Chapter 9 - Ethics and Professional Practice In It

An Introduction to Ethics and Morality

- **ethics** is closely related to morality and society's understanding of whats right and wrong
- a persons moral stance depends on their age, gender, religion etc
- **morals** are closely linked to **personal values** - beliefs that you hold about the way the world works and your role in it
- your ethical position on any decision is informed by your own values, moral code, and life experiences
- society's legal codes also help us define right from wrong
- **ethical dilemma**: where the law and some people's moral or religious codes do not coincide to create an easy answer (gay marriage)

Business Ethics and Conduct

- corporations/organizations are inanimate ; they don't exist in a human form but are animated by the actions of humans who create or belong to them
- society relies on the individual personal ethics of those in business to make the right decisions even though businesses as a whole have rules and regulations

The Business Benefits of Acting Ethically

- shields employees from harmful and costly legal action and negative publicity (offsets risk)
- reduces long term compliance and audit costs
- creates a brand built on integrity which can increase sales and create long term customer loyalty
- creates goodwill
- ensures the organization will be accepted as it expands
- attracting quality employees and supporting an excellent employee brand

What Causes Ethical Misconduct in Business?

- organizations in the private sector want to make profits and maximize shareholder value and often could more money by acting illegally or unethically
- gap between management and shareholders --> actions may be taken to benefit management
- greed and ego are powerful forces and causes many people to confuse the differences between right and wrong and act more in self interest

Corporate and IT Governance

- **corporate governance** is defined as the highest level of decision making involving basic questions of status, strategy and compliance within and organization --> suggests a need to include IT
- effective governance is critical enable for success in the global economy, for securing the enterprises information resources and creating competitive advantage
- in light of the high profile corporate scandals such as Enron and WorldCom all companies are re-evaluating their governance to bring it in line with emerging standards
- corporate governance means that the leadership and management of a business are directly accountable to its owners (shareholders) for proper operation and financial control of the organization (includes deliberate and complete disclosure and reporting of results)
- any requirements, especially around reporting and disclosure, clearly rely on fundamental assurances that whats in an organization's IT systems is reliable, safe and secure

- **IT governance** is the distribution of IT decision making rights and responsibilities among enterprise stakeholders and the procedures and mechanisms for making and monitoring strategic decisions regarding IT
- IT governance begins as a very high-level process that specifies:
  1. How the organization will set goals, objectives, priorities and policies for IT;
  2. How it will integrate IT with business strategies and goals; and
  3. Which organizational members will make decisions regarding, and be responsible for, the successful completion of these tasks (the "who" of IT governance)

The CIO: Managing IT Governance

- **The Chief Information Officer (CIO)** must insure proper and secure use of all the organization's information resources and particularly the organization's compliance with privacy laws and regulations in every jurisdiction in which it operates

Law and Regulations	Description
Personal Information Protection and Electronic Documents Act (PIPEDA)	- federal gov't sets out ground rules for how private sector organizations can collect, use or disclose personal information - gives individuals the right to access and request correction of their personal informations thats been collected
Bill 198	- Ontario legislator bill that gives Ontario Security Commission the rule making authority - requires reporting issuers to appoint audit committees and to prescribe requirements relating to their functions
Privacy Act	- federal government act imposes obligations on 150 federal government depts and agencies to respect privacy rights by limiting the collection use and disclosure of personal information

- since not all organizations have a formally designated CIO the role of ensuring that IT governance is properly in place is actually the responsibility of the senior executive team ad the BOD

Personal Codes of Conduct and Practice

- codes of conduct are relevant to any profession and help guide the professionals within the field in terms of what is and isn't acceptable and ethical behavior
- many professions have very strict codes of conduct (medicine, law) where the consequences of not following them normally results in expulsion and the payment of compensation
- many large private companies in canada also have internal codes of conduct that relate to employee conduct and maintaining high ethical standards (especially in high risk industries where the risk of unethical behaviour has high financial or human costs such as a hospital)

Common Ethical Dilemmas Involving IT

Copyright and Piracy
- one of the biggest plagues of the software industry --> piracy
- piracy hurts the costs of software in the marketplace (vendors factor in these costs and pass them to consumers), does not encourage innovation and diminishes opportunities for IT professionals
- copying and pasting something without referencing it is also another serious aspect of copyright infringement

Patent Violation
- although violations rarely happen deliberately, there are still many cases where companies are sued for patent violations
- to use someone else's invention without paying is unethical and illegal

Reverse Engineering
- used most often to find out how another manufacturer created a product and then attempting to learn from this to make a better one or find a new way to replicate it in a different way to avoid infringing on copyright or paying royalties on a patent

Spam and Privacy Codes
- organizations use spam as a marketing tactic and criminal organizations use it in phishing schemes
- the ethical dilemma is not the practice of sending a promotional email; it is seeking the permission to do so rather than collecting or buying e-mail addresses where individuals have not provided their consent -- requires IT professions to implement systems

Security Breaches
- news stories often describe breaches in protocol, usually in IT, or how intrusions or security breaches resulted in the loss or disclosure of valuable personal information
- in most countries there are specific requirements to report these privacy breaches and take immediate action however there are exclusions to minor breaches

Competitive Intelligence
- competitors want insight into what other in the industry are doing so that they can respond to the market and maintain their share
- gaining insights from customers, partners, or observation are all fine but beyond that there are a whole bunch of practices that are unethical

Hiring Practices, Equity and Equal Opportunity
- the high demand for IT professionals and low supply has attracted many immigrants of qualified professional to fill the demand --> there has been evidence that visa workers are mistreated, not paid fairly or exploited
- also people who come to canada to study have reported having less opportunity
- practices that are not completely merit based are unethical

Green IT
- IT is a contributor to environmental damage
- major steps all IT professionals should take: promote recycling and reduce consumption

CHAPTER 8 - WEB, SOCIAL MEDIA, AND ONLINE TRENDS

A- Introduction of Web 2.0

- refers to an interactive web and allows moving from a passive site that basically displays information to a site that permits interaction with visitors or users
- interactive sites are supported by audio and video capabilities combines with **user generated content (UGC)** such as blogs and conversation threads
- the ability for an internet site to become a two way communication tool enhances the sense of an online community
- **semantic web** is a next generation web that makes information sharing and exchanges easier by focusing on content, searchabillity, and interpretability at a technical level
- Advances in technology that allowed us to go from web 1.0 to web 2.0 include
    - **Adobe Flash**: allows interactivity, animation and audio and video streaming (YouTube)
    - **Javascript:** communicator between the computer and the Internet
    - **API** - through the use of Application Protocol Interface, developers can access established programs and use their functionality (example: several sites use the google maps to show the location of certain places)

B- Defining Social Technologies and Utility

- developers replicate models of human social interactions online by *linking form to function*
- when you think about the social web, you are really only thinking about doing something that human beings have been doing forever (converse, connect, gather, join, belong) and translating that into an online context
- the primary purpose of social websites it to connect us with friends, family, partners and colleagues
- a recent online survey reported that social networking is the 4th most popular online application overall and is now ahead of e-mail

Social Utility

- social utility suggests that people spend time on sites that provide social value, contributing to social satisfaction
- the only reason people spend time on sites such as a Facebook is because they provide something on social value (social utility) in return for spending valuable time creating profiles, updating entries and so on
- The **Three Pillars of Sociability** apply to both real life and the online world: the desire to affiliate, participate, and be validated by others - social networking sites allow users to do this online
    - **Affiliation:** the first step after being aware of the opportunity to join something is ensuring that users want to be affiliated with your group --> affiliation is essentially the need to belong
    - **Participation:** important for the growth of your online community that users understand the rules of behaviour and conduct and you need to find ways to make participation socially safe (most successful networking sites focus on ensuring and invitation design)
    - **Validation:** experiencing social comfort and involvement leads to a user's validation and increases their confidence to interact

Design and Usability
- design esthetic and easy usability are critical to building a successful media site
- if you make it easy to navigate and are constantly changing and refining the technology flow based on peoples feedback, people will use it
- also important to eliminate barriers and complexities so that users can easily find and use a specific function

Business Utility
- Translating online social utility into business utility helps drive value for companies and organizations
- consumers and clients will share information if they get something back in return that they want (products and services, information, access to other buyers)

Technology Implications
- Web 2.0 sites are more expensive to create and run than traditional websites
- this also means that there is an increasing demand for **compressions technologies** which help reduce the costs of storage and transmission and for developers that know how to codes and implement systems that efficiently handle large amounts of information
- many companies have or are planning on banning social networking sites at the office --> brings up the technical concern of how the employees will find a way to get around the ban and access the sites anyways

Privacy and Security
- there are also implication for privacy and security for any social website
- if you lose your users trust because of a security breach or because you cannot help them keep their private information protected you will not succeed in retaining them
- privacy protection and other related codes create obligations that companies and organizations must adhere to or this can become a legal risk

C- User Generated Content

Creating Content
- essential ingredient that is **fundamental** to most social media applications is the concept of **user generate content**
- this suggests that true social websites focus on providing the context in which the users generate content themselves
- creating a **participating identity** allows the user to create and post content
- self regulating sites allow members to report negative conduct to a moderator

Finding Content
- to make your own content useful to other users. you must label or tag it
- **tagging** associates keywords with your content to make it searchable so that other users can locate and interact with it
- by using collaborative tagging and comparing and combining how other users tag the same or similar content you derive a **folksonomy** which is a collective cloud tag that assists users in accessing information quickly and efficiently
- **viral social interactions** occur when content instantly spreads online around the world

User Generated Content and Brand Risk

- having something good about your business go viral would be wonderful but it is important to remember that drawing from the psychological concept of **schadenfreude** (drawing happiness from other misfortune) negative stories go viral more often than positive stories
- an essential element of a companies and organizations' online social strategy should be an awareness of the risks of undertaking any kind of online social campaign that might backfire
- **mashups** and **brandstorms** (situation where a traditional brand faces an online storm that can damage the value of its brand overnight) can be very negative and damaging to companies as they are created by implications, not on the basis of fact

Creating Business Utility Using Social Media Tools and E-Marketing

- **Direct Marketing**: messages, offers, or promotions that come directly from the company to the consumer in some form which moved companies into a new phase of computer enabled marketing where the two disciplines began to work more closely in tandem
- the first phase was associated mostly with the creation of mostly passive websites and the slow beginning of basic online marketing techniques such as e-mail lists
- eventually companies began to refine their efforts to understand online customer behaviour and began to customize offers presented to consumers and it was around this time that most companies began to offer some method of buying products and services online --> customers were still not interacting with the company
- the arrival of the social web was about to change everything as consumers began to realize the power of interacting online and began to demand that companies operate with a view of how they wanted to access the product
- so, the balance of power between marketers and consumers shifted --> what others were saying or doing with their product was more important and consumers began to seek out **indirect** sources of information (product ranking and review sites, word of mouth)
- this meant an emerging distrust in some instances for the direct marketing messages coming from companies and more emphasis being placed on validating what companies were saying about their brands and products

Figure 8.4: *Phase 1: Early on, marketing's use of IT technology rested solely on gathering and using e-info data*

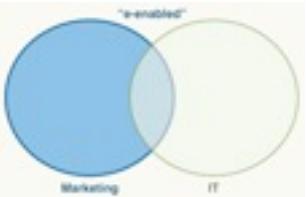


Figure 8.5: *Phase 2: As the Web began to grow, most companies began to use IT as a way to communicate directly with their customers. However, the communication was still only one way — from company to consumer*

Figure 8.6: *Phase 3: As the social web began to take over, marketing became e-dominated, where use of the Web is an integral part of marketing's communications with*

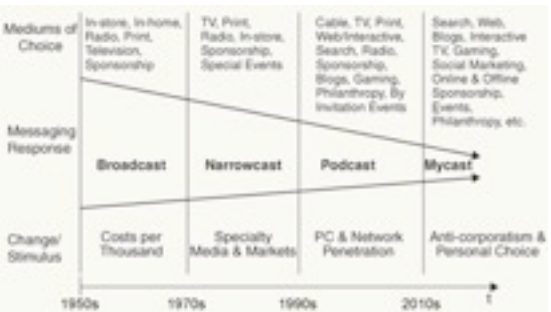
Harnessing the Power of Social Media

- facilitate employer/employee engagement
- create band-related clubs/forums (Facebook groups)
- manage online communities
- facilitate online review sites
- promote geo-purposed sites
- **media transparency** ensures branding and advertising messages are coherent and consistent

The Social And Business Impacts of WEB 2.0

- generational impact of the Web on entertainment choices --> rapid decline in the consumption of network TV as more and more choices have become available
- more disturbing to many advertisers is the similar decline in the consumption of newspapers, magazines and radio and most other forms of mass media because everyone is going online

- the amount of time spent online by the average person has increased steadily over the last 15 years as more and more people spend time online (rising across all demographics)
- this has driven a corresponding explosion in online advertising spending
- as people spend more time online they are not seeing or responding to advertising the way they used to
- many companies are realizing the importance of social media in their marketing efforts and are putting more advertising dollars into these sites than more traditional online advertising such as search and banner ads



Social Business Models

Recent things being done in the social web to great advantage and which begin to help define the business benefit of social computing in new ways:

1. conducting online focus groups for new product development (faster and easier)
2. running viral campaigns to launch new products
3. holding virtual recruiting and job fairs
4. replacing annual online surveys with virtual equivalents (more cost effective and up-to-date)
5. using social media tools to move from a broadcast to podcast model for training and development and internal communications with employees

CHAPTER 7: CREATING IS SOLUTIONS AND MANAGING IS PROJECTS

Critical Pre-Development Questions

- before implementing a new system, an organization needs to address 4 critical questions
- the "pre-development" questions happen before an organization decides to start a system design project - referred to as the concept design and inception stage
- some questions to consider:
    - 1. What are we planning and why?
    - 2. Is the project feasible?
    - 3. Should we buy or lease?
    - 4. If we build, should we do it in house or outsource it?

What are we Building and Why?

- an organization can plan to improve the performance of its business processed by automating, informating, and transforming
- it should also look for ways an IS can add value to its new or existing products
- once an organization realizes how an IS system can help them, the process of determining the best IS design for its needs begins
- by answering this question the begin to understand its high level system requirements and the business case for why it makes sense to build the system

Is the Project Feasible?

- if it is decided that an IS is needed, a **feasibility study** is conducted, which is a detailed investigation and analysis of a proposed project - determines whether it is technically and economically possible to successfully build t
- **technical feasibility** measures whether there is the technology available to solve the problem and if the company is technically capable of acquiring and using it
- **financial feasibility** measures whether or not the company is able to pay for the project and if it offers a good return to the company
    - financial measures: return on investment, net present value, internal rate of return, payback period
    - some costs and benefits are tangible (value can easily be applied) while others are intangible (difficult to measure in monetary terms)

Should we Build or Buy/Lease?

- organizations usually choose from one of three primary options for obtaining an IS: build, acquire, or lease
- **building** an IS from scratch ensures the best match of IS with an organization's requirements and it is the best option for obtaining competitive advantage because it cant be easily copied

- **building** is a long and costly process and when time and cost have a greater importance than a competitive advantage or customization, a firm often pursues buying or leasing
- **buying** an existing system often requires adjustments because your compromising the ultimate list of preferred requirements with the actual capabilities but it saves time and cost of building a new system
- **leasing** refers to using a software as a service (SaaS) or using an application service provider (ASP) - often a pay as you go approach based on transaction volumes or usage or renting access to an application on a renewable monthly or yearly basis --> major advantage is that the vendor is responsible for maintaining and updating it

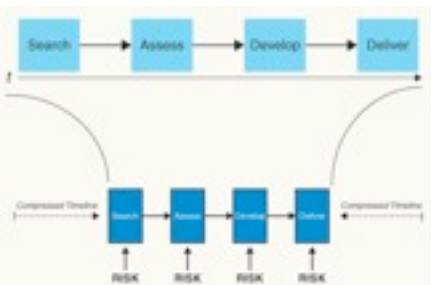


Figure 7.2: *Globalization has forced organizations to speed up their processes, including system development cycles, to become or remain competitive. However, with increased speed comes increased risk.*

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

Should we Develop In-House or Outsource?

If an organization chooses to **build**, the next question is whether to use its own staff (in-house) or to hire another company to do it (outsourcing)

- when the outsourcing company is located in a foreign country the practice is known as offshoring

	Advantages	Disadvantages
In-house	▪ Firm retains control ▪ Process builds internal knowledge	▪ More time and costs ▪ Distraction of in-house staff
Outsource	▪ High level of skill and expertise ▪ Internal project oversight ▪ Lower time and costs	▪ Lost control of project ▪ Less opportunity for internal staff to learn ▪ Requires good contracts and oversight

IS Development Teams

- people associated with an IS project usually fall within 2 groups: those on the actual project team and those who are stakeholders in the IS

The Importance of Stakeholders:

- stakeholder attitudes toward a project can dramatically impact the projects eventual success or failure
- various stakeholders who are the subjects matter experts can best inform you about various aspects of the system
- a **stakeholder analysis** should begin as part of the project feasibility study and continue during the course of the project
    - beings with a list of stakeholders, what each has at stake and the degree of impact each could have on the project
    - a project manager should assign team members to different stakeholders with an anticipated strategy for dealing with each one

A Typical IS Project Team

- the size of the project team and IS development team with vary depending on the project
- Most IS development teams possess the following:
    - **Project Sponsor**: ensures project goals correspond to the organization's business objectives --> usually a senior executive
    - **Project Manager**: ensures delivery of project on time and on budget and coordinates project team
    - **Account Management**: used when the project team works as an outsourcer and is responsible for finding clients and daily communications with them

- **Architecture and Design**: must provide a well designed user interface
- **Analysts**: provide the methods and processes to translate high level requirements in their particular area into lower levels of detail that can be turned into code by programmers
- **Developers**: creates the system by coding and deploying technical infrastructure and programming it to perform required tasks
- **Specialists**: handles unique aspects of the project (Subject Matter Experts - SME)
- **Client Interface**: can be internal or external customer, client must define system requirements, negotiate contract terms, maintain oversight of the teams

- most successful project teams consist of technical IT people as well as those with non technical skills

The Stages and Importance of the System Development Cycle (SDLC)

- an information system goes through a life cycle
- important to understand that a system created today not matter how good, cannot last forever
- IS project involves more than just technology: 4 distinct pillars that impact an IS project --> people, tools, management and methodology
- throughout the life cycle, various departments or functions will be doing different things to support the IS as it progresses through the stages its is SDLC

1. **Concept:** (also known as pre-inception or idea phase) involves the environment within an organization that either promotes or inhibits the development of ideas for systems (hopefully promotes to improve the bottom line)
2. **Inception**: the organization has an idea: focus is on understanding the problem and planning the project, early interactions with stakeholders take place
3. **Elaboration**: system team finalizes requirements for the system and create conceptual models of the systems
4. **Construction**: team builds the initial running system
5. **Transition**: team finalizes the system and puts in the place; final training of users and management is completed
6. **Production**: after the system is up an running, it must be monitored, maintained and evaluated; it must be kept up to date
7. **Retirement**: system loses value to the company and must be replaced

Traditional Waterfall Methodology

Standard IS Methodology

- a methodology provides a framework for the management and technical processes of the project throughout its life cycle
- provides a project team with structure to ensure that everyone is working toward the same project goals
- the methodology chosen will define most of the development activities that are part of the developed by the project manager
- initially, system developers used an ad hoc approach --> **build and fix** model
    - developers discussed with the boss or customers what the requirements were and then they wrote programs, created databases and knit together hardware to create a rudimentary system
    - after building the system, developers tested and debugged it
    - this model often did not satisfy customer requirements r easily allow new developers to join the project and understand what had already been done
    - due to the lack of a common approach or a shared understand and documentation of the system the organizations often depended on the developers and the resignation of the developer often impaired the future evolution of the system

The Traditional IS Methodology: The Waterfall Model

- the first development model to gain acceptance among system developers was based on the waterfall model
- in this model, there are a number of phases, and the new phase begins only after the preceding phase is acceptably completed
- if problems are found, its possible to cycle back to a previous phase
- development activities tend to move downstream though the phases in a formal detailed manner
- the idea is that if things are done right in each phase, there will be little or no need to go back
- the waterfall model is a document driven and highly structures process
- criticisms: too focused on output (documents) and not sufficiently on outcomes

- weaknesses: usually only effective when users can express their exact needs (nothing to show the user until the entire process through transition is complete), the sequential nature of the waterfall process can delay progress

Importance of Methodology to IS Development:

Advantages	Disadvantages
▪ Methodologies help teams use best practices ▪ Should avoid repeating tasks in the event of changing requirements ▪ Helps to identify and manage risks ▪ Helps detect errors early, when they are easier to correct ▪ Focuses on customers' needs and desires ▪ Makes it easy to identify and organize the project activities ▪ Helps target resources toward the activities that need them most	▪ Some methodologies can be overly rigid and bureaucratic, discouraging creativity and inspired solutions ▪ Cost

Modern IS Methodologies

- An **evolutionary model** is an approach to development whereby developers produce a partial running system that is evaluated, revised and enhanced
- a common approach to the evolutionary model is to use **prototyping:**
    - the project team works with customers to progressively build the system, starting with an initial version call the prototype
    - this process helps team members and users better understand requirements
    - **weakness**: a problem with the evolutionary life cycle model can be the failure to create a well-defined set of documents making it difficult to monitor and control the project
- a current trend is to develop systems using an **agile development** methodology to create an IS
    - with agile development, the development team develops software in short development cycles or increments
    - each cycle may include all of the primary phases of the process
    - well known method: rational unified process (RUP)

- evolutionary and agile development methodologies are an attempt to reduce the somewhat constricting formality of the pure waterfall approach
- the greater complexity and importance of the project to the strategic mission of the company, the more formality is needed in the development process

IS Modeling

- a **model** is a simplified representation of something real (a building, weather pattern, IS system)
- can be a set of mathematical equations, a computer simulation, a graph or a chart etc
- for IS development the model usually includes one or more diagrams that developers use to examine, evaluate and adjust to understand the system requirements and performance
- generally created during the elaboration phase

Unified Modeling Language (UML)

- a very popular modeling tool
- the purpose of UML diagrams is to show multiple views of the system
- together the set of UML diagrams is known as the system model
- a UML model describes the purpose of the system but not how to implement it
- the most commonly used UML diagrams include class, object, use case, state, sequence, activity, communication, component and deployment diagrams
- as a language, the UML has a grammar or rule for combining these elements into diagrams

IS Tools for IS Development

- developers need tools to create and document code and test and deploy systems

Integrated Development Environments (IDEs)

- today most software programs rely on IDEs
- an IDE allows developers to complete several programming tasks within the same software application (Microsoft Visual Studio, Eclipse)

Code Generators

- with code generation, a developer can use graphical diagrams to define a system's components and how they are related

Computer-Aided Software Engineering (CASE)

- the use of computer based support in the software development process
- CASE tools support the creation and maintenance of the many documents, diagrams, and data that the project team creates throughout the life cycle and integrates them in a CASE environment accessible to all users

Silver Bullet Syndrome: occurs when there is an over-reliance on the tools for the success of the project while neglecting the other pillars of a development project

Managing an IS Project

- **project management** is the application of knowledge skills, tools, and techniques to project activities to meet project requirements
- for IS development, a project manager oversees three main project elements:
    - 1. Project Scope: what the project should accomplish
    - 2. Resources needed: people, equipment, material and money
    - 3. Time to complete it
- project scope is often the most important to manage: increases in scope will drive increases in time and resources needed

Overview of Project Management Tasks

Four core functions lead to specific project objectives:

1. **Project Scope Management**: identify and manage all tasks required to complete a project
2. **Time Management**: estimate duration of project, develop acceptable schedule and manage project to ensure timely completion
3. **Cost Management**: prepare a budget and manage the costs of the project
4. **Quality Management**: ensure that the finished project satisfies its defined goals

- facilitating functions support the project activities: human resources management focuses on making productive use of the team members, communications management involves the supervision of shared project information, risk management, procurement management

Project Time Management

- controlling the schedule is second only to budgeting in importance
- delays in completing tasks usually go hand in hand with increases in costs
- project time management includes:
    - **Define Activities**: identifying the activities that team members need to do to complete the project
    - **Sequence activities**: identifying and documenting relationships between project activities
    - **Estimate Activity resources:** estimating type and quantity of resources
    - **Estimate activity duration:** determining how long each activity will take
    - **Develop schedule**: creating a deliverable schedule
    - **Control schedule**: keeping the project on schedule
- to manage all these activities, project managers often use a GNATT CHART

Risk Management

- most project risks reflect the fact that much of an IS plan relies on estimates
- the job of **risk management** is to recognize, address and eliminate sources of risk before they become a threat
- risk management tasks:

- risk assessment: identify potential risks and the likelihood of them occurring
- risk control: the greatest effort to manage will be on those with high probability and high impact

Common Areas of Project Risk

- Feature Creep: as the project progresses, user requirements may increase beyond the teams ability to handle them within the original project scope
- Requirements Gold-Plating: project has more requirements than originally planned
- Short-Changed Quality: when corners are cut if a project is rushed
- Overly Optimistic Schedule: can cause abbreviations in tasks and undue pressure
- Inadequate Design: not enough time allocated to design
- Silver Bullet Syndrome: when the team latches on to a new practice or technology and expects it to answer all their problems
- Research Oriented Development: when a design pushes the boundaries of what is technically feasible in too many areas
- Weak Personnel: skills and knowledge of team members are not adequate
- Friction with Customers

Responses to Risk

- *Risk Transfer*: move the risk to somebody better able to deal with it (insurance)
- *Risk Deferral*: adjust the schedule to move some activities to a later date when the risk might be lessened
- *Risk Reduction*: either reduce probability of the risk happening or lessen the impact
- *Risk Acceptance*: accept the risk, but make sure contingency plans are in place
- *Risk Avoidance*: eliminate the possibility of the risk happening

Program and Portfolio Management

Program Management

- sometimes it useful to break down a very large project into a series on smaller interrelated project or to group a series of related projects into a single work effort
- when this happens the result is called a program and the management of several projects together is known as program management

Portfolio Management

- along with choices about time, cost and quality, organizations make decisions about what projects should be undertaken in the first place
- they try to select projects that are aligned to their overall strategy that provide the company with a benefit
- the selecting and approving of projects that will accomplish their strategic objectives is known and **portfolio management**
- it is a planning process that takes place before project management

Project Management Software

- **project management software (PM)** is designed to support and automate the tasks of project management and to help project managers make decisions
- *low level packages* include tools for basic scheduling, project control, reporting and filtering and sorting
- *mid level packages* add resource leveling, resource allocation, cost control and flexible charting
- *high level packages* add advanced functions like scheduling by user defined rules

Chapter 1: IT for Business and Business Professionals

Why Information Systems Matter

- organizations and individuals must keep up with rapid technology changes of risk becoming obsolete
- the rate or technology change is greater today than ever before and it will be more important to keep up those changes
- information technology, as a part of any IS impacts all business disciplines
- in todays work environment it is impossible to do knowledge work (discovery, analysis, transformation, syntheses and communication of data information and knowledge) without technology

Moore's Law: computing power (measure by the max # of transistors in an integrated circuit) roughly doubles every 16 months

- means more performance and decreasing costs
- Moore connected the notion of underlying changes in the pace of technology with consumer access to lower cost and higher performance computing over time
- --> created a technology revolution: intro of a personal computer and the WWB
- since every technology company always assumed that its competitors would soon introduce a newer faster technology than theirs, the industry became hyper-competitive and ones of the most production and innovative industries in the world

What is an Information System (IS)?

- an **information system** is organized collection of people, information, business processes and information technology designed to transform inputs into outputs, in order to achieve a goal
- information systems enhance knowledge, work, decision making, problem solving, communication and coordination

Information System Components:

Concept	Definition
Input	Items entered into a system to transform them into outputs
Process	A series of one or more steps used by a business to transform inputs into outputs
Output	The end result of a process. Information is the result of the transformation (processing) of data. From an organizational perspective, the output of a process is a product or a service
Data	Raw, unorganized facts
Information	Processed/organized/transformed data that is useful to a person
Knowledge	Information plus human experience and judgment
System	A recognizable whole that consists of a collection of interrelated parts that interact with each other to transform inputs into outputs to achieve a goal
People	People or organizations that have both an interest in and an influence on the creation, implementation, or operation of an IS
Information Technology	The physical components, typically hardware, software and connectivity, that make up an IS. Technology enables processes to perform the steps they were designed to accomplish
Decision	A choice made from one or more alternatives to follow or avoid some course of action
Business Value	A positive return on the investment of resources that is created through the effective and efficient integration of an organization's people, information, information technology and business processes

What is Information Technology (IT)?

- **Information technology (IT)** is a collection of tools - hardware, software and connectivity - that enable individuals or businesses to achieve their goals
- is is the collection of technology used in and IS that enable the other components of an IS

The Productivity Zone

- created at the intersection of people, process, and technology
- incorporates elements of human design to accommodate how people will use the system

- combines all three of these elements allowing for superior productivity and a competitive advantage

The Internet

The internet has become an integral part of personal and business lives for the following reasons:

1. Communication: generates business value by making it possible for professionals to share info between themselves and with business partners, the internet does this through news groups, chat rooms, email, instant messaging
2. Information: key to generating business value and to increase personal productivity is the ability to make information available and to find information in a timely manner - through the WWB the internet has dramatically reduced the effort required for both of these
3. Commerce: internet can generate business value by being an avenue for the buying and selling of goods, commerce using computer networks is known and e-commerce

What's in IT for Me?

- IT knowledge can be a key contributor to your success both personally and professionally
- using technology allows you to be more efficient and effective, thereby becoming more productive
- IT is fundamental to your career
- provides a major source of entertainment and enjoyment

What's in IT for an Organization?

- organizations use IT to increase revenue per customer and gain new customers by using technology that matches your current customer profile to your buying behaviour
- IT also increases efficiency and reduces costs

Business Organizations and the Business Environment

For our purposes a business is an organization with one or more people who:

- decide on common goals to pursue
- work together to locate and organize resources
- create processes to achieve the desired goal or goals

Many different factors drive the selection of business goals one of the most important being the business environment

business environment--> complex collection of political, economic, social and technological factors that organizational leaders must consider when making decisions regarding goals, organizational forms and business value

- businesses are not relying on IT to respond to those facts

Types of Information Systems (IS) Found in Business

1. *Transaction Processing Systems*: captures and processes transactions to make them available to the organization

- it creates business value by enabling a business to efficiently and accurately track the transactions that are the heart of all business activities which can then be used to support decision making

2. *Management Information System*: through processing and reporting features and MIS provides timely information to decision makers

- timely reports enable managers to monitor critical processes and avoid costly mistakes

3. *Decision Support System*: provides analytical and visualization tools to support and enhance decision making

- it enables decision makers to make decisions based on data and to discover new business opportunities through the use of tools provided by the IS

4. *Enterprise Resource Planning Systems*: integrates and standardizes processes and centralizes and standardizes the storage and management of data

- this can reduce costs associated with duplication of processes and effort and it can also reduce the decision making mistakes made because of multiple versions of the same data, information and knowledge

5. *Customer Relationship Management Systems*: integrates data collection, transformation, storage and analysis of customer transaction data, including purchases, service request and other forms of customer contact

- this greatly increases understanding of customer's purchasing and service behaviour and needs and it facilitates timely and proactive management of customers

What's in IT for Society?

Globalization means that modern businesses are using information technology to:

- expand their market to customers around the globe
- find the lowest cost suppliers, regardless of location
- create 24 hour business days by shuttling work across time zones and nations
- much of globalization is built around the internet, which is simply a large number of cooperating computer networks that use the same rules for sending messages
- information and communications technology is a major contributor to the economy of the world in all industries
- IT is critical to the success of business around the globe

Chapter 2: Technology Essentials

The Components of IT

All IT devices are limited to the following capabilities:

- accepting and storing data and information
- performing mathematical calculations
- applying logic to make decisions
- retrieving, displaying and sending information
- consistently repeating the above actions many times

Information Technology consists of 3 basic categories:

- **Hardware:** the electronic and mechanical components that you can see and touch
- **Software:** the set of instructions that direct the hardware
- **Network Technology**: increases the power of IT by allowing the sharing of resources

----> together these 3 basic categories create a platform

1. Hardware:

- represents the physical (hard) parts of the system
- 6 basic IT hardware categories

a) **Processing Hardware: directs the execution of instructions and the transformation of data using transistors**

- transistor: electronic switch that can be either on (1) or off (0)
    - a tiny chip made of transistors--> microprocessor
    - this chip contains most of the components that make up the central processing unit (CPU)
- organizations need to select combinations of processors with varying processing power

Computer Type	Relative Processing Power	Purpose
Supercomputer	Largest and fastest	Performs processor-intensive computations using parallel processing.
Mainframe	Large	Carries out many of the organizational processing needs using high-speed processing chips and large amounts of memory.
Server farms	Medium/many	Allows multiple servers to handle network processing activities.
Personal computer (PC)	Small to medium	Enables users to carry out processing tasks needed to perform their job; usually networked together.
Personal digital assistant (PDA)/ Smartphones	Very small	Provides users with portable computing power; often used to communicate with PC or other users.
Embedded processors	Extremely small	Provides low-scale processing and/or identification; embedded in appliances and products.

***b)* Memory: temporarily stores dates and instructions before and after processing**

- computers have **long term memory (ROM)** and **short term memory (RAM)**
- both types of memory are stored on memory chips which is measured by the number of bytes stored

Read Only Memory (ROM): contains instructions that are not meant to be changed or changed infrequently

- ROM is present in most IT devices
- in computers, ROM hold instructions used to control the start-up process
- there are less ROM chips that RAM chips in a computer

Random Access Memory (RAM): the predominant form of memory in a computer

- the CPU can access any item stored in RAM directly (randomly)
- RAM in a temporary memory, so anything in RAM is lost when the computer is shut down
- increasing RAM capacity is the easiest way to increase a computer's effectiveness

***c)* Input Hardware: provides the interface used for data entry into a device**

- input devices provide on interface between the internal processes of an IS and its environment
- the allow us to enter date and commands
- includes: keyboards, pointing devices (mouse), scanning devices (barcode scanner)

***d)* Output Hardware: provides the interface to retrieve information from a device**

- output devices convert IT processed information into a usable form for people or other machines
- quality and speed of output are important when choosing an output device
- includes display devices (LCD), printers, speakers

e) **Storage Hardware: stores data, information and instructions for the long term**

- storage refers to hardware media and devices used to contain large amounts of data and instructions for the long term
- storage is much slower to access than memory
- examples include: hard drive, CD's and DVD's, USB

f) **Communications Hardware: connects ones IT device to another**

- **Network Interface cards (NIC)** provides the physical connection between the computer and local network
- when you are not physically connected to a network you can use a modem
- **modems** allow you to connect to a remote network over a telecommunications line; it converts (modulates) the digital signals going from your computer into an analog signal appropriate for the connection medium used
- recent IT technology has allowed mobile devices to connect to wireless networks by using wireless NICs

2. Software

- software is information that specifies how a device should work with other data
- software is legally protected by copyright laws
- **firmware** is software build into chips (hardware), like that in cell phones and PDAs
- 3 main categories: system software, application software and middleware

a) **System Software: includes any software required to control the hardware components and to support the execution on application software**

- Operating System software (OS): coordinated and handles the details of working with the computer hardware
    - manages the hardware and software resources of the computer
    - provides a stable and consistent interface between application programs and the hardware
- Utility Software: provides additional tools to maintain and services your system (man of which are now included in the OS)

b) **Application Software: a complete self contained program or set of programs for performing a specific job** (ex. you would use a word processing application software to write your term paper)

- it is the software you use to get things done
- **productivity software** is software used by business professionals to work with data, information and knowledge

c) **Middleware Software: links applications that use dissimilar software or hardware platforms and acts as a messenger/translator to manage the exchange of information**

- more common in enterprises

d) **Open Source Software: software that can be used, modified, improved and redistributed**

- often free or have low costs
- commonly used ones include
    - Linux - OS for servers
    - Apache - web server software application
    - MySql - database management system
    - Ruby on Rails - a web application framework

3. Connecting over Networks

Networks consist of 4 primary components

1. data

2. special hardware

3. software that allows computer to share data

4. communications media to link computers together

Network Categories

- computer networks are commonly described by the physical size of the network
- the most commonly used types are LANs and WANs
- a **local area network (LAN)** is confined to a relatively small area like a building
- a **wide area network (WAN)** connects computers over regions, countries and continents

Network	Size	Purpose
PAN (private area network) (private)	Covers a very small space that ranges from the size of a human body to a small office	Communication among computer devices in close proximity

LAN (local area network) (private)	Within the immediate location or building	Share files, resources, servers and other hardware among the members of an organization
MAN (metropolitan area network) (private/public)	Ranges in size from a few blocks to an entire metropolitan area	Provides data and voice transmission typically at high speeds (≈100 Mbps)
WAN (wide area network) (private/public)	Over a large geographical area	Share data, information and resources among units of an organization distant from one another
Internet (public)	Worldwide	Share data and information with all stakeholders in the organization, as well as with the general public

Network Hardware

3 Basic Categories of network hardware

1. Hardware to connect a device to a network
2. specialized hardware for handling network traffic
    - a bridge is a device that lets you connect to networks or break a large network into two smaller more efficient networks
    - a router connects, translates and then direct data that cross between two networks
    - a hub serves as a central connection point for cables from the devices on the network
    - a repeater is sometimes needed to strengthen signals
    - a wireless access point is a special bridge that connects between wireless devices and a wired network
3. specialized computers that control the network and delivery of date on the network
    - on most networks, specialized computers, called servers manage the various functions of the network

Network Software

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

The Internet

- any computer network that connects several networks together is an internet
- typically, we refer to the single largest and most popular internet as the “internet”
- the internet uses the TCP/IP suite of packet switching protocols
- any computer using software compatible with TCP/IP, regardless of the operating system, ca connect and communicate over the internet

Accessing the Internet

- at home users access the Internet through dial-up over traditional telephone lines or broadband through cabe or DSL
- at work, they often connect directly through the organizations LAN or WAN
- most users connect through and ***internet service provider*** *(ISP)* using internet access software
- internet access have moved into libraries, airports or coffee shops using Wi-Fi
- **Wi-Fi** stands for 802.11 standards for wireless network access
- **Voice over Internet Protocol (VoIP)** allows making calls anywhere in the world (Skype)
- **Cloud computing** allows user to use any internet connection to access their resources on virtual computers

The World Wide Web

- the world wide web (WWW) is one of the 2 most popular internet applications (email is the other)
- the Web provides a hypertext system that operated over the internet
- **hypertext** provides an easy way to publish information on the network in documents that incorporate hyperlinks to other information on the network
- **web browser** software enables users to view hypertext documents and use hyperlinks to browse other related documents

Basic Components of the World Wide Web

Client/Server Networks

- when you open a web browser on your computer, you start a client application
- if you type a **uniform resource located (URL)** which specifies a unique address for each page that indicates the location of a document into your browser or click a hyperlink the browser sends a request out over the Web that makes its way to the corresponding server
- when the request reaches its destination, the server generates a response that includes the requested item and conforms to HTTP
- **Hyper Transfer Protocol** (HTTP)which provides rules used by browsers and servers as they respond to each other
- **hypertext markup language (HTML):** provides a language for encoding the information so a variety of IT devices can display it, it is the primary language for creating web pages

Search Technologies

- users search the Web to find new of updated Web pages using search engines
- following an algorithm, the submitted pages are organized and stored in a database
- search engine tools let you query the database for sites that match your search criteria

The Technology of E-Commerce

- e-commerce is a transaction carried out using computer networks (credit, debit, atm, online purchasing)
- users can search for information on a wide variety of products and purchase the items
- comparative data on products can help with the purchase

First Generation of E-Commerce Technologies: Establishing a Web Presence

First Generation: **static content**, such as company information, online marketing and company brochures
- term often used to refer to sites with only static content is brochureware
- basic technologies are still used:
    - client/server networks: the networks over which data travels
    - browser: the application software hat lets user request and view web pages
    - HTTP protocol: the standardized rules for exchanging data over the web
    - HTML: the language that guides the display of a requested page

Second Generation E-Commerce Technologies: Providing Interaction

Second Generation: **dynamic content** where the web page changes depending on a number of factors such as time and date, user profile, or browser location
- providing interaction between the web page and user requires dynamic content based on user input and programming instructions
- the process involves:
    - **obtaining input data**: can come from several sources such as the web pages header information about user, server resources like the system clock, stored data about the user from a cookie, data input using an HTML form
    - passing data to the Web server
    - holding data in memory
    - executing the programming instructions to process the data

Storing Data on the Client Side
- to carry out e-commerce transactions, its is necessary to store data about the customer
- one was to do this is to use a **cookie** - a small bit of data stored on the client machine and passed back and forth between it the web browser
- when data remains on the client machine for a period of time it is know as **persistent data**
- cookies do create privacy concerns when hey are used to track browsing habits

Making the Client Side Dynamic and Interactive
- to make the interaction with the client machine dynamic some sort of programming is required which can occur on the client side or the server side

scripting languages like JavaScript are built into the web page to add dynamic interaction, like data validation
- activeX technology is used for sharing information among different technologies
- an applet is a small program that a browser can download and execute
- a browser plug in is a small software module that can work with the browser

Most businesses use **server side programming** to deliver truly dynamic content because its more powerful and can there do much more than client side scripting

- almost every major e-commerce site you have visited uses server side programming - when this site requires you to log in, a program on the server checks that you are a registered user
- with server side programming a business can:
    - deliver content that is customized for each user
    - dynamically modify content for any page
    - access data stored on a server-side database and send it the clients browser
    - take action on queries and data sent form the client
    - provide access control and security for a website
    - optimally manage traffic to the site

Third Generation E-Commerce Technologies: Supporting Transactions

Third Generation: Growth in businesses' ability to support transactions on the web
- in the 3rd generation of e-commerce, businesses recognized that they must deal with 3 issued to be successful:
    - 1. Making it possible for customers to find information about companies, products and services
    - 2. Making is possible for customer to order and pay online for goods and services
    - 3. Providing secure and private transactions

Order and Payment Systems
- all e-commerce sites must have components for processing orders and accepting payments
- 4 primary components of a typical e-commerce site:
    - 1. The shopping and ordering system
    - 2. The merchant account
    - 3. The payment gateway
    - 4. The security system
- most e-commerce systems use a secure HTML order form or an in-house shopping cart system
- smaller businesses often use third party merchant accounts, like that available from PayPal
- the shopping cart system is the most popular e-commerce system for larger businesses where a customer wants to buy multiple products usually using a credit card

Merchant Accounts
- an important aspect of any e-commerce system is a merchant account, which is a bank account that allows the merchant to receive the proceeds of credit card purchases
- a **secure gateway provider** is a company that provides a network to process encrypted transactions from a merchants website; it then passes the transactions on to the issuing banks credit card approval
    - it will usually provide a payment gateway and a processor; the payment gateway links the e-commerce site to the banking system
    - the processor accepts data from the shopping cart, formats it and enters it into the banking network

Steps in the E-commerce Process

1. the customer places order through e-commerce website

2. the payment gateway provider detects the placement of an order, securely encrypts the transaction data and passes an authorization request to the bank to verify the customers credit card account and available funds
3. the gateway provider returns a response, indicating whether or not the transaction is authorized, to the merchant (this process typically takes less than 3 seconds)
4. upon approval, the e-commerce merchant notifies the user and fulfills the customer's order
5. the gateway provider sends a settlement request to the merchant account's bank
6. the merchant account's bank deposits the transaction funds into the e-commerce merchants account

- the order and payment systems must be secure to protect both the customer and the merchant
- most e-commerce security technologies relate to the **secure socket layer** (SSL) protocol --> the url of a secure server starts with HTTPS and you may also see a closed lock icon in the lower corner of your browser

Fourth Generation E-Commerce Technologies: Transforming Processes

Fourth Generation: increasing integration with external partners on the Web. including allowing transactions between Web applications

- XML and Web services are moving us into the realm of automatic interaction between computers at one business with computers at another business
- for e-commerce, these technologies are improving the ability to exchange small amounts of data via the Web and to standardize transactions

eXtensible Markup Language (XML)

- XML organizes data based on its meaning rather than how it should appear
- HTML's goal is to describe how to display data
- XML complements HTML and the 2 are often used together
- XML has become a major component in a set of technologies that are helping make the Web more interactive

Web Services

- **Web services** are standardized way for one computer program to request and run another computer program over the internet
- a web service is platform-independent software component that can be:
    - described using standard description language
    - published to a public registry of services
    - discovered using a standard method
    - requested through an application program interface (API)
    - combined with other services and procedures to compose an application
- web services give companies the ability to do more e-commerce business, with more potential business partners and in different ways that before at a more reasonable costs
- web services are based on a number of accepted standards that allow everybody to work form the same basic design

- web services enable different systems to interact more efficiently and quickly link and share data
- web services continue to gain in use and popularity as they save time and create value

Internet Security

The following actions can minimize internet security threats:
- install and keep up to date antivirus software and a personal firewall
- update software to patch security holes or move to less vulnerable system
- do not open emails form unknown sources
- follow safe computing practices such as a effective password policies

To ensure that your password remains as strong as possible you should:
- use at least 8 characters
- include digits, punctuation and nonprinting characters
- use both upper and lowercase characters
- use different passwords on different accounts
- change your password regularly and do not reuse passwords

Common Internet Security Threats:

1. *Malware:* the use of malicious code as a part of a subversive organized scheme (viruses, worms, trojans)
2. *Scareware*: type of malware designed to trick victims into purchasing and downloading useless and potentially dangerous software
3. *Virus*: a program this is able to copy itself and infect a computer; designed to spread to as many computers as possible
4. *Worm*: destructive software that can spread by itself (automatically sends to all contacts)
5. *Spam*: unsolicited and undesired emails --> ay facilitate the installation of malware or phishing
6. *Phishing*: an attempt to gain personal and confidential information for fraudulent purposes
7. *Denial of Service Attack*: attempt to make a website unavailable to its users

Meaningful Applications of Technology

One of the most important applications of technology is collaboration - never before have we seen this number of technology tools that allow us to collaborate and communicate with people across the world

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

Tech Guide B- The Details of IT Hardware and Software

Evaluating Hardware Devices:

- **Cost**: we want the device to be within our budget and provide the most value
- **Compatibility**: we need hardware that works correctly with the other devices in the system
- **Data and Information Needs**: we want our IT devices to work with data and information in a specific way
- **Accuracy**: we want our devices to handle data and instructions accurately
- **Speed**: we want to work as quickly and efficiently as possible
- **Portability**: we often want our devices to be portable
- **Form factor**: the size, shape and physical arrangement of IT affects how and where we use it

The Electronics of Hardware

- primary electronic component of IT hardware is the transistor
- **transistors** are electronic switches that be on or off

Binary Numbers

- the binary number system is a convenient number system that uses only the digits 1 and 0
- the basic unit of the binary number system is a bit (binary digit)
- 8 bits = 1 byte = 1 character
- binary codes represent letters and numbers through **character encoding** which permits a specific combination of bits to represent each character

Encoding Schemes

- Extended Binary Coded Decimal Interchange Code (EBCDIC): original code used for mainframes
- Standard ASCII: original code used for personal computers
- **Unicode**: used for all personal computers today

Machine Instructions

- hardware devices execute instructions as a sequence of binary strings known as **machine instructions**

- the sequence used to represent a specific instruction is assigned in a similar manner as that used to assign binary sequences to character data

Processing Hardware
- at the core of all computing operations is the microprocessor
- the microprocessor contains the components that make up the **central processing unit (CPU)**
- the CPU works with memory to control the execution instructions and the processing of all data
- the CPU is located on the systems **motherboard** which is the main circuit board of and electronic device
- the performance of the CPU is key in determining the processing capability of IT devices

The Central Processing Unit (CPU)
Key Components:
1. **Control Unit**: performs 4 basic functions: fetch, code, execute and store
    - Fetch: obtain and write the next part of an instruction to the proper location of the instruction cache
    - Decode: send current instructions from the instruction cache to the decode unit
    - Execute: start processing calculations within the ALU and control the flow of data
    - Store: write instruction results in memory
2. **Arithmetic Logic Unit (ALU)**: executes mathematical and logic calculations
3. **Floating Point Unit (FPU)**: executes mathematical and logic calculations on non-integer values
4. **Decode Unit**: fetches machine language instructions from the instruction cache and translates them into binary code that the ALU processes
5. **Cache Memory**: provides a staging area for instructions and the data; faster than RAM
6. **Prefetch Unit**: provides a small amount of memory that stores incoming instructions in a queue while awaiting execution, thereby reducing CPU waiting time
7. **Registers**: small sections of memory that store data while the microprocessor needs it
8. **clock**: a crystal that sits on the motherboard and vibrates regularly, man times per second; clock speed refers to the number of cycles a CPU performs in the span of a tick of the computers internal clock
    - clock speed is expressed in megahertz (MHz), controls how many instructions per second the CPU can execute
9. **Bus**: a set of wires that transports data from one location to another
    - Bandwidth (Bus Size): the number of bits that can be processed by the CPU in a single instruction
10. **Instruction Set**: collection of machine language instructions that governs how the processor interprets and executes various tasks that it performs

Internal Memory - ROM & RAM

Read on Memory (ROM): permanent memory that contains instructions and data that cannot be altered
- main purpose of ROM is to hold instructions that are used to control the computer's start up processes (booting up)
- this small set of instructions is known as the BIOS (basic input/output system)

Random Access Memory (RAM): the main short term memory in a computer

- access to RAM is much faster than access to secondary storage
- memory capacity is measure in terms of bytes that may be stored
- the size of the CPU address bus determines the max number of memory locations that can be addressed
- types of RAM:
    - **Dynamic RAM (DRAM)**: the majority of RAM; data in an array of chips that has to be electronically refreshed several hundred times a second; if the array loses its charge all data held there is erased
    - **Static RAM (SRAM)**: faster and less volatile the DRAM, but much more expensive
    - **Peripheral RAM**: often found in the peripheral components (printers or video cards) of your IS

Storage Hardware

- because of he limited amount of internal storage and the volatility of RAM, some form of storage external to RAM is necessary to permanently store data and programs
- this secondary storage usually comes as magnetic storage media, optical disks or chip based flash memory

Magnetic Disks are used as a form of direct access storage; information may be accessed in any order

- **Disk Drives** spin the disk while reading and writing information onto it
- **hard disks** serve as the main storage device for programs

Optical disks use a laser to read and write data

- the two main types are compact disk (CD) and digital versatile disk (DVD)
- have very large storage capacity but are not as quick as hard disks

Chip based Storage

- flash memory is a special type of chip based memory that can be written to as well as read into internal memory
- known as USB flash drives

Operating Software

Comparison of Operating Systems

- operating system functions apply to all computers regardless of size
- there are important differences between the operating systems for mainframes, networks, personal computer and hand held devices --> primary difference are the number of users and the complexity of the peripheral devices they manage
- mainframe and networks manage multi user system
- most personal computer and hand held devices deal with a single user
- mainframes and networks also require more sophisticated security because they are dealing with multiple users

How the Operating System Works

- All operating systems consist of 2 parts: the kernel and the command interpreter
- **kernel** handles requests from application programs or hardware and determines the processing order
- **command interpreter** (shell in UNIX OS systems) accept commands from users and translates them for the Kernel
- **graphical user interface** (GUI) is used to communicate with the command interpreter

- **application program interface** (API) allows the application program to make request to the OS of another application

Operating System Responsibilities

1. starting the computer
    - relies heavily on the ROM
    - power on--> activates ROM --> causes BIOS to provide instructions to the CPU to perform a power on self test --> after POST, ROM/BIOS tells the CPU to fidn the system disk and read operating systems programs from secondary storage --> CPU loads OS files into RAM --> CPU implement instructions in the OS files and then displays the OS interface
2. Managing Hardware
3. Controlling access to the computer
4. Providing an interface for the user
5. Ensuring efficient use of he CPU
6. Providing services to application software

Managing Hardware

- the operating system acts as a go-between for the user, software and hardware system
- hardware management includes:
    - **input**: operations like accepting date from keyboard and instructions from mouse
    - **output:** sending information to the monitor and to a printer
    - **transfer**: of data, instructions and informations between the CPU chi and internal memory and secondary storage
    - **mainframes:** hardware for multiple users
    - **Network OS:** controls the communications between devices on the network

Controlling Access

- a mainframe or network operating system must provide security to everyone's data, information and programs against unwarranted intrusion
- access controls exist that require the user to enter a password to use a PC

Efficient use of the CPU

- a key task of the operating system is to ensure that slow input/output does not hold up the CPU
- one was to keep the I/O from interfering with processing is to perform run programs concurrently, this is, the CPU processes part of one program, then part of another and so on
- the OS allows CPU **multitasking -** handles multiple programs or tasks at the same time; jobs are placed in a queue to be executed according to their level of priority

Providing Services to Application Software

Operating systems provide a number of services to application software, including:

- running the application software and ensuring that needed resources are available (ex. when the user instructs a word processing program to print a document, the application software issues a command to the operating system. which handles the printing job)
- determining the order in which concurrent programs will be processed
- file/disk management
- providing memory management

Application Software

- application software is designed to help us accomplish work and tasks on the computer
- application software for business comes in 2 primary forms:
    - **Commercial off the shelf software**: ready to install and use without further modification on the part of the user
    - **Custom developed software**: software which is developed by a company specifically for its own use

Developing Customized Software

- to achieve a competitive advantage a company must often custom develop software to meet its particular needs
- computer programs are based on algorithms which are detailed sequences of actions that when followed will accomplish some task
- the process of creating a computer program is called programming, which uses one of a variety of computer languages to communicate with the computer

Open Source Software

- open source software is software in which the programming code is freely available to anyone who wishes to download it over the internet
- the only requirement is that any change a programmer makes to the open source code must also be made freely available to others
- **proprietary software** is software that requires a license that must be purchased by a company and the source code is not available to anyone outside of the company

Chapter 3 - Creating Business Value

Business Organizations and Business Processes

- because of the sheer number of different tasks that need to be coordinated to deliver the end result product or service a company needs a **business strategy**
- a **strategy** is a broad-based formula how how a business is going to compete, what its goals should be and what plans and policies will be needed to carry out those goals
- IT is an essential elements of any organizations strategy

Businesses as Open Systems

- the **open systems model** indicates that a business operates by transforming inputs into outputs and by constantly interacting with its environment
- 2 significant components of the business environment: stakeholders and boundaries

Stakeholder

- a **stakeholder** is a person or entity that has an interest in and an influence on how a business will function ; a stakeholder can be external or internal relative to the business

Boundaries

- all open systems have an **organizational boundary** that separates them from their environment but still allows them to interact with their environment
- a business must be aware of what is going on its environment so it can take steps to remain competitive by responding to opportunities or threats
- interaction with the environment carries risk especially when the environment changes constantly

How Businesses Organize to Create Value

- all business organizations possess structures that organize information, responsibility and authority

- types of organizational structures include **functional decentralized,** and **matrix** structures
- in **functional and decentralized** structures lines of authority are vertically oriented
- a **matrix** organization is a blend of functional and decentralized organizations that uses teams

Organizational Form	Advantages
Functional	▪ Economies of scale ▪ Technical expertise in functional areas ▪ Clear chain of authority and communications
Decentralized	▪ Faster response and greater flexibility ▪ Greater communication and coordination ▪ Greater development of breadth of skills
Matrix	▪ Increased flexibility and responsiveness ▪ Enhanced problem solving, cooperation, communication and resource sharing ▪ Decision making lower in organization

Business Process

- to transform inputs into outputs (goods and services) organizations need to perform a series of steps known as a business process
- a process receives inputs, undertakes some actions and then produces outputs
- a sub-process is one or more tasks that accomplish a significant portion or stage of a process
- manufacturing processes directly create output in the form of a product
- other processes create a service
- **feedback** is a special kin of measurement created by a business process that this then returned to the system to control the system future inputs, processes and outputs
- **business process reengineering (BPR)**: the study of business processes to find ways of making them more efficient; goals are usually to reduce costs, increase throughput and speed, and increase quality and service --> increase competitive advantage

Defining Competitive Advantage

- all organizations must focus on improving results all the time --> continuous improvements
- **competitive advantage =** quality of insight + speed of execution + cost competitiveness
- good IT systems are deploys to improve the quality of insight of those making decisions, to improve speed of execution, to reduce cots and to increase the efficiency of processes

Applying IT to Create Business Value

- IT can be applied to value chain activities to create business value in 3 ways:

- 1. Automating
- 2. Informating
- 3. Transforming

1. **Automating to Do Things Faster**

- automating uses technology to perform tedious or repetitive tasks faster, cheaper and more consistently
- the organization uses technology to do the same things as before, but with greater efficiency and accuracy, and also to do new things

Industry	Automation	Benefits
Banking	ATM machines, online banking	▪ Reduces costs associated with the processing of transactions ▪ Increases flexibility and improves access to services
Grocery/Retail	Barcode inventory systems	▪ Increases speed and accuracy of transactions ▪ Reduces costs and transfers control to customers
Travel	Reservation and scheduling systems	▪ Faster and more efficient processing of reservations ▪ Allows transfer of processes to customers through online services

2. Informating to do Things Better

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

3. Transforming to Gain Competitive Advantage

- since one of the primary goals of business it to achieve a competitive advantage, most businesses have a transforming view of IT, that is, to use IT to acquire or continue a competitive advantage over competitors
- two basic ways to obtain a competitive advantage:
    - A company gains a **cost advantage** when it delivers the same benefits to customers as competitors at a lower cost
    - A company gains a **differentiation advantage** when is delivers superior benefits to customers
- to be successful and continue to be successful, businesses must be armed with data and information about their business, competitors and the business environment
- once armed with this knowledge, business leaders must make decisions and solves problems based on this information

Decision Making

- a **rational decision** is a choice about actions to take or not take in a given situation after analyzing the consequences of each option
- a **structured decision** is one that can be programmed; it is routine or repetitive
- a **semistructured decision** is one that involves some uncertainty or doubt about the outcome
- an **unstructured decision** is one that involves a significant amount of uncertainty about the outcome

Using Information in Decision Making

- rational decision making is all about using information to reduce uncertainty
- information systems help businesses by providing information to decision makes
- another important element of good decision making is what to do when you receive new information - is it valuable and should it influence your decision?
- information should be complete, accurate, reliable and timely
- **productivity** is the ability to create business value with the least cost
- **efficiency** is getting the most output from a given input
- **effectiveness** is pursuing the goal or task that is appropriate for the given situation

Problem Solving

- a **problem** exists when we find ourselves in a current situation that fails to meet our goals, needs, or expectations
- problems are often the result of a past series of events or lack of events
- once we recognize that a problem exists, we have an opportunity to solve it
- **problem solving** refers to a series of steps or a process taken in response to some event or activity

The IADD Model

4 Major Steps: **I**nvestigate, **A**nalyze, **D**ecide, **D**o

1. **Investigate**: determine if there is a problem or an opportunity and if it is possible to solve the problem or take advantage of the opportunity

- business professionals identify a challenge or problem and gather data to determine it meeting the challenge or solving the problem is possible
- problems tend to be defined or identified in terms of what went wrong with a process or action
- problems can be defined by comparing your current situation to a desired current or future state and noticing a difference
- problems can also be defined as opportunities or challenges

2. **Analyze**: gather data that are relevant to the problem or opportunity

- look for clues that will help determine what happened

- generate alternative solutions and determine criteria that will be used in selecting a solution
- IS can help with analysis
    - databases and software are tool for organizing and storing data
    - tools are provided to manipulate data and ask questions of your database - querying and data mining

3. **Decide**: Evaluated solution and make choices regarding how to implement the solution

- choose the best solution and describe how it will solves the problem, meet the challenge or capitalize on the opportunity
- synthesize the best ideas from the alternative solutions into a best solution

4. **Do**: implement the solution and monitor the results

- tasks and other physical activities are carried out according to your solution
- often requires planning, scheduling, managing and supervising: project management skills are often required

Chapter 4: Enterprise Systems

The Value Chain

- the **value chain** is a connected series of activities, each of which adds value or supports the addition of value to the firm's goods and services
    - inbound logistics: receiving, warehousing, and inventory control of raw materials
    - operations: value creating and often proprietary activities that transform the raw inputs into the final product
    - outbound logistics: activities required to get the final product to customers
    - marketing an sales: all activities associated with getting buyers to purchase the product
    - service activities: those that maintain and enhance the products value (customer support, repair services, and warranty and recall)
- every action an organization takes, from securing the necessary raw materials (input) to making the goods or service (process) to completing a transaction with a customer (output), is either a primary or a support activity
- a transaction is an exchange of goods or services (value) between two or more parties

Primary Activities

- Primary activities are directly related to the production and distribution of the organizations products and services that create business value for the organization and its customers
- includes inbound logistics, operations, outbound logistics, marketing, sales and service

Support Activities

- support activities are value chain activities that an organization conducts to support the creation of business value
- support includes:1.
    - Firm Infrastructure (administration)
    - Technology Development
    - Human Resource (HR) management
    - Procurement

Summary of the Value Chain

- an organizations value chain s the sum of its primary and support activities working together to create business value
- through an intelligent use of IT, a business can increase its competitive advantage by incrementally changing the value adding activities themselves, or by making it possible to configure the value chain in a new way

Information Systems that Support Business Activities

1. Functional Information Systems

- focus on departmental activities to improve efficiency and effectiveness

System	Description
Accounting IS	Dedicated to tracking and reporting a firm's financial health
Marketing IS	Supports marketing research and decision making
Human Resource IS	Supports activities related to managing the employees of an organization
Financial IS	Provides financial information to an organization's financial managers
Manufacturing IS	Supports manufacturing processes and activities

2. Workflow Management Systems

- a **workflow** represents steps, resources, input and output data and tools needed to complete a business process
- a **workflow management system** or business process management focuses on a business process from beginning to end
- WMS enables modeling the steps of the business process to show the flow of work along with the state of components
- benefits--> less misplaced or stalled work, managers can focus more time on business decisions rather than tracking work, because developing a WMS required formal documentation of all procedures, more analysis and tighter control of the processes result

3. Transaction Processing Systems

- TPS enable transaction activities and capture key data created by the transactions
- a transaction is a unit of work that has the following characteristics:
    - **Atomicity**: a transaction must be unequivocally completes. If an errors causes the transaction to fail, then the entire transaction to that point should undone and date reset to its previous state
    - **Consistency**: the data captures by the transaction must fit within the rules of the data storage
    - **Isolation**: each transaction should execute independently other other transactions
    - **Durability:** completed transaction should be permanent
- TPS software applications must incorporate the logic for controlling and enabling the transaction, the business rules of the organization that apply to the transaction, and necessary error handling logic

4. Management Information Systems

- businesses use captured and stored data to create information, which is used for decision making
- one way to have information available is to store it in the form of reports created by a management information system (MIS)
- MIS typically generates 3 types of reports
    - Periodic Report
    - Exception Reports
    - Demand Reports

5. Document Management Systems

- some modern versions of MIS are referred to as document management systems
- a DMS enters, tracks, routes and processed the many documents used in an organization
- documents can be created electronically or converted to electronic form using imaging technology
- can be used to support workflow system by managing storage and routing of documents

6. Knowledge Management Systems

- knowledge is the most difficult form of informational resources to store and share
- 2 types of knowledge--> explicit knowledge and tacit knowledge
- *explicit knowledge* includes everything that can be written down, stores and codified
- *tacit knowledge* includes know how that people have through learning and experience
- to support tacit knowledge, knowledge management system often rely on **collaborative software** which supports teamwork (groupware)
- benefits on knowledge management are difficult to calculate
- **expert systems** are a form on knowledge management that tries to capture and store the knowledge of a human expert

7. Decisions Support Systems

Type of DSS	Description
Communication-driven DSS	Focuses on communications, collaboration and shared decision making
Data-driven DSS	Focuses on access to and manipulation of internal company data
Document-driven DSS	Focuses on retrieval and management of unstructured documents
Knowledge-driven DSS	Aids decision making by suggesting actions to users
Model-driven DSS	Focuses on access to and manipulation of a model

8. **Supply Chain Management**

- a **supply chain** is a system involved in moving a product or service from a supplier to a customer
- **supply chain management** integrates supply and demand management within and across companies; seeks to optimize the supply chain to create business value and competitive advantage
- includes materials management, inventory management, order management, logistics management

9. Enterprise Resource Planning

- **enterprise resource planning (ERP)** software integrates the departments and functions across and organization
- with ERP a company runs all of its applications form a single database
- each functional unit (finance, marketing, accounting) still uses its own supporting enterprise software applications but ERP links these applications and ensures their compatibility via common data storage
- benefit--> streamline business processes and can support all areas of the value chain
- disadvantage--> can become very complex and difficult to manage as it grows

Enterprise Systems that Support the Value Chain

- **Enterprise Systems** are large scale application that support business units or function
- they are another way that an organization might apply IT to its value chain
- enterprise systems support every area of the value chain an organization may have many
- enterprise systems ether bought or built internally can be very expensive to implement and maintain --> companies look for more economic ways of fulfilling the need for these systems (SaaS, ASPs)
- **inbound logistics** include activities such as raw material procurement and warehousing
- **operations** are the activities required to create a product or service and make it available to the marketplace; unique to each organization
    - computer aided design and computer aided manufacturing software can be used
    - production scheduling tools
    - quality management

- **outbound logistics** involve warehousing and distribution of finished goods
    - enterprise systems supporting the outbound logistics component of the value chain include systems that get products into the hands on consumer (TPS)
- **marketing and Sales** investigates what customers needs and determines the products and services to meet their needs
- **customer relationship management (CRM)** provides the tools to service customers better
- **administration and finance systems** are aimed at automating and optimizing administrative processes to reduce costs and ensure efficiency
- **human resources** is responsible for recruiting, hiring, training and compensation
- **technology development** supports the value creating activities of the organization such as intranet
- raw material necessary for the product or service are acquired in the **procurement** process

Software as a Service (SaaS

- by using **software as a service** companies can essentially rent software
- **utility computing services** provide on demand software, hosted on servers, which can be accessed from anywhere
- advantages for clients:
    - clients no longer have to develop or maintain the applications
    - applications are available anywhere clients can gain access to the web
    - costs are reduced, as clients only pay for what they use and for only as along as they use the service
- disadvantages:
    - clients must be willing to let go of some control over the applications
    - wont be able to gain competitive advantage because competitors can also use them --> implies that these types of services would be best suited for processes that are common to most organizations such as accounting

Software as an Outsources Service

- software can be provided to organizations through an application service provider (ASP)
- an ASP is an online technology company that develops and delivers software tools on the internet
- payment is often based on fees or subscriptions
- advantages
    - when an organization uses an ASP, an external company builds and operates the system which means that the organization does not need to acquire its own technical resources or hire staff with technical expertise

	SaaS	ASP

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

Roles of IT Governance and Leadership in Creating Business Value

- effective IT governance and leadership combine Porter's competitive strategies with the value chain model to help create business value
- examples of ways IT can create business value include:
    - integrating technology to reduce or eliminate costs throughout its value chain until it becomes the lowest cost producer or retailer
    - developing a specific IT strategy which enables the business to implement its lowest cost strategy
    - enabling outsourcing opportunities with reduced labor costs that help the business offer lower prices
    - developing a strategy that includes how to support global operations
    - measuring the performance and costs of the automation or outsourcing efforts against the unit cost savings for the product or service
    - if the IT strategy does not meet the lowest cost business strategy, IS leadership must act to bring performance in line with expectations

Enterprise Risk Management (ERM)

- all businesses face threats and risks to current and future operations
- when creating and implementing a business strategy, a business must attempt to identify, address, and eliminate elements of risk before they threaten its success
- to do this businesses apply **enterprise risk management** which is:
    - affected by an entity's stakeholders
    - applied strategically across the enterprise
    - designed to identify potential events that may affect the entity and manage risk to be within its risk appetite to provide reasonable assurance regarding the achievement of entity goals

The Role of Compliance

- compliance is about adhering to the laws
- compliance reduces risk through policies and processes that ensure proper financial and accounting procedures
- it protects employee and customer data that corporate IS stores, processes and transmits
- it builds trust in the integrity of the organization's practices

Control and Controls

- one way to avoid risk is to implement controls
- **control advantage**: the strengthening of internal controls and compliance through IT based controls to business processed, policies and procedures
- **Control**: a process that runs throughout the organization influencing how people behave at work
- **controls**: specific actions, including policies and procedures, designed to ensure the achievement of business objectives
- *effective controls* prevent, detect, and correct actions that increase the enterprises risk of failing to meet business objectives

Internal Control

- effectiveness and efficiency of operations
- reliability of financial reporting
- compliance with applicable laws and regulations
- could be preventive (requiring employees to change their password every 30 days), detective (warning e-mail after 25 days to change your password) or corrective (if they have not changes their password on the 30th dat they may be locked out of the system)

Specific Internal Control Processes

1. Segregation of duties: ensures that here are no conflicts of interest
2. authorization: defines scope of work and prevents scope creep
3. security: defines access rights
4. ID codes: create an audit trail that organizations can follow to ensure proper controls are in place and working
5. verification: confirms the application is accomplishing e-commerce functions without error
6. control totals: detect fraudulent actions
7. supervisory review: supervisors should audit and review processes and transaction periodically

Chapter 5: E-Commerce

E-Commerce Defined

- e-commerce is the use of information system, technologies and computer networks by individuals and organizations to carry out transactions in order to create or support the creation of business value
- this general definition includes all types of computer networks, all types of transactions and all types of business relationships and models

	Description	Examples of Websites
B2C	Online equivalent of retail store as well as other services	www.chapters.indigo.ca www.amazon.ca
B2B	Electronic exchanges between companies	www.manheim.com www.boeing.com
B2G	Online sales to government agencies	www.ppitpb.gov.on.ca (Ontario government)
C2G	Electronic payment of taxes	www.netfile.gc.ca
C2C	Use of online auctions	www.ebay.ca auctions.yahoo.com

E-Commerce and Products: Physical and Digital

Physical Products: anything that requires an actual shipment of a package to the buyer

- this also requires an off-line supply chain to handle the sales, order processing, and delivery of these goods
- must have back office elements to handle order fulfillment and returns for physical goods

Digital Products: can be received directly over the Internet or other computer network
- requires the use of a completely IT-enables supply chain
- no returns

E-Commerce Business Models
- a **business model** defines how a company will meet the needs of its customers wile making a profit
- an **e-commerce business model** combines a specific type of website with a successful revenue model that produces profits for the website owner
- ways in which most companies currently make money on the Web:
    - displaying advertising
    - selling good and services
    - earning royalties, access fees, or revenue sharing from selling access to their platform
    - selling aggregate data about online user behaviour
    - getting users to subscribe to your service
    - selling upgrades to a premium subscription service by first offering a free service with more limited capacity (freemium model)
- having a great e-commerce business model will not generate a profit if its not associated with a website that brings in customers or visitors
- most online companies choose to focus on only one or two of the models to maximize their focus and their profits

	Purpose	Examples	Business Model
Portal	A gateway to many other websites	Netscape, Yahoo!, MSN	Advertising, Affiliate
Search Engine	Finds websites that contain a word or phrase	Google, Yahoo!, MSN, DogPile	Advertising, Affiliate, Infomediary
Browse or Search and Buy	Sell goods and services	Dell, LandsEnd, iTunes	Merchant, Infomediary, Manufacturer Direct, Co-operative
Sales Support	Provide information on a product before or after the sale	Microsoft, BMW, McAfee, Telus	Community, Infomediary
Information Service	Provide news, information, commentary, etc.	National Post, TSN, Economist	Subscription, Community, Affiliate
Auction	Facilitate sales between third parties	eBay, PayPal	Brokerage
Travel	Sells travel tickets and tours	Delta, Travelocity, Orbitz, itravel2000	Merchant, Brokerage, Co-operatitive
Special Interest or Services	Provide information, product sales and support and contacts between visitors	Lavalife, Microsoft support groups	Community, Merchant, Affiliate, Infomediary, Advertising

The E-Commerce Advantage

- the use of computer networks to carry out transaction is creating a tangible e-commerce advantage in our economy especially with regard to: technology, competition and strategy
- often referred to as the *frictionless transactions* **-** the ability of the consumer to move from thought to action creates new opportunities for businesses to operate at lower costs by easing the burden of the supply chain electronically
- over 1.5 billion potential customers in the marketplace due to increasing Internet access - **global reach**
- **universal standards** make it work the same way no matter where in the world you are
- it also allows for the instant creation of niche businesses targeting small markets that would not be dense enough in any single geography to support a small local retailer
- the expansion of global e-commerce has produced global competition with sellers being able to reach any potential buyer worldwide

Information Clutter
- also increased buyers level of **information density**: that is the quality and quantity of information about products and services
- customers can obtain product guides, reviews and prices from a number of websites due to **online advertising** and **search engine optimization** (technique to make your website more visible to search engines and spiders to get people to your website)
- **partnering and traffic trading:** in the online world you ca partner with other sites and each of you can cross list the others website and trade potential traffic that comes to the site

Mass Customization and Personalization
- one response to information density is to create business value based on a customization approach to e-commerce
- **Mass customization** is the ability to create custom products or services on demand (Dell)
- **Personalization** is a personalized marketing message for each potential customer based on searching, browsing, or buying habits (Amazon)

Web Usage and Statistics
- once you have your website up an running, besides using methods to generate traffic, make sure to pay attention to how the traffic uses your site
- many web statistics reporting software programs are available

E-Commerce Competitive Difference

E-Commerce is having a dramatic effect on competition between organizations in a number of ways:
- reducing barriers to entry
- preventing any company from owning the market
- enhancing collaboration/alliances
- multiplying market niches
- changing marketplace drivers (forces that make things happen in the market)

E-Commerce and Business Strategy
- technology advances change business strategy

- strategy emerges and evolves over time in natural response to a constantly emerging competitive landscape and the individual performance level of any competitor in that market space
- **an e-commerce strategy** is a general term for how a business is going to use Web-based networks and information systems to compete in a global marketplace
- building an e-commerce strategy requires 2 views of an organizations strategy:
    - 1. What it wants to do (conceptual)
    - 2. How it will do it (technology strategy)
- one strategy being used by many companies is customer relationship management which enables them to create one to one marketing experiences for their customers
- other e-commerce strategies include:
    - virtual showrooms
    - increased channel choices
    - wider component choice
    - use of mobile technology
- **Mobile Commerce** is the use of laptops, mobile phones and PDAs to connect to the internet and Web to conduct many of the activities associated with e-commerce

Benefits and Limitations for Consumers

Benefits

- lower prices
- shopping 24/7
- greater searchability for products
- shorter delivery times for digital products
- more sharing of information with other consumers
- improved customer service

Limitations

- delay in receiving goods plus shipping charges
- slow download speeds
- security and privacy concerns
- inability to touch, feel, smell, try out, or try on products before purchasing
- unavailability of micropayments for purchases of small cost items

Benefits and Limitation for Business

Benefits

- expansion of marketplace to global proportions
- cheaper electronic transaction
- greater customer loyalty through customized web pages and ones to one marketing
- expansions of niche marketing opportunities
- direct communication with customers through website often resulting in better customer service

Limitations

- increased competition to due global marketplace
- ease of comparison between competing products drives prices down
- customers want specific choices and not accept substitutes

- customers control flow of information instead of companies

E-Commerce between Organizations

- doing business with other organizations (B2B) is by far larger than with consumers (B2C) in terms on volume of transactions and dollar amounts
- is is also quite different in terms of scope of the purchases and the complexity involved in them - especially in the decision making process required to make a purchase (ex, while you may buy one PC, a company may buy thousands)
- inter-organizational systems are the information systems tat handle the information flow between trading partners

B2B Transactions and Business Models

2 types of B2B transactions: spot buying and strategic sourcing

- **spot buying** is much like what you do when you make a stock market transaction; you buy at market prices determined by supply and demand from someone you don't know (usually done to purchase commodities)

strategic sourcing involves forming a long term relationship with another company, prices are set through negotiation

- in the **one to one marketing model** two companies form a trading relationship that is good for both of them
- in the **company centric business model** a company is either a seller to many companies (one to many) or a buyer from many companies (many to one) --> in either case the single company tends to dominate the market and controls the information systems that support the transactions. **Electronic data interchange (EDI)** or an extranet is often used to link trading partners
- **e-procurement** is often the name for B2B e-commerce in the many to one business model because it provides a single buyer with products that it needs to carry out its business

Exchange Model

- many companies use an exchange to buy and sell from each other through spot buying transactions
- vertical exchanges meet the needs of a single industry
- horizontal exchanges deal with the products and services that all companies need regardless of the industry (supplies)
- an exchange is typically a website where buyers and sellers post their needs and offerings

Using B2B E-Commerce to Improve Supply Chain Efficiency:

- procurement is a big part of the supply chain, and using e-commerce for procurement has resulted in cost savings

Traditional Procurement Process

- Traditionally, this paper flow has involved 3 key elements: the purchase order, invoice and receipt of goods
- 1. Purchase order to vendor

- 2. goods to buyer along with bill of lading
- 3. upon receipt of goods and BOL, signed copy of BOL returned to vendor and receipt of goods is filed
- 4. vendor sends invoice to buyer
- 5. buyers accounting department compares PO to receipt of goods and invoice and if it matches they pay the vendor

Using E-Commerce to Improve the Procurement Process
- E-commerce replaces the paper documents
- employees can quickly compare digital files with far fewer errors and less opportunity for fraud
- an **inter-organizational system** is a networked information system used by two or more separate organizations to perform a join business function
- the 2 most common forms of IOS --> EDI and extranets

Electronic Data Interchange (EDI)
- EDI uses private networks to allow the exchange of structured information between two computer applications with a minimum of human involvement
- even though often overshadowed by newer technologies, EDI remains the engine behind the majority of e-commerce transactions worldwide
- EDI is too expensive for most small businesses

Extranets
- extranets are collaborative networks that use Internet technology to link businesses with their customers
- security measures keep data secure and XML is used to transfer the data
- an extranet can be thought of as two connected intranets

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

Chapter 6 - Database Management and Business Intelligence

What are Data, Information and Knowledge?
- the flow of data and information to create knowledge is what creates value in organizations
- **data** are raw unorganized facts, numbers, pictures and so on
- **information** is data that have been organized and are useful to a person
- **knowledge** is created when a person combines experience and judgements with information
- **wisdom** adds insight and ethics to the experience and professional judgment inherent in knowledge
- IT and systems assist primarily with collecting, collating, and analyzing data and information

Lifelong Knowledge Creation
- to be successful, always strive to create or acquire new knowledge
- *explicit knowledge* is readily codified, such as the knowledge in a textbook
- *tacit knowledge* is gained through experience, insight and discovery

Knowledge Work Activities: involves the discovery, analysis transformation, synthesis and communication of data, information and knowledge
Discovery: the finding of data, information and knowledge relevant to a task, problem, issue
- search engines are an important part of discovery
- intranets contain data about the company that can be searched by employees to find best practices

Analysis: the knowledge work activity that involves thoughtful investigation and examination of available data, information and knowledge
- spreadsheet software is widely used in analysis

Transformation: involves organizing the results of analysis activities
- often involves transforming data using databases into information that can be used to create business value
- database management systems are important to the transformation process

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

Communication: sharing analysis with others

Databases: The Primary Data Storage for Organizations
- all business information systems rely on stored data to make decisions
- the primary technology for data storage is the database
- a **database** consists on interrelated data that are stored in files and organized so that computer programs can quickly and easily access specific pieces of data
- a **database management system** is a collection of software that allows users to create and work with a database
- together a database and a DBMS make up a database system

The Data Hierarchy
- to organize data in a database most users rely on the data hierarchy
- **the data hierarchy** organizes stored data in creasing levels on complexity:
  1. Bit
  2. Character
  3. Field - combination of characters representing a data item such as a name

4. Record - collections of fields (name, address, gender, age)
5. File/ Table - collection of all records
6. Database

The Relational Data Model

- the **relational data model** stores data in one or more tables corresponding to entities such as suppliers and products for a retailer, and the relationships between those entities
- databases then use these defined relationships to store the connections between the entities, such as which supplier provide which products
- tables consist of records that correspond to rows int he tables
- a record generally holds data about a single instance of an entity
- a record consists of one or more fields
- fields are often referred to as attributes and correspond to columns of the tables
- the product and vendor tables each store one field that has a unique value for each record called the **primary key**
- when a second table uses the primary key of one table as a reference field in its table the field is a **foreign key**
- **relational database management systems** are the most popular way of storing large amounts of data
- a **query** is a method for asking a question of a database --> Standard Query Language provides general rules for formulating the queries on relational databases

Designing a Relational Database

Data Modeling

- the process of analyzing the data required by the processes of an organization to support it bother operationally ad strategically
- data models are often the first, high level step in designing a relational database

Entity-Relationship Diagram and Logical Data Model

- the 2 most commonly used models for designing the organization of relational database

Entity Relationship Diagram (ERD)

- indicates the entities and how they are related (one to one, one to many, many to many)

Logical Data Model

- translates ERD into a digram of the tables in the data base

Data Flow Diagrams

- traditional IS model that depicts how data moves through a system
- it includes:
    - external entities that send input or receive output from a system
    - processes that show activities that move or transform data
    - date stores that usually correspond to tables in the data model
    - data flows that connect the components

Other Methods to Store Data, Information and Knowledge

- in addition to using databases, there are a number of others way to store data, information and knowledge including:
    - data warehouses
    - Management information system

- knowledge management
- collaborative software

Using Data Warehouses

- a **data warehouse** is a way of storing and managing data for information access
- it consists of transaction data that has been cleaned and restructured to fit the data warehouse model
- it is meant to support queries, summary reports and analysis
- because data warehouses are very large in comparison with databases they work with tools that allow users to deal with vast amount of data
- **data marts** are used to extract and reorganize specific data according to needs
- data warehouses often provide support for organizing multidimensional data which is also known as slicing and dicing
- businesses access and use a data warehouse for 4 primary reasons:
    - 1. automatic production of reports and queries
    - 2. queries against summary or detailed data
    - 3. data mining for detailed data to find trends or patterns in large sets of data
    - interfacing with other applications and data stores

	Database	Data Warehouse
Supported Activity	Operational	Analytical
Response Time	Fast	Can be slow
Age of Data	Current transaction	Historical data
Scope	Limited area within organization	Provides view of entire organization
Data Variability	Changes often	Infrequent changes
Source	Transactions	Multiple sources
Data Model	Business rules	Aligns with overall business structure

Business Intelligence

- **Business Intelligence** is a process for gaining competitive advantage through the intelligent use of data and information in decision making
- data and information must go through several staged to be used in decision making
- IT assists at every step

Stage	Description
1. Data sourcing	Mining data and information from text documents, images, media files and web pages
2. Data analysis	Producing useful knowledge from collected data and information
3. Situation awareness	Culling out and relating the useful facts and knowledge
4. Risk assessment	Identifying decision options and evaluating them
5. Decision support	Using interactive software tools to identify and select intelligent decisions and strategies

Using SQL to Query Relational Databases

- The primary function of a database is to let knowledge-enabled professionals obtain information in a usable form using queries (questions).
- To query a relational database, many people use **Structured Query Language (SQL)**, which is a computer language for manipulating data in a relational database.
- SQL queries also enable database users to add new records, or change or delete records.

Important Terms

- **Primary key**: a field that holds a unique value for each record in a table
- **Foreign key**: the primary key from another table that is in the current table; it relates the two tables
- **Entity**: another name for a table in a relational database
- **Row**: another name for a record in a relational database table
- **Column**: another name for a field in a relational database table
- **Query**: a statement written in SQL that requests matching records, changes matching records, deletes matching records or adds new records

Secondary keys: field used to group many people together that share a common attribute

Querying a Single Table Database ex: city, country, province etc.

To query a single table database, we use an SQL statement of the form: SELECT *fields* FROM *tables* WHERE *fields match query condition*

- The SELECT keyword designates which fields to display as a result of the query.
- The FROM keyword designates which tables to search.
- The WHERE keyword specifies the search criteria to use in finding records.

Note that we use uppercase for keywords to make them stand out, but otherwise case is not important when using SQL

In addition to the SELECT keyword, there are a number of other keywords:

- CREATE a table
- INSERT new records in a table
- DELETE records from a table
- UPDATE one or more records in a table

We can also search for records that are like a specific condition, or compute sums, averages, and so on for all records that match some criteria.

Displaying Selected Fields for Matching Records

To display selected fields for records that match some condition we use the WHERE keyword followed by some query condition involving one of six comparison operators plus a field name and a value:

- equals (=)
- greater than (>)
- less than (<)
- greater than or equal to (>=)
- less than or equal to (<=)
- not equal to (<>)
-

Inserting Records

- To insert a record into a table, you would use an SQL statement of the form: INSERT INTO *TableName* Values (*value1, value2, …*)

- Note that the values must be entered in the exact order as the fields in the record, separated by commas. If there are null or missing values, the corresponding comma must be entered.

Using Aggregate Functions in SQL

- SQL can be used to compute certain values in the table using five different aggregate functions — COUNT, AVG, SUM, MIN and MAX.
- In each case, you must use a dummy field name for the result of the computation.
- The form for the AVG, SUM, MAX and MIN functions is: SELECT AVG(*fieldname*) AS *DummyName* FROM *TableName* WHERE *Query condition*
- The COUNT function uses a different form: SELECT COUNT(*) AS *DummyName* FROM *TableName* WHERE *Query condition*

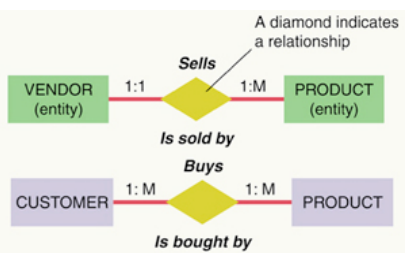
Using Logical Modelling to Create a Relational Database

- **Redundancy** can occur, which can result in the database table taking up unneeded storage space as well as causing problems when trying to insert, delete, or update records.
- These problems, typically referred to as **anomalies**, can harm the integrity of the database records.
- To create relational databases that avoid these problems with redundancy, *logical modelling* is used.
- The first step in logical modelling is to create an **entity-relationship diagram (ERD)** that allow us to focus on the "big picture," that is, the entities and the relationships.

Entity-Relationship Diagramming

The symbols for an ERD (where 1:1 means a one-to-one relationship and 1:M means a one-to-many relationship):

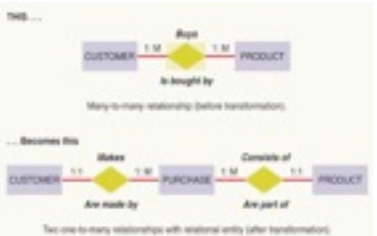
- A one-to-many relationship with one vendor selling many products



- A many-to-many relationship with no primary key–foreign key relationship: many customers buy many products

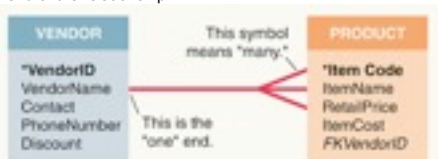
Using a Relational Entity for M:M Relationships

We convert an M:M relationship into two 1:M relationships by adding the PURCHASE relational entity between the CUSTOMER and the PRODUCT entities. This enables us to have the required primary and foreign keys to carry out queries.



Relational Data Models

- The next step after creating an ERD is to convert it into a corresponding relational data model (the relational data model for the 1:M ERD is shown to the right).
- Note that the relational diamond is replaced by a “crow’s foot” representing the “many” end of the relationship.



Many-to-Many Relational Models

To model the many-to-many ERD, we add the PURCHASE entity and then use it to link the CUSTOMER and PRODUCT entities.

Querying Multitable Databases

- The most common operation in querying multitable databases is the JOIN operation in which we create one table from two.

- For example, to query the Product-Vendor data model shown earlier, the JOIN query would be: SELECT * FROM Product, Vendor WHERE Product.VendorID = Vendor.VendorID
- This would result in a table containing all fields from both the PRODUCT and VENDOR tables where there is a match between the primary key in the VENDOR table and the foreign key in the PRODUCT table.

Creating Views

- In most database systems, queries can be saved and reused.
- A saved query is often referred to as a **view**.
- A query can be saved as a view and then used again by itself or as part of another query.
- One reason to save a query as a view is for security. By creating a view only showing fields that we want others to see, we can protect confidential information.