COMM 226
Business Technology Mgmt
Final Exam Fall 2014

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Thank you,

The SOS Team

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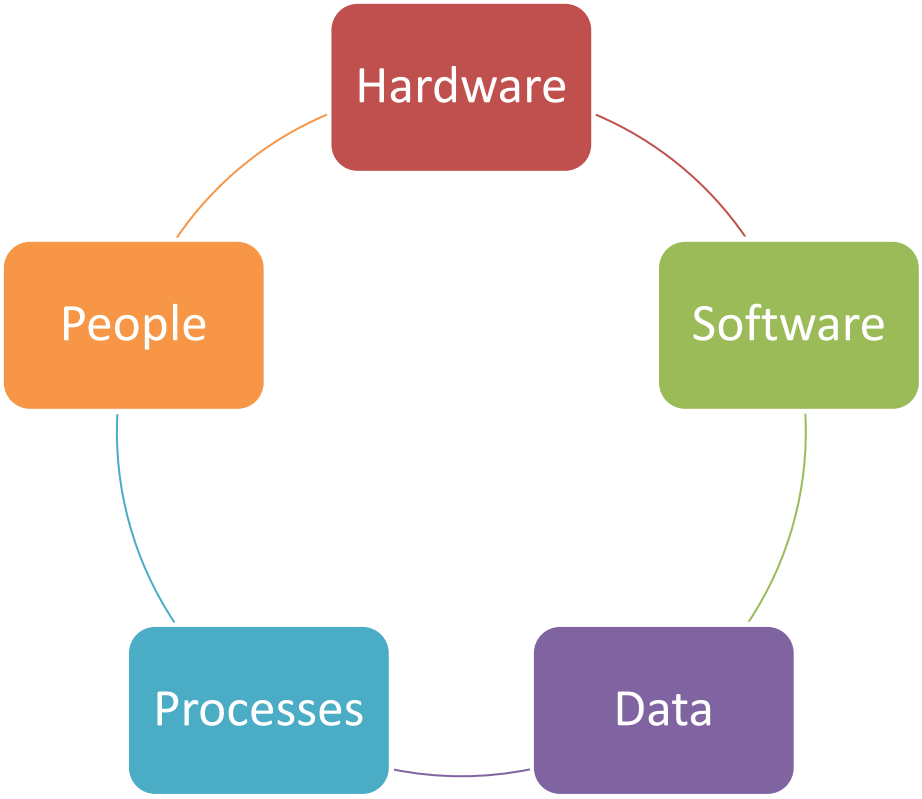
Lecture Notes

Chapter 1
INFORMATION SYSTEMS AND YOU

Information Systems Defined

- System: A **group of components** that **interact** to achieve a **purpose**
  - Not necessarily technology-related (e.g. a tree is a system, so is a human)
  - When the system's PURPOSE to is to create information, it then becomes an information system
  - Still not necessarily technology-related (e.g. market researchers going door-to-door and consolidating results on paper without ever using a computer)
    - This was the reality before computers – information systems still existed!

- Computerized Information System
  - An information system that is enabled by technology
  - What we commonly associate with MIS in business today
  - Consist of 5 components



The 5 Components Explained

COMPONENT	EXPLANATION	EXAMPLES
Hardware	All electrical components of the system	Computer, Cables, phones
Software	Programs and application that are part of the system	Microsoft Office, Adobe Photoshop, MyConcordia
Data	Facts and statistics collected to form information	Sales revenue, grades in school, temperature
Procedures	Instructions or steps followed to achieve an outcome	How to turn on a computer, how to write an essay
People	The humans using or interacting with the system (both directly and indirectly)	DIRECT USERS" Programmers, employees inputting data, someone who logs in INDIRECT USERS: Manager who receives a system-generated report (didn't physically use the system themselves)

IT vs. IS

	Information Technology (IT)	Information Systems (IS)
Included Components	✓ Hardware ✓ Software ✓ Data	✓ Hardware ✓ Software ✓ Data ✓ Processes ✓ People
The Difference	Raw Technology	Gives IT a purpose
Example	Just a computer	A computer that is used by a manager (people), to generate monthly sales forecasts (process)

What is MIS?

- Using technology to achieve strategic business goals and objectives
- Created to solve a business problem or optimize the business in some way
  Example: Developing a website for the sake of having one doesn't solve anything
  - Always ask yourself, what is the company's need → the system should address it
  - *The newest, biggest, shiniest system will not always solve the issue!*

Think of IS as a tool used to accomplish organizational goals

Information Systems + Canadian Economy

- Referred to as the Information and Communications Technology (ICT) sector
  - Provides IT and IS services to businesses
  - Growing industry in Canada (9.5% of GDP from 2002-2012)
- Compared to other industries:
  - Higher proportion of ICT workers has university degrees (44.4%)
  - Higher paid than average salary (over 65,000$ average)
  -

Information Systems + Business Professionals

- It's not enough to know how to use technology to stand out
- Communication and business skills are key, even in MIS
- Types of jobs:
  - Business analyst
  - IS Consultants
  - Computer and IS manager
  - User-support technicians

Moore's Law

- The density of circuits on electronic chips is doubling every 18 months or so which leads to…
  1. Computer speed is increasing exponential (not at a stable rate every 18 months, but it is continuously increasing)
  2. The cost for a given computing speed decreases exponentially
  3. Data storage and data communication costs virtually 0$
  4. Routine tasks can be outsourced cheaply – if your job can be automated, you job isn't secure

- **Key points**
  - Created by: Gordon Moore, founder of Intel, in 1965
  - Not a real law - A prediction that has become reality

Trends in IT

Trend Name	Explanation	Example
1. Network Effects (Lock-In)	The value derived from technology increases as more people use it. *** IMPLICATION: User Adoption is the key to driving value in IT.	Facebook Google+
2. Shrinking Device Size	Due to Moore's Law, we can fit a lot more power into much smaller devices.	Smartphones
3. Ubiquity	Technology is everywhere in our lives.	Your smartphone, tablet, and laptops are all in-sync and available anywhere, all the time.
4. Location-Based Services	We can locate people wherever they are.	GPS Shopping on your phone

Practice Problems

1. Which of the following is NOT TRUE about Murphy's Law?
   a) Density of transistors on a given microchip increase every 18 months or so
   b) Computer speed increases every 18 months
   c) Costs of computers decreases as density on microchips increase
   d) Murphy's law is a prediction but not a real law founded on science

2. _____ cost(s) virtually 0$.
   a) Hardware
   b) Microchips
   c) Communication Technology
   d) Data Storage

3. Moore's Law has resulted in some jobs becoming obsolete. Which of the following skills would not be impacted by Moore's Law when it comes to job security here in Canada?
   a) Programming skills
   b) Statistics computation skills
   c) Business analysis skills
   d) Assembly line skills

4. You go on a shopping spree at your favourite clothing store. The clerk hands you the machine so that you can pay with your credit card. The machine she hands you is an example of:
   a) Software
   b) Hardware
   c) People
   d) Process

5. When you are handed a copy of your receipt at your local Starbucks, you are becoming the following part of the information system used for the transaction:
   a) Direct User
   b) Indirect User
   c) Data
   d) Output

6. Which of the following is a valid reason for a company to develop a new information system?
   a) All of its competitors have new systems
   b) New industry standards recommend the new system
   c) To make you produce your products at a lower cost
   d) Because it's being offered by the supplier at a discount

7. Which of the following components distinguish a computerized information system but not involved in information technology?
   a) Direct Users
   b) Data
   c) Hardware
   d) Software

8. Some airlines offer Wi-Fi on long-haul flights meaning passengers can now use their laptops on board. As a result, major online retailers can now promote their online shopping experience to you while cruising at 35,000 feet in the air. This represents which IT trend?
   a) Shrinking Device Size
   b) Network Effects
   c) Moore's Law
   d) Ubiquity

9. The recent trend of network effects in IT implies that:
   a) Networks are getting more powerful over time
   b) People are able to communicate virtually due to new tools becoming available
   c) New technology becomes more useful as more and more people start using it
   d) Everyone is connected to the Internet using networks

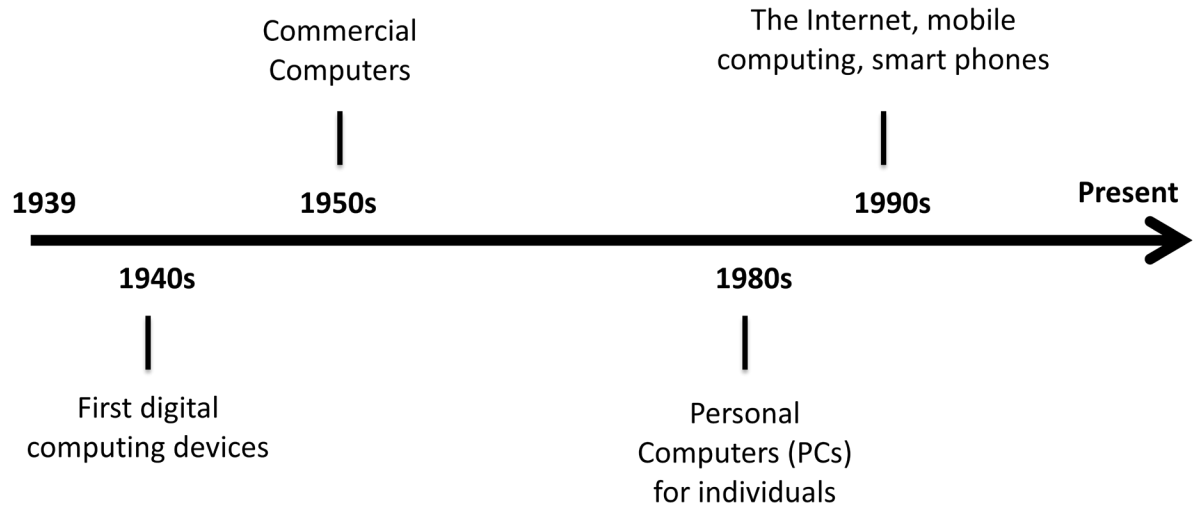
10. In recent years, the ICT industry in Canada has grown significantly relative to other sectors. The industry can be defined as _____ compared to other industries.
    a) Having a higher number of younger workers
    b) Having a higher number of university graduates
    c) Being promoted more rapidly
    d) Being more satisfied in the work they do

11. Mark works for a manufacturer of electrical components for cars. Every day, he in charge of going down to the factory floor and taking note of the number of parts that are being produced at each station throughout the day. He fills in a form on his clipchart and hands it in at the end of day to his manager. Mark's work would be considered a(n):
    a) Computerized Information System
    b) System
    c) Information System
    d) Business Analyst

12. MIS professionals are most likely found at the heart of the following departments within a business:
    a) Programmers and software developers
    b) Programmers and the marketing department
    c) Marketing an Accounting
    d) Human resources and the recruiters

Chapter 4
HARDWARE AND SOFTWARE

The Past



- **Key Conclusions**
  1. Price and Performance relationship: Moore's Law
  2. Shrinking Device Size: Over time, devices have been getting smaller and smaller
  3. Networking Is Key: Cheaper and easier to join

Years	Type of Computer	Primary Developer/ First Models	Why was it created?	Characteristics
1939-1952	Early Computers	US Military	Military purposes	• Large, bulky, and very expensive • One task at a time (couldn't run multiple programs) • First one in US: ENIAC (Electronic Numerical Integrator and Computer) in 1946

1952 to present	Mainframes	Built UNIVAC for US Census bureau	For businesses and the government	• First commercial computers
				• Originally based on vacuum tube technology
				• Originally sold without software, so companies had to make their own
				• Require entire rooms to house all the parts (e.g. an entire classroom)
				  ○ 1st generation: cost 200k to 400k; huge and bulky
				  ○ 2nd generation: smaller, more reliable
				  ○ 3rd generation: By the 1960s, software and operating systems were included; multiprocessing capability (multiple users)
				• Still used in businesses today for fast processing and massive storage

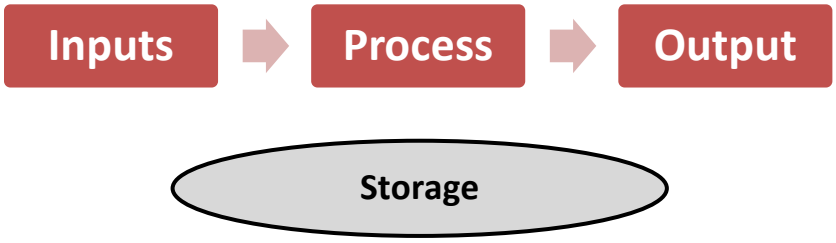
1975 to present	Microcomputers	Based on Texas Instruments chips for calculators	Mainframes were too big!	• Software was not included, which led to the creation of programming languages and operating systems to make microcomputers more usable • Individual users • First personal computers

1985 to present	Networking Personal Computers	Enabled by Ethernet patented by Xerox	Unable to share data between computers	• Resulted in LAN (Local Area Network) technology
				  ○ A set of rules that allows connected devices to communicate and share information
				• Each device has a specific address
				• WAN (Wide Area Network) expanded the range of computers that could be shared with
				  ○ The largest one of its kind is the Internet as we know it

1990s to present	Mobile and Tablet Computing	Palm, RIM, Apple	The Internet made sharing easy	• Among other factors, mobile devices were made possible because of lower technology costs and the resurgence of Apple • Important issues: the DOT COM boom, Y2K bug

Hardware

- All the raw electrical components of an IS system (one of the 5 components in chapter 1)
- Despite changing technology, all computers consist of these components.



	Role	Visible to User?	How are they compared?	Examples
Inputs	Collect data provided by the user; make requests to the computer	Yes	• Physical properties (size, number of buttons, etc.) • Usage specific (resolution, speed of input, etc.)	Keyboard, touch screen, barcode scanner, microphone, camera
Processing	Manipulates the data; performs logic and calculations	No	• Speed and performance	CPU, RAM (see details below)
Outputs	Provide requested information to the user and show results	Yes	• Output Quality (printer resolution, pages per minute, etc.)	Printer, computer screen, speakers
Storage	Saves data and programs for future use by the computer	No	• Volume (how much can be stored) • Reliability	USB keys, magnetic tapes, hard drives

The CPU

- The brain of the computer
- Performance measured in Hertz (Hz) – and kilohertz, megahertz, up to gigahertz today
- Compared based on: Speed, function, cost
- Part of the **PROCESSING** component of Hardware
- Costly investment and research needed for CPU makers to compete

RAM vs. ROM

	ROM	RAM
Full Name	Read-Only Memory	Random Access Memory
Memory State	Permanent (NON-VOLATILE)	Temporary (VOLATILE)
Purpose	Start the computer	Run programs when the computer is on
Speed	Adding ROM has little impact on processing speed	Adding RAM lets you do more things at the same time
Human Example	VITAL FUNCTIONS - breathing doesn't need to be thought about – your body just does it	DAILY ACTIVITIES - you can listen to music, study, and chat on Facebook at the same time… but then try also cooking and working out at the same time; your brain can't process that many tasks at the same time. When you go to sleep, you stop doing all those activities!

- ROM is what allows a computer to start.
  - The instructions that explain to the CPU how to start are stored here because they don't need electricity to be remembered.

- RAM is erased when it loses electricity.
  - This why you need to re-open Firefox, Word, Excel and other programs when you reboot.

How does it all fit together?

_____
_____
_____
_____
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_____
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_____

Measuring Computer Data

- A Computer talks to its different parts, as well as with itself, in binary code
  - Binary code consists of 1's and 0's
  - It is incomprehensible to humans – that's why we have programming languages.
  - Each 1 or 0 = 1 bit
    - Bits are organized into groups of 8, called BYTES → 8 BITS = 1 BYTE

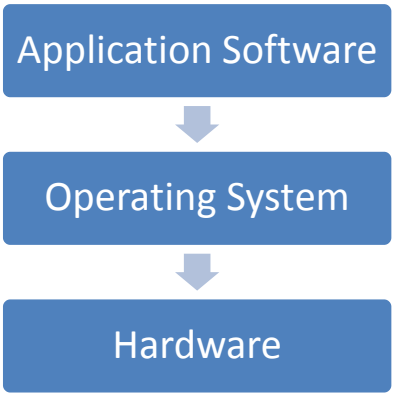
      Example of a byte: 01101001
      - Each character is represented by a BYTE
      - 1 Kilobyte is **1024 BYTES**, NOT 1000 like in other measurements (example: 1000 grams = 1 kilogram)

Name	Size	Examples
Kilobyte (K)	1024 BYTES	Small files
Megabyte (MB)	1024 KILOBYTES	Small programs, files, photos, etc.
Gigabyte (GB)	1024 MEGABYTES	Large programs, files, photos, etc.
Terabyte (TB)	1024 GIGABYTES	Modern hard drives
Petabyte (PB)	1024 TERABYTES	Used in large businesses, not in our personal computers

Software

1. **OPERATING SYSTEM (OS):** Controls the computer's resources
   Examples: iOS, Android, Windows, Mac OS, Linux, etc.

2. **APPLICATION SOFTWARE:** Allows the user to perform a specific task
   Examples: Shazam, Calendar applications, Instagram, Facebook Messenger, Microsoft Office, Adobe Acrobat



Application Software is made to run on certain operating systems.

Example: Apple software, such as Keynote and Pages, cannot be run on a Windows operating system.

Operating Systems are made to run on certain types of hardware.

Example: You need an Apple phone to run iOS.

Common Operating Systems			
Name	**Description**	**Typical Users/User Fields**	**Notes**
Windows	Most popular OS in the world with over 85% of computers running it	Everyone	Also used for servers in businesses
Mac OS	Developed by Apple	Everyone (less in businesses)	Used almost exclusively for arts and graphics before 2006 when it gained widespread popularity
Unix	Powerful OS developed in the 1970s by Bell Labs	Science and engineering	Very complex and difficult to use
Linux	A version of UNIX that is free for users and developed by an open-source community **	Engineering, computer science, servers	Used mostly on server computers (popularized by IBM)

****NOTE:** Open-source means that the software was developed by a community of programmers who volunteer their time to develop it. It is often free and is maintained entirely by the community.

Application Software Categories		
Category	**Description**	**Examples**
Horizontal Market Apps	Applications used across all organizations and industries	Word, Excel, Paint, Photoshop
Vertical Market Apps	Applications designed for specific organizations and industries	Hotel software, accounting programs
One-of-a-kind Apps	Applications designed for a very specific purpose	Software used by Canada Revenue Agency

- **WEB BROWSERS:** Software that enables you to access the Internet
  Examples: Firefox, Chrome, Safari, Internet Explorer
  - A combination of Application Software and OS

- **Licensing vs. Owning Software**
  - When you buy a copy of Windows or Mac OS, you **DO NOT** own it
  - You are provided with a license, the rights to use the program
  - Windows and Apple respectively still own the software
  - They can technically withdraw your rights to use their program at any time

- **FIRMWARE:** Software that is installed into devices (examples: printers, keyboard, etc.)
  - All devices have bits of software (firmware) inside to help it talk with the computer
  - It is **Software for the Hardware** (instead of for the user)
  - Helps the device turn itself on
    - For computers, this program is called **BIOS (Basic Input/Output System)**
    - Goes into the ROM (see above) and runs the instructions that turn the computer on

Computers Interacting

- **CLIENT**: The local computer that you use
  - Run programs that the user needs (examples: Word, Photoshop)

- **SERVER**: A computer physically located elsewhere that provides your computer with a service
  - Includes all programs that you access over the Internet (email, Facebook)
  - Much faster, larger, and costly than clients
  - Can also be a collection of computers running the program (**SERVER FARM**)

- **CLOUD COMPUTING:** The SERVER computer is not owned by those running the program
  - A certain space is rented
  - The Network in the middle is usually the Internet
  - Based on the concept of **GRID COMPUTING**, meaning lots of computers are used to address a single problem (in this case, provide a service)

  Examples: Facebook, Gmail, Amazon, YouTube

- **Thin vs. Thick Client Software**
  - **THIN CLIENT:** All you need to access the server is a Web Browser

    Example: Facebook, Gmail
  - **THICK CLIENT:** Programs other than a web browser are needed to access the server

    Example: Outlook 2010 (you need a web browser and the MS Outlook program installed on your computer to use it)

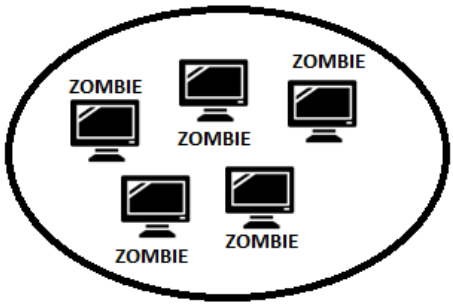
Computer Security 101

- **VIRUS:** A computer program that spreads across your computer doing unwanted things
  - Unwanted things include deleting your programs, sending files and emails
  - **PAYLOAD** is the code that causes the unwanted activity
  - Human Analogy: Cancer, it keeps spreading until it consumes all resources

- **MACRO-VIRUS:** Viruses that attach themselves to documents
  - Starts the malicious activity when you open it

  Example: Downloading an infected Word file

- **WORM:** Viruses that spread over the Internet
  - They are made to spread across computers
  - An infected computer is called a **ZOMBIE** computer
  - A group of zombie computers is called a **BOTNET**



BOTNET

- **Preventing Viruses:**
  1. **PATCHES:** Program makers find holes in their programs that let viruses in, then modify the code to prevent this from happening
     - Solution: Update your computer frequently
  2. **ANTIVIRUS SOFTWARE:** Scans your computer for viruses and gets rid of them
     - Solution: Make sure you have one

Why does this matter to business managers?

- Managers must know what their employees need to accomplish their daily tasks:
  - How fast should the computer be?
  - Which programs are needed to accomplish the tasks?
  - Which programs on the server does my employee need to access?

- They must understand how computers work so that they can communicate with the IT department.

- Most hardware and software are standardized in businesses

  Example: Everyone uses Windows, so Mac OS isn't usually an option in most businesses just because a client wants to use it.

Chapter 3
PRODUCTIVITY, INNOVATION AND STRATEGY

Productivity and Technology

- **PRODUCTIVITY:** Dollar value generated by a Canadian worker in 1 hour
  - Canadians are about 20% less productive than Americans are.
  - The ICT industry provides technology to make you work smarter.
  - There is no link between having a computer and productivity.
    - This is referred to as the **PRODUCIVITY PARADOX**
  - It's not about having a computer; it's about how we use it.

- **IT Value:** The benefit derived from technology when it's used
  1. FOR A COMPANY: Create more or better output
     Example: Automating the manufacturing process of clothing makes the process faster
  2. FOR AN INDUSTRY: Changes industry dynamics and competition
     Example: iPods killed CDs, CDs killed cassettes
  3. FOR A CUSTOMER: End-user benefits from better product
     Example: Computers are getting cheaper but are of higher quality

** This is why BTM (Business Technology Management) was created:
to drive technology innovation in Canadian businesses **

Efficiency vs. Effectiveness

- **EFFICIENCY:** Doing the same old thing, but quicker or with fewer resources
  - "Doing things right"

  Example: Replacing workers making cars with automated machines

- **EFFECTIVENESS:** Doing something new or improving what you do to better meet the customer's needs
  - "Doing the right things"

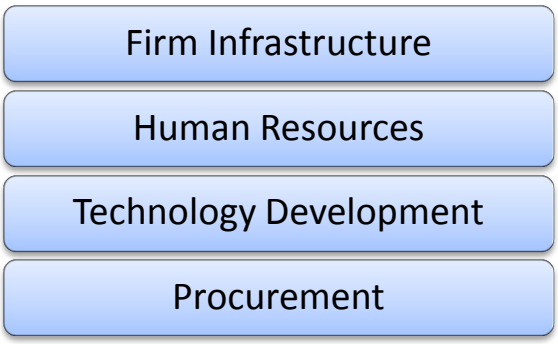
  Example: Finding features for the iPhone that user wants

** Businesses need to find the balance between the two **

Value Chain Analysis

- Formalized by Michael Porter (Harvard University)
- Looks internally (within the company)
- Different for each business (depends on their processes)
- **PRIMARY ACTIVITIES:** The activities involved with providing a product or service

- **SUPPORT ACTIVITIES:** The activities that support the primary ones
  - The background stuff that helps the business run (***example***: finances, hiring, tech support, etc.)



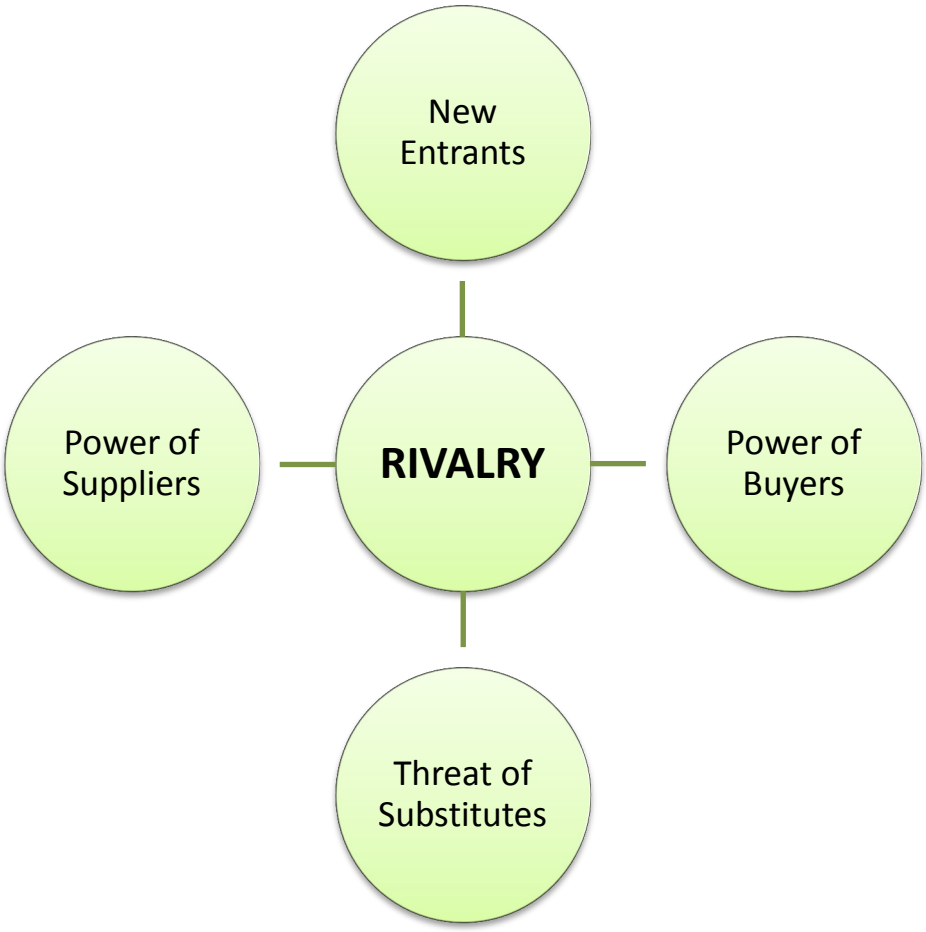
Porter's Four Competitive Strategies

- Companies can adopt one or several of these strategies to compete
- Company goals, culture, and activities must be in line with the chosen strategy

	Cost	Differentiation
Industry-Wide (Mass)	Providing low-cost products targeting all consumers • Wal-Mart, Dollarama	Providing unique products targeting all consumers • Coke, FedEx
Focus	Providing low-cost products for a specific customer • Forever 21	Providing a unique product for a specific type of customer • Ferrari, Canada Goose

Porter's Five Forces Model

- Defines the industry structure
- Shows if an industry is attractive or not



Innovation and IT

- **SUSTAINING TECHNOLOGIES**: Regular improvements on what we're doing

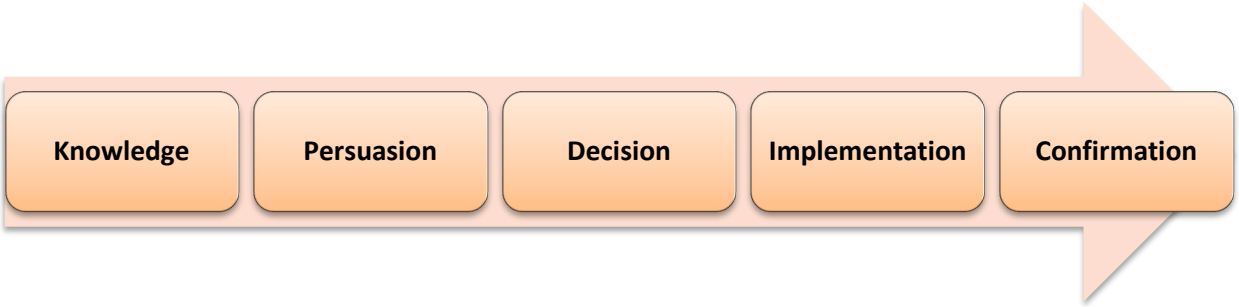
  Examples: Faster smart phones, longer battery life

- **DISRUPTIVE TECHNOLOGIES**: New products or services that drastically change our environment

  Examples: The iPhone when it first came out

  - Can completely change industries (examples: Phones were forever changed after the iPhone was released; banking was forever changed once ATMs were invented.)
  - Can completely destroy industries (example: CDs died after the iPod came out)

- **DIFFUSION OF INNOVATION:** The steps a person takes in adopting new technology



Competitive Advantage

- Organizations that do something that allow them to outperform competitors

Product and Services	Business Processes
1. Make something new 2. Improve what you're currently offering 3. Differentiate what you're offering	1. Lock in customers and buyers* 2. Lock in suppliers* 3. Make it harder for new companies to enter the market/industry 4. Partner with others 5. Reduce costs

* Locking in stakeholders can be done by increasing **Switching Costs**, the costs (monetary or otherwise) involved in switching from one company to another (example: Apple has everything integrated)

Sustaining the Advantage with IT

- Technology can start by giving you an advantage, but companies quickly copy.
- The more common technology is, the less of an advantage it is.
  Example: Word processing software is now just needed, it doesn't make you different.

Sustaining the Advantage with IS

- Information Systems (IS) include processes and people, which can't be easily copied.
- It's all about how you use the technology.

PS&I Chapters 2 and 5
BUSINESS PROCESSES

Processes

- BUSINESS PROCESS: A sequence of activities that serve to accomplish something.

  Example: Taking orders at Tim Hortons

  Example: Making sandwich at Tim Hortons

- ACTIVITY: The tasks involved in completing a business process

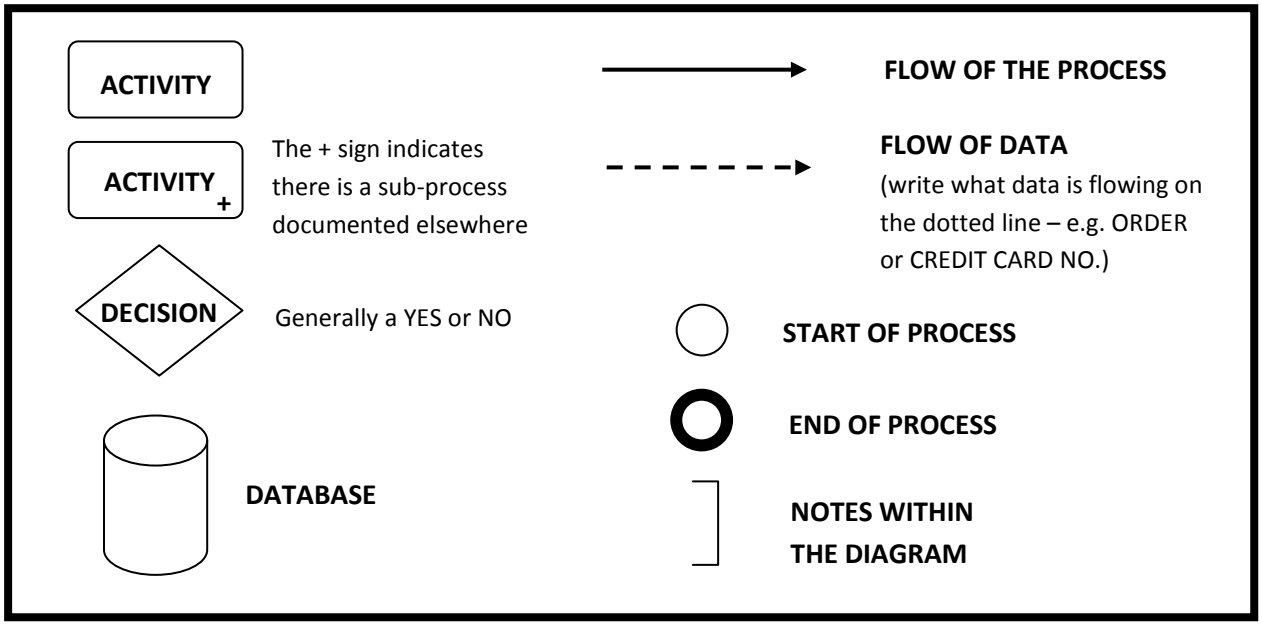
  Example: When making the sandwich, the tasks include adding chicken, cutting bread, toasting, etc.

Why Standardize Processes?

	Reason	Example – Starbucks
1	Enforce Policy	Having a standard way of doing things lets Starbucks enforce rules
2	Consistency	Starbucks quality is the same everywhere due to standard processes
3	Scalable for change	If we make a new drink at Starbucks, we have a base for how to make it
4	Reduces Risk	Less likely to mess up your drink since there's a set way of making it regardless of which employee is working

Business Process Model & Notation (BPMN)

- A standard for communicating businesses processes in visual, human terms



- ROLE: A category of activities within the process performed by an actor (e.g. cashier)

- ACTOR: A **human** or **computer** that accomplishes certain tasks

  Example: Taking an order includes several sets of activities... the cashier takes the order and deals with payment, the employee putting together your order has their own set of activities (e.g. get donut, make coffee, etc.)

- SWIMLANES: All of the activities in one role (thus for one actor)
  - Can be drawn horizontally or vertically

SOS Step Box

STEP 1: Read the case and list all the roles in your case.

STEP 2: Re-read the case and this time list all the activities for each role. Then, re-read the case again and list all the decisions that are made by each actor.

STEP 3: Draw a column for each role with that role's name at the top of the column.

STEP 4: Place all activities and decisions in your columns (swimlanes) based on the lists your made.

STEP 5: Draw the PROCESS and DATA flows. Don't forget to label your data flows.

STEP 6: Draw the START and STOP point

Example CASE 1 – Future Shop Home Delivery

Map the following case using a business process model and notation (BPMN).

1. A customer enters Future Shop and places an order for home delivery
2. The cashier enters the order in the system (called Order OS).
3. If the customer is new, a profile must be created in Order OS. In this case, the cashier takes down all customer information (address, telephone, email). If it is a returning customer, the order proceeds as normal and is placed into the system.
4. The cashier processes the payment.
5. Order OS sends a message to a packer in the central warehouse with details about what to package and where to send it. The packer assembles the order.
6. The order is given to a truck driver who is automatically sent a receipt from Order OS with the delivery details. The driver hands the package directly to the customer.

Draw your BPMN and be sure to label everything accordingly.

NOTES

Structured vs. Dynamic Processes

- STRUCTURED PROCESSES: Formal activities that don't change from day-to-day
  Example: Making a coffee at Tim Hortons – one way of doing it properly

- DYNAMIC PROCESSES: Informal activities that aren't always done the same way
  Example: A sales rep at Future Shop – the experience differs depending on customer needs

Category	Structured	Dynamic
Limitations	Many – there's one way of doing things	Few – more relaxed
Innovation	Not necessary	Very necessary
Control	Procedures are enforced by the company	Must adapt as you go
Efficiency	Very important – save time & money	Less important, more strategic

Data vs. Information

- DATA: Recorded facts and figures
  Example: Number of houses on a street, number of tickets sold

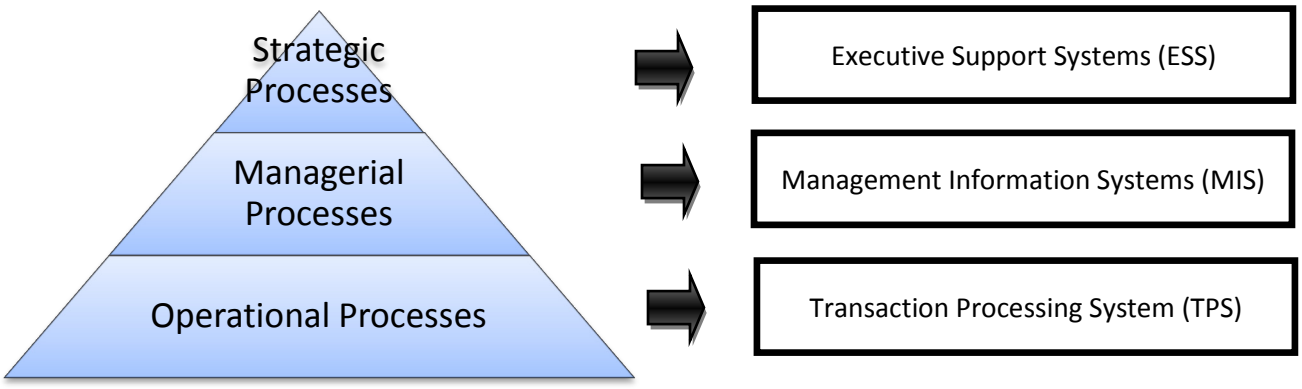
Accurate	Timely	Relevant	Sufficient	Cost
Must be able to rely on what comes out of systems	Need it in a timely fashion to make decisions	Must be usable in the decision at hand	You need enough to make proper decisions	Data is expensive – think of surveys or the census!

- INFORMATION: The knowledge we gain from interpreting those facts (data), provides meaning
  - When you sort, process, or interpret data, it becomes information – becomes meaningful
  - The MEANING of information differs from one person to the next
    Example: 25 degrees outside is hot for me, but might be just right for you

Data vs. Information using Examples

	Data	Information
Temperature	Temperature taken each day	Organized by day over 5 years to see annual trends
Sales	Revenue generated each day	Revenue generated yearly compared over 3 years
Population	# of students at Concordia	Change in enrollment over the past 3 years

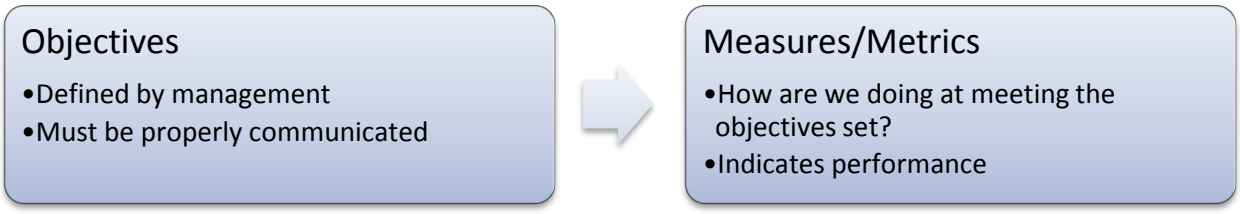
Types of Processes in Organization



	Explanations	Examples
Strategic	Solving broad, organization-wide issues, direction of company. Often made by executives	• New product lines • New menu items • Outsourcing
Managerial	Planning, analyzing, and managing resources in order to meet objectives	• Schedule maintenance • Inventory Management • Financial Statements
Operational	Day-to-day tasks with structured processes that focus on efficiency (i.e. front-line staff)	• Customer Service Agents • Bookkeeping • Software testing

- Each activity in the **VALUE CHAIN** (chapter 4) has processes from EACH level above
- Systems play a role in business processes (automation, recording, data storage)

Process Improvement



Example – McDonalds

- OBJECTIVE: Serve customers faster than any other fast food chain
- METRIC: Customer served in less than 45 seconds

***** Process improvement is about changing the way we do things to better meet our objectives *****

How IT helps	
How?	**Examples**
Improve Activity	• Grills that heat up and cook faster • Fries made in major batches
Improve Data Flow	• Screens that show cooks the order as its placed • Tracker that sends message to manager when stock is low
Improve Control	• Burgers come with pre-chosen toppings instead of letting customer customize it
Improve Procedures	• 1 person grilling, 1 person assembling instead of the same • More training so employees work faster
Automation	• Timers turn deep fryers on and off • Drinks fill themselves to the right level

- BOTTLENECK: When an activity slows down the whole process
  Example: We can't keep producing clothes 24/7 because fabric delivery is too slow

Using BPNM Diagrams for Improvement

- As-is diagrams: The way the process currently looks
- Out-to-be-diagrams: How the process looks once its improved and re-mapped

PS&I Chapters 6 & 7
ERPs and SAP

What are ERPs?

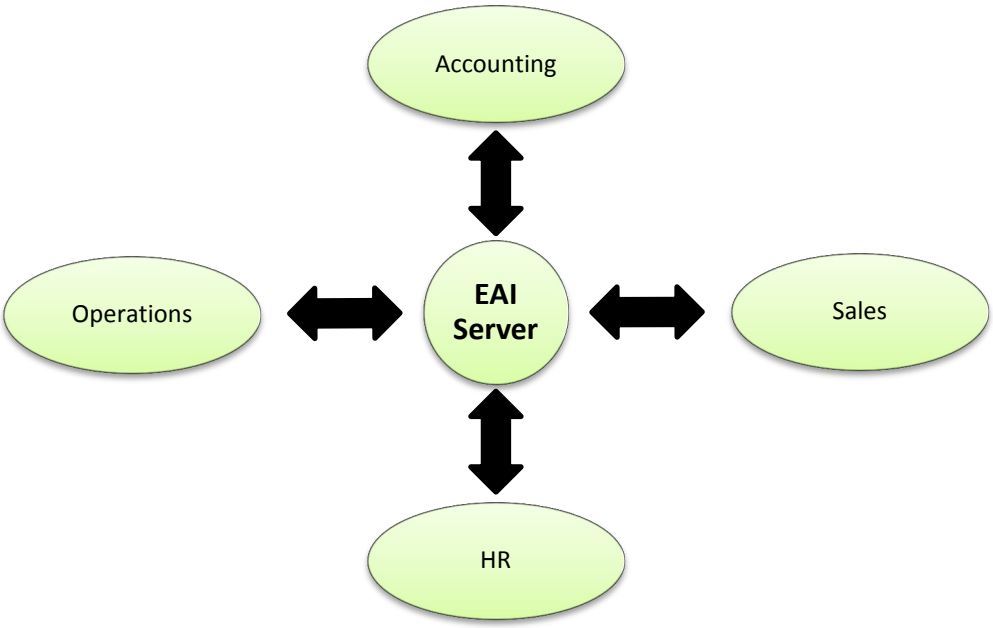
- ENTERPRISE RESOURC PLANNING (ERP): A system that centralizes data

1. ONE Database
2. Integrated, industry-leading processes needed to use the system

- Prevents INFORMATION SILOS (when data is stored in separate systems)
  - If not prevented, departments work in isolation
- Since the ERP comes with processes, the organization must change the way it does things
  - These processes are called INHERENT PROCESSES or PROCESS BLUEPRINTS
  - GAP ANALYSIS: Uncovering differences between business needs and ERP's ability

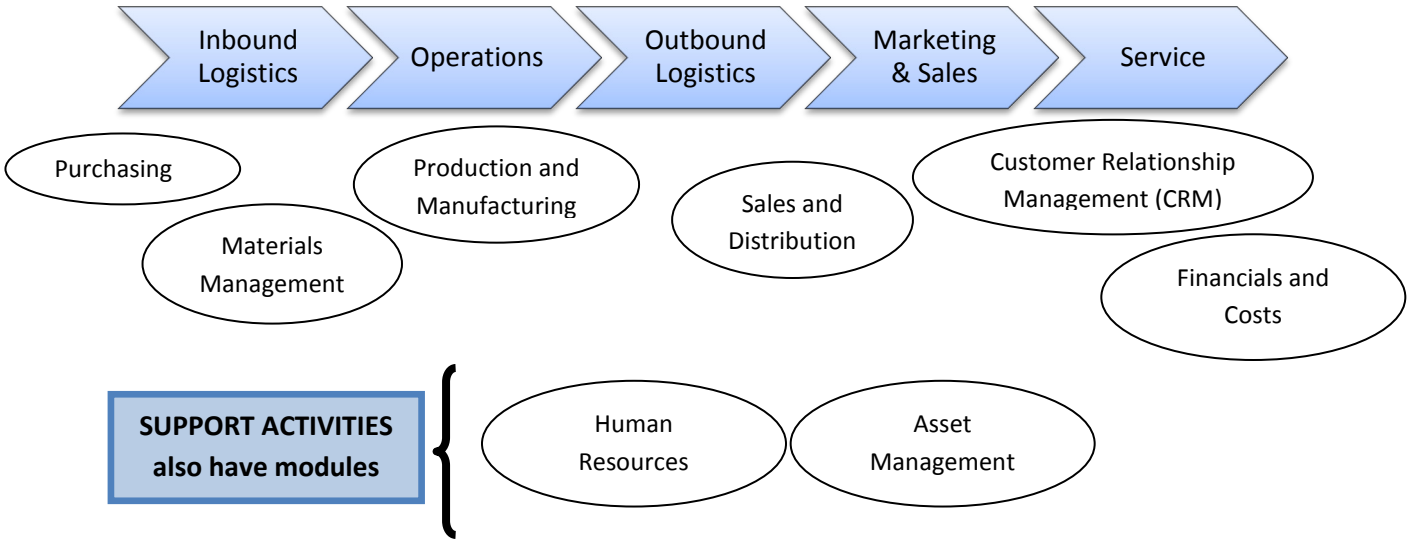
When ERPs are too expensive...

- ENTERPRISE APPLICATION INTEGRATION (EAI): Provides software that allows the separate databases to communicate with each other
  - Enables communication
  - Departments maintain their own data but it can be integrated as needed
  - Allows companies to gradually move to ERP



Elements of an ERP

Integrated throughout all of the company's activities (value chain)



- Each function (the ovals) is called a MODULE
- ERPs were developed over time
  - Started with Materials Requirement Planning (MRP) then made its way through the value chain to integrate the whole business
  - Originally started in manufacturing companies
- Involves all 5 components of an IS:

Hardware	• Purchase needed computers, servers, printers, network devices, etc. • On-the-cloud of physical system?
Software	• CONFIGURATION: The setup of the system on the company's computers • CUSTOMIZATION: Modifications to the ERP to meet specific needs
Data	• Big empty databases that need to be converted. • Old data needs to be moved into it
Procedures	Company chooses which ERP processes. It then must change its old way of doing things.
People	Includes the following people: 1. Users 2. Systems Analysts 3. Consultants from the vendor or a third-party

Types of Data in an ERP

1. TRANSACTIONAL DATA: Day-to-day data collected from operations, changes by transaction

   Example: Sales made, items purchases

2. MASTER DATA: Data that doesn't change between transactions

   Example: Supplier names, addresses

3. ORGANIZATIONAL DATA: Data about the company

   Example: Locations, warehouses, financial accounts

Benefits of ERP

	Benefit	Example
1	Suppliers are integrated	Your system can talk with the supplier's system
2	Access to more data for managers	Managers from around the world can see statistics from divisions around the world
3	No more silos	Marketing can collaborate with operations since all data is together
4	Data is shared in real-time	When an update is made in the production in China, managers in the US can see it right away
5	Integrated processes based on best practices	The processes that come with the ERP are based on optimal ways of doing things

Implementation Challenges

Decision Challenges	
Decision	**Example**
Vendor Selection	SAP, Oracle, Microsoft??
Gap Analysis	Which modules do we integrate, which do we not? Do we customize?
Configuration	The rules – Order sizes, who approves new orders, who modifies
Data Issues	The way we stored data in our old databases may not be same as the ERP
Cutover Process	When and how do we switch to the new system?

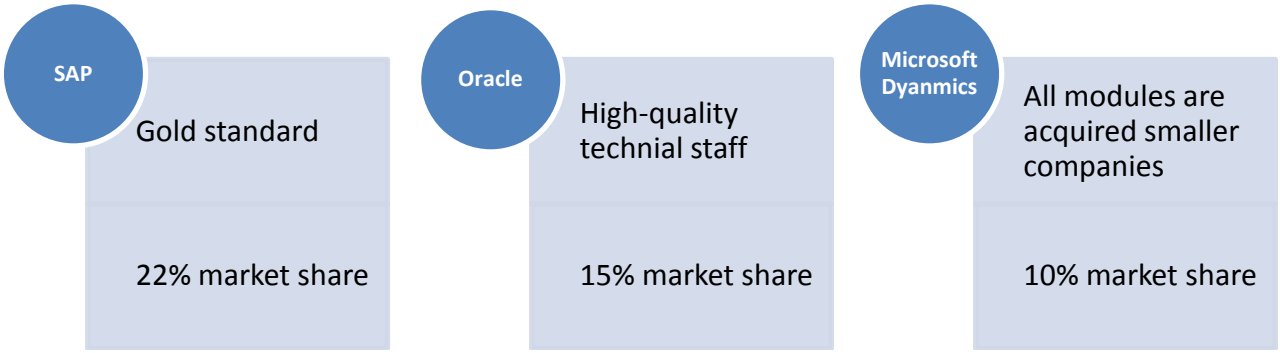
Company Hierarchy ↓

People Challenges		
Category	**Challenge**	**Example**
Management	Not supporting it throughout	Management says "go, implement it" then doesn't ask for updates on progress
	Oversell benefits	ERP will not change the world, it's not the solution to all company problems
	Ignores Cultural Resistance	The way work is done will change – people need to be made aware of this
Team	Lack of Collaboration	The wrong configuration is set up because the end users are not consulted on their needs
Individual	Users don't see benefit	Using the new system makes it longer for me to place an order

What types of Organizations use ERP?

- INDUSTRY: Used across all industries
- COMPANY SIZE: Used by large organizations with revenues above 5 million
  - Smaller companies don't need massive software
  - May not have the IT resources to implement it
- COUNTRY: Used around the world and in multi-national companies
  - SINGLE INSTANCE: for the whole company around the world
  - MULTIOPLE INSTANCES: different installation in different regions

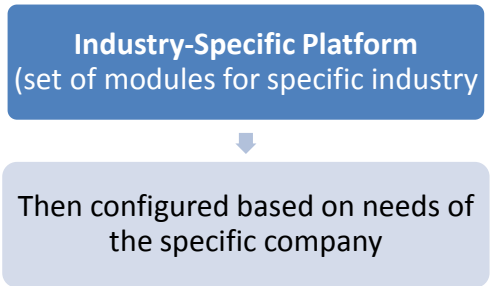
ERP Vendors



- Smaller vendors focus on niche markets (e.g. advertising agencies, small companies, cloud)

SAP

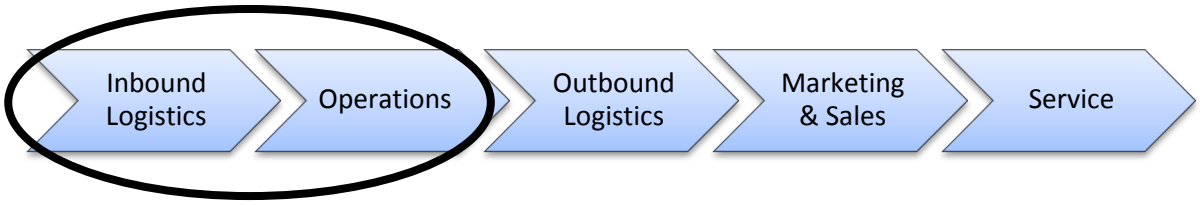
- Built in Germany founded in 1972
- Used by more than 80% of Fortune 500 companies
- First ERP designed to work at multiple companies
- Most popular version is **R/3** → rebranded as SAP Business Suite
- Runs on **NETWEAVER**, the operating system for SAP
- **ABAP** is the programming language for SAP customization



Procurement Concepts

- PROCUREMENT: The process of acquiring goods and services from suppliers
  Example: Raw materials, machines, parts, ingredients
- PURCHASE ORDER (PO): A document that requests the delivery of a product + the quantity
- RAW MATERIALS INVENTORY: Stock of materials used to make our core product
  Example: Starbucks – How much sugar do we have left, how many coffee beans
- SUPPLIER RELATIONSHIP MANAGEMENT (SRM): Interaction between supplier and company
  - Automated with the use of ERPs

  Example: Automatically place order for more coffee beans when we have less than 5 bags
- RETURNS MANAGEMENT PROCESS: Getting defective products back to the supplier
- SUPPLIER EVALUATION PROCESS: Adding, removing, and approving new suppliers
- BULLWHIP EFFECT: When a company orders more products than needed
  - Caused by a sudden change in demand



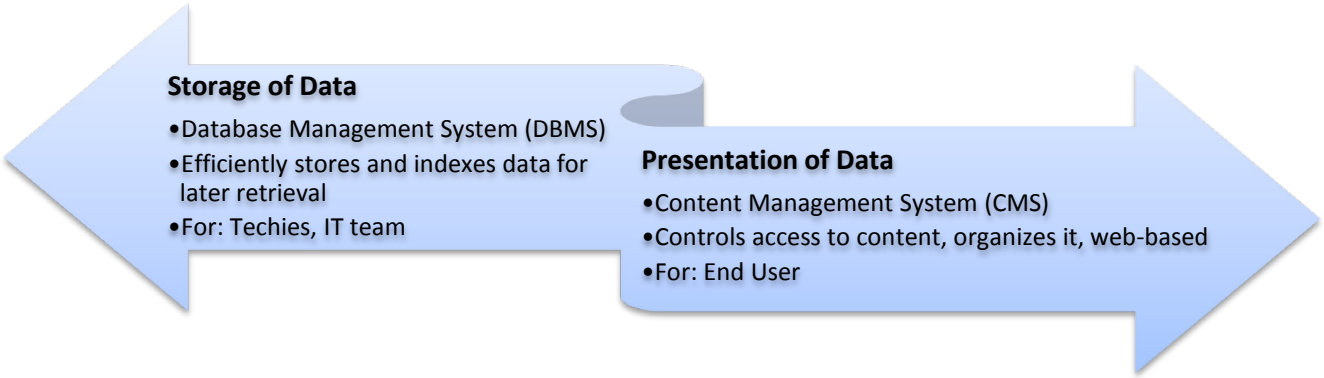
Other Concepts

- TRAIN THE TRAINER: The vendor trains super users, who then train others below, and so on
  - Reduces costs of training
- ACCESS CONTROLS: Which parts of the ERP a user can access

Chapters 5, 5a, 5b
DATABASE MANAGEMENT

Content Defined

- Content = Organization's Property
  - All files, documents, web pages, videos, data collected, employee info, orders, etc.
  - Challenge: Storing and managing all of this information collected



Databases Defined

- DATABASE: A collection of structured data
  - Tables / Files
  - Relationships among rows in tables

1

Each collection is a table is called a **FILE**. A database contains many of these

Each column is a **FIELD** – attributes of what we're collecting data about

Each row is called a **RECORD** (one instance of what is being collected in that database)

- E.g. one order, one customer

Customer ID	Name	Address	Phone Number	# of past orders	Type of Customer
1	SMITH, JOHN	123 Rainbow Road	514-234-3242	3	Normal
2	DOE, JANE	832 Rue Ste. Catherine	438-233-5463	8	Normal
3	KIMMEL, JIMMY	434 Hollywood Blvd	312-424-2313	1	VIP
4	DION, CELINE	3721 Falsetto Lane	418-356-2984	12	Repeat

Every character in the database is a **BYTE**

2

Customer ID	Name	Address	Phone Number	# of past orders	Type ID
1	SMITH, JOHN	123 Rainbow Road	514-234-3242	3	1
2	DOE, JANE	832 Rue Ste. Catherine	438-233-5463	8	1
3	KIMMEL, JIMMY	434 Hollywood Blvd	312-424-2313	1	3
4	DION, CELINE	3721 Falsetto Lane	418-356-2984	12	②

Type ID	Type of Customer	Discount	Notes
1	Normal	0%	Default customer type
②	Repeat	10%	Minimum 10 past orders
3	VIP	15%	Celebrities, media, etc.

- PRIMARY KEY: A column that contains unique data that identifies a row/record in a table
  Examples: Student ID, Customer ID, Employee No.
- FOREIGN KEY: A column that refers to another table to form a relationship between the 2
  - Matches the primary key of another table
- Using this structure prevents us from storing the same data over and over
  Example: Instead of storing all that information about each type of customer, each type is stored once in a separate table and referred to using the keys

- **METADATA:** Data about the data
  - What type of data are we storing in the column?

    Examples: Dates, numbers, characters, currency

3

Customer ID	Name	Address	Phone Number	# of past orders	Type ID
1	SMITH, JOHN	123 Rainbow Road	514-234-3242	3	1
2	DOE, JANE	832 Rue Ste. Catherine	438-233-5463	8	1
3	KIMMEL, JIMMY	434 Hollywood Blvd	312-424-2313	1	3
4	DION, CELINE	3721 Falsetto Lane	418-356-2984	12	②

NUMBER

VARCHAR (variable characters)

VARCHAR (variable characters because of the dashes ---)

NUMBER

Why Databases vs. Spreadsheet?

Databases	Spreadsheets
1. Safer (access control) 2. Multiple users can access it and edit at the same time from anywhere 3. Can store larger quantities of data 4. Better data integrity (fewer errors, duplicates) 5. Easy to generate reports and find data	1. Easier to use 2. Better for small amounts of data about a single theme (e.g. a list of contacts)

Database Management Systems (DBMS)

- DBMS: Software that is used to create, process, and manage databases
  - Provides user with access to the database
  - Using the DBMS, the data can be created, modified, deleted, read, and secured
  - Most popular DBMS program: Access, SQL Server, MySQL, DB2
  - The language used to speak to databases is called **STRUCTURED QUERY LANGUAGE (SQL)**
    - Made up of **queries** – questions that we ask the data to answer

Database Applications

- The tools that users use in the DBMS in order to interact with the database
  - Allows the user to interact without typing in SQL (code)
  - Includes: REPORTS, FORMS, and QUERIES

- Often allow **MULTI-USER PROCESSING –** multiple updating the DB simultaneously
  - **LOST-UPDATE PROBLEM:** When two people open up the same file, edit it, and both save it... the person who saved last overwrites the other person

Types of DBMS

- ENTERPRISE DBMS: Used in organizations and large groups

- PERSONAL DBMS: Used for small, simple databases
  - Often used by fewer than 15 people
  - Only remaining one is **MICROSOFT ACCESS**

Entity-Relationship Diagrams (ERD)

- DATA MODEL: A visual representation of what the database will look like (a blueprint)
  - Shows the structure of how the data is stored and how everything is related
  - The most popular data model is the ENTITY RELATIONSHIP DIAGRAM (ERD)
  - Second most popular is the UNIFIED MODEL LANGUAGE (UML)
    - For COMM 226, you need to be able to draw ERDs and just be aware that UML exists

Components of an ERD

Component	Description	Examples
Entities	Something that we are collecting data about	• CUSTOMER • ORDER
Attributes	Characteristics about the entity	• CUSTOMER_NAME • ORDER QUANTITY
Relationships	Common data between entities	• CUSTOMER places ORDERS

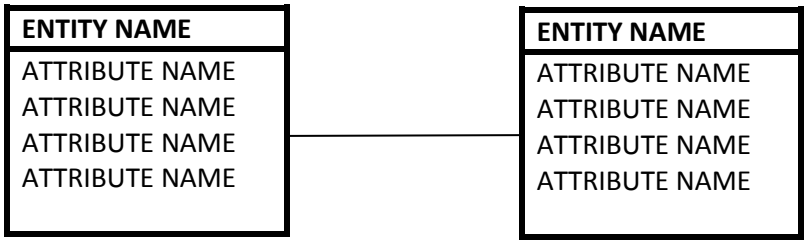
- NOTE: All entities should have an identifier, something that distinguishes 1 row from another
  - This becomes the primary key when we want to make relationships

Example #1A

A university in Montreal has a database for course scheduling. The university keeps track of all employee information for their professors including address, phone number, years with the company, and which department they are in. The professors teach courses that are in turn taken by students. The university evidently tracks the student ID numbers, their names, addresses, major, and email address. When registering for a course, students know which the name of the course, the course code, the time at which the course it taught, the room it's in, and the professor's name.

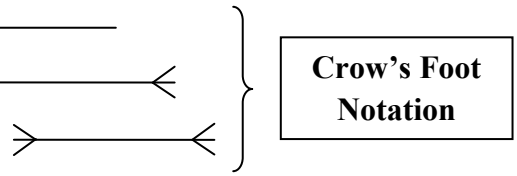
List all entities and their attributes. Then, draw relationships between the entities.

How are to draw the ERD



Types of Relationships

1. ONE-to-ONE relationships (1:1)
2. ONE-to-MANY relationships (1:N)
3. MANY-to-MANY relationships (N:M)



Each relationship must have a verb on it to describe the nature of said relationship (***example***: is bought by).

Example #1B

A course can be taught by many professors. All courses are taught by one and only 1 professor. Students can take multiple classes in a semester.

Using the entities, attributes, and relationships you listed in the previous example, add the crow's foot notation and draw the ERD diagram

Cardinality

- 1:N or N:M represent a relationship's MAXIMUM CARDINALITY
  - N and M represent variable numbers

  Example: A customer can place many (N) orders

- The MINIMUM CARDINALITY is a constraint in the relationship, the minimum required

  Example: A customer must place at least 1 order to be in the system

Example #1C

Some teachers do not teach any classes. However, all courses must be taught by one and only one professor. Students also may not be taking classes in the event that they are taking a semester off.

Re-draw your ERD diagram this time adding the minimum cardinality.

SOS Step Box

STEP 1: Read the case once and make a list of all the entities.

STEP 2: Re-read the case and list all attributes for each entity. Don't forget to include an identifier for each.

STEP 3: Make a box around each entity and all of the attributes. Re-read the case and draw the relationships between each of the entities.

STEP 4: Using the lists you've made, DRAW YOUR ERD.

STEP 5: Re-read your case one last time – fill in the cardinality and add verbs throughout your diagram.

STEP 6: Include a foreign key on the MANY side of each relationship.

STEP 7: State assumptions as needed.

Example #2 – Timeless Inc. CDs

In 2013, Matthew and Chelsea Martin opened Timeless Inc., a family-owned business that sells audio CDs of classic and best-selling children's stories.

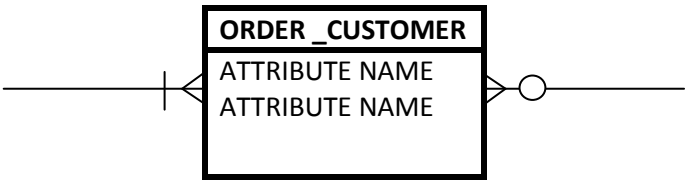
The Company has a number of distributors that supply them with the CDs for resale. The company collects information about the location of each distributor and the number of purchases made from each one.

For selling purposes, the CDs are classified by appropriate age groups: 3–6; 7–12; and 13–17.

Roughly 20% of total sales occur within their single retail store; the remaining 70% are through the website. Sales are particularly strong during the summer vacation months and Christmas shopping season. As such, dates and amounts are always collected for planning purposes.

Many-to-Many relationships

- When you have a many-to-many (N:M) relationship, you need to break it apart
  - Add a table in between containing the names of both



Example #3 – M&H Clothing

M&H is a clothing retailer located around the world. Each store has its own database to manage its operations. M&H has several suppliers from which it receives clothing. The company thus tracks what the company supplies, their contact information, and address. All products have a SKU, a quantity in stock and price associated with it. The products sold range from shirts and pants to jewelry and accessories. All suppliers stored in the system have supplied at least 1 article of clothing.

When customers make a purchase, the company asks for their phone number and records the number of items purchased as well as the date of their last purchase. Each purchase is also recorded including the date it was made and the employee who made the sale. When the purchase is made, the items that were sold are deducted from the inventory in the system.

Normalizing Data

- Breaking apart a poorly structured table into two or more well-structured ones
  - Done to prevent DATA INTEGRITY problems
    - Occurs when data is duplicated throughout the database (hard to update)

      Example: What if the course name changes? We'd need to update each student's schedule!
  - When you see duplicate data, eliminate it by placing it in a new table
    - Each table should only represent one theme, one concept

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3	KIMMEL, JIMMY	434 Hollywood Blvd	312-424-2313	1	VIP
4	DION, CELINE	3721 Falsetto Lane	418-356-2984	12	Repeat

Separated into a different table so if we were to update the discount %, it wouldn't have to be changed for each customer individually

Type ID	Type of Customer	Discount	Notes
1	Normal	0%	Default customer type
2	Repeat	10%	Minimum 10 past orders
3	VIP	15%	Celebrities, media, etc.

Chapter 6
NETWORKS AND COLLABORATION

Networks 101

- It becomes most useful when connected to a network

- COLLABORATION: When two or more people work towards a common goal
  - In IT, this is enabled by IT
  - Dependent on the following 4 factors (the 4C's)

Factor	Example – Group Projects
Communication Skills and Culture	Are we encouraged to collaborate? Are you purposely put into groups like in school?
Communication Systems	Do we have access to tools like Skype, Dropbox, or Facebook Messenger that allow us to work together remotely?
Content Management	Do we have tools to work on the content at the same time without a hassle? (***example***: Google Docs)
Control of Workflow	Is there a plan, outlined tasks, divided between members? (***example***: when doing group projects, you split the work and set deadlines from the start)

- Networks are more valuable when more people use them – NETWORKS EFFECTS (chapter 1)
  - NETWORK EXTERNALITIES: Synonym for network effects

    Example: Google + is less popular than Facebook because few people use it, not because it's a bad system

Computer Networks

- COMPUTER NETWORK: Collection of computers that send and/ signals from transmission media
  - TRANSMISSION MEDIA: Cables, wires, wireless (***example***: cell tower signals)

Network Type	Description	Examples
LOCAL AREA NETWORK (LAN)	Computers connected within a small, single location	Your home network, Starbucks Wi-Fi
WIDE AREA NETWORK (WAN)	Connects computers geographically apart, two or more locations	Concordia Wi-Fi at both SGW and Loyola campuses
An internet (lower-case i)	A collection of several WANs and/or LANs	PepsiCo's internal network used around the world
The Internet (capital I)	The most popular internet	What we use every day to access emails and Facebook

How networks work

- SWITCH: An intermediary computer that allows two computers to talk, it translates the message
- NETWORK INTERFACE CARD (NIC): Allows a device (computer, phone) to be able to talk to the network (otherwise, the commuter is just a box of wires with no connectivity)
  - ONBOARD NIC: Built into a computer
  - MEDICA CONTROL ADDRESS (MAC): ID for each NIC so the network knows who it is
- UNSHIELDED TWISTED PAIR (UTP) Cable: Connects your computer to the network (blue cable you use to connect when there's no Wi-Fi)
- FIBRE OPTIC CABLES: Newer cables that can carry more data, and faster

UTP Cable

- Today, a cable isn't always need – this is called WIRELESS LAN
- WIRELESS NIC: Allows devices to connect without wires (e.g. there's one in your phone)
  - ACCESS POINT (APs): Like a switch – the computer that all wireless devices connect to
    - Range from 40 to 100 meters
    - REFLECTORS or REPEATERS may be used to increase this range

How they talk to each other: Protocols (Network Language)

- PROTOCOLS: Rules that allow two computers to talk with each other (common language)
  - All devices on 1 LAN must use the same protocol (must speak the same language)
  - IEE 802.3 PROTOCOL: Most popular one today
    - Also known as ETHERNET
    - The NICs needed to use this protocol support 10/100/1000 ETHERNET

***Example*:**

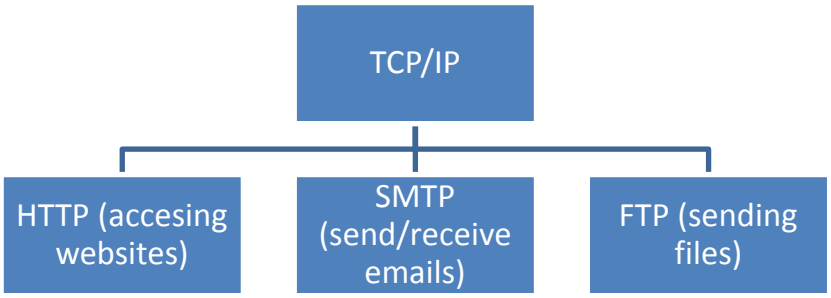
How the Internet works

- The Internet is a WAN
- ROUTER: Helps to implement the protocols for a WAN
- INTERNET SERVICE PROVIDER (ISP): Your router connects to them, they connect to Internet
  Examples: Bell, Videotron

***Example*:**

How do devices speak on the Internet?

- TCP/IP (Transmission Control Program / Internet Protocol)
  - Communication language of the Internet
  - There are dozens of sub-languages (protocols) that accomplish different tasks



The Web vs. the Internet

- NOT THE SAME THING
- THE WEB: Subcategory of the Internet that uses Hypertext Transfer Protocol (http://)
  - i.e. Just the websites on the Internet
- BROWSERS: The software that speaks in HTTP so that you can talk with **websites**
  Example: Firefox, Internet Explorer, Safari, Chrome

Naming Websites (Domains)

- All websites have a TLD (Top-Level Domain) at the end of its name
  Examples: .com, .ca, .net, .org
- UNIFORM RESOURCE LOCATOR): The address of the website in human language
  Example: concordia.ca
- IP ADDRESS: The address of the website in networking language
  Example: 198.103.238.30
  - IP Addresses can be PUBLIC (websites) or private (your computer)
    - Your address is assigned at random by the DCHP
- DOMAIN NAME SYSTEM (DNS): Converts the URL to IP and vice-versa
  - The translator between human and networking languages
  - This translation process is called DOMAIN NAME RESOLUTION
    - Like a phone book – I'm looking for JMSB ---> JMSB is located at 1450 Guy
    - The translation is done by a DOMAIN NAME RESOLVER
      - This translators live in universities, large companies, government

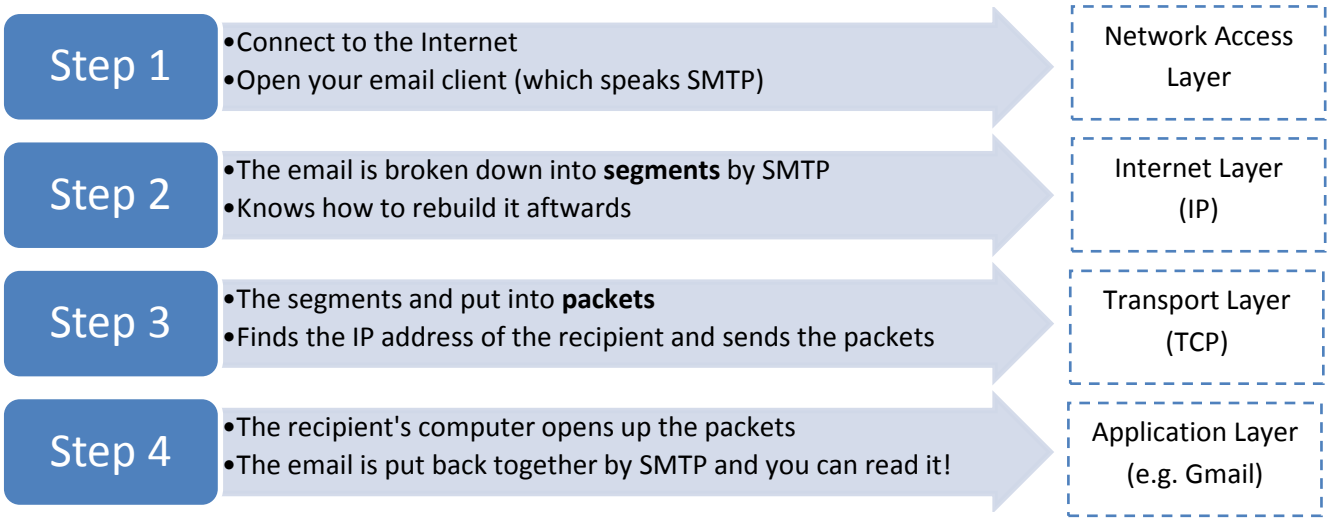
***Example*:**

Terminology – Connecting the Router to your ISP

- When you send signals from Router to ISP, this signals are ANALOG waves
- Computers speak DIGITAL waves
  - MODULATOR/DEMODULATOR or MODEM: Converts between analog/digital
- DSL Line (Digital Subscriber Line): Uses the telephone line to connect to the Internet
  - Doesn`t interfere with phones anymore
- ADSL (Asynmmetric Digital Subscriber Lines): DSL Lines with different upload/download speeds
  - UPLOAD: Data that you send
  - DOWNLOAD: Data that you receive
- SDSL (Symmetric Digital Subscriber Lines): DSL Lines with same upload/download speed
- CABLE MODEM: Uses television cable line to connect to the Internet
- NARROWBAND: Lines with transmission speeds of less than 56 kpbs
  Example: Remember when you had Dial-Up Internet?
- BROADBAND: Lines with transmission speeds of greater than 256 kbps
  - The Internet as we know it

How email works

- SMTP (Simple Mail Transfer Protocol): The protocol used to send emails
  - There are other less common ones as well (MIME, POP, IMAP)



How search engines work

- Developed in 1990 by Alan Emtage from McGill
  1) Collect the URLs from around the Internet
  2) Store them so that they can be searched (like a phone book)

- WEB CRAWLER: Software that goes around the Web finding new URLs and updating old ones
  - Like a spider, they crawl around mapping out the Web

- INDEXING: Sorting out all the URLs found
  - The way things are sorted is a secret
  - Keep in mind they are companies and may place ads in your search result

Mobile Computing

- A device that is mobile and used to connect to the Internet

- Smartphones and laptops are made to communicate on the go
  - M-COMMERCE: Transactions using a mobile device

    Example: Banking on your phone, buying tickets on your phone, ordering food

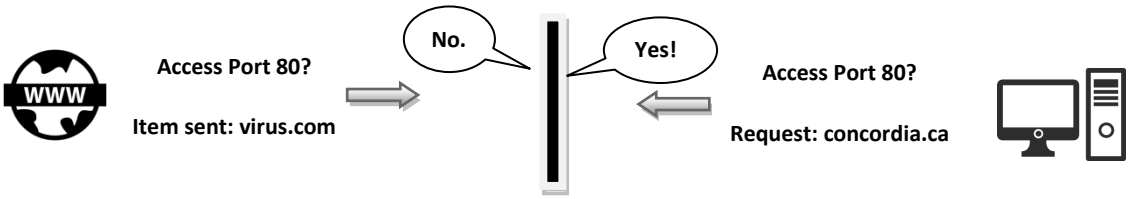
Where will it be used? (Asian phones are not the same as Canadian ones)	**Connection Speed?** (2G, 3G, 4G, LTE)	**Operating System?** (iOS, Android, Windows Mobile)

- Tablets and e-Readers: Hybrid mobile devices originally designed for reading
  - Special "electronic ink" makes reading the screen less straining on eyes

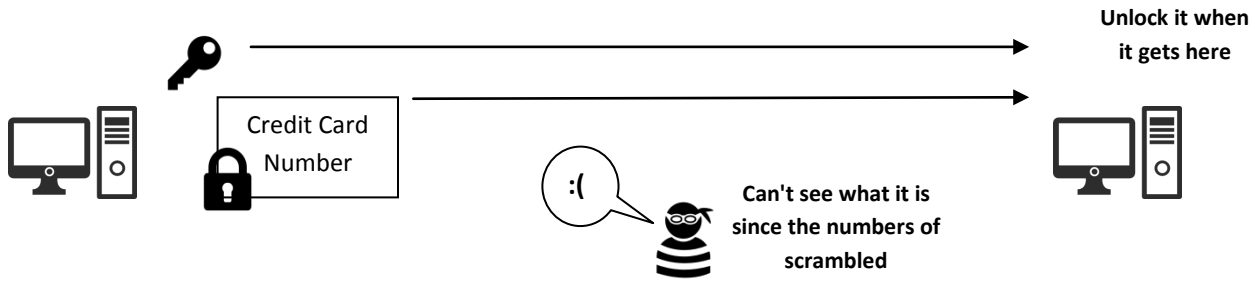
Pros	**Cons**
Your office goes with you wherever you go	Constantly Connected (***example***: you can't leave work behind)
Constantly Connected	Compatibility between devices (***example***: iOS vs. Android apps)
	Ownership (***example***: people want to use their own phone at work – this concept is called BRING YOUR OWN DEVICE)

Firewalls, Encryption, VPNs

- FIREWALL: Controls who has access to the network
- PORT: A number that identifies which service should be used
  Example: If we want to load a website (HTTP service), the port is 80
- Firewalls can block ports to prevent access to some services
  Example: Block port 80 if you don't want anyone access websites
- PACKET-FILTERING FIREWALLS: Examines messages to determine whether they should be sent or not (like a coffee filter, only the good stuff gets through)
  - Commercial firewalls today are general of this type
  - Can be used to block sites (e.g. Facebook or YouTube at work)



- Encryption: Transforming regular text into unreadable text so that it cannot be stolen
  - Like using a cryptic code so no one can steal data
    Example: Your phone number // 514 848 2424 ------> 2b&bd@bd
  - There is a key used to lock and unlock the encryption
    - The key is like a switch that changes the phone number from numbers to code
    - SYMMETRIC ENCRYPTION: Same key is used to encode and decode **(faster)**
    - ASYMMETRIC ENCRYPTION: Different keys are used to encode and decode
  - The protocol (language) used for encrypting website is **HTTPS**
  - The protocol (language) used for encrypting the data ON the website is **SSL/TSL**
    - Used if you're sending sensitive information between your PC and website
      Example: Online banking uses this so no one intercepts your info



- Virtual Private Networks (VPNs): A private connection between your computer and the website over the Internet (public)
  - Virtual because it uses the public Internet, not a real private network
  - Makes TUNNELS from your computer to the website, or from one office to another

Chapter 9
E-COMMERCE, SOCIAL MEDIA, WEB 2.0

E-Commerce

- **E-Business:** Any business activity conducted electronically (using IT)
  - This can include any business functions such as looking at reviews before buying in-store, checking the weather, customer support

- **E-Commerce:** A sub-category of e-business that involves a transaction (buying or selling) involving goods or services over a network (public or private)
  - Merchant Companies: Buy and sell their goods
  - Non-Merchant Companies: Facilitate sales but don't own the goods (intermediary)

MERCHANT COMPANIES	NON-MERCHANT COMPANIES
▪ **Business-to-Consumer (B2C)** ***Example***: Amazon ▪ **Business-to-Business (B2B)** ***Example***: a small clothing store ordering clothes from a supplier in China ▪ **Business-to-Government (B2G)** ***Example***:. The QC government buying computers from Dell	▪ **Online Auctions** Buyers bid like in a real-world auction but all through an online system ***Example***: eBay ▪ **Clearinghouses** The website advertises the goods, and delivers them on behalf of someone else – they never own them ***Example***: some Amazon items ▪ **Electronic Exchange** The website connects buyers and sellers and take a small cut of each sale ***Example***: Expedia

Pros and Cons of E-Commerce

Advantages	Disadvantages
1. Disintermediation: The middle man is cut out... the manufacturer sells directly to the customer thus eliminating businesses	1. Channel Conflict: When the artist sells a CD directly to the customer, how does HMV feel?
2. Available Information: Can now look at reviews and make more informed purchases	2. Price Conflict: Buying a book on indigo.ca is cheaper than going into a Chapters store
3. Price Elasticity: Companies can better understand demand and supply through online tracking and experimenting with prices easily	3. Logistics Expense: its costly for Amazon to ship so many small orders instead of 1 big one
4. More Feedback: The company and customer can interact easily	4. Customer Service: The salesperson isn't there to show the customer how the phone works
5. Convenience: You can shop in your PJs!	5. Showrooming: People go into the store to play with the computers, then buy it online (that's why BestBuy stores are shutting down)
	6. Taxation: If you buy something from a US retailer, do you pay American or Canadian taxes?

Social Networking

- Social Networking: A web of related individuals and organizations

- Social Capital: The benefit derived from social networking
- From the business' perspective, the following capital exists
  1. Physical capital: Physical resources such as assembly lines, computers, machines
  2. Human Capital: Knowledge and skills from your employees
  3. Social Capital: Social relationships between people (employees, customers, etc.)
     - There are 4 benefits to social capital:

Information Shows Opportuntiies, threats, problems, the way the customer is thinking	**Influence** Your relationships with co-workers can influence their decision, your customers can influence others to buy (word of mouth)
Social Credentials Social status helps to shape who you are and the business' brand	**Personal Reinforcement** Networks reinforce your professional image or position in an industry

Weak vs. Strong Relationships

- The people you know best (STRONG) tend to all know each other (close circle of friends)
  - This means your network won't expand with them!
- The people you know least (WEAK) contribute most to your network
  - When you see them at cocktails or other events, you'll me

Social Networking Enabled by IT

- You don't need a computer to network, but Facebook has made it synonymous with the Internet
- IT brings benefits that don't exist in face-to-face networking
  1. SORTING THROUGH DATA is easier with IT, you can find what and who you need
  2. TRACKING RELATIONSHIPS is easier (such as birthdays, last time we spoke)
  3. NETWORK EFFECTS means that platforms like Facebook will grow as more people use them... this means your network keeps growing automatically!

Web 2.0

- Started with the creation of smartphones, user-created content, social media, e-commerce – not a specific change in technology.

	Web 2.0	Traditional Web (1.0)
Software	A service that is free for all to use via the cloud / the Internet, constantly changing (***example***: Google.ca)	Licenses needed, updates released periodically
Client	Thin Client – you don't need to download extra software to use things like Google Maps, Gmail	Thick Client – required downloads, updates released one at a time
Product Value	NETWORK EFFECTS – more users adds more value (***example***: Twitter)	Value depends on the product (***example***: a laptop's value depends on it specs)
User Experience	Differs on each website (***example***: Amazon looks different from Expedia)	Static, standardized user interface (***example***: all MS Office programs look the same)
Content	Participation from user is welcome	Static – company posts the content
Business Model	Free services, advertising for revenue	Licenses, software sales
Advertising	Viral, shared by customers	Static ads spread everywhere by the company

Other Terms

- User-Generated Content: The user adds value by creating content (***example***: user reviews)
- Crowdsourcing: New ideas are posted online and customers can pre-order thus contributing to the product actually coming to life
- Mashups: Taking a services from website and combining with another (***example***: when you see a Google Map on a company website's "Contact Us" page)

How do companies benefit?

1. ADVERTISING: More targeted and focussed

   Example: You can't determine who will see a billboard, for a website you can

2. MASHUPS: More collaboration between businesses

   Example: Hotels can team up with car rentals so you can book both simultaneously

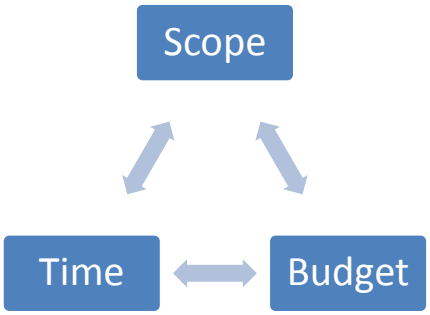
Chapter 10
Acquiring IS through Projects

Project Management

- Standards put in place through the **PMBOK** (Project Management Book of Knowledge)
  - Developed and maintained by **PMI** (Project Management Institute)
  - People certified to manage projects are **PMP**s (Project Management Professionals)
  - **ITPM** (Information Technology Project Management) are techniques and methods used to better run projects used by all project managers

- If it involves technology, it becomes an **IT Project**
  - Affects all 5 components of the system (including people and procedures)

The Iron Triangle



- It's almost impossible to get all 3 in balance
- Only **16%** of projects are completed on time, within budget, and on scope
- **30%** of projects are cancelled before completion

*** The key to successful projects is good **planning** ***

Operations vs. Projects

- IT Operations: The day-to-day tasks
  - GOAL: Keep things running efficiently, stable, predictably, and securely

- Projects: Implementing changes over a set period of time
  - GOAL: Improve the business

- ITIL (Information Technology Infrastructure Library) = PMBOK for operations
  - Standards and procedures for driving value from operations
  - People working in operations usually specialize (e.g. Windows expert, website admin)

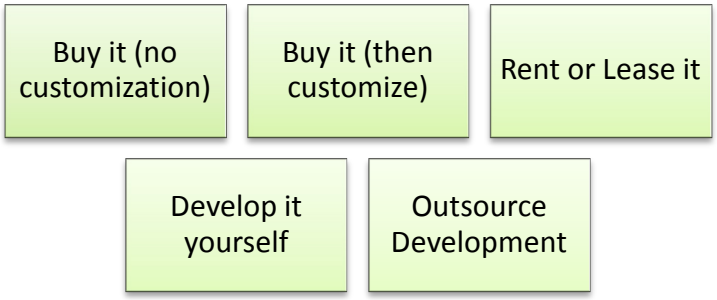
Risks in Projects

1. SCOPE: IT is virtual, i can't see what the project will look like when complete
2. COSTS: IT costs are constantly changing
3. TIME: How do I know how long each part will take?

Risks aren't only related to the technology, it's also human!

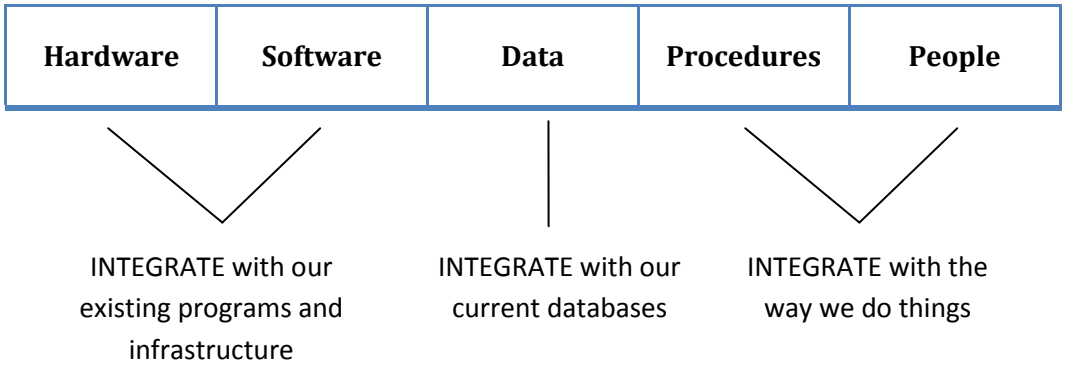
- Lack of knowledge
- Unclear requirements
- Too complex
- Lack of support from management

Acquiring New Systems



Key Questions

- Do you have the skills needed to develop it?
- Which option is cheapest?
- Which takes the least time?
- Which best meets our needs?
- Does something already exist on the market (no need to re-create it)?
- How will integrate with our existing systems?



Implementing New Systems

- System Development Life Cycle (SDLC): a classic process for acquiring or developing IS

Phase 1: System Definition

- Define Goals and Purpose

  Example: Help PepsiCo compete against a new competitor

  Example: Enable Starbucks to take online orders

COMPANY STRATEGY (CHAPTER 3)
- Industry Forces (Porter's 5)
- Value Chain (internal improvement)
- Competitor Actions

Organization's Response

PROJECTS
Improvements that make us more competitive or help us to execute the strategy

- Assess Feasibility
  - Cost Feasibility: Do the benefits outweigh the cost?
  - Schedule Feasibility: Can we complete it in reasonable time?
  - Technical Feasibly: Can our existing systems work with the new system?
  - Organizational Feasibility: Will it fit with the way we work? Culture? Legal?

Phase 2: Requirements Analysis

- It's hard to visualize what the system will look like when complete
- Involve the end users of the system, they know best how the system will be used

  Example: The accountants know what they need to do their job better than IT does
- Getting users on board helps to gain their support
- Now is the cheapest time to change the requirements

  Example: Adding a new feature half way through the project is costly
- Team consists of SYSTEMS ANALYSTS and BUSINESS ANALYSTS in this phase
  - These people need to understand both IT and the business (MIS background)

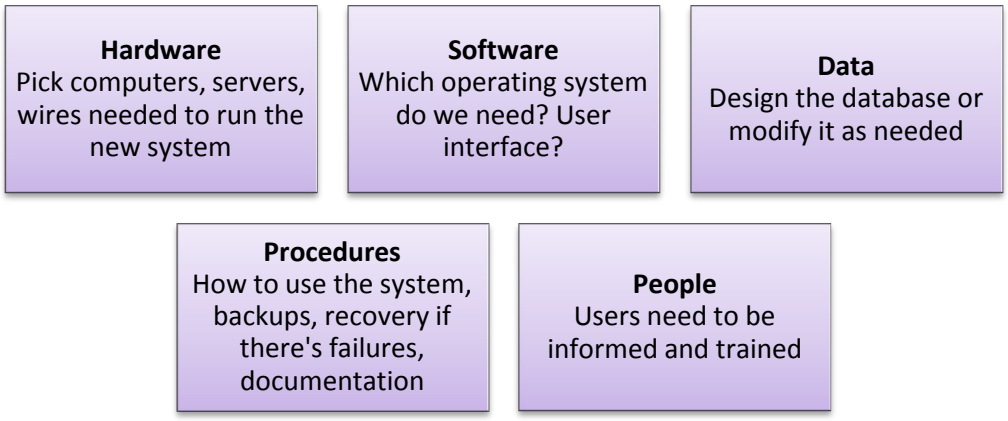
Phase 3: Component Design

- If you choose to BUY IT, there will always be discrepancies between what you need what is offered
  - Commercial off-the-shelf (COTS) software will never fit super comfortably

How to deal with discrepancies

- Customize the Software
- Change the way we do things
- Live with it

- If you choose to BUILD IT, you need to design all 5 components of the IS



Phase 4: Implementation

- Once it's all designed, the programmers come in and make it (coding, programming)!
- If it's purchased, this is when we start hooking things up and installing all the components
- SYSTEM TESTING
  - Test Plan: List of actions users need to perform to test all parts of the system

    Example: Try to log in

    Example: Press the button; write down which page it brings you to
  - Product Quality Assurance: Same as testing
  - Beta Testing: Allows users to try the system on their own before fully released
- TRANSITIONING TO THE NEW SYSTEM (CONVERSION)

Options	How it's done
Pilot	The whole system is implemented into 1 part of the business to see how users will react. Allows us to test and improve before giving to everyone.
Phased	Different parts of the system are released to different parts of the organizations one at a time. This allows users to adapt and allows to regional tweaking. ***Example***: Week 1 – Accounting gets it, Week 2 – Marketing team gets it
Parallel	The old and new system runs at the same time for a short period. Very costly but provides a nice fallback plan in case of problems
Plunge	Unplug the old system, plug the new one it – all in one shot

Phase 5: System Maintenance

- Making modifications as needed after implementation
- Patch or service packs fix the problems
- Prioritize requests for changes
  - Requests can either be due to errors or just for suggested improvements

Weakness of SDLC Methodology

1. Considered a **WATERFALL METHOD**... once you move to the next phase, you don't go back
   ➔ Example: Once you start designing, sometimes you need to go back and redo some requiring with the end user... SDLC doesn't allow for this

2. Some projects are just too complicated
   ➔ Example: Can you list all the requirements to build an airplane all at once?
   i. **ANALYSIS PARALYSIS**: When documentation and defining requirements goes on forever even when we have enough to move forward

Other Methodologies

- Agile Methods: Like hybrid methods

- Why they exist? No single process works for all organizations

Outsourcing

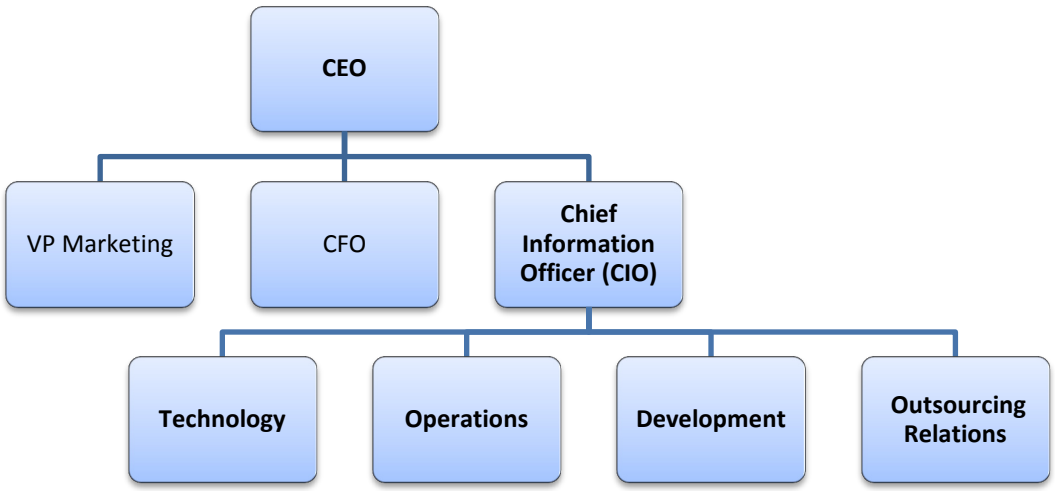
- OUTSOURCING: Having another organization perform a service for you (***example***: manage your database)
  - If they are on a different continent, this is called OFFSHORING (***example***: Indian call centers)

Advantages	Disadvantages
1. IT isn't everyone's expertise 2. Less costly elsewhere (India, China) 3. Risk reduction (projects often fail)	1. Loss of control 2. Tied to the developer (they know your system better than you) 3. If they mess up, you still pay 4. Expensive and difficult to change vendors

- APPLICATION SERVICE PROVIDERS (ASPs): Provides software and applications for rent
  - The system is maintained by the ASP and is accessed via the Internet
  - Risks include:
    1. No control over your data, stored abroad
    2. If you lose the Internet, your whole system can't be used
    3. Can get locked-in, make sure you can take your data if you need to switch vendors

Chapter 11
STRUCTURE, GOVERNANCE, ETHICS

IT Department Structure



- Technology: Lead by the Chief Technology Officer (CTO) – in charge of new tech & innovation
- Operations: Day-to-day administration (network administrators, infrastructure, user support)
- Development: Improve current system and implements new ones
  - If the company develops in-house: includes programmers, testers, project managers
  - If the company only buys: Mostly business and system analysts
- Outsourcing Relations: Monitors relationships and service levels
- WEB → Marketing Team
- Most jobs in IT require communication skills, business skills, and interpersonal skills

IT Architecture

- IT should contribute to the company's strategy

  Example: Wal-Mart invests heavily in IT to make logistics flawless → lowers prices

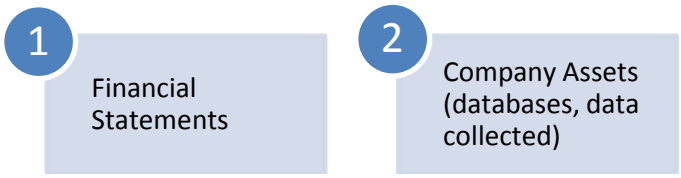
- IT Architecture: The plan for everything IT in the business
  - All computers, when they're bought, when they should be replaced, who's in charge of what, what software is on which computers, networking, access controls, etc.
  - ENTERPRISE ARCHITECT: Job title in large organizations for person who manages this
  - ZACHMAN FRAMEWORK: A model for IT architecture to help companies develop it

- ALIGNMENT: When the IT department's mission, goals, and plans overlap with the organization's ones
  - Major challenge in business today
  - Requires constant communication between business and IT

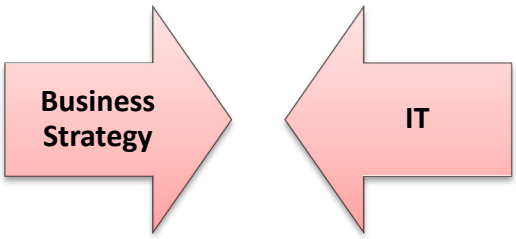
IT Governance

- GOVERNANCE: Standard management policies and processes for IT services
  - Deals with sourcing, prioritizing IT investments, security, and privacy
  - Recent laws have made this increasingly important for companies
    1. Budget Measures Act (ONTARIO)
    2. Sarbanes-Oxley Act (SOX)

- **Sarbanes-Oxley Act (SOX)**
  - Result of fraud in the early 2000s (Enron, WorldCom)
  - Key executives are now criminally liable
  - Requires companies to create internal controls to protect:

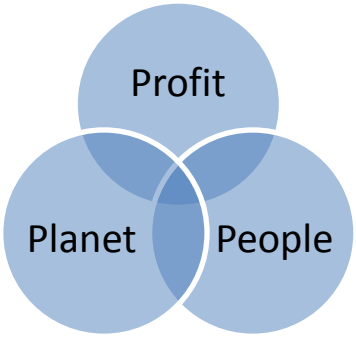


- **IT Audit**
  - INFORMATION SYSTEMS AUDIT: Making sure that the IT systems that hold financial data are secured and that the data inside of them are reliable
  - INFORMATION SYSTEMS AND CONTROL ASSOCIATION (ISACA): Develops standards for IT governance and IT audit
    - CERTIFIED INFROAMTION SYSTEMS AUDITOR (CISA): Professional designation for people who do the IT audits
    - CONTROL OBJECTIVES FOR INFORMATION AND RELATED TECHNOLOGIES (COBIT): Frameworks and standards that help to align IT with the business



Ethics and Green IT

- Computers don't have ethics, it's how HUMANS use the data that causes the problems
  - Issues surround privacy of data and what we do with it
- GREEN IT: Understand the impact of our tech resources on our environment
- TRIPLE-BOTTOM LINE: Not all about the money



- ENERGY STAR: An international program that labels products that consume less power
  Example: Consume less electricity to run
  Example: Sleep mode on computers after 15 mins of inactivity
- E-CYCLING: Recycling computers and devices
- E-WASTE: Disposing of computers and devices

Chapter 12
MANAGING INFORMATION SECURITY AND PRIVACY

Identity Theft and PIPEDA

- **IDENTITY THEFT:** Critical personal information is stolen and used to impersonate a person
  - One of the fastest growing crimes in Canada
  - Commonly Stolen Information: Social insurance Number, name, address, credit card

- Organizations have a responsibility to keep customer data safe --> PIPEDA
  - PIPEDA = Personal information Protection and Electronic Act (a Canadian act)
    - Under this act, business what tell you...
      1. What they are collecting
         ➔ ***Example***: Websites that record when you visit tell you this in their terms of service
      2. What they will do with your information
         ➔ ***Example***: Apple can't sell your information to Facebook without telling you
      3. How they keep your information safe (upon request)
         ➔ ***Example***: You have the right to know what country Google stores your info in

Threats faced by Organizations

SECURITY THREATS	PROBLEMS
1. Human Error (Accident) 2. Malicious Behaviour (Intentional) 3. Natural Events (Non-Human)	1. Unauthorized Data Leak 2. Incorrect Data Modification 3. Faulty Service 4. Denial of Service 5. Infrastructure

HOW DATA GETS OUT INTENTIONALLY

General (*examples*: Phone, in-person)

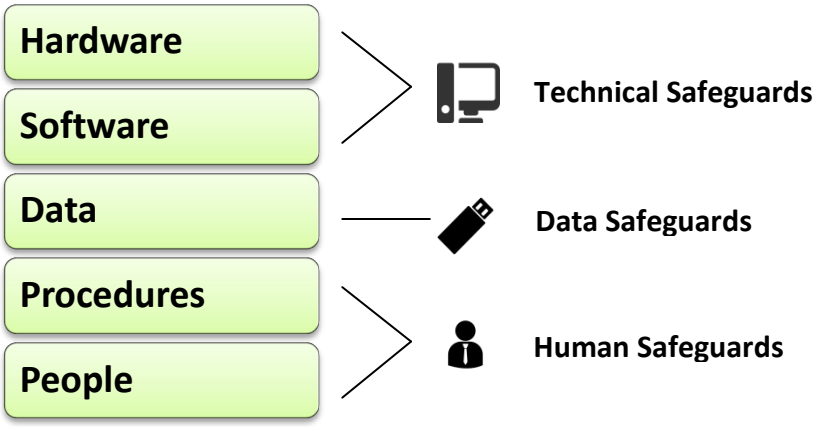
- Pretexting: Saying that you are someone you're not to gain access to sensitive information
  Example: Someone calls pretending to be your bank and asks for your account number

- Spoofing: Hiding your identity to pretend someone you're not
  Example: When the caller also disguises their number as the bank's

IT Specific

- Phishing: Same as pretexting but done via email
  Example: Email from your "bank" telling you to click a link to change your password
- Email Spoofing: Synonym for phishing
- IP Spoofing: When the website pretends to be another then directs you to another one
- Sniffing: Intercepting communication to steal the data
  Example: a virus that makes a copy of all emails you send
- Hacking: Gaining unauthorized to a system for malicious reasons (stealing, wreaking havoc)

As a result of all these threats, management must create security procedures to manage risks...



Technical Safeguards

	Safeguard	Description	Examples
1	**Identification and Authentication**	Ways of determining who is accessing the computer and validating that it's the right person	○ Username and Password ○ Smart Cards (employee badge) ○ Biometric Authentication: Eye or hand scanner ○ Single Sign-On: You only enter your password once but have access to all your applications such as email, intranet, etc.
2	**Encryption and Firewalls**	Sending data safely between computers and networks	*See Chapter 6*
3	**Malware Protection**	Software programs and human actions that are used to prevent and remove viruses, worms, malware, spyware, etc.	○ Antivirus and antispyware software ○ Scan frequently ○ Update malware definitions (how the antivirus programs detect new viruses) ○ Be careful with email attachments ○ Install updates and patches ○ Be careful of where you use Internet

Data Safeguards

1. Database Administration: Policies and standards used to manage databases
2. Backups: Creating copies of the database in case it fails
3. Physical Security: Log who goes into the rooms where databases are stored

Human Safeguards

	Safeguard	Types	Explanations
1	**For Employees**	Segregation of Duties	Just like in accounting, the person approving accesses should not be same person granting them
		Assign least possible privileges	Only give employees access to the data they will need regularly
		Document accesses	This allows companies to modify and remove access easily as needed
		Security Training	All new employees should be subject to training and shown the security policies
		Enforcement	3 components (RAC) *
		Termination	Accesses should be removed as quickly as possible when someone quits or is fired. If they leave on bad terms, be aware of the risks (e.g. stealing customers)
		Hire and screen carefully	Be careful of who you hire especially if the job requires them to have access to sensitive information
2	**For Non-Employees**	Hardening	Given temporary employees and contractors very basic access
		Protect Supplies, Customers	Make sure the systems they use (e.g. your website) are safe
3	**Account Administration**	Account Management	○ Giving Access ○ Modifying Access ○ Removing Access Having unused accounts left around in your system is extremely unsafe!
		Password Management**	Require employees to choose safe passwords
		Help-Desk Policies	For instance, when you call your bank, they ask security questions so they know that it's really you

		Procedures and Operations	1. NORMAL: How to perform jobs properly 2. BACKUP Operations: How to make sure we have copies or everything and are prepared if something stops working 3. RECOVERY Operations: How to restore the system if it goes down
4	**Security Monitoring**	Check logs and investigate incidents	Systems log who accesses them, who performs operations, etc. When something goes wrong, you need to use this data and patch your software or procedures as needed!

*** RAC determines who enforces different parts of the systems (e.g. credit card data)**

R – Who's **RESPONSIBLE** for the credit card data

A – Who's **ACCOUNTABLE** if someone hacks it

C – Who's in charge of ensuring that everyone **COMPLIES** to the security policy

**** PASSWORD ETIQUETTE**

1. Change password immediately when its created
2. Change passwords frequently
3. Don't let users switch back and forth between passwords
4. Require a mix of lower-case, UPPER-CASE, numb3rs, and special characters ($%&)

NEVER give your password out to anyone... if someone really needs it, go enter it for them

Disaster Recovery and Business Continuity Plans

If disaster strikes, whether human or natural, we need to make sure the business keeps working!

1. LOCATION: Make sure you know where data is backed up and spread around

   Example: If there's an earthquake in California, Apple must keep operating elsewhere

2. MISSION-CRITICAL SYSTEMS: Know the basics you need to keep running

   Example: Google has multiple servers that are used for Gmail – if one goes down, the others kick in to keep the service going

3. HOT SITES: Third-party companies that keep backups at a fee

   Example: A law firm will store copies of case material documents elsewhere

4. COLD SITES: Office space to be used in the event of a disaster in your main locations

   Example: If your office catches fire, we can restart tomorrow in another office

***** Just like in a fire drill, companies need to practice, have standards for speed, time, resource allocation, and plans in place to make sure that nothing can take down the companies IT or its daily operations *****