaining access to a company's facilities

- includes walls, doors, fencing, gates, guards, sensors

Access Controls

Def'n- restricts unauthorized individuals from using info resources

- can be physical controls or logical controls

Logical controls- implemented by software (limiting users to acceptable login times and locations)

- can limit the number of unsuccessful login attempts

Authentication- identity of the person

Authorization- privileges the person has based on their identity

Orgs use many methods to identify authorized personnel:

Something the user is → biometrics; fingerprint scans, palm scans

“ has → regular ID cards (person’s picture and signature), smart ID cards (chip), tokens (chips and digital display that presents a login number)

“ does → voice recognition (user speaks a phrase), signature recognition (signs their name)

“ knows → passwords and pass phrases

Strong passwords will be hard to guess, are long, have combo of letters/numbers/characters

Pass phrase- something that is longer than a password but easily memorized

Multifactor authentication → it can identify authorized users more efficiently

-stronger authentication is more expensive and irritating

Privilege- computer system operations that can be performed by users of the system

Least privilege- principle that users be granted the privilege for some activity only

Communications Controls

Def’n- secures the movement of data across networks; firewalls, anti-malware systems

Firewall- prevents a specific type of into from moving b/n untrusted networks

-prevents unauthorized Internet users from accessing private networks

-consists of hardware, software, combo of both

Demilitarized zone (DMZ)- located between the two firewalls

Anti-malware systems- attempts to identify and eliminate viruses, worms, other malicious software

-it creates def’n of types of malware and then updates the signatures into their products

-it then examines suspicious computer code to see if it matches a known signature; if it does, the anti-malware software will remove it

Whitelisting- permits acceptable software to run; either prevents anything else from running or lets new software run in a quarantined environment until the company can verify its validity

-doesn’t allow anything to run unless it is on whitelist

Blacklisting- includes certain types of software that aren’t allowed to run in the co environment

-allows everything to run unless it’s on the blacklist

Intrusion detection system- detects all malicious traffic & comp usage that can’t be detected by firewall

Encryption- converting an original message into a form that can’t be read by anybody else

-all encryption uses a key that scrambles and decodes the message

Public-key encryption- uses a public and a private key

Public → publicly available in a directory

Private → never shared with anyone

Certificate authority- trusted intermediary between companies

Digital certificate- electronic document attached to a file certifying the file is from the org it claims

Virtual private network (VPN)- private network that uses a public network to connect users

-integrates Internet with a private network to extend the reach of an org's networks

Adv; allows remote users to access the company network

-flexibility; users can access the org's network

-orgs can impose their security policies through VPNs

-to provide secure transmissions, VPNs use **tunneling**; it encrypts each data packet to be sent and places each packet inside another packer so it can travel across the Internet with confidentiality

Secure socket layer (transport layer security)- used for secure transactions, C/C purchases

-shows up on a URL as https instead of http

Vulnerability management systems- handle security vulnerabilities on unmanaged remote devices

-they scan the remote system and decide whether to allow the user to access it

-also implements virtual user sessions

-after the user is finished, it cleans the com's browser cache and temp files

Employee monitoring systems- monitors employees' computers, e-mails, Internet activities

Application Controls

Def'n- security countermeasures that protect specific applications; three categories

Input controls- edits input data for errors before they are processed

Processing controls- performs actions part of the record-keeping of org, reconcile & check transactions

Output controls- edits output data for errors, helps ensure output is provided to only authorized indivs

Business Continuity Planning, Backup, and Recovery

-important strategy for orgs is a disaster recovery plan

-it will keep the business operating after a disaster occurs

Orgs can employ diff strategies for business continuity;

Hot site- duplicates computing resources, peripherals, phone systems, apps, work stations

-reduces risk the greatest, but most expensive

Warm site- includes computing equipment like servers, but doesn't often include work stations

Cold site- provides no comp hardware or user work stations

-cheapest, but reduces risk the least

Off-site data storage- stores valuable data in a secure location geographically far from co's data centre

Information Systems Auditing

-ensures that info systems work properly

Audit- examination of info systems, their inputs, outputs and processing

Types of Auditors and Audits

External auditor→ works are public accounting firm with financial statements

Government→work for provincial or federal auditors general offices

Canada Revenue Agency→tax legislation

Internal→work for specific orgs

Specialist→variety of fields; information systems

- IS auditing is usually as part of internal auditing
- they consider the likelihood of errors, risk of orgs not following their procedures
- internal auditors conduct their audits based on a plan approved by management
- looks at areas where there are high risks of theft, new systems development projects
- where legislation is new, auditors conduct a privacy audit to evaluate whether the org is in compliance with the legislation

Tech Guide 3: Protecting Your Information Assets

General Behavioural Actions

- don't give out personal info to strangers in any format to prevent social engineering attacks at home
- verify that you're talking to authorized personnel before giving personal info
- secure credit cards, use virtual credit cards w/ a disposable credit card number
- pay attention to credit card billing cycles
- when writing cheques, don't write a complete card number on "For" line, just last four digits
- limit the use of debit cards
- reduce the number of credit cards you have
- avoid using a personal mailbox for things besides magazines and catalogues; P.O box
- use a shredder when disposing old records
- sign up with a company that protects personal info

What to do in the Event of Identity Theft

- if SIN number is lost, contact Service Canada
- if passport is lost, contact local passport office
- cancel all affected credit cards
- consult a lawyer if necessary
- file a detailed police report, get the name and number and give to creditors
- use certified, return-receipt mail; ask each agency to send you your credit report
- tell each agency to issue a fraud alert, get the document needed to file a LT fraud alert
- point out all entries that have been generated due to fraud to each agency
- order a "credit freeze" → requires lenders to get special access to credit report through a PIN based system; helps prevent anyone from getting new loans under your name
- be aware for change of address forms in the mail

Computer-Based Actions

- determine where people have visited on the Internet on your comp; check browser history
- don't post personal info on social networking sites
 - they have added features to give us control over our info
 - but the privacy settings aren't always easy to find
- use malicious software to determine if computer is infected
 - if the computer shuts down unexpectedly, refuses to start normally
 - DOS CHKDSK (check disk) shows less than 640kb are available
 - comp shows erratic behaviour, takes longer to load, shows strange messages

Computer Actions to Prevent Malware Infections

- never open unrequested attachments to e-mail files
- never open attachments from people/sites you don't know
- never accept files transferred to you during Internet chat

Test your system with commercial or free security tests

- it tells how well your system is protected from attacks
- run free malware scans on your computer

Install security suite on computer

- contains anti-malware software, spam protection, e-mail fraud/spyware detection

Install anti-malware products to be scanned atleast once a week

Install a firewall on the computer

- personal firewalls are installed on home comps to control communications to/from your computer by allowing/denying communications based on security settings
- aka the comp operates in stealth mode on the Internet
- alerts you of suspicious behaviour; tells when a program is doing something unwanted
- blocks outbound connections that you don't initiate
- firewall should be tested; best to use only sites that are run by actual firewalls

Install monitoring software to log keystrokes, e-mails, websites, Internet connections, passwords

- used by employers to track employee productivity
- can also be used by hackers to trap your passwords
- the software can backup the action you've done on your comp, and also determining whether someone else has been using your computer

Install content filtering software to block access to undesirable websites

- views all websites visited, records both sides of chat convos, lets you selectively filter content

Install anti-spam software to control spam

- set up multiple free e-mail accounts for internet surfing, not home/business

Install proactive intrusion detection and prevention software

- scans computer for malicious software; if present, a 30-day clean up will be activated to remove the malware
- when the period runs out it will still scan to protect, but payment required to remove

Manage patches, which are usually released to repair security problems

- when patches are announced, hackers exploit them before users react
- if patches aren't installed quick, computer becomes vulnerable to attack

Use other browsers than Internet

- Firefox, Opera, Safari attracts less hackers
- keep any browser updated

Use OS other than Windows

- Apple, Linux are more secure than Windows, as well as a smaller market share

Protecting Portable Devices and Info

- keep laptop in a subtle container, don't leave it unattended
- use alarms to prevent theft
- two factor authentication → two forms of id to access laptop
 - token/biometrics, and then personal password
- data encryption gives additional protection by turning data into meaningless symbols
- encrypt your whole hard drive, including your apps
- if laptop is lost/stolen, laptop tracing tools can be useful in deleting specified data on the lost laptop; it even works when other security software methods fail

Internet Explorer 7

- it offers multiple security features to help defend computers against malicious software
- features help prevent attackers' efforts to trick one into entering personal data

Protected Mode

- it can't modify any files w/o owner's consent; makes owner aware of what the website is trying to do

ActiveX Opt-In

- disables all except a small group of pre-approved controls
- if a website tries to use an ActiveX, it will display a notice at the top

Fix My Settings

- feature that alerts owner when they may be browsing with unsafe settings on their computer
- warning is displayed in the Information Bar

Windows Defender

- protects owner against spyware, helps prevent malware from penetrating system through piggyback download on spyware
 - piggybacked malware on spyware is a common mechanism where malware is silently installed on a system

Personal Data Safeguards

- helps owner differentiate authentic websites from malicious ones
- Security Status Bar gives visual cues to indicate the safety of a website
- website's digital certificate info can be seen with click on the padlock icon
- Address Bar of every website is shown in every window to learn more about the source

Phishing Filter

- opt-in feature that maintains a list of websites that should be blocked
 - it scans for suspicious website characteristics; Address Bar turns red

Delete Browsing History

- can easily be done quick through the browser settings

Internet Explorer 8

- security app called InPrivate; prevents browser from keeping browsing history, temp Internet files
- allows users to block the info that third party websites can use to track their browsing history

Other Actions to Take on a Computer

Detecting a **worm**:

- worms are malicious programs that perform unwanted actions on a comp;
 - unexplained hard disk activity
 - connects to the internet by itself; short on available memory; odd e-mail message

Detecting a **Trojan horse**:

- are malicious programs disguised as legitimate software

Turn off Peer-to-Peer File Sharing

- computers on P2P networks act as both clients and servers
- when a P2P is joined, you are no longer an anonymous computer on the Internet
- attackers focus on P2P because comps on the networks can be targets

Detect fake websites using Verification Engine (online)

Protecting Your Privacy

- use strong passwords; Password Safe helps you remember passwords securely
- select privacy level you want when you're using your computer
- surf the web anonymously to ensure IP address isn't shown to the visited websites
 - anonymizer websites can be used as a proxy server, or permanent proxy server in web browser
 - proxy server → computer to which you connect to connect to the website you want to visit
- e-mail anonymously to protect your privacy
 - e-mail messages can't be tracked back to you, your location, or your computer
 - messages are sent through another server called a re-mailer

StealthSurfer II ID Protect

- is a thumb drive that lets you surf the web anonymously from any computer in encrypted mode
- is ideal for coffee shop surfers, airport people, Internet café
- all sensitive internet files are stored on the device instead of computer
- if StealthSurfer is found by somebody else, password protection will maintain your privacy
- plugs into USB and contains Firefox, MojoPac, Tor software, RoboForm, Thunderbird, Hushmail
- erase Google search history

Preparing for Personal Disasters

- have a safety deposit box at local bank for important papers
- have a fireproof safe at home
- restore backup files through Windows Backup Utility
 - Windows System Restore; restores key system files to its state before issues occurred
 - creates a mirror of the files ever 10 hours
- wireless security; if it's used then you are non-secure as you are broadcasting
- hide your service set identifier (SSID)
 - the wireless router that connects to home network comes with a default SSID
 - attackers can search for wireless networks by inputting the SSIDs
- use encryption with your wireless home network
 - Wi-Fi Protected Access (WPA2) to strengthen encryption from attackers

-filter out media access control (MAC) addresses

-every piece of networking hardware has a MAC

-get the MAC address of all computers, instruct router to connect only with those comps

-instruct router to allow only a number of IP addresses to connect to the network

-wireless intrusion detection systems monitor wireless network for intruders, tell you they're on your network and even tell them you know they are

-avoid using public hotspot; least security, many intruders go there to listen in on wireless computing

-purchase wireless security programs, to warn when unknown user tries to access your wireless network

-detects wireless networks and helps secure them

Ch 4 – Data, Information, and Knowledge Management

Managing Data

- images captured by over a billion devices make up the largest component of digital info
- when data are managed properly, they become information first, and then knowledge
- technology helps us put data in a form that managers/analysts can fully understand
- info should be accurate, complete, consistent, relevant, and concise

Difficulties of Managing Data

Amount of data increases exponentially- new data are added quick and fast

Data are scattered throughout orgs and collected by many indivs using different methods- data are stored in diff servers in diff computing systems

Data come from internal, external, and personal sources

Clickstream data- data that visitors produce when they visit a website and click on hyperlinks

- provides a trail of the users' behaviour and browsing patterns

New sources of data are constantly being developed

Data degrade over time- customers move, companies go out of business, new products are made, etc

Data are subject to data rot- problems with the media that the data is stored on (physical problems)

- finding machines to access the data can be difficult

Data errors- data that's out of date, inaccurate, corrupt

Data security, quality

Data Life Cycle (*fig 4.1)

-data comes from internal (employee names, SIN), external (Stats Can, Bank of Canada, newspaper), personal data (opinions, estimates)

-data is then stored in 1+ database; selected data are fit the data warehouse

-users access the data in the warehouse or data mart for analysis

-these activities generate knowledge that supports decision making

-both the data and knowledge must be presented to users

- accomplished by using diff visualization tools

Database Approach

Database management system (DBMS)- set of programs that provides users with tools to add, delete, access, analyze data stored in one location

-helps manage security and user access, recovers info if the system fails

-using databases eliminates many issues that came from previous methods of storing/accessing data

- data doesn't have to be input manually

- data is now accurate, up-to-date

- data can be shared across all business units; allows managers to compare performance

Disadv: data redundancy → same data is stored in many places

data isolation → apps can't access data associated with other apps

data inconsistency → copies of the data do not agree

Adv: **data security**→high security deters mistakes and attacks
data integrity→it meets constraints (eg. No letters in a SIN field)
data independence→apps and data are independent of one another

Data Hierarchy

Bit- smallest unit

Byte- group of eight bits; represents a single character

Field- grouping of characters into a word or ID number (eg. Student's name would be in the 'name' field)

Record- grouping of related fields

File/table- logical grouping of related records

Database- logical grouping of related tables

Designing the Database

Data model- diagram that reps entities in the database and their relationships

Entity (record)- person, place, thing that info is maintained

Attribute (field)- characteristic/quality of an entity

Primary key- one attribute that uniquely identifies that record

Secondary key- other fields that have some identifying info

Entity-Relationship Modelling

Def'n- is done by designers to plan and develop the database

-they use an ER diagram

-ER diagrams consist of entities, attributes, relationships

-entities are pictured in boxes, relationships in diamonds

Entity classes- entities of a given type

Instance- representation of one particular entity

Identifiers- another name for primary key

-entities have attributes that describe the entity's characteristics

-entities are associated with one another in relationships, which can include many entities

-the number of entities in a relationship is the degree of the relationship

-relationships b/n 2 items are called **binary relationships**

One-to-one (1:1) relationship- single-entity instance of one type is related to a single-entity instance of another type (Eg. Student parking permit; no stud has more than 1 permit, no 1+ permit for 1 stud)

One-to-many (1:M)- eg. Class-professor; 1 prof can have many classes, each class has 1 prof

Many-to-many (M:M)- Eg. Student-class; stud can have many classes, each class can have many studs

Relational Database Management

Relational Database Model

Def'n- concept of 2D tables; isn't a big table (flat file), but a number of related tables

-each table contains entities and attributes

-uniqueness of primary key tells DBMS which records are joined with others in related tables

-allows flexibility in the variety queries

Disadv; design can be complex, thereby causing slow search and access times

Query Languages

Structured query language (SQL)- language used to request info

-uses simple statements or key words; SELECT, FROM, WHERE

Query by example (QBE)- user fills out a grid/template to construct a sample of the data they want

-is done using Microsoft Access

Data Dictionary

Def'n- defines the format necessary to enter the data into the database

-provides info on whether it is a key, part of a key, type of data, valid values

Adv: reduces the chance that the same attribute will be used in diff apps but with a diff name

-enables programmers to develop programs quicker

Normalization

Def'n- reducing relational database to its streamlined form for minimum redundancy, maximum data integrity, best processing performance

-when data are normalized, attributes in the table depend only on the primary key

Data Warehousing

Characteristics of a Data Warehouse

Data warehouse- stores historical data

Basic characteristics:

Organized by business dimension or subject- contains info relevant for decision support

Consistent- all data must be coded in a consistent manner

Historical- used for trends, forecasting, comparisons over time

Non-volatile- data doesn't change after it is entered in the warehouse

Has the ability to use on-line analytical processing- OLAP- process of performing complex analyses of data stored in a database

-databases use **on-line transaction processing (OLTP)**, where business transactions are processed on-line as soon as they occur

-objectives for this are speed and efficiency

Multi-dimensional-data warehouse uses a multi-dimensional data structure

-data warehouses store data in more than two dimensions; a **multi-dimensional structure**

-common representation of this is the data cube

Relationship with relational databases- data in data warehouses come from the co's operational databases, which can be relational databases

-data is stored in operational database management systems; and special software called **extract, transform, and load (ETL)** processes data and stores them in a data warehouse

-not all data are transferred to the warehouse

Adv of data warehousing: end users can access data quick via web browsers

-can conduct extensive analysis

-can obtain a consolidated view of organizational data

-these advs can improve bus knowledge, provide competitive advantage, enhance customer service, facilitate decision making, streamline business processes

Disadv: expensive to build and maintain

- incorporating data from obsolete mainframe systems can be difficult
- people in one department might be reluctant to share data with other departments
- cleansing process that changes the info

Data Marts

- data warehouses are usually used by large companies; lower-cost version of it is data mart
- Def'n**- designed for the end user's needs in a strategic business unit or a department
- are implemented quicker; have a more rapid response since it's smaller and easier to learn

Data Governance

Many reasons why managing data is difficult;

- over time, orgs have developed info systems for specific business processes
- inconsistent data prevent a co from developing a unified view of core business info
- gov regulations make it a top priority for cos to better account for how info gets managed
 - the law holds CEOs and CFOs responsible for the disclosure
- to be profitable, companies must develop a strategy for managing the data effectively

Data governance- managing info across an entire organization

- ensures that data are handled in a certain, well-defined fashion
- makes info available for the people authorized to access it, from the moment it enters an org until it is outdated and deleted

Master data- set of core data that span the enterprise info systems

Transaction data- generated by operational systems that describe the activities of the business

- master data are used to categorize and evaluate the transaction data

Master data management- provides companies with the ability to store the company's core master data

Knowledge Management

Def'n- helps orgs manipulate important knowledge in an unstructured format

Knowledge

Def'n- info that is contextual, relevant and actionable; aka intellectual capital

Explicit and Tacit Knowledge

Explicit knowledge- objective, rational, technical knowledge

- has been codified that can be transformed into a process or strategy

Tacit knowledge- experiential learning; insights, expertise, know-how, organizational culture

- is generally imprecise, costly to transfer and highly personal

Knowledge Management Systems

KMS- use of modern info techs to enhance and expedite intrafirm and interfirm knowledge management

- helps org cope with turnover and downsizing by making the expertise of org's human capital accessible

Adv: **Best practices**- efficient ways of doing things that's available to many employees

- improved customer service, efficient product development, high employee morale

Disadv: employees must be willing to share their tacit knowledge

- knowledge abse must be continually maintained and updated

Knowledge Management System Cycle (6)

Create knowledge- when people determine new ways of doing things

Capture knowledge- new knowledge must be identified as valuable

Refine knowledge- new knowledge must be placed in context so that it is actionable

-tacit qualities must be captured with explicit facts

Store knowledge- useful knowledge to be stored in a reasonable format so others in the org can access it

Manage knowledge- knowledge must be kept current, and reviewed regularly

Disseminate knowledge- it must be made available in a useful format to anyone in the org who needs it at anytime and anywhere

Ch 5: Network Applications

Network Applications

-networks support businesses for three main usages:

Discovery

-the Internet's discovery ranges from education to gov services to entertainment and commerce
-the Web's major strength poses a challenge; the vast amount of info on the web can make it difficult to navigate through the web, so people resort to search engines, directories, and portals

Search Engines and Metasearch Engines

Search engine- comp program that searches for specific info that match a set of user-specified keywords

Measearch engine- more thorough search; searches several engines at once

Publication of Material in Foreign Languages

-the huge amount of info published on the Internet is also available in many languages
-multilingual sites are a competitive necessity because of the global nature of the bus environment
-it is needed to grow revenues and attract new customers
-translation budgets are very expensive; goes into the millions
 -large companies use software for their translations

Portals

-most orgs encounter info overload when info is scattered across documents, e-mails, and databases at diff locations in diff systems

Portal- web-based, gateway to information that gives relevant info from diff IT systems and Internet using advanced search techniques; there are four types

Commercial (public) portals- intended for broad and diverse audiences

Affinity portals- single point of entry to a community of people (Eg. York has one for its alumni)

Corporate portal- single point of access to critical business info located inside and outside an org

-it can offer employees, customers, suppliers self-service opportunities

-can allow an org to conduct business with its suppliers

-can sell/distribute products from a single supplier to multiple buyers

Industry-wide portals- serve entire industries

Mobile portals- accessible from mobile decies

Communication

Electronic mail

Web-Based Call Centres

-aka customer care centres; are sometimes located in foreign countries

Electronic Chat Rooms

Chat room- virtual meeting place; anyone can join in

-two major types of chat programs

Web-based chat program → visiting a web caht site

E-mail based → called Internet Relay Chat (IRC); interacts with customers, gives expert advice

Voice Communication

Voice-over Internet Protocol (VoIP)- analogue voice signals get digitized, sectioned into packets, and then over the Internet; significantly reduces monthly phone bills

Unified Communications

Def'n- integrates all forms of communications on a common hardware and software platform

-unifies all forms of human and comp communications into a common user experience

-allows an indiv to receive a voice mail message and then read it in their e-mail inbox

Collaboration

Def'n- efforts by 2+ entities (indivs, groups, orgs) to accomplish certain tasks together

Work group- 2+ individuals who act together to perform some task

Workflow- movement of info

-workflow mgmt makes it possible to pass documents, info, tasks from one participant to another

Virtual group- group members that are in diff locations

Virtual collaboration- use of digital technologies to collaboratively manage products

-one type of collaboration is crowdsourcing→outsourcing a task to a large group of ppl in an open call

Synchronous collaboration→ all team members meeting at the same time

Asynchronously- when team members can't meet at the same time

Collaboration Software

-provides on-line collaboration capabilities, work-group e-mail, distributed databases, bulletin whiteboards, electronic text editing, instant messaging

-products that provide version management track changes to documents;

-version control systems give each team member an account with their set of permissions

Microsoft SharePoint Workspace- provides shared content with version management

-has a shared workspace where team members collaborate together

-when 1+ user tries to edit the document, one can't do it until the other is finished

Google Docs- free web-based word processor that creates/edits documents on-line while collaborating with other users; allows multiple users to edit documents at the same time

IBM Lotus Quickr- shared content with version control with check-in and check-out features

-uses team calendars, discussion forums, blogs

Jive- uses web collaboration to allow people to share content with version management via discussion rooms, calendars, to-do lists

Electronic Teleconferencing

Def'n- allows 2+ people at diff locations to hold a simultaneous conference

-disadv; doesn't allow participants to communicate face-to-face

Videoconference- participants can see the others' documents at other locations

Telepresence enables participants to share data, voice, pictures, graphics by electronic means

-also has advanced audio capabilities so everybody can talk without voices being cancelled

Google

-the company's applications fall into five categories:

Search applications; communicate, show and share apps (Google Docs); mobile apps (Google Web Search, Google Maps, Google SMS); apps to make your comp work better; apps to explore and innovate (Google Custom Search, Google Code)

Web 2.0

Def'n- loose collection of information technologies and apps and the websites that use them
-encourages user participation, social interaction, and collaboration

Web 2.0 Info Technologies and Applications

Ajax- technique that lets portions of web pages to reload with fresh data instead of requiring the entire web page to reload; helps speed up response time

Tagging- keyword that describes a piece of info

-allows users to place info in multiple associations rather than rigid categories

Blogging- a personal website which the site creator expresses their feelings/opinions

Blogsphere- millions of blogs on the Web

Wiki- website on which anyone can post material and make changes to other material

-the collective input of many indivs can produce outstanding results; ex. Amazon has added features in which indivs can have editorial reviews

-it helps maintain project histories

-enable cos to collaborate with customers, suppliers, other business partners on projects

-keeps FAQs accurate and current

Really Simple Syndication (RSS)- allows users to receive the info they want when they want it without having to go through thousands of websites

-allows anyone to publish their blog to anyone who has an interest to subscribing

Podcast- digital audio file that's distributed over the Web using RSS for playback on portable

Videocast- same as a podcast but a video file

Categories of Web 2.0 Sites

Social Networking- allows users to upload their content to the Web in forms of text,voice, images,videos

-is an interactive way to communicate with others on the Web

-useful way to find like-minded people on-line

Aggregators- websites that give collections of content from the Web

-includes bloglines, digg, Simply Hired, technorati

Mashups- mixes content from other sites to create a new kind of content

Eg. Google Maps; taking a map from Google and inputting their own data

E-Learning and Distance Learning

E-learning- learning that is supported by the Web

-can take place inside classrooms, or virtual classrooms

Distance Learning (DL)- any learning situation in which teachers and students do not meet face-to-face

-both methods are useful for formal education and corporate training

Adv→can deliver high quality content that's also current and consistent

-flexibility to learn anywhere, anytime

-in corporate training centres, learning time is shorter

Disadv→students must be computer literate; the face-to-face interaction with instructors is lost

-assessing students' work is an issue because you don't know who actually did it

Virtual Universities

Def'n- on-line universities that gives dozens of degrees on-line

-other universities offer on-line courses but use innovative teaching methods

Telecommuting

Def'n- workers who can work anywhere at anytime

-some work in home offices, airport lounges, client conference rooms

-telecommuting is driven by globalization, long commutes to work, rising gas prices, powerful comps

Adv→reduced stress, improved family life

-gives employment chances for housebound people (single mothers, disabled)

-employer benefits from increased productivity, retained skilled employees, can also attract employees who don't live within commuting distance

Disadv→ loss of fringe benefits, lower pay, slow promotions

-lack of socialization, increased feelings of isolation

-employer may find difficulties in supervising work; potential data security issues, training costs

Tech Guide 4 – Telecommunications, Networks, and the WWW

Telecommunications System

Def'n- hardware and software that transmits info (data, text, voice) from one location to another

There are two basic types of signals:

Analog signals→transmits info by altering characteristics of waves

Digital signals→discrete pulses that are either on or off, repping series of bits (0s and 1s)

-basic components of a t.s: devices, communications processors/channels, networking software

Communications Processors

Def'n- hardware deices that support data transmission & reception across a telecommunications system

Modems

Def'n- function is modulation (digital to analog) and demodulation (analog to digital)

-are used in pairs; modem at sending end converts digital into analog, receiving end does vice versa

Cable modem- modems that operate over coaxial cable; uses a shared line

Multiplexer

Def'n- allows a single communications channel to carry data transmissions from many sources

-divides a high speed channel into multiple channels

-lowers communication costs by sharing communications channels

Front-End Processor

Def'n- managers all routing communications with peripheral devices

Communications Media and Channels

Communications channels- communicates data from one location to another

2 types of media; cable and broadcast

Cable media- uses physical wires/cables to transmit data

Broadcast media- uses electromagnetic media to transmit data

Twisted-Pair Wire

Def'n- strands of copper wire twisted in pairs

-cheap, widely available, easy to work with

Disadv: slow for transmitting data, interference from other electrical sources, can easily be tapped

Coaxial Cable

Def'n- insulated copper wire; less susceptible to interference

Disadv: more expensive, difficult to work with, inflexible

Fibre Optics

Def'n- thousands of thin filaments of glass fibres that transmit info via light pulses generated by lasers

-smaller and lighter than cable media, transmits more data, more security from interference

-used as the backbone for a network

Disadv: reduces the strength of a signal

Transmission Speed

Bandwidth- range of frequencies available in any communications channel

-the greater the bandwidth, the greater the channel capacity

Narrowband- provides low speed transmission speeds

Broadband- provides high speed transmission rates

Transmission Technologies

Integrated services digital network (ISDN)- uses existing telephone lines and allows users to transfer voice, video, image and data simultaneously

Digital Subscriber Line (DSL)- high-speed, digital data transmission from homes and businesses over existing telephone lines

Asynchronous transfer mode (ATM)- allows for almost unlimited bandwidth on demand

Adv: large increases in bandwidth; supports data, video, voice on a single communications line

Disadv: more expensive

Synchronous Optical Network (SONET)- transports digital signals over fibre-optic lines that allows users to integrate transmissions from multiple vendors

T-Carrier System- digital transmission system that defines circuits that operate at diff rates

Types of Networks

Computer network- connects comps via communications media so data can be transmitted among them

-enables orgs to be more flexible to changing business conditions

-lets companies share hardware, comp apps, and data across the org

-makes it possible for geographically dispersed employees to share data

-are a critical link between businesses and their customers

Local Area Networks

LAN- connects 2+ devices in a limited geographical region so every device on the network can communicate with every other device

Switch- special purpose comp that allows devices in a LAN to communicate directly with each other

Network interface Card (NIC)- allows the device to physically connect to LAN's communications medium

File server- powerful microcomputers with large, fast-access hard drives

-contains data for the network

-houses LAN's network operating system

Gateway- connects different networks by translating from one set of protocols to another

Bridge- processor that connects two networks of the same type

Router- routes messages through connected LANs or across a wide area network (like the Internet)

Wireless LAN- gives LAN connectivity over short distances

Wide Area Networks

Def'n- networks that cover large geographic areas; usually connect multiple LANs and channels

-the Internet is an example of WAN

Value-added network (VAN)- private, data-only networks managed by 3rd parties that give telecommunication and computing services to multiple organizations

-many companies use VANs to avoid managing their own networks

Enterprise Networking

Def'n- LANs and WANs that are interconnected

Backbone networks- high speed central networks that connect multiple smaller networks

Network Fundamentals

Network Protocols

Protocol- rules and procedures that govern transmission across a network (2 major protocols)

Ethernet

Def'n- common LAN protocol that provides quick transmissions speeds

Transmission Control Protocol/Internet Protocol (TCP/IP)

-protocol of the Internet; uses a suite of protocols (TCP and IP)

TCP performs three main functions:

-manages movement of packets b/n comps by establishing connection b/n comps

-sequences the transfer of packets

-acknowledges the packets that have been transmitted

Internet Protocol (IP)- disassembles, delivers, reassembles the data during transmission

Packet Switching- breaks up blocks of text into packets

-each packet travels across the network and can be routed through diff paths in the network

-when they reach their destination, they get reassembled into the original message

Functions in four layers:

Application layer-enables client app programs to access the other layers, defines the protocols that apps use to exchange data

Hypertext Transfer Protocol (HTTP)- defines how messages are formulated and transmitted

Transport- gives app layer with communication and packet services

Internet- addresses, routes, packages data packets

Network Interface- packets on and receives them from the network medium

-enables users to send data across sometimes unreliable networks with assurance that the data will arrive in uncorrupted form

Types of Network Processing

Distributed processing- divides processing work among two or more computers

-enables computers in different locations to communicate with one another

Client/Server Computing

Def'n- links 2+ comps in an arrangement where some servers provide computing services for clients

-orgs do most of its processing on powerful servers that can be accessed by less powerful client machines

Peer-to-Peer Processing

Def'n- each computer acts as a client and server

-each computer can access all files on all other computers

Three types of this:

1) accesses unused CPU power among networked computers

2) real-time, person-to-person collaboration

3) advanced search and file sharing; lets users discover other users, not just data and web pages

Eg. BitTorrent → file-sharing app that simplifies sharing large files by dividing them into tiny torrents

-everybody has to share little pieces of a file at the same time; swarming

The Internet

Def'n- connects 1M org'l computer networks in more than 200 countries

-comps and org'l nodes (comp systems) are connected to one another by data communications lines of different speeds

-enables people to access data in other organizations

Intranet- serves internal informational needs of a single organization

Extranet- connects parts of the intranets of diff orgs and allows communications among business partners over the Internet using virtual private networks

Darknets- private networks that run on Internet but are open only to users who belong to the network

-data flowing between these comps are often encrypted

3 major uses for darknets:

-contribute to freedom of speech in countries that practice censorship

-enable cos to create secure networks to protect sensitive data

-allow people to illegally share music, movies, data

Accessing the Internet

Connecting via an On-line Service

Internet Service Provider (ISP)- company that offers Internet connections for a fee

-this requires a modem and standard communications software

Network access points (NAPs)- connects ISPs

-exchange points for Internet traffic; determines how traffic is routed

Connecting via Other Means

Internet kiosks- located in public places (airports, libraries) for those who don't have own comps

Addresses on the Internet

Internet protocol (IP) address- distinguishes each computer from one another

Domain name system (DNS)- names given to computers since IPs are hard to remember

Domain names- consist of multiple parts, read from right to left

Top-level domain (TLD)- rightmost part of an Internet name (com, edu, org, gov)

IP Addressing Schemes

-first scheme was IPv4; new IP is IPv6

-IPv6 will accommodate increasing devices that need IP addresses (smart phones)

Future of the Internet

-with more people working online, more bandwidth is required

-brownouts occur when computers go off-line for several minutes at a time

Internet 2- designed to be fast, easy, trusted

World Wide Web

Def'n- system of universally accepted standards for storing/displaying info via client/server architecture

Home page- screen display that welcomes user and explains the org that established the page

Website- all the pages of a particular company

Webmaster- person in charge of an org's website

Uniform resource locator (URL)- points to the address of a specific resource on the Web

Browsers- graphical front end that enables users to point and click their way across a web (**surfing**)

Tech Guide 1- Computer Hardware

Introducing Hardware Components

Hardware consists of:

Central Processing Unit (CPU)- controls the tasks performed

Primary storage- temporarily stores data

Secondary storage- external to the CPU; stores data for future use

Input technologies- converts instructions to a form that the computer understands

Output technologies- presents data in a form that people can understand

Communication technologies- provides for the flow of data from computer networks to CPU and from CPU to the computer networks

Strategic Hardware Issues

How do orgs keep up with performance advancements in hardware

How should orgs determine the need for new hardware infrastructures; and will these new work styles benefit employees and the org

Innovations in Hardware Utilization

Server Farms

Def'n- contains thousands of networked computer servers

-provides redundancy and fault tolerance in case 1+ servers fail

-requires large amounts of electricity, AC, backup generators, security and money

Virtualization

-most of the time, orgs only use a small percentage of their total computing capacity; virtualization means servers don't have to be dedicated to a particular task

Server virtualization- uses software-based partitions to create multiple virtual servers on a single server

Adv- cost savings in equipment and energy

-allows orgs to quickly modify their systems to respond to changing demands

-focus of IT dept can shift from the tech to the services the tech can provide

Grid Computing

Def'n-applies unused processing resources of dispersed comps in a network to form a virtual supercomp

Utility Computing

Def'n- service provider makes computing resources available to a customer as needed

-provider then charges the customer for specific usage

-allows companies to efficiently meet fluctuating demands

-provides fault tolerance as well → if one server fails, another can replace it

Cloud Computing

Def'n- tasks are performed by computers physically removed from the user and accessed over a network

-incorporates both grid and utility computing on a global basis

-supplies as many computers as are needed, and users pay for the amount of actual processing

Adv- low infrastructure costs

Disadv- privacy, security, reliability concerns

-companies can avoid costs of IT infrastructure and IT staff by renting as much as they can

Edge Computing

Def'n- parts of website content and processing are located close to the user to decrease response time

3 components: the computer you use to access a website

- small servers that are located at your Internet Service Provider
- servers of the company

Autonomic Computing

Autonomic systems- manage themselves without direct human intervention

Nanotechnology

Def'n- creation of materials, devices, systems at a scale of 1-100 nanometres

-very little power, but huge storage capacities

Computer Hierarchy

-to compare computer classes is to compare their processing power;6 categories

Supercomputers

Def'n- fastest computing engines available at any given time

- floating point operation is an arithmetic operation involving decimals
 - supercomputers typically run military and scientific applications
 - used for commercial apps where large amounts of data must be analyzed
- Eg. Large banks, health-care organizations

Mainframe Computers

Mainframes- popular in large enterprises for extensive computing apps that are accessed by thousands of users at one time (airline reservation systems, corporate payroll programs, student grade calculation)

- less powerful and less expensive
- some large orgs are now moving back to mainframes due to
 - supporting high transaction levels associated with e-commerce
 - reducing total cost of ownership of distributed systems
 - simplifying administration
 - reducing support-personnel requirements
 - improving system performance

Midrange Computers

Minicomputers- small, inexpensive compact computers that have the same functions as mainframe but with more limited extents

Server- computer that supports computer networks and enables users to share files, software

-gives flexibility to orgs that don't want to spend IT dollars on mainframes

Workstations

Def'n- run intensive scientific, engineering, financial applications

- high-speed calculations and high-resolution graphic displays
- used within scientific and business communities

Microcomputers

Def'n- PCs; smallest and least expensive computer

Major categories of microcomputers:

Desktop PCs

-standard tool for business and homes; has a CPU and a separate monitor and keyboard

Thin-Client Systems

-servers are comps that provide a variety of services for clients

-clients are typically comps on which users perform their tasks

Thin-Client systems- desktop comp systems that don't offer the full functionality of PC

Fat client- lack locally installed software due to a absence of disk drive storage

Adv- fast application deployment, centralized management, lower cost of ownership, easy maintenance

Disadv- if the network fails, users can do very little on their comps

Laptop and Notebook Computers

Def'n- easily transportable, lightweight microcomputers

Ultra-Mobile PCs

Def'n- mobile comps that run various mobile operating systems

Netbooks

Def'n- very small, lightweight, low-cost, energy-efficient, portable computer

-optimized for web browsing and e-mailing

Computing Devices

-wearable computers are worn and used on the body

-for factory automation, warehouse management, performance support

-used in freight delivery, aerospace, securities trading, law enforcement

-embedded computers are placed inside other products to add features and capabilities

-eg. Mid-sized car has many embedded comps that monitors every function

Input and Output Technologies

-input techs allow people to put data into a computer

Two main types of input devices:

Human data entry- requires human effort to input data (keyboard, mouse, trackball)

Source data automation- input data with minimal human intervention

-helps speed up data collection, reduce errors (barcode readers)

-output generated by a comp is via several output devices (monitors, printers, voice)

Multimedia technology- integration of text, sound, still images, animation

-reps a collection of various input and output techs

-high quality multimedia processing requires powerful microprocessors and extensive memory capacity

Central Processing Unit

CPU- performs the actual computation inside any computer

Microprocessor- made up of millions of microscopic transistors in a circuit on a chip

How the CPU Works

Control unit- accesses program instructions, decodes them, controls the flow of data to and from ALU

Arithmetic-logic unit (ALU)- performs the mathematic calculations

Registers- stores small amounts of data and instructions for short periods of time

-in the CPU, inputs enter and are stores until needed

Advances in Microprocessor Design

Moore's Law- describes that chip designs are coming at an increasing rate

Advances include producing more miniaturized transistors

- making the physical layout of the chip's components as compact as possible
- using materials for the chip that improve the conductivity (flow) of electricity
- placing multiple processors on a single chip (called multicore chips)

Microcontrollers- embedded in countless products and technologies

Computer Memory and Storage Systems

Memory Capacity

-CPUs process binary units (0s and 1s) that get translated into bits

-combo of bits reps a character or mathematical operation

Kilobyte→1000 bytes Megabyte→1M bytes Gigabyte→1B bytes Terabyte→1T bytes

Petabyte→1000 terabytes Exabyte→1000 petabytes Zettabyte→1000 exabytes

Primary Storage

Def'n- stores three types of info for very brief periods of time

-data to be processed by CPU; instructions for CPU; operating system programs that manage diff aspects of the comp's operation

-primary storage takes place in chips mounted on the com's main circuit board (motherboard)

-all data in primary storage are translated into binary code

4 types of primary storage:

Register

-least capacity, storing limited data immediately before and after processing

Random Access Memory

Def'n- holds a software program and small amounts of data for processing

-RAM is a type of microprocessor chip

-RAM is volatile; its content is lost if the current is lost or turned off (but there are nonvolatile RAM)

-two types of RAM; **DynamicRAM** offer most capacity and lowest cost per bit, but slow

StaticRAM costs more, but is faster (preferred more)

-emerging is **MagneticRAM**; uses magnetism to store data

Adv→nonvolatile, requires little electricity

Cache Memory

Def'n- high-speed memory that enables the comp to temporarily store blocks of data that's used more often and a processor can access more rapidly than RAM

-physically located closer to CPU than RAM

-blocks used less often remain in RAM until transferred to cache

Read-Only Memory

Def'n- type of chip where certain critical instructions are safeguarded

-nonvolatile; instructions can only be read by the comp and cannot be changed by the user

Secondary Storage

Def'n- store very large amounts of data for extended periods of time

-is non-volatile; takes more time to retrieve data, cheaper than primary, takes place on various media

Magnetic Media

Magnetic tape- kept on a large open reel or in a smaller cartridge/cassette

-cheapest storage medium, but slowest for retrieving data because it is sequential

Sequential access- going through the whole system to find desired piece of data

-modern magnetic type systems use cartridges and robotic system that loads cartridge automatically

Magnetic disks- magnetized disk divided into tracks that provide addresses for various data

-more rapid access to data

Hard drives- most commonly used; low cost, high speed, large storage capacity

-hard drives store data on platters that are divided into concentric tracks

-each track is then divided into sectors; a read/write head pivots across rotating disks to locate the right track to access a sector

-the head waits as the disk rotates until the right sector is underneath it

-any bit of dust can disrupt it (disk crash); are sealed when manufactured

-can be retrieved in a nonsequential manner by direct access (direct access storage devices)

Optical Storage Devices

Def'n- do not store data via magnetism

-laser reads the surface of a reflective plastic platter

-slower than magnetic, but less susceptible to damage, and less fragile, can store more info

-types of optical disks include CD-ROM and DVD

Compact Disk-ROM→high capacity, low cost, high durability

Digital Video Disk→sharp detail, true colour, no flicker, no snow

-performs as computer storage disks as well; faster than CD-ROM

Holographic memory- uses 3D medium to store data

Flash memory- non-volatile computer memory that can be erased and reprogrammed

Flash memory devices- storage devices that use less power than hard drives

-smaller and more durable, store less info

Thumb drive- fits into universal serial bus ports (USB)

Enterprise Storage Systems

Def'n- external system that includes 2+ storage devices

-large amounts of storage, high-performance data transfer, protection against data loss

Three major types of enterprise storage systems:

Redundant Arrays of Independent Disks

Def'n- links groups of standard hard drives to a specialized microcontroller

-coordinates the drives so they appear as a single logical drive, but takes adv of the multiple physical drives by storing data redundantly

-protects against data loss

Storage Area Network

SAN- allows rapid and reliable access to storage devices by multiple servers

Storage over IP- uses Internet protocol to transport stored data among devices within a SAN

Storage visualization software- graphically plots an entire network and allow storage administrators to monitor all networked storage devices from a single console

Network-Attached Storage

NAS- provides file storage to users who access the device over a network

-simple to install, works like a general-purpose file server so no special software is needed

Tech Guide 2- Computer Software

Significance of Software

Software- contains instructions

Computer programs- sequences of instructions for the computer

Stored program concept- software programs stored in the comp's hardware

-the programs are accessed and instructions are executed in the comp's CPU

Documentation- written description of the functions of the program

-helps the user operate the computer system and understand what the program does

2 major types of software:

Systems software- instructions that serves as an intermediary b/n comp hardware and app programs

Application software- instructions that provides more specific functionality to a user

-may be broad (word processing) or narrow (payroll program)

-essentially applies a computer to a certain need

Systems Software

-controls and supports the computer system and its info-processing activities

-directs the basic functions of the computer

System Control Programs

Def'n- controls the use of hardware, software, data resources of a comp system

Operating system- main system control program

-supervises the overall operation of the computer

-monitors the comp's scheduling operations, input and output processes

-allocates CPU time and main memory to programs running on the comp

-interface b/n user and hardware

Functions of the Operating System

Multi-tasking- management of 2+ tasks running on the comp system

-creating graph in Excel, exporting to Word

Multi-threading- multi-tasking that involves running 1+ tasks within a single application simultaneously

-editing one document while spell-checking another

Multiprocessing- comp system with 2+ processors runs more than one program at a given time by assigning them to diff processors

Virtual memory- lets users write programs as if primary storage is bigger than it actually is
-divides an app program into pages (fixed length portions)

Graphical user interface (GUI)- allows users to exercise direct control of visible objects and actions that replace complex commands

Social Interface- guides the user through computer apps by using graphics, animation, voice commands

Haptic Interface- allows the user to feel a sense of touch by applying forces to the user (Wii)

Spatial operating environment- user stands in front of 1+ comp screens and gestures with gloved hands to move images around, touch virtual objects, navigate complex data

Types of Operating Systems

Operating environments- comp programs that enable system developers to create applications without directly accessing the OS

-functions only with an operating system

-classified into diff types depending on the type of customer and number of users they support

-OS for mobile devices are designed to support a single person

-small comp operating systems support a single user or small workgroup

-large comp operating systems support a few dozen to thousands of users

Plug-and-play- enables OS to recognize new hardware and automatically install needed software

System Support Programs

Def'n- supports the OS, management, users of a comp system by providing a variety of support devices

System utilities- programs that have ben written to accomplish common tasks (sorting, locating files)

System performance monitors- monitor the processing of jobs on a computer system

-monitors processor time, memory space

System security monitors- monitors comp's use to protect it from fraud, destruction, misuse

Application Software

-instructions that direct a computer system to perform specific activities

Types of Application Software

Proprietary application software- addresses a specific or unique business need for a co

-may be developed in-house or bought from a software vendor

Contract software- software programs developed for a specific co by a vendor

Off-the-shelf application software- is bought from a vendor who sells them to many orgs

Package- comp program developed by a vendor for purchase in a prepackaged form

Categories of Personal Application Software

Def'n- off the shelf application programs to help individual users increase their productivity

-software suites; Microsoft Office

Speech recognition software- recognizes human speech either by word or conversational stream

Open Systems

Def'n- model of computing products that work together

-is done by using the same OS with compatible software on all the diff comps

Open-Source Software

-trend that moves away from proprietary software to open-source

-proprietary is developed by a co and has limits on its use, copying, modification

-company keeps the code private

Open-source software- source code is available at no extra cost

-copyrighted and distributed with license terms, ensuring it will be available

Adv- low-cost, high quality, reliable, flexible, more reliable than commercial software

Disadv- orgs that don't have in-house technical experts will have to buy extra contracts

-amount of time and expense needed to train users

-compatibility with existing systems and those of business partners

Programming Languages

-allows people to write instructions that tell computers what to do

-requires a high degree of precision and completeness

Compiling- translating all comp languages into binary digits for processing

Object-oriented languages- taking small amount of data and the instructions about what to do with the data (**methods**) and then combining them into an **object**

Reusability feature- objects created for one purpose can be used in diff object-oriented program

Java- object-oriented language that enables programmers to develop apps that work across the Internet

Applets- small apps that can be included in an HTML page on the Internet

Hypertext Markup Languages and Extensible Markup Language

-used to build multimedia web pages, websites, web-based applications

Hypertext Markup Language- used for creating/formatting docs on WWW

-controls fonts, font size, paragraph spacing

Hypertext- approach to document management in which documents are stored in a network connected by links, called hyperlinks

Hypertext document- combo of nodes, links, supporting indexes

-contains text, images, data files, audio, video

Extensible markup language (XML)- describes what the data in the docs actually mean

-identifies the business purpose of the docs themselves

-improves the compatibility by allowing XML docs to be moved to any format on any platform

without elements losing their meaning

-the info can be published to a web browser, PDA, smart phone and would all look the same

-HTML displays data on web pages, says how the data will be displayed

-XML describes data and info; can be used to send complex messages that include diff files

Ch 6- E-Business and E-Commerce

Overview of E-Business and E-Commerce

Electronic commerce- process of buying, selling, transferring products and services via comp networks

E-business- broader concept; services customers, collaborations with business partners, performing electronic transactions as well as e-commerce duties

Pure vs. Partial E-Commerce

-e-commerce can take diff forms depending on the degree of digitization

-degree of digitization is the extent to which commerce is transformed from physical → digital

-relates to the product/service sold; process where it's produced; the delivery agent

Bricks-and-mortar organizations- purely physical orgs

Virtual organizations- all dimensions are digital

-all other ones that are a mix of physical and digital are called partial EC

Clicks-and-mortar orgs- some e-commerce, but primary business is physical

-example of partial EC

Types of E-Commerce (6)

-on-line classified ads include vehicles, real estate, employment, travel, tickets

-available through most ISPs; can contain search engines

-adv is it reaches an international audience rather than local

Business-to-Consumer (B2C)- orgs sell, individuals buy

Business-to-Business (B2B)- business orgs sell and buy

Consumer-to-Consumer (C2C)- individual sells products/services to other individuals

Business-to-Employee (B2E)- orgs uses EC internally to provide info/services to its employees

-take classes electronically, order supplies/materials, electronic corp stores

E-government- use of Internet to deliver info/services to citizens, business partners/suppliers

-makes gov more efficient and effective

Eg. Electronic benefits transfer → transfers benefits directly to bank accounts

Mobile commerce (m-commerce)- conducted in a wireless environment (cell phones to shop)

Business model- method by which a company generates revenue to sustain itself

-on-line marketing, name-your-own-price, find-the-best-price, online auctions, etc

Major E-Commerce Mechanisms

Auction- competitive process where seller takes bids from buyers, or a buyer solicits bids from sellers

-e-auctions broaden the customer base

-buyers can bargain for lower prices, and don't have to travel anywhere

Forward Auctions- auctions that sellers use as a channel to many potential buyers

Reverse auctions- one buyer wants to buy a product or service

-buyer posts a request for quotation (RFQ) on its site, suppliers study the RFQ and submit the bids electronically, lowest-price bidder wins the auction

-most common for large purchases

Electronic marketplace- virtual market space where buyers and sellers conduct e-commerce/e-business

Benefits and Limitations of E-Commerce

Adv- makes markets more accessible

- lowers costs of processing, distributing, retrieving info
- customers can access a large number of products and services

Disadv- lack of universally accepted security standards

- insufficient telecommunications bandwidth, expensive accessibility
- perceptions that EC is insecure, lacks mass sellers and buyers

Business-to-Commerce Electronic Commerce

-B2C EC is more complex than B2B EC

- large number of buyers making millions of transactions per day with small number of sellers

-two basic mechanisms for customers to access companies on the Web:

Electronic Storefronts and Malls

Electronic retailing (e-tailing)- direct sale of products and services through e-storefronts

- can buy from home 24/7
- EC offers a wider variety of products and services, often at lower prices
- shoppers can compare products and services, can find hundreds of sellers

Electronic Storefront- represents a single store

Electronic mall- collection of individual shops under a single Internet address (thousands of vendors)

Online Service Industries

-services can be delivered through e-commerce with considerable cost reduction

-on-line delivery of services is growing fast

-most pressing EC issue relating to online services is **disintermediation**;

- middlemen/intermediaries have 2 main functions, to provide info and perform value-added services; first can be automated so they are eliminated

-performing value-added services requires expertise, can only be partially automated

- likely to survive and thrive

- Web helps these service providers when the number of participants is big, and when the info that has to be exchanged is complex

Cyberbanking

Def'n- conducting various banking activities from home instead of physical banks

-saves time, convenient, inexpensive for banks to be an alternative to branch banking

Virtual banks- dedicated solely to Internet transactions

-critical for international trade; transfers of e-funds and e-letters of credit

Online Securities Trading

-to trade stocks, bonds, other financial instruments

-cheaper than a full service or discount broker

Online Job Market

-many companies and government agencies put job ads online, accept resumes, take applications

-job seekers reply online when companies advertise openings on their site

Travel Services

- allows for airline ticket purchases, hotel reservations, car rentals
- are provided by all major airline services, large travel agencies, car rental agencies, hotels

Issues in E-Tailing

Channel conflict- conflict clicks-and-mortar companies face with their distributors when they sell directly to customers online; can alienate the distributors

- can arise in the pricing of products and services, resource allocation, services provided by offline activities to online activities (returning and item bought online in store)

Multi-channelling- integrating online and offline channels

Order fulfillment- finding the products to be shipped, packed, arranged, delivered, money collected, handling any returns or defects both efficiently and effectively

- hard to do because small packages are to be delivered to many customers fast
- because of this, supply chain issues arise in B2C activities
- order fulfillment is less complex in B2B; transactions are larger, but fewer in number

On-Line Advertising

- improves on traditional forms of advertising; can be updated at anytime with little cost,
 - can reach large numbers of potential buyers
 - cheaper than radio, tv, can be interactive
 - can be targeted to a specific group
- difficult to measure effectiveness though

Advertising Methods

Banners- electronic billboards; short text or graphical message, maybe video clips

Adv- customized to the target audience

Disadv- conveys only limited info due to their small size

Pop-up ad- appears in the front of the current browser window

Pop-under ad- appears underneath the active window

- e-mail is also emerging; better and quicker response rate but a potential for misuse of advertising

Spamming- distribution of electronic ads without permission of the receiver

Permission marketing- asks consumers to give their permission to voluntarily accept on-line ads/email

Viral marketing- word-of-mouth marketing; forwarding messages to friends, family

- web design is an important element to consider in e-commerce
- web analytics allow firms to collect data from their websites to understand behaviour of website users

Business-to-Business (B2B) Electronic Commerce

Sell-Side Marketplaces

Def'n- orgs sell their p&s to other orgs from their own e-marketplace website/third party website

- key mechanisms are electronic catalogues, forward auctions
- powerful for companies with huge reputations (manufacturer, distributor, retailer)
- is suitable to customization (allowing customers to customize orders online, selecting what they want)

Buy-Side Marketplaces

Def'n- orgs attempt to buy needed p&s from other orgs electronically; reverse auction

-goal is to reduce both the costs of items purchased and administrative expenses in purchasing them

E-procurement- purchasing by using electronic support

-uses reverse auctions; group purchasing

Group purchasing- multiple buyers combine their orders to attract more seller attention, and to negotiate a volume discount

Electronic Exchanges

Exchange- many sellers and many buyers

-open to all businesses, frequently operated by a third party

-often the initial point for contacts between business partners

-once they make contact, partners move to a private exchange to conduct their trading activities

-some electronic exchanges are for direct materials (inputs to manufacturing process), and some are for indirect materials (items needed for maintenance, repairs, operations (MRO))

3 types of public exchange:

Vertical exchange- connects buyers and sellers in a given industry

-offers services that are suited to the community they serve

Horizontal exchange- connect buyers and sellers across many industries, used mainly for MRO materials

Functional exchanges- services are traded on an as-needed basis (eg. Temp labour)

Electronic Payments

Electronic payment systems- enables you to pay for g&s electronically

Electronic Cheques

-mostly used in B2B; customer must first establish a chequing account with a bank

-they also carry a signature that can be verified

Electronic Credit and Debit Cards

-allows customers to charge on-line payments to their c/c account

-used mostly in B2C and shopping by small-to-medium enterprises (SMEs)

-some issuers offer customers with virtual, single-use credit card numbers

-a random card number every time you shop online

Purchasing Cards

-B2B equivalent of e-credit cards

-payments made with these are settled within a week

-used for unplanned B2B purchases, can be used on the Internet

Electronic Cash

-most common mode of payment in offline transactions

-come in four major forms:

Store-value money cards- allow you to store a fixed amount of repaid money and spend it when needed

Smart Cards- contains a chip that can store a lot of info

-usually multipurpose; credit card, debit card, stored-value money

-can help customers transfer funds, pay bills, purchase items from vending machines, pay for services

Person-to-Person Payments- enables 2 indivs to transfer funds w/o using a credit card

-fastest growing payment mechanisms (eg. Paypal)

Digital wallets- software mechanisms that provide security measures and convenience to EC purchasing

-stores financial info of the buyer

-buyer doesn't need to re-enter sensitive info for each purchase

Disadv- need to set up a separate e-wallet with each merchant

-solution is to install a wallet on comp, but if this is done a purchase can't be made from another computer using that same wallet

Adv- convenience, but not totally secured systems

Ethical and Legal Issues in E-Business

Ethical Issues

-threats to privacy; electronic payment systems know who the buyers are

-tracking; individual's Internet activities can be tracked by cookies

-use of EC may eliminate the need for a company's employees

Legal Issues Specific to E-Commerce

-chance that dishonest people will commit fraud

Fraud on the Internet

-spread false rumours about companies in order to boost the stock price

-selling bogus investments, setting up phantom business opportunities

-RCMP regularly publishes examples of scams most likely to be spread via e-mail

Domain Names

-assigned by central nonprofit organizations

-the closer the domain name matches the co's name, the easier it is to locate

-problems come up when several companies with similar names compete over a domain name

Cybersquatting- registering domain names to profit from the goodwill belonging to somebody else

-domain tasting lets others profit from money trail of pay-per-click advertising

-domain tasters claim Internet domains for five days at no cost; allows them to jam the domains full of ads→because of this millions of domain names are registered daily

-domain name is legal when the person who owns the name has had a business under the same name for a period of time

Taxes and Other Fees

-most provinces tax business transactions that are conducted within their jurisdiction

-federal, provincial, local authorities are trying to create a taxation policy for e-businesses

-question about where electronic sellers should pay business license taxes

Copyright

-many people believe once they purchase a piece of software, they have the right to share it with others

-they only have the right to use it, not distribute it

-copying material from websites without permission

Ch 7- Wireless, Mobile Computing, and Mobile Commerce

Wireless- telecommunications where electromagnetic waves carry signal b/n communicating devices

Wireless Technologies

Wireless Devices

- can make productive use of time that was formerly wasted
- allows for more flexible work locations, can allocate working time around personal obligations

Wireless application protocol- enables wireless devices to access web-based info and services

Microbrowsers- Internet browsers with a small file size that work within small screen sizes

- combines pagers, e-mails, PDAs, cellular telephones
- capabilities include Bluetooth, Wi-Fi, camera, GPS, SMS

Disadv- people can use them to copy and pass on confidential info

-jamming devices are now available to jam cell phones

Wireless Transmission Media

- transmit signals without wires over the air or in space

Microwave

Microwave transmission- used for high-volume, LD, line-of-sight communication

- offers only a limited solution to data communications needs
- susceptible to environmental interference during severe weather

Satellite

Satellite transmission- makes use of communication satellites

- three types of satellites; geostationary earth orbit (farthest from earth), medium, low
- must receive and transmit data via line of sight
- the higher a satellite orbits, the larger its footprint
- satellites use broadcast transmission, sending signals to many receivers at one time

Types of Orbits:

GEO maintains a fixed position above the earth's surface since their orbital period matches 24hr

Disadv- transmissions take 0.25sec to send and return; propagation delay

- makes two way phone convos hard to maintain
- large, expensive, large amounts of power to launch

MEO requires more satellites to cover than GEO since their footprints are smaller

Adv- less expensive, no propagation delay

Disadv- its satellites move with respect to a pt on earth's surface, so receivers have to track the satellites

LEO have little to none propagation delay, must be tracked by receivers

- harder to track LEO since they move quicker than MEO
- LEO satellites can pick up signals from weak transmitters
- consume less power, cost less to launch

Global Positioning System

- Def'n**- uses satellites to enable users to determine their position anywhere on earth
- exact position of each satellite is always known because the satellite continuously broadcasts its position along with a time signal
- can convert the user's latitude and longitude to an electronic map

Internet over Satellite (IoS)

- is the only option for some countries with no Internet access; is accessed via GEO satellites
- Disadv- propagation delay, can be disrupted by environmental influences

Radio

- Radio transmission**- radio-wave frequencies to send data directly b/n transmitters and receivers
- Adv- radio waves travels easily, inexpensive, easy to install, transmits data fast
- Disadv- can create electrical interference problems
 - susceptible to snooping by anyone who has similar equipment

Satellite Radio

- Def'n**- offers uninterrupted, near CD-quality music
- spectrum of stations, types of music, news, talk

Infrared Transmission

- Infrared**- red light that is not visible to human eyes
- used for short distance connections
- transceiver- device that can transmit and receive signals

Wireless Computer Networks and Internet Access

Short Range Wireless Networks

- helps simplify the task of connecting one device to another (range of 30m or less)

Bluetooth Networks

- Def'n**- industry specification used to create small personal area networks
- Personal area network**- comp network for communication among computer devices close to 1 person
- uses low power, radio based communication
- Adv- low power consumption, uses omnidirectional radio waves (comes from diff directions)

Ultra-Wideband Networks (UWB)

- Def'n**- high-bandwidth wireless tech; good for streaming multimedia from comp to TV

Near-Field Communications Networks (NFC)

- Def'n**- smallest range, designed to be embedded in mobile devices such as cells and credit cards
- can swipe card or device at POS systems

Medium Range Wireless Networks

Wireless Fidelity (Wi-Fi)

- Def'n**- medium range WLAN; transmitter with an antenna (wireless access point) that connects to a wired LAN or satellite dishes that provide an Internet connection
- Hotspot**- small geographical perimeter

Wireless network interface card (NIC)- helps communicate wirelessly

-provides fast and easy Internet

-Institute of Electrical and Electronics Engineers (IEEE) established standards for wireless comp networks

-for Wi-Fi it is 802.11 family; has a, b, g, n

-most WLANs use 802.11g; range of 100m

Adv- low cost, simple Internet access, ability to connect to the Internet wirelessly

Disadv- customers can't roam from hotspot to hotspot

-hard to shield from intruders since it uses radio waves (security)

Wireless Mesh Networks

Mesh networks- use multiple Wi-Fi access points to create a wide area network

-series of interconnected local area networks

Wide-Area Wireless Networks

-connects users to the Internet over geographically dispersed territory

-use portions of the wireless spectrum that are regulated by the government

Cellular Radio

Cell phones- uses radio waves to provide two-way communication

First generation (1G)- based on analog signals, low bandwidth

2G- digital signals, provides data communication

3G- digital signals and can transmit voice and data; supports video, web browsing

Disadv → cell cos in NA use 2 techs; CDMA and GSM

-expensive, carriers limit how much one can download

4G- network that operates on Internet tech, combines with Wi-Fi, WiMAX

Wireless Broadband or WiMax

Worldwide Interoperability for Microwave Access; is a secure system, features like voice and video

-tech can provide LD broadband wireless access to rural areas/other locations that aren't being served

Mobile Computing and Mobile Commerce

2 major characteristics; mobility- users carry a device that can initiate real time contact

-broad reach- users carry a mobile device and can be reached instantly

-mobile device can provide info regardless of the user's location

-there is convenience and instant connectivity, customization in SMS, helps a company advertise its products and services through localization

Mobile Commerce

-transactions are conducted in a wireless environment, especially via the internet

-creates opportunities for businesses to deliver new services to existing customers and new ones

Widespread availability of mobile devices- mass market is developing for mobile computing/m-commerce

No need for a PC- users can access the Internet via smart phones

"Cell phone culture"- it is becoming a social phenomenon

Declining prices- prices of wireless devices is declining

Bandwidth improvement- sufficient bandwidth is needed for transmitting text, audio, multimedia

Mobile Commerce Applications

Financial Services

-makes it more convenient for customers to transact business

Mobile banking- banks can alert customers on their cell phones

Wireless Electronic Payment systems- transform cells into secure purchasing tools; contactless payment

Micropayments- electronic payments for small purchase amounts (\$10)

-success of it depends on the costs of the transactions; transaction costs will only be small when the volume of transactions is large

Mobile (Wireless) Wallets- enable cardholders to make purchases with a click from their mobile device

Wireless Bill Payments- providing their customers with the option of paying their bills directly from cell

Intrabusiness Applications

-most of today's m-commerce apps are used within organizations

-mobile devices are becoming an integral part of workflow apps

-target areas for mobile deliver include transportation, utilities, field service, security, health care

Accessing Information

Mobile portals- aggregates and provides content and services for mobile users

-includes news, sports, e-mail, entertainment, travel

Voice portals- website with an audio interface; a phone number connects you to a website, where you can request info verbally

Location-Based Applications

Shopping from wireless devices- online vendors allow customers to shop from wireless devices

Location-based services- provide info specific to a location; ATM or a restaurant

-requesting warnings of a traffic jam or accident, scheduling fleets, tracking objects

Location-based advertising- knowing current locations and preferences of mobile users to send ads

Wireless Telemedicine

-use of modern telecommunications to provide clinical care and to transmit the info that clinicians need to provide the care

-emergency situations that arise during airplane flights

Telemetry Applications

Telemetry- wireless transmission gathered from remote sensors

-has numerous mobile computing applications

Pervasive Computing

-every object has processing power with wireless or wired connections to a global network

-is essentially invisible "everywhere computing"

Radio-frequency Distribution

RFID technology- allows manufacturers to attach tags with antennas and comp chips on goods and track their movement through radio signals; replaces bar codes

-UPC is made up of 12 digits in various groups

Disadv- require line of sight to the scanning device

- since it is paper, can be ripped, soiled, lost

- identifies the manufacturer and product but not the actual item

-RFID systems use tags with embedded microchips to transmit radio signals over a short distance

2 basic types of RFID tag:

Active→internal batteries for power, broadcast radio waves to a reader

- more expensive and can be read over greater distances; used for expensive items

Passive- rely on readers for their power, applied to cheaper items

Wireless Sensor Networks (WSNs)

Def'n- interconnected, battery powered, wireless sensors called motes that are placed into physical env

- motes then collect data from many points over an extended space

- data are moved mote by mote until they reach a central comp where they can be stored and analyzed

Adv- if one mote fails, another can pick the data up; makes it reliable

- if more bandwidth is needed, easy to boost performance by placing new motes when needed

Wireless Security

- wireless networks are a challenge to management due to lack of security

- transmissions can be intercepted by anybody close enough

4 major threats:

Rogue access point- unauthorized access point to a wireless network

- rogue is the evil twin; wishing to access a wireless network for malicious purpose

- in an evil twin attack, attacker is in the vicinity with Wi-Fi and simulates an access point with the same wireless network name as the one that authorized users expect

- attacker then asks them to provide confidential info like names, passwords

War driving- locating WLANs while driving/walking

- to do this, a Wi-Fi detector is needed and a wirelessly enabled computer

- if WLAN has a range that extends beyond the building that it's located in, unauthorized users can intrude into the network

Eavesdropping- unauthorized users that access data that travel over wireless networks

Radio-frequency jamming- person/device interferes with wireless network transmissions either on purpose or by unintentionally

Ch 8- Organizational Information Systems

Transaction Processing Systems

Transaction- any business event that generates data that is stored in a database

Eg. Product that is manufactured, service sold, person hired

-TPSs collect, store and process data generated from all business transactions
-must handle high volume and large variations in volume efficiently; avoid errors, record results accurately, maintain privacy and security

Data are first collected by people/sensors and entered into the comp via input device

-system then processes the data in two ways:

Batch processing- firm collects data from transactions, places them in batches; periodically processed

Real-time transaction processing- data are processed as soon as they occur

Functional Area Information Systems

FAIS- provides info to lower and middle level managers; managers use it to plan/control operations

Information Systems for Accounting and Finance

-manage money flows into, within and out of organizations

Financial Planning and Budgeting

Financial and economic forecasting- tells orgs what funds they need; when; how it will be acquired

-funds can come from shareholders' investments, bond sales, bank loans, product sales

-decisions about fund sources come from decision support systems, expert systems

Budgeting- annual budget that allocates org's financial resources among participants/activities

Managing Financial Transactions

-access customers' financial data, inventory levels, manufacturing databases

Global stock exchanges- buy/sell stocks, broadcast real-time stock prices

Managing multiple currencies- comes from global trade

Virtual close- companies want to be able to close their books at any time

Expense management automation- systems that automate data entry; web-based apps

Investment Management

-shares, bonds, real estate

-complex b/c there are thousands of investment alternatives, and are subject to complex regulations

-managers need to evaluate financial and economic reports

-financial analysts mainly use Internet search engines and business intelligence to analyze the data

Control and Auditing

-to forecast and/or secure sufficient cash flow

Budgetary control- annual budget gets divided into monthly allocations

-managers monitor departmental expenditures

Internal auditing- evaluate controls at the org, org's risk assessment, governance processes

-they can also prepare periodic external audits by outside public accounting firms

Financial ratio analysis- monitor co's financial health by assessing diff financial ratios;

-liquidity ratios, activity ratios (converting non-cash assets to cash assets), debt ratios, profitability ratios (firm's use of its assets to generate rate of return)

Information Systems for Marketing

-understand its customers' needs/wants and then develop marketing strategies around it

Information Systems for Production/Operations Management

-POM is responsible for processes that transform inputs into useful outputs

In-House Logistics and Materials Management

-deals with ordering, purchasing, inbound logistics (receiving), outbound (shipping)

Inventory management → how much inv to keep for manufacturing/sale

-overstocking/understocking can be expensive

-when to order, how much to order

-many large cos allow suppliers to manage their inv so they can ship products as needed

Quality control → gives info about quality of incoming material, quality of in-process semi finished products, final finished products

-data can be collected by sensors, interpreted in real time or stored in a database

Planning Production and Operations

-inv systems that use an EOQ (economic order quantity) approach are designed for items whose demand is independent

-some items are interdependent though (three chairs that use the same screw)

-material requirements planning (MRP) is a process that integrates production, purchasing, and inventory management of interdependent items

-it only deals with production scheduling and inventories

-MRP II deals with more complex planning that allocates related resources (money, labour, finance)

Computer-Integrated Manufacturing

CIM- integrates various automated factory systems; three goals:

1) Simplify manufacturing technologies

2) Automate as much of the manufacturing process as possible

3) Integrate and coordinate design, manufacturing, related functions via comp systems

Product Life Cycle Management

-enables manufacturers to share product-related data to support product design and development and supply chain operations

-applies collaborative techs to product development

-manages the product from its inception through its completion

Information Systems for HRM

-manages benefits, keeps records of vacation day

-delivered via an HR portal; advertise job openings, conduct on-line hiring and training

Recruitment

-finding potential employees, evaluates them, decide who to hire

-IT helps in testing and screening job applicants

-there are specialized search engines; on-line recruiting is cheaper than traditional methods

HR Maintenance and Development

- IT gives support in evaluation, maintaining, development
- employees can be evaluated by their supervisors and peers
- IT also helps in training and retraining, via the web or intranet

HR Planning and Management

- payroll and employees' records; printing paycheques, transferring money
- benefits administration; wages, bonuses, health and dental care
- employee relationship management; call centre for employees' problems

Functional Area Information Systems Reports

- FAIS sends info to the corporate data warehouse and used for decision support
- produces three main types of reports:

Routine reports- done at scheduled intervals; from hourly to daily reports

- managers often need special info that's not included in these reports though

Ad-hoc (on demand) reports- out of routine reports where info is needed at diff times

Eg. A report for today for the last three days

- requests can also be made for **drill-down** reports → greater level of detail

key-indicator reports → summarize the performance of critical activities

comparative reports- compares performances of diff business units

Exception reports- includes only info that falls outside threshold standards

- implementing management by exception: management creates performance standards, set up systems to monitor performance, compare actual performance to the standards, identify predefined exceptions
- saves managers' time and helps them focus on problem areas

Enterprise Resource Planning Systems

ERP systems- takes a business view of the overall org to integrate and use all of an org's resources

-employs a common software platform

- integrates functional areas of an org to enable info to flow across functional areas
- changes in one functional area will immediately be reflected in other functional areas as well

ERP II Systems

Def'n- gives web-enabled links b/n a co's key business systems and its customers, suppliers, distributors

- integrates internal-facing ERP apps with the external-focused apps of supply chain management and customer relationship management

-ERP II functions are now delivered as e-business suites

- includes a variety of modules that are divided into core ERP modules (financial, operations, HR management) and extended ERP modules (supply chain management, business intelligence)

Benefits and Limitations of ERP Systems

Adv:

- organizational flexibility and agility; can react quick to changing business conditions, as well as capitalizing on new business opportunities
- decision support; gives info on bus performance, improves managers' ability to make better decisions
- quality and efficiency; improves org's business processes, efficiency of customer service, production
- decreased costs; less transaction, hardware, software costs; requires smaller IT staff

Disadv:

- the bus processes in ERP are predefined by the best practices the ERP vendor developed
- Best practice**- most successful solutions for achieving a business objective
- some cos may need to change existing bus processes to fit the predefined processes of the software
- can be complex, expensive, time consuming

Reasons for failing

- there are often large losses in revenue when core business processes failed
- shipments were lost, inventory changes not recorded, unreliable inventory levels
- IT professionals underestimate complexity of planning, development and training
- inability to involve affected employees in planning/development phases
- trying to do too much too fast
- lack of training, as well as failure to perform proper data conversion

Enterprise Application Integration

-for some orgs, ERP systems aren't appropriate (non-manufacturing and some manufacturing where the process of converting the current system is too expensive)

EAI system is used; integrates existing systems by providing layers of software that connects applications together; lets them communicate and share data

Ch 9- Customer Relationship Management

Defining Customer Relationship Management

CRM- personal marketing where a business markets to each individual customer

-designed to achieve customer intimacy and is enabled by IT

-is customer focused and customer driven

-helps cos acquire new customers, retain existing ones, grow the r/n with existing ones

-successful CRM improves customer satisfaction, making sales/service employees more productive

Customer Touch Points

Def'n- interactions that businesses have with their customers

-phone, mail, physical interactions, e-mail, websites

Data Consolidation

-enables the org's functional areas to share info about customers

Collaborative CRM- gives effective/efficient interactive communication with the customer throughout the whole entire organization

-enables customers to provide direct feedback to the organization

Operational CRM

Def'n-supports the front-office business processes; direct interaction with customers

Customer-Facing Applications

Def'n- where an org's sales, field service, customer interaction centre reps interact with customers

Customer Service and Support

-service requests, complaints, product returns

Customer Interaction Centres- multiple communication channels to support the communication preferences of customers

Outbound telesales→a call list is created for the sales team, whose members contact sales prospects

-customer and sales team collaborate in discussions of products

Inbound teleservice→customers communicate directly with CIC if they want to place an order, ask about products and get info about a transaction

-there are also Information Help Desks, e-mail and web interaction, live chat

Sales Force Automation (SFA)

Def'n- automatically records all aspects in a sales transaction process

Contact management system→ tracks all contact made with a customer, purpose contact, any follow up needed (eliminates duplicated contacts and redundancy)

Sales lead tracking system→potential customers or customers who bought related products

Sales forecasting system→ estimates future sales

Product knowledge system→ info regarding products and services

Marketing

-identify and target the best customers, manage marketing campaigns, generate quality leads

Cross selling- marketing additional related products to customers based on a previous purchase

Up-selling- buying higher value related products than the consumer's initial purchase

Bundling- form of cross selling where a group of products is cheaper than combined individual prices

Campaign Management

Campaign Management Applications- plan campaigns so the right messages are sent to the right people through the right channels

- personalizes individual messages for each particular customer

Customer-Touching Applications

- customers interact directly with these technologies rather than a company rep

Customer-touching CRM apps- customers are able to help themselves with these apps

Search and comparison capabilities: offered by many on-line stores and malls

Technical services: personalized experiences; able to download product manuals

Customized products and services: mass customization where customers can configure own products

- can view their account balances, check their shipping statuses

Personalized web pages: customers use these to record purchases, preferences, problems, requests

FAQs: useful for answering repetitive inquiries

E-mail- inexpensive and fast

Loyalty programs- recognize customers who always use a vendor's products/services

Operational CRM benefits

- efficient, personalized marketing, sales, service

- 360 degree view of each customer

- complete history of customer interaction with the organization

Analytical CRM

Def'n- analyzes customer behaviour and provides actionable business intelligence

- gives info on customer request and transactions

- creates statistical models of customer behaviour and the value of customer r/ns over time

- important technologies: data warehouses, data mining, decision support

- it analyzes customer data for many reasons; for targeted marketing campaigns

- increasing customer acquisition, cross selling, up selling

- provide input into decisions relating to products and services

- financial forecasting, customer profitability analysis

Other Types of CRM

On Demand CRM

Def'n- hosted by an external vendor in the vendor's data centre

- saves the org any costs associated with buying the actual system

- org's employees would need to only know how to access it, and use it

Disadv: vendor could be unreliable

- software could be difficult to modify

- may be hard to integrate the vendor's software with the org's software

Mobile CRM

Def'n- enables an org to conduct communication related to sales and marketing through mobiles

- interacting directly with consumers through their own portable devices

Open-Source CRM

Def'n- software whose source code is available to developers and users

-can be implemented either on premise or on demand

Adv: favourable pricing, wide variety of applications, easily customizable, fast updates, free support

Disadv: quality control; lack of central authority to oversee the quality of the product

-companies must have the same IT platform as the platform the open-source CRM was dev'ped

Ch 10- Supply Chain Management

Structure of Supply Chains

-supply chain is how partnering orgs are linked together

-is the flow of materials from raw material suppliers to the end customers

Supply chain involves three segments:

Upstream- sourcing from external suppliers

-SC managers select suppliers to produce its product, develop pricing/delivery, payment processes

-there are several tiers of suppliers; a supplier may have one or more sub-suppliers, and the sub-supplier may have their own sub-suppliers as well

Internal- where packaging, assembly, manufacturing takes place

-preparing goods for delivery

-SC managers also monitor quality levels

Downstream- where distribution takes place

-SC managers develop a network of warehouses and select carriers to deliver goods to customers

There are also three flows in the supply chain:

Material flows- physical products that flow along the chain (raw materials, supplies)

-there are also reverse flows, where products get returned

Information flows- data related to demand, shipments

Financial flows- money transfers, payments, payment schedules

-all supply chains don't have the same number and types of flows

-there may be no physical flow, but a flow of information

-purpose of supply chain is to improve trust and collaboration among supply chain partners

Supply chain visibility- ability for all orgs to access relevant data on purchased materials as they move through the networks to their receiving docks

-orgs can also access the relevant data on outbound goods as they are manufactured

Inventory velocity- the time between the incoming goods and the finished, outbound products

Problems along the Supply Chain and their Solutions

-problems stem mainly from uncertainties and the need to coordinate several activities, internal units, and business partners

-uncertainties can come from demand forecasts; the demand for a product can be influenced by competition, prices, weather conditions, delivery times, traffic jams, production delays

Bullwhip effect- big shifts in orders up and down the supply chain (stockpiling, hoarding)

Push model- production begins with a forecast that determines which products customers want, and the quantity of each product

- company then pushes these products to customers
- causes bullwhip effect, because the forecasts are often incorrect (too high or too low)

Solutions to Supply Chain Problems

Vertical integration- where a company buys its upstream suppliers to ensure its essential supplies are available when they are needed

Using Inventories to Solve Supply Chain Problems

- building inventories as insurance against supply chain uncertainties is an issue because it is hard to determine an accurate inventory level for each product/part
- the total cost of maintaining the inventory, covering lost sales can be very expensive

Just-in-Time Inventory System- attempts to minimize inventories as they deliver the precise number of parts at precisely the right time

Sharing Information

Pull model- production process begins with a customer order; cos make only what the customers want

Vendor-managed inventory- big company manages inventory levels of its other smaller companies

- they will know when inventories fall below the threshold, triggering an immediate shipment
- allows for more accurate planning production

Supply Chain Management Systems and Related Technologies

Supply chain management (SCM)- planning, organizing activities performed along supply chain

Inter-organizational information system (IOS)- info flows among 2+ organizations

Benefits→ reduces costs of routine business transactions

- improves info flow by reducing errors, compresses cycle time
- eliminates paper processing
- makes processing of info easier for users

-goal of SCM is to reduce the problems along the supply chain (increased time, costs, inventories)

-SCM decreases inventory levels and cycle time

-SCM are essential to the operation of many businesses

Electronic Data Interchange (EDI)

Def'n- enables business partners to exchange documents electronically

-transmits messages using a converter called a translator

Benefits→ minimizes data entry errors, length of message can be shorter

- reduces cycle time, increases productivity, enhances customer service, minimizes paper usage

Disadv→ is expensive, operating costs are high

- traditional EDI system is inflexible so it is difficult to make quick changes

-EDI is an issue for small businesses because it requires support from specialized IT experts to make changes, which is often very expensive

-also an issue because sometimes a larger supply chain partner will require participants to use EDI tech

Web Services

Def'n- apps over the Internet that users can select and combine through any device

- permits diff systems to talk with one another
- can be used in different environments

Service-oriented architecture (SOA)- IT architecture that makes it possible to construct business applications using web services

- can be reused across and organization in other applications and with business partners

Extranets

- connects intranets of various business partners to create extranets
- provides access to certain areas of one another's corporate intranets
- primary goal is to foster collaboration between business partners
- enables people who are located outside a company to work together with the company's internally located employees
- can access data, place orders, check order statuses, communicate, collaborate
- extranets use virtual private network tech to make communication more secure
- less expensive than proprietary networks

Adv → faster information flow, lower costs, improvement in business effectiveness

Types of Extranets

A company and its dealers, customers, suppliers

- centred around a single company (FedEx extranet that lets customers check delivery)

Industry's extranet

- major players in an industry to create an extranet that will benefit all of them
- provides a secure medium for B2B information exchange

Joint ventures and other business partnerships

- partners in a joint venture use the extranet for communications

Ch 11- Managerial Support Systems

Managers and Decision Making

Management- process by which an org achieves its goals (output) through the use of resources (inputs)

Productivity- the ratio between inputs and outputs

Manager's Job and Decision Making

3 main jobs of all managers:

Interpersonal → leader, liaison

Informational → monitor, spokesperson, analyzer

Decisional → entrepreneur, disturbance handler, resource allocator, negotiator

-information systems have been developed to support all three of those roles

-decision making is a systematic process; composed of three phases:

Intelligence → managers examine and define the problem

Design → decision makers construct a model to simplify the problem

Model- expresses the relationships among the relevant variables

Choice → select a solution and test it on paper before implementing it

Why Managers Need IT Support

-making decisions are becoming more difficult due to

Increasing number of alternatives- due to technology, improved communications

Time pressure- unable to manually process the large amount of info fast enough

Sophisticated analysis- is needed to make a good, informed decision

In group decision making, decision makers are often in **different locations** so bringing them together can incur large costs; IT can bring them together quickly

What Information Technologies are Available to Support Managers?

Business Intelligence (BI) Systems- can be used independently or combined

-related to data warehousing

Framework for Computerized Decision Analysis

-decisions are classified along two major dimensions; problem structure and decision nature

Problem Structure

-decision making processes fall on scale ranging from highly structured to highly unstructured decisions

Structured- routine problems that have a standard solution

-two basic criteria to evaluate these sol'ns are minimizing costs, maximizing profits

Unstructured- problems with no solid solution; has to do with human intuition

Semistructured- only some of the decision proves phases are structured

-combo of standard solution and individual judgement (evaluating employees)

Nature of Decisions

-there are three categories that encompass all managerial decisions

Operational → executing specific tasks efficiently and effectively

Management → acquiring and using resources efficiently

Strategic planning → long range goals for growth and resource allocation

Computer Support for Structured Decisions

- are mainly used in finance and operations management
- capital budgeting, allocating resources, distributing merchandise, controlling inventory
- the use of mathematical formulas is also available for operations research

Business Intelligence

Def'n- technologies that provide access to vast amounts of data to help users make better bus decisions

- gives historical, current, predictive views of business operations
- enters data for each line of business; managers can sue real time analytics to compare and analyze reports, and marketing team can perform what-if analyses from historical data
- managing the operating budget, and lets managers adjust daily staffing levels, maintain inventories
- customer service can be maintained so it is responsive and helpful
- one specific use of BI apps is **corporate performance management**- to manage org's performance according to key performance indicators such as revenue and operating costs
- for online businesses other factors include server load, network traffic, transactions per second
- allows managers to obtain info concerning the org's key performance indicators

There are **two types** of BI apps; those that give data analysis tools, and those that give easily accessible information in a structured format

Multi-Dimensional Data Analysis (Online Analytical Processing)

- performing complex, analyses of data stored in a database using graphical software
- gives users a view of what is happening, or what has already happened
- in the data warehouse, relational tables can be linked to form multi-dimensional data structures that can be rotated so users can see it from diff perspectives
- statistical tools provide users with mathematical models to apply to the data
- allows users to quickly answer business questions

Data Mining

-explains why it is happening, helps predict what will happen in the future

Def'n- process of searching for important bus info in a large data base to create a competitive adv

They perform two basic operations; predicting trends and behaviours

- identifying previously unknown patterns

(1)it finds predictive info in large database like in targeted marketing; uses data from past promotional mailings to identify people who are most likely to respond to future mailings

- can also help forecast bankruptcy

(2)it can also analyze data to discover unrelated products that are often purchased together

-can detect fake c/c transactions; pattern is diff from reg use pattern if somebody took your card

Retail and sales → predicting sales, preventing fraud, correcting inventory levels

Banking → levels of bad loans, fake cc use

Manufacturing and production → predicting machinery failures

Insurance → forecasting claim amounts, predicting which customers will buy new insurances

Police work → crime patterns, criminal behaviour

Health care → patients' demographics with critical illnesses

Marketing → predict which customers will buy a certain product

Decision Support Systems

Def'n- combines models and data to solve semistructured, some unstructured problems

-enables business managers to access data interactively to conduct appropriate analyses

-can support decisions made by one indiv and also a group

-electronic support is referred to GDSS (group decision) and ODSS (organizational decision)

ODSS- focuses on an organizational task that involves a sequence of operations and decision makers

-decision support systems can contribute to all levels of decision making

-can also perform a wide range of analyses

Sensitivity Analysis

Def'n- that change that 1+ parts of a decision making model has on other parts

-impact that changes in input variables have on output variables

-enables the system to adapt to changing conditions and the varying requirements of diff decision making situations

-sensitive model: small changes in conditions will dictate a diff solution

-nonsensitive model: changes do not significantly change the solution

-because of this, chances for a solution to succeed are higher in a nonsensitive model

What-If Analysis

Def'n- predicts the impact of a change in the assumptions on the proposed solution

Goal-Seeking Analysis

Def'n- backward solution approach; finds the value of the inputs to achieve the output

Digital Dashboards

Def'n- gives rapid access to timely information and direct access to management reports

-enables managers to examine exception reports and drill-down reports

Management Cockpit

-is a strategic management room containing set of digital dashboards that enables top level decision makers to pilot their businesses better

-encourages efficient management meetings, boosts team performance via effective communication

-info relating to critical success factors are displayed graphically on the walls of a meeting room to help managers grasp how all the diff factors in the business interrelate

-in the room are four walls with different colours

black; principle success factors and financial indicators

red; market performance

blue; projects performance of internal processes and employees

white; status of strategic projects

-gives a common basis for information and communication; supports efforts to translate a corporate strategy into concrete activities

Data Visualization Techniques

- after data has been processed, they can be presented to users in diff formats like text, tables
- makes IT apps more understandable to users

Geographic Information Systems

GIS- computer-based system for capturing, integrating, displaying data using digitized maps

- every digital object has an identified geographical location
- geocoding enables users to generate info for decision making
- there are PC based GIS packages; GIS data are available from both gov and private sources

Virtual Reality

Def'n- computer generated, 3D graphics delivered to the user through head-mounted display

- large groups can share the same artificial environment; powerful medium for communication, entertainment, learning
- user wears stereo goggles, headset, computerized display, hand-position sensors
- VR updates the display in real time

Intelligent Systems

Def'n- describes the various commercial apps of artificial intelligence

Artificial intelligence- studies the thought processes of humans, and recreating the effects of those processes through machines like computers and robots

- goal of AI is to build machines that mimic human intelligence

Turing test- person and comp pretend to be human, human interviewer has to decide which is which

- the potential value of AI can be better understood by contrasting it with human intelligence

Major intelligent systems:

Expert Systems

- used when a complex decision is to be made, a problem to be solved
- experts have specific knowledge and experience in the problem area
- can predict how likely the solutions will succeed, can also calculate costs if problem doesn't resolve
- companies use this for things like mergers, acquisitions, advertising strategy
- the more unstructured the situation, the more expensive the advice

Def'n- comp system that mimic human experts by applying expertise in a specific domain

- can either support decision makers or replace them
- can reach a level of performance comparable to a human expert
- users can consult the computer for specific advice, giving recommendations and explaining the logic

*Table 11.4 → useful in 10 generic categories

*Table 11.5 → capabilities and benefits

Natural Language Processing and Voice Technologies

NLP- communicating with a computer in the user's native language

- comp must have the knowledge to analyze and then interpret the input
- once the computer understands the input, it can perform the desired action

2 types of NLP:

Natural Language Understanding (Input)

Def'n- allows a computer to comprehend spoken instructions given in the user's everyday language

Adv: easy to use; more people can speak than type so more accessible

- speaking is faster than typing

- gives manual freedom; can speak while assembling machinery; disabled benefits too

Disadv: inability to recognize long sentences; the better the system, the higher the cost

Natural Language Generation (Output)

Def'n- enables computers to produce everyday languages so people can understand comps easier

- the quality of the voice is good, but the technology is expensive

- lower costs and improved performance can encourage more commercial interactive voice response

- banks and cc companies already offer this to their customers

Neural Networks

Def'n- system of programs that simulates the underlying concepts of the human brain

- large number of processors operating in parallel, each with its own data

- it is initially fed large amounts of data about data relationships (to make conclusions in the end)

- are good at recognizing subtle, hidden patterns within complex data

 - also good at interpreting incomplete inputs

- became the standard for combating fraud in the credit card, telecommunications industries

- network has three levels of interconnected nodes (input, middle, output)

Fuzzy Logic

- deals with uncertainties by simulating the process of human reasoning; the grey area

- handles subjective concepts

- used in financial analysis and the manufacture of antilock brakes

- allows users to analyze info with imprecise values like intangible assets (goodwill)

Ch 12- Acquiring Information Systems and Applications

Information Technology Project Management

Projects- ST efforts to create a business related outcome, in the form of products or services

IS project management- effort to plan and manage resources to bring about the successful achievement of specific IS goals

-all projects are constrained by the same 3 factors called **triple constraints of project management**

Time→window of opportunity that the proj must be finished to benefit the org

Cost→ actual amount of resources

Scope→ processes that ensure that the project includes all the work required

Project Management Process (5 phases)

1) Project Initiation

- problem is defined so it can be solved, so goals can be achieved
- identify the need resources, analyze costs and benefits, potential risks
- future users should be involved to ensure their needs are met as well

2) Project Planning

- every project objective must be identified
- many tools assist developers in sequencing these activities
- the tools will ensure that activities are performed in a logical sequence and helps determine how long the project will take

3) Project Execution

- work in the project management plan is performed to accomplish the project's requirements

4) Project Monitoring and Control

- determine whether the project is progressing as planned; has three steps
 - Monitor where the company is
 - Compare cost/effort/time with the actual plan of where the company should be
 - Identify actions to get back on track

5) Project Completion

- the project is completed when it is formally accepted by the organization

Project Management Failure

Runaway projects→those that are so far over budget or past deadline that they get abandoned

- due to lack of sufficient planning, lack of management commitment, lack of time
- difficulties with technology compatibility

Justifying IT Applications

Evaluating and Justifying IT Investment: Benefits, Costs, Issues

Assessing the Costs

- major challenges that companies face is to allocate fixed costs among diff IT projects
- fixed costs** remain the same regardless of any change (infrastructure cost, IT services, IT management)
- costs accumulate over time when it has to consistently maintain, debug, improve the system
- tax changes also cause changes to systems

Assessing the Benefits

- even more complex than calculating costs since many are intangible (customer/partner relations)
- to obtain a return from an IT investment, the co must implement the technology successfully

Conducting Cost-Benefit Analysis (4 approaches)

Net Present Value → analysts convert future values of benefits to their present-value equivalent

Return on Investment → management's effectiveness in generating profits with its assets

- calculated by dividing net income by the average assets invested in the project
- the higher the return, the better it is

Break-even analysis → point at which the \$ value of the benefits equals the investment made in the proj

Business case approach → system developers write a case to justify funding one or more specific projects

- helps clarify how the org can best use its resources to accomplish its IT strategy
- helps the org to concentrate on justifying the investment

Strategies for Acquiring IT Applications

- if a company has successfully justified an IT investment, it must decide how to pursue it (6 ways)

Buy the Applications (Off-the-Shelf Approach)

- buying commercial software packages
- company should ensure the selected package contains all necessary features to address its needs
- companies may sometimes buy multiple packages to fully satisfy their needs

Lease the Applications

- can save a company time and money; generally includes features that are most commonly needed by orgs in a given industry
- companies apply the **80/20 rule** when evaluating vendor software
 - if it meets 80% of the co's needs, co should consider changing its business processes so the 20% can also be fulfilled
- attractive to SMEs, but large companies do it as well to test potential IT solutions before committing to large investments
- leasing can be done in three ways; leasing it from a software developer to install it on co's property; using an ASP; using SaaS

Application service provider - vendor that assembles the software and packages the software w/ services

- customer can then access these applications via the Internet

Software-as-a-Service (SaaS) - vendor hosts the applications and provides them as a service to customers over a network

- customers pay for using the service; saves them the expense of buying and maintaining the software

Use Open-Source Software

- orgs can use open-source software to develop applications in-house

Outsource

- good for SMEs with few IT staff or limited budgets

Outsourcing - acquiring IT apps from external orgs

- large cos also do it if they want to experiment with new IT techs before making the large investment
- Disadv; company's corporate data may be under the control of the outsourcing vendor
- vendors offer services for creating IT systems including e-commerce applications

- IT outsourcers offer a variety of services
- offshoring can save money, but includes risks when corporate data is sent overseas
- Develop the Applications In-House**
- more time consuming and expensive, but is a better fit with the org's requirements
- basic methodology is the systems development life cycle

Traditional Systems Development Life Cycle

SDLC- method that orgs use for large scale IT projects

- consists of sequential processes (six) by which information systems are developed
- systems development projects produce desired results through team efforts
 - users, who are employees from all functional areas
 - System analysts**, IS pros who specialize in analyzing IS
 - Programmers**, IS pros who modify existing computer programs
 - Technical specialists**, experts on a certain type of technology
- Systems stakeholders**- everybody who is affected by changes in a company's IS

Systems Investigation

- the more time invested in understanding the business problem to be solved;
 - specifying the technical options for systems;
 - anticipating the problems that are likely to occur, the greater the success
- orgs have three sol'ns to any business problem; do nothing and continue using existing system
 - modify/enhance the existing system
 - develop a new system

Feasibility study- analyzes which best fits the particular business problem

Technical feasibility- determines if the hardware, software can be acquired to solve the bus problem

Economic feasibility- whether the org has the time/money to successfully complete the project

Behavioural feasibility- human issues of the systems development project

IT steering committee- they reach the Go or No-Go decision (if not around then top management does)

- if the decision is No-Go, then the project is either discarded or put on the shelf for later use

Systems Analysis

Def'n- examination of the business problem that the org plans to solve with an IS

- gathers info about the existing system to determine the requirements for enhanced system
- most difficult task in systems analysis is to determine the specific requirements that the system must satisfy, called user requirements

Systems Design

Def'n- describes howt he system ill resolve the business problem

- specifies system outputs, inputs, user interfaces
 - hardware, software, telecommunications, personnel, procedures
 - blueprint of how the components are integrated
- when the system specifications are approved by all participants, they are 'frozen'; can't be changed

Scope creep- when functions are added after the project has already been initiated

Programming and Testing

-if the org decides to construct the software in-house, programming will begin

Programming- translating design specifications into computer code

-can be lengthy and time consuming since testing is continuous

-is done to see if the comp code will produce the expected and desired results

Implementation

Def'n- converting from the old system to the new system; three main conversion strategies

Direct conversion- old system is cut off and new system is turned on; least expensive way

-most risky if the new system doesn't work as planned though

Pilot conversion- introduces the new system in one part of the org

-new system runs for a period of time and is then assessed

Phased conversion- introduces components of the new system

-if it works properly then other modules get introduced as well

-in parallel conversion, the old and new systems operate simultaneously for a time

Operation and Maintenance

-once the new system's operations are stabilized, performed audits determine if it's being used correctly

-several types of maintenance; debugging continues throughout the life of the system

-updating is done to accommodate changes in business conditions

-adding new functions to the existing system without disturbing its operation

Alternative Methods and Tools for Systems Development

Prototyping

Def'n- defines an initial list of user requirements, builds a model of the system, then improves the system based on users' feedback

-they quickly develop a smaller working version of the system, called a prototype

Prototype- can take two forms; can contain just the component of new system that's of most interest

-can also be a small-scale working model of the entire system

-users make suggestions based on their experiences with the new system; developers then refine the prototype and this continues until the users either approve of it, or disapprove of it

Disadv; users won't realize the amount of work that has to be done to provide an operational system with a database; security precautions; error checking

Joint Application Design

JAD- group-based tool for collecting user requirements and creating system designs

-most often used within the systems analysis and system design stages

-involves a group meeting attended by the analysts and all the users

-all users define and agree on the system requirements

Disadv; hard to get all users to attend the meeting

- problems associated with group processes in general
- JAD sessions usually have a facilitator; use of groupware also helps

Integrated Computer-Assisted Software Engineering Tools

CASE- uses specialized tools to automate many of the tasks in SDLC

- tools used to automate the early stages of the SDLC are called upper CASE tools
- tools used to automate later stages called lower CASE tools

Integrated CASE (ICASE) tools- gives a link between upper and lower Adv; can produce systems with a longer effective operational life

- can speed up development process; can produce more flexible systems to bus env
- Disadv; more expensive to build and maintain
- more extensive definitions of user needs and requirements
- difficult to customize as well

Rapid Application Development

RAD- combines JAD, prototyping, ICASE tools to quickly produce a high-quality system

- developers use JAD sessions to collect system requirements
- designs and the system are developed and then undergo a series of improvements
- RAD develops prototypes, users review them in JAD sessions
- RAD produces functional components of a final system
- RAD makes it possible to develop systems faster; can improve process of rewriting legacy apps

Agile Development

Def'n- delivers functionality in rapid iterations

- requires frequent communication, development, testing, delivery
- focuses on rapid development to create software that addresses the needs of business users
- core is to do only what you have to do to be successful right now
- uses small teams that deliver project features ever 2-4 weeks (5-9 people)

End-User Development

Def'n-org's end users developing their own apps with no assistance from the IT department at all

- Disadv**- end users may not be skilled enough in application development, jeopardizing cost/quality
- many end users fail to take proper security measures

Component-Based Development

Def'n- uses standard components to build applications

- components; reusable applications that have one specific function
- is closely linked with web services and service-oriented architectures

Object-Oriented Development

Def'n- diff view of computer systems than traditional SDLC development approaches

- trad'l approaches give step-by-step instructions in the form of computer programs
- these programs produce a system that performs the original task but not other tasks
- OO system begins with aspects of the real world that must be modelled to perform the task

- begins with a feasibility study and an analysis of the existing system
 - systems developers identify the objects (tangible, real-world entity) in the new system
 - objects also have properties/data values
 - objects have operations that can be performed on their properties
 - object-oriented analysts model how the objects interact to meet the new system's objectives
- Disadv;** becomes complex as the number of objects increase, slowing down processing

Vendor and Software Selection

- firms are increasingly relying on outside vendors to provide software
- selecting and managing these vendors and their software offerings has become a big aspect of acquiring an IT application; there are six steps to selection:

Identify potential vendors

- look through software catalogues, trade journals, peers in other companies
- lists provided by hardware vendors, web searches, consultants

Determine the evaluation criteria

- characteristics of the vendor, functional requirements of the system
 - technical requirements that the software has to satisfy, vendor support
- Request for Proposal (RFP)- sent to potential vendors inviting them to submit a proposal that describes their software package and how it would meet the company's needs
- describes the env the system will be used in, criteria the company will use to evaluate proposals
 - can also request a list of current users of the package that the company can contact

Evaluate vendors and packages

- determine gaps between the co's needs and the capabilities of the vendors
- company gives an overall score by assigning an importance weight to each criteria, ranking vendors on criteria, multiplying ranks by associated weights

Choose the vendor and package

- begin negotiations with vendors to determine how packages might be modified to remove any discrepancies with the company's IT needs
- company must consider the opinions of both the users and IT personnel

Negotiate a contract

- price of the software, and the amount of support the vendor will provide
- if the vendor is modifying the software, the contract must have specifications
- companies might need the services of lawyers and negotiators to ease the process

Establish a service level agreement

SLA- formal agreements that specify how work is divided b/n the company and its vendors

- how quality checks will be made, what is to be done in disputes
- it defines the responsibilities of both partners; gives a framework for designing support services; allows the company to retain as much control as possible over its own systems
- it includes issues like availability, backup and recovery, upgrades, software ownership