

COM-226 Review Notes

Intro to Management Information Systems (ch1p)

1. Why is MIS important?

226 is Processes and info systems

Moore's Law: "number of transistors per Inch² on integrated chip doubles every 18 months" OR "Speed of computer doubles every 18" OR "Cost of memory falls every 18"

Takeaway: Cost of Data Processing, Communications, Storage is essentially Zero.

New Apps, more access, more data, greater mobile = changing Business use of IT.

Why MIS important now? Opportunities to connect with customers worldwide, & improve business activities (efficiency/streamline).

Takeaway: future Business grads need = Asses, Evaluate, Apply emerging IT to business Helps with job security. With IT, other marketable skills can be outsourced.

Non-routine, cognitive skills:

- abstract reasoning: build a model/represent, simplification of an idea/concept, manipulated with logic/reasoning
- systems thinking: how to system components interact? Inputs outputs relate?
- Collaboration: develop ideas/Plans with others, critical feedback
- Experimentation: create/test new alternatives. Careful, reasonable analysis of opportunity. Learn from experience

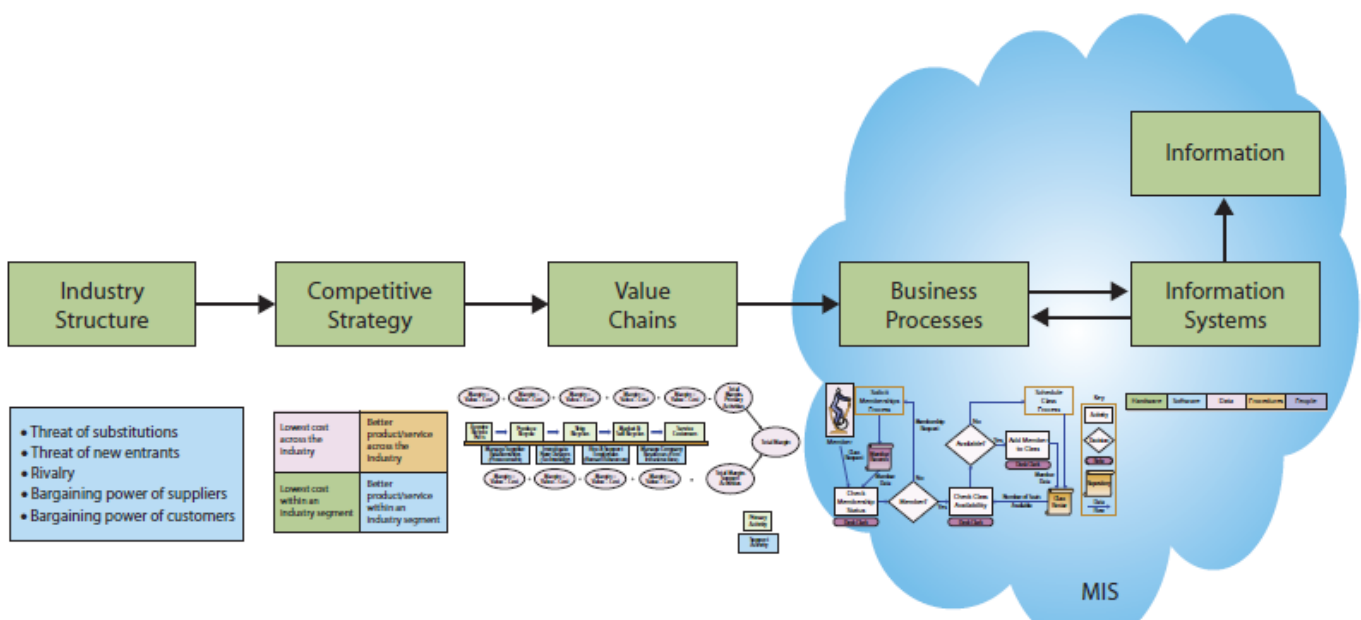
Takeaway: ultimate job security, marketable skills via abstract R, systems think, collab, experiment

2. What is MIS?

Management info systems: management and use of processes, info systems, and info to help orgs achieve strategies.

- Processes, info sys, info: Process is way of doing something, accomplish work via process. IS is collection of components like computer, store/receive/send data, produce info. Info is meaningful insight to help do a job.
- Management and use: creation, monitoring, adapting processes, IS, and info.
- Achieve strategies: business do not DO anything. MIS exists to help the people do things. Do not just be modern/match the current (use twitter). Create and use MIS for a need, not because of 'falling behind'.

3. How is MIS related to Org Strategy



Orgs goals/strategy determined by competitive strategy: low cost across industry, better product/service across industry, low cost or better within industry segment.

Porter’s Three models:

Five Forces: characteristics and structure of the industry (environment): How profitable/sustainable?

- Threat of substitutions
- Threat of new entrants
- Existing rivals
- Bargaining power of suppliers
- Bargaining power of customers

Substitute Strength: price lower, value/benefits are similar, ease of switch

New entrants: industry barriers, reaction from established companies.

Barriers to entry: high customer switch costs, large \$ invest to start, sales/distr not accessible, gov policies.

Competition: price discounting, new products, service improvements

Competition high?: numerous, industry growth slow, exit barriers high

Bargaining power: number of available sup/buy, switch costs, differentiation of product, size of firm vs supplier/customers

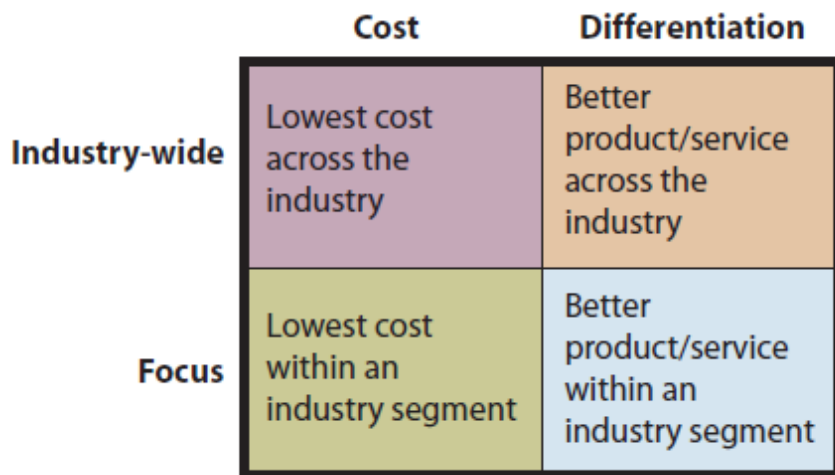
Walmart:

Force	Examples	Strength of Force
Threat of substitutes	e-commerce	Strong
Threat of new entrants	Regional chains that grow	Strong
Existing rivals	Target, Kmart, Sears	Medium
Bargaining power of suppliers	Procter & Gamble, Microsoft	Weak
Bargaining power of customers	You and I	Weak

FIGURE 1-10
Five Forces at Walmart

Competitive Strategy

Responds to structure of industry by choosing competitive model. Cost leader, or add value to differentiate. Commit to one, do not try both. Strategy must be distinctive and maintainable.



Organization goals, objectives, culture, activities must be consistent with strategy. **Takeaway:** MIS systems, processes, IS, info must be constructed to facilitate the company’s strategy.

Competitive Strategy & Value Chain Structure

Analyze industry to make competitive strategy, then organize structure org to implement that strategy.

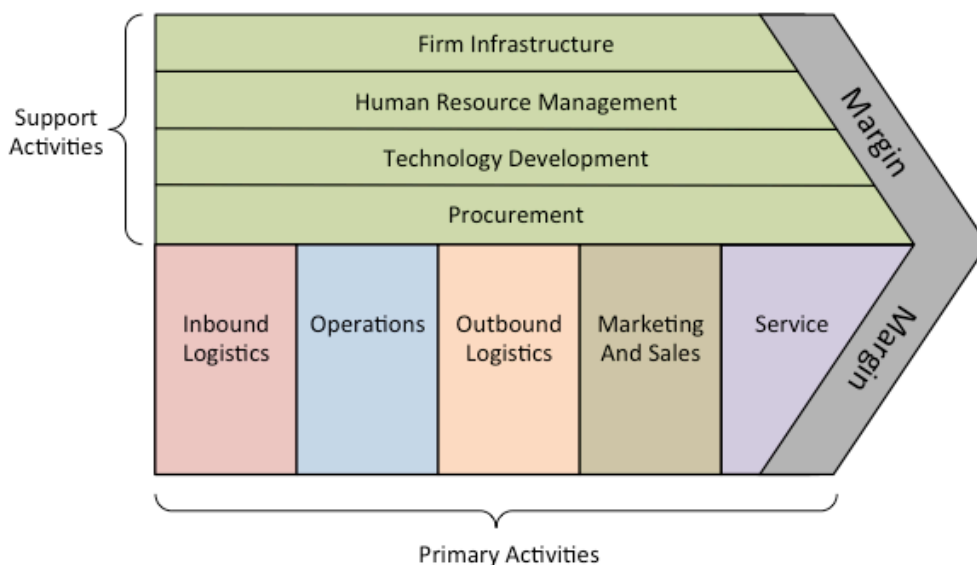
Value: amount \$ customer willing to pay for resource, product, service. Value of activity - cost of activity = **Margin**. Value Chain is a group/network of value-creating activities. Five primary and 4 support activities.

Primary

Primary Activity	Description
Inbound logistics	Receiving, storing, and disseminating inputs to products
Operations/manufacturing	Transforming inputs into final products
Outbound logistics	Collecting, storing, and physically distributing products to buyers
Sales and marketing	Inducing buyers to purchase products and providing a means for them to do so
Customer service	Assisting customer's use of products and thus maintaining and enhancing the products' value

Support: Procurement (find, contracts, nego prices) Tech (R&D, techniques, methods, procedures), HR (recruit, compensate, evals, train), Firm Infrastructure (management, fina, acco, legal, gov)

Chain Linkages: interactions across value activities. Create integrated, cross-departmental business systems. = Business Process Design. Do not automate/improve existing systems. Create new more efficient processes to integrate activities of all dept. In chain.



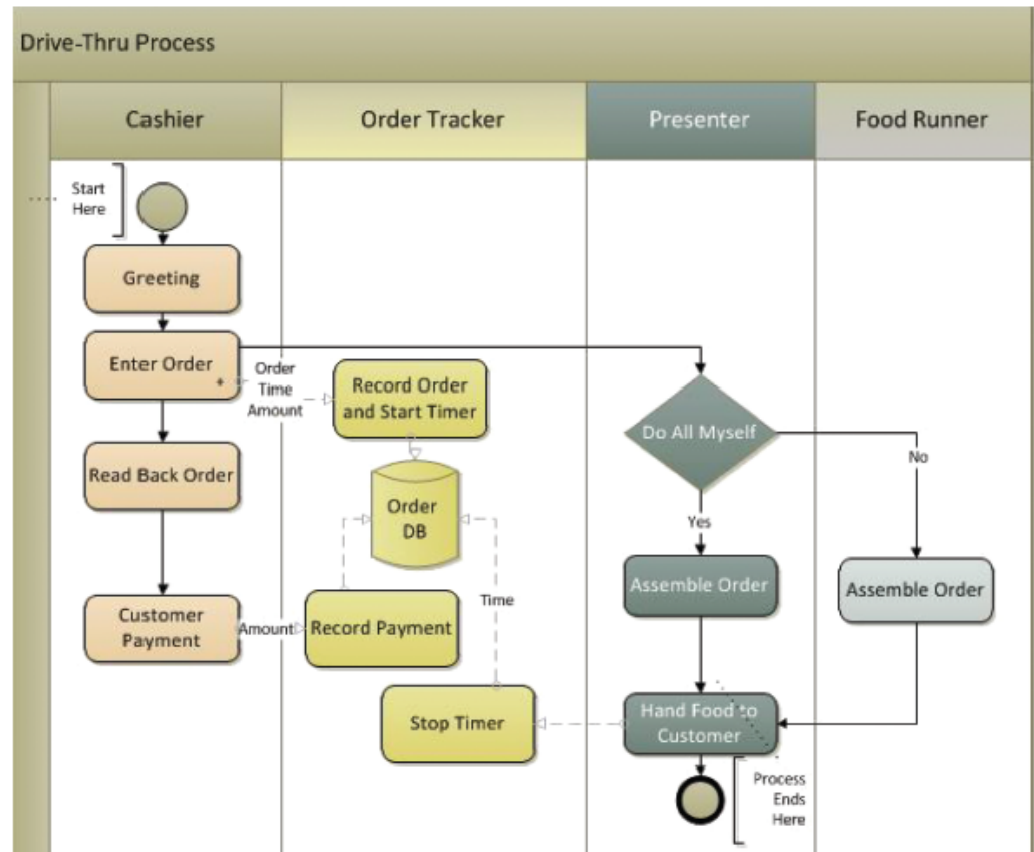
Business Processes, Info Systems, and Info (ch2p)

1. Process: sequence of activities for accomplishing a function. Activity is a task within a process. Processes involve resources: people, computers, data, documents.

Resources connected to Processes= BPMN Business Process Model Notation

FIGURE 2-1

Fast Food Restaurant Drive-Thru BPMN Diagram



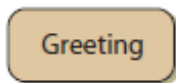
Start



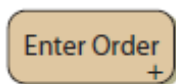
Stop



Activity



Activity Documented Elsewhere



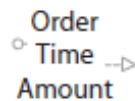
Decision



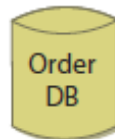
Process Flow



Data Flow



Repository



Annotation

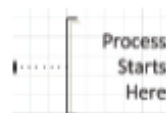


FIGURE 2-2

Summary of BPMN Symbols

Swim-lanes: all the activities for a particular role

Role: subset of activities in process performed by particular actor (people or components)

Standardization: Enforce Policies, Consistent results, Scalable, reduce risk.

Structured vs. Dynamic: Daily processes are fixed formally defined, same steps every time, highly standardized. Dynamic is less specific, adaptive, intuitive.

Structured Processes	Dynamic Processes
Formally defined process, activity flow fixed	Informal process
Process change slow and difficult	Process change rapid and expected
Control is critical	Adaptation is critical
Innovation not expected	Innovation required
Efficiency and effectiveness are important	Effectiveness typically more important
Procedures are prescriptive	Procedures are supportive
Examples in this book: Chapter 7 Procurement; Chapter 8 Sales	Examples in this book: Chapter 9 Collaboration; Chapter 10 Social Media; Chapter 11 Business Intelligence
At Fast Food Restaurant: Scheduling, Drive-Thru, In-Store Ordering, Revenue Totaling, Reordering, Opening, Closing	At Fast Food Restaurant: Landscaping, Community Outreach, Hiring

FIGURE 2-8
Differences Between
Structured and Dynamic
Processes

2. Information System: system group of components interact to achieve a purpose. IS produces info
Components: 5-framework=symmetry.

- Computer hardware: do things.
- Software: instructions
- Data: bridge between machine and human
- Procedures: instructions
- People: do things

Takeaway: Recognize YOU are key, make each component work, estimate scope of new IS, order comp by difficulty and disruption.

Process can be supported by one or many IS.

Procedures: anchor an IS to a Process, describes how to use IS for each process. Process will have diff procedure for each IS it uses.

3. Information (4 definitions): knowledge is derived from data (facts/figures). Information is data represented in a meaningful way. Info is processed data (must do something with the data). Info is any difference that makes a difference.

Elements of info: More than just data, is meaningful, varies from person, located inside you.

Assumptions: it is hard to communicate (data diff v people), all new IS frustrating at first, understand be effective on team, stay curious.

Characteristics:

- Accurate: complete data processed correctly
- Timely: available in time for intended use, or unintended (predicted).
- Relevant: to context and subject. Data summarized for CEO, related to reason needed (subject)
- Just sufficient: amount only for purpose generated, barley so. Critical decisions too much data.
- Cost worth: data is not free. What purpose does data serve compared to cost to acquire.

Takeaway: knowledge is the application/interpretation of information. Information is an aggregation of data to extract meaning from it.

Apply models? See how Process fit together? Support work of others? Try things on my own?

Ethics

Categorical Imperative: Immanuel Kant

Should behave only in way we would want to be **universal law**. (golden rule, due unto others...)

Duty=necessity to act according to categorical imperative.

Perfect Duty= behavior must always be met, **Imperfect**=not required but praiseworthy.

Utilitarianism: morality of an act is determined by it's **outcome**. Moral IF result in most good for most people, OR Max happiness, reduce suffering.

Ex: lying to people with fatal illness=moral it reduces suffering, increase happiness

Problem: but who are we to say if telling the person or not would increase happiness?

Hardware, Software, Networks (ch3p)

1. **Hardware:** electronic components that input, output, store data according to instructions encoded in software.

- Central Processing Unit (CPU): processes instructions, performs logical and arithmetic comparisons, stores results in memory. Speed in cycles/hertz. 64bit/32bit uses more connections with memory.
- Main Memory (RAM): CPU reads instructions/data from memory, and stores results in. Need 64 bit to properly utilize over 4Gb of RAM. Volatile=lost without power source.
- Storage (hardware): save data and programs in magnetic format/optical

Types: personal computer, tablet, smartphone, server, server farm.

Server: computer designed to support processing from many remote computers/users/terminals.

Devices that access cloud servers=clients

Data: binary digits, bits, zero or one, easily to represent electrically, switch open/closed. Numbers, characters, photos, etc all represented by string of bits. Grouped into 8-bit Bytes (hex). Character/letters=1=1byte (8 bits). KB=1024B, MB=1024KB, etc giga, tera, peta, exa, zettabyte, yottabyte.

2. Software

Operating System: controls computer resources. R/W data, allocate RAM, swap memory, start-stop programs, respond to errors, creates/manages user interface. OS of client and server do not need to be same. Windows=80%, Mac, Unix=workstation clients.

Programs processed by Server or Client, both/or by application design.

Virtualization: one computer hosts the appearance of many computers. One operating system runs others as virtual machines.

- PC Virtual: personal computer hosts more than one OS, and runs one within another (parallels)
- Server Virtual: server hosts others. Used in cloud computing chp 6.
- Desktop Virtual: server hosts many versions of OS and can run simultaneously

Horizontal market application: capabilities across all orgs and industries like a word processor

Vertical market app: needs of a specific industry, like medical scheduling apps. Usually customized

One-of-a-kind: developed for specific, unique need. CRA accounting software, ex.

Types: Off shelf, offshelf+altered, custom

Firmware: installed software like an OS, in Read-only way on the hardware itself. Program becomes part of the system's memory.

Native V Thin-Client Apps: native runs on one OS, while thin-client runs on browser/multiple OS.

Object-oriented languages (C#, java) are for native, scripting for thin-client (html, css).

User interfaces (UI), present the format of an app. Windows, menus, dialog boxes, toolbars,

User experience is how the user interact with UI. Chrome=the visual overhead in display. Using content to drive application behavior=direct interaction. Context-sensitive chrome=video playback controls pop up when needed.

App scaling= different appearances for sized devices, carry-over for sizes and devices.

Cloud: most apps use resources and data remote from user and likely not even known.

Roaming=moving activities across devices (reading book from one kindle to other). Soon ERP and CRM will support roaming. Push data servers send to devices, pull the device requests update.

3. Networks

Local Area Network: LAN: connects computers in same geo location. Communication lines on site

Wide area network: WAN: connects computers across many geo locations. Coms line not on site.

Difference=single v multi-sites.

Internet is network of networks. Connects LANs, WANs, private and public

Seamless flow across networks uses protocols (set of rules), scheme called layered protocol used.

IEEE 802.11, 802.3 protocols, processed by LAN device. Ethernet=wired, or NIC network interface controllers. 10/100/1000 ethernet=transmission rate megabits/sec

802.11n is 600mb/s

ISP provides you legit internet address, serves as gateway, pay for internet.

TCP/IP: transmission control protocol/internet protocol

Hypertext transport protocol (http)

Simple Mail transfer protocol SMTP

FTP file transfer p

Uniform Resource Locator URL: the location address of into/data

Domain name: worldwide unique name. Can direct to one address/location, but multiple names.

Three-tier architecture: e-commerce arrangement of user comps, servers into categories. User tier, server tier, database tier.

Cloud: *elastic* leasing of *pooled* resources over the *internet*. Small capital\$, speedy dev, flexible, adaptable, known cost, security, scalable to industry.

Service-oriented architecture (SOA), XML data, JSON.

Private cloud for internal use.

Software as a Service (SaaS): provider has hardware, OS, and software. Ex: salesforce, iCloud

Platform as a Service (PaaS): provider has hardware, OS, and maybe Database management, but clients clients add own apps to host.ex: Oracle on Demand

Infrastructure as a service (IaaS): cloud hosting of bare computer server/storage. Ex: amazon S3 simple storage service

Using IS to Improve Processes (chp5)

Sequence of activities to accomplish a function... activity=task, resources=items (people, data, etc)
Actors=items/resources either human or computer. Role=subset of activities by 1 actor.

Ex: Pizzeria. **OMIS model: objectives, measures, implement IS**

- **Process:** order, assemble, bake, package, deliver
- **Activities** (assemble): prep dough, add sauce, add cheese, add toppings
- **Role:** Chef, "John"=actor
- **Resources:** utensils, table, flour, recipe/instructions
- Processes/Activities=rectangles (are basically smaller subsets of each other)

1. Characteristics

Characteristic of Process	Categories of Process
Stability of Flow	Structured Dynamic
Scope	Operational Managerial Strategic
Objectives	Effectiveness Efficiency
Location in Value Chain	Inbound Logistics Operations Outbound Logistics Sales and Marketing Service Technology Development Infrastructure

Scope of Processes

Scope	Characteristics	Mix of Actors	Frequency	Examples	IS Supporting This Type of Process
Strategic	Broad-scope, organizational issues	More people than other processes	Low	Decide on new restaurant location, corporate budgeting	Executive support system (ESS)
Managerial	Allocation and use of resources	Mix	Medium	Assess seasonal promotions, plan and schedule cashiers	Management information system (MIS)
Operational	Common, routine, day-to-day	More computers than other processes	High	Order supplies, pay bills, check out customers	Transaction processing system (TPS)

Objectives

Objective Category	Definition	Example Process and Objective at Pizza Shop
Effectiveness	Achieve organizational strategy	Sales process: Sell to freshmen
Efficiency	Create more output with same input or same output with fewer inputs	Delivery process: Reduce unnecessary delays

Value Chain

Value Chain Activity	Operational Process	Managerial Process	Strategic Processes
Primary Activities			
Inbound logistics	Procurement (Chapter 7)	Manage inventory	Evaluate potential suppliers
Operations	Assemble product	Schedule maintenance	Open new restaurant
Outbound logistics	Sales (Chapter 8)	Award refund	Determine payment policy
Sales & marketing	Mail promotion	Evaluate promotional discounts	Launch new product
Service	Track orders	Evaluate complaint patterns	Evaluate outsourcing options
Support Activities			
Human resources	Recruit employees	Plan future needs	Determine pay scales
Technology development	Test software	Estimate milestones	Evaluate acquisition options

Takeaway: ask Q about objectives, standardize structured and keep dynamic processes fluid, don't confuse process and IS, ensure processes work together.

2. Improving Processes

Managers must communicate clearly.

- Classify objectives as efficiency or effectiveness
- Make unstated objectives explicit
- Ensure objectives match with strategy

Measures

- Metrics: quantities assigned to attributes. KPIs. Key performance indicators
- Many objectives for one process, many measures for one objective
- All measures imperfect to some degree. "Not everything that can be counted, counts. Not everything that counts can be counted" -Einstein.
- **Reasonable:** valid and compelling
- **Accurate:** exact and precise
- **Consistent:** reliable

Use IS to Improve an Activity

- Add an IS: add GPS to delivery of pizzas, improves delivery time (objective)
- Data flow among activities: Order IS system sends data to Deliver GPS automatically
- Control of activities: control limits behavior/reduces variation, results=consistently. Computer order system prevents mistakes (forgot topping)
- Automation: computer takes activity from person. ATM replaced bank teller.
- Improve procedures:

- each process relies on 0, 1, or many IS, and 1 IS may support many processes
- Procedure anchors an IS to a process
- Procedure is often weak link between IS and process
- Ex: improve payment procedure at pizzeria to accept student IDs.
- Ex: ERP systems

3. Process Management

Principles for improvement: Systems engineering, workflow, business process modeling, process reengineering, continuous improvement, xMatrix, Kaizen, Six Sigma.

Improve activity without IS too (better insulated pizza bags), or add resources (more drivers), or remove unproductive resources (cutting slack) (have non busy drivers also take orders), improve feedback (to identify problems, test solutions).

Remove **bottleneck**: one activity reduces performance of total process(1 waitress of too many client)
Redesign/change structure: arrangement of roles, or activities. Ex: 3 chefs all assemble vs, specialize
Outsource: to customer, other supplier, etc

Six Sigma: improve process outputs by removing defects and minimizing variation. Structured sequence of steps with quantified financial measures. 99.99966% outputs free from defects.

4. IS hinders process

Information Silos: prevents or restricts flow, data needed for process activity is unavailable, stored in isolated, separated IS. Or data format isn't same, so information isn't useful. Physical separation, or time separation (different databases send report at EoD). Why? Control data, different departments different objectives for data, so diff format, Or security/sensitive info. Departmental systems, cross-department, then Enterprise!

Ethics Problem: process improvement or privacy: GPS tracking of cars.

Enterprise Resource Planning (ch6p)

ERPs solve the information silo problem. Very large IS that bring data together.

Decentralized approach=enterprise application interface (EAI)

EAls: provides layers of software to connect IS together. Coverts and communicates data across departments/different IS. Existing applications, integrated data, leverages existing systems, gradual move to ERP. Alleviates problems of info Silo, while using current apps. Less disruptive/cheaper.

ERPs: two characteristics, consolidate data for real-time sharing, integrate processes. Solves: multiple versions, up to date info (integration).

2. Components of ERP

Material Requirements Planning (MRP) efficiently manage inventory, labour, production.

Manufacturing Resource Planning (MRPII) adds financial tracking and scheduling equipment/facilities

Just in Time (JIT) inventory/delivery: required tight coms between supplier and producer.

- Supply Chain Management: procurement, sales order processing, inventory, supplier management
- Manufacturing: scheduling, capacity planning, quality control, bill of materials
- Customer Relationship Mana: sales prospecting, customer manage, marketing, support, call centre
- Human Resources: payroll, time/attendance, HR manage, commission calcs, benefits admin
- Accounting: general ledge, A/R, A/P, cash management, fixed-asset accounting.

ERP system requires: software, hardware, data, procedures, people.

Software can be customized (write new code) / configured (no new code)

Database, database design, and initial configuration data. Transactional Data (events), Master Data (reference), Organizational Data (unique)

ERP (forms, queries, reports, apps) uses DBMS (create, process, administer) to maintain database (tables, relationships, metadata).

Procedures=set of instructs for people using the ERP. Specify how processes (like hiring) will be done in ERP with procedure.

People: 3 types, Systems Analysts, consultant (third party), Users. Access controls are used for each.

Implementation of ERP

Re-examine strategy, conduct GAP analysis, develop processes, configure ERP, install (write procedures, train users, test system)

Benefits

Benefits of Using an ERP Solution
Data sharing occurs in real time.
Implements integrated processes that are industry best practices.
More managers see more data, leading to better oversight.
The information silo problem is solved.
Better integration with supply chain partners.

FIGURE 6-12

Benefits of Using an ERP Solution

Challenges

- Decision Making: Planning, Analysis, Config, data, Transition

Implementation Decision Challenges
ERP vendor selection
Gap Analysis—decide on limited number of “like to dos” and what to do with gaps
Configuration—identifiers, order sizes, BOM
Data issues
Cutover pressure

FIGURE 6-14
Implementation Decision Challenges

- People

Implementation People Challenges
Management Moves on prematurely Oversells Fails to anticipate cultural resistance
Team Collaboration breaks down
Individual Users feel pain and get no gain

FIGURE 6-16
Implementation People Challenges

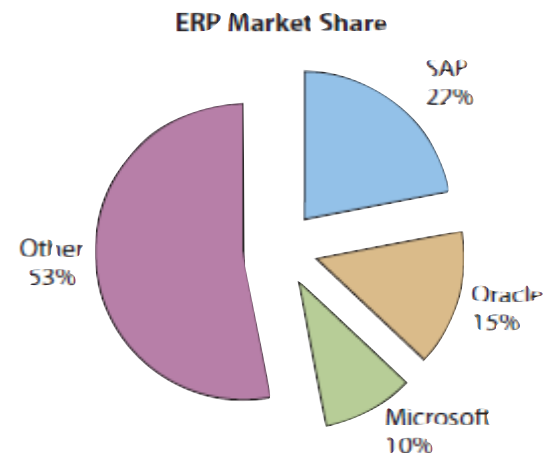
- ERP upgrades

FIGURE 6-17
ERP Upgrade Challenges

ERP Upgrade Challenges
Surprise and resistance
Justification
Version lock from customization
No long-term upgrade strategy

Vendors

FIGURE 6-19
ERP Vendors and Market Share



SAP

Modules, Inputs/Outputs, Software

QM	Quality Management	PP	Production Planning
FI	Financial Accounting	CO	Controlling
PM	Plant Maintenance	SD*	Sales and Distribution
HR	Human Resource	MM**	Materials Management
PS	Project Systems	BI	Business Intelligence

*SD includes sales processes, the topic of Chapter 8.

**MM includes procurement processes, the topic of Chapter 7.

Procurement Process

Process of obtaining goods and services like raw materials, machine spare parts, etc.

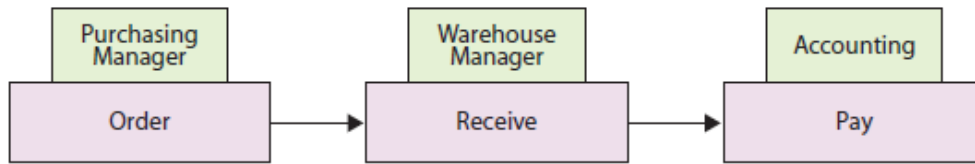
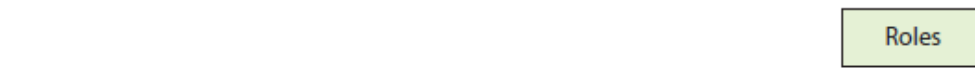


FIGURE 7-1
Main Procurement Process Activities and Roles



Primary Activity	Description	Process and Chapter
Inbound logistics	Receiving, storing, and disseminating inputs to products	Procurement, Chapter 7
Operations	Transforming inputs into final products	
Outbound logistics	Collecting, storing, and physically distributing products to buyers	
Sales and marketing	Inducing buyers to purchase products and providing the means for them to do so	Sales, Chapter 8
Customer service	Assisting customers' use of products and thus maintaining and enhancing the products' value	

FIGURE 7-2
Procurement Process within the Value Chain of CBI

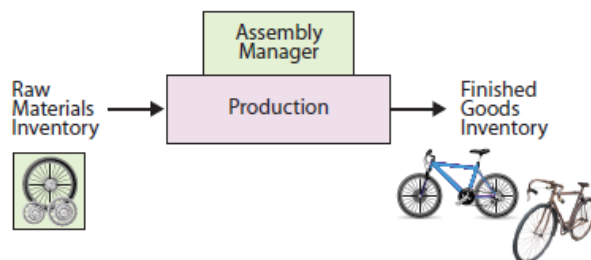
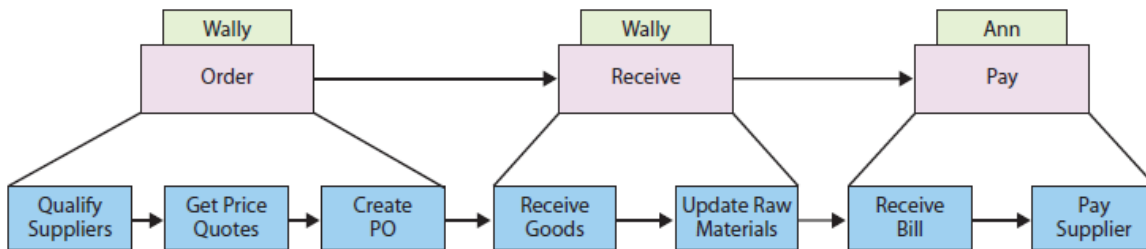


FIGURE 7-4
Main Procurement Process Activities, Subactivities, Production Process, and Inventories

Purchase Order (PO), Raw materials inventory, finished goods inventory.
 Lead time=supplier to deliver an order. After, invoice is received from supplier.
 Three-way match: Purchase Order, Receipt of Goods. Helps Internal Control.
 Problems: warehouse mngr doesn't know sales price data, so can't interpret and use sales data (to buy more materials for more production). Accounting discrepancies, miscounted inventory etc.
 Accounting reports also lag, need to roll-up data for reports. Purchasing agents spread out not same

SAP Implementation

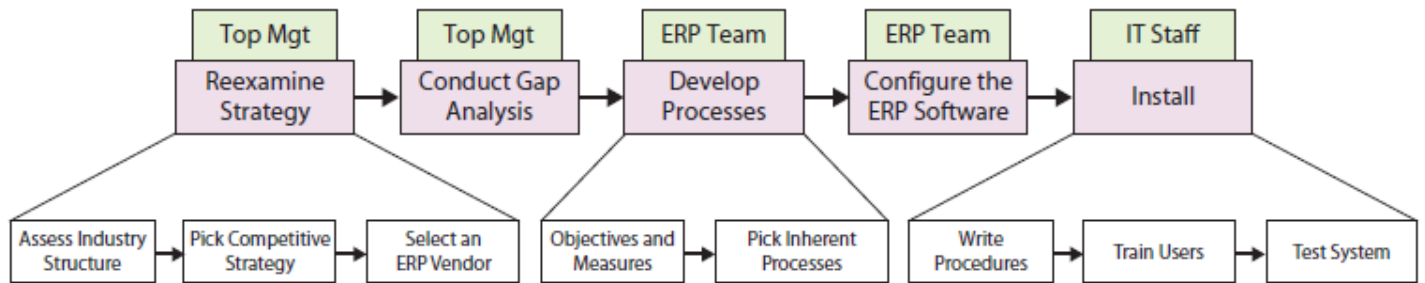
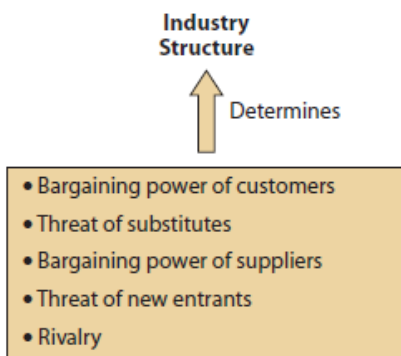


FIGURE 7-9

SAP Implementation Process at CBI

Part 1-Determine Industry w/ 5-Forces



Part 2-Competitive Strategy

	Cost	Differentiation
Industry-wide	Lowest cost across the industry	Better product/service across the industry
Focus	Lowest cost within an industry segment	Better product/service within an industry segment

(a) Competitive strategies

	Responsiveness
High-End Bikes	Competitive Strategy High-end bikes Responsiveness to retailers

(b) Competitive strategy chosen by CBI of high-end bikes; customer responsiveness differentiation

Part 3-Objectives and Measures

Objective	Measure
Efficiency Reduce Administrative Time	Average time of Create Purchase Order activity Average time of Receive Goods activity Average time of Pay Supplier activity
Effectiveness More Responsive to Customers	Average lead time to supply customer orders Number of products to sell Stockouts of new, hot-selling products

Problems-Benefits

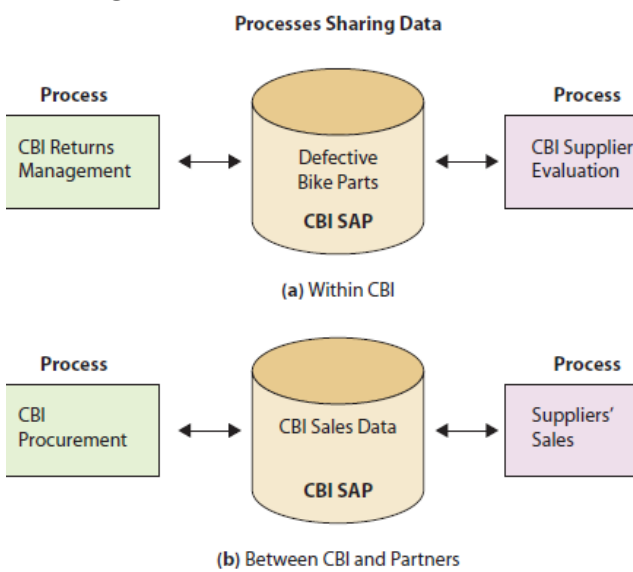
CBI Problems	SAP Benefits
Warehouse Warehouse manager does not have data on sales price discounts.	Integrated inherent process allows warehouse to see sales process prices.
Accounting Three-way match discrepancies take time to correct. Accounting data are not real time.	Real-time data sharing limits errors. Real-time data sharing reduces roll-up time.
Purchasing Agents not centralized; training, experience, motivation vary. Weak internal controls lead to limited scrutiny of purchases.	Integrated purchasing activity of ERP system. Real-time data sharing increases use of financial reports.

Supply Chain Implementation

Supplier Relationship Management (SRM) automates, simplifies, accelerates. Reduce procurement costs, build collaborative supplier relationships, better manage supplier options, improve time to market (TTM). Returns management Process, Supplier Evaluation Process

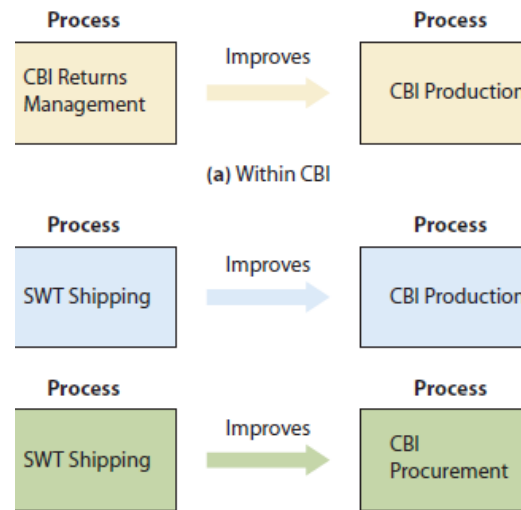
Process Scope	Supply Chain Processes
Operational	Procurement
Managerial	Supplier Relationship Management (SRM) Returns Management
Strategic	Supplier Evaluation

Sharing Data

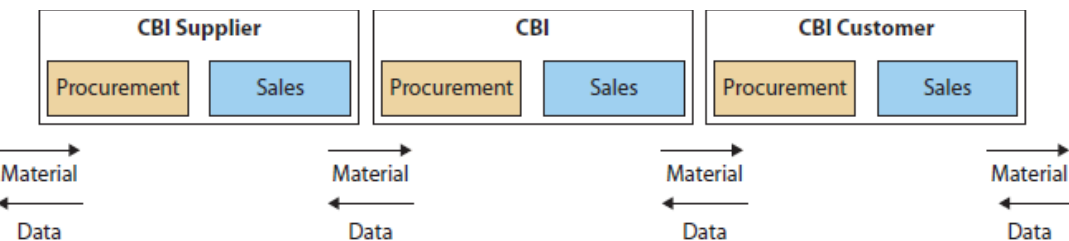


Integrating Processes

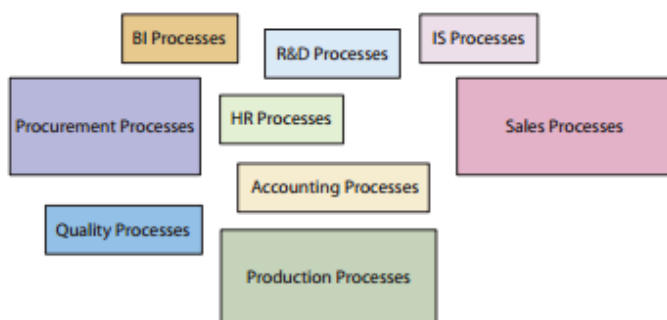
Integrating Processes—Process Synergy



BOTH Data Share & Integration



Other Systems



Impacts of SAP

- New skills needed
- Process focus
- More data sharing
- Outsourcing
- New IS to impact: robotics, 3-Dprint, RFID, sensors, augmented reality.

Database Management (ch5p of emis)

Content: something of value, considered an asset, organized via management and presentation.
 Content management Systems (CMSs).

Database keeps track of things. List or spreadsheet. Database tracks more info, easier to develop and maintain.

Database: collection of tables, relationships, metadata

Database: self-describing collection of integrated records. Bytes is character of data. Grouped into Columns “Fields”, grouped into Rows “Records”, table or file of similar rows/columns. Database adds relationships among rows, and Metadata (describes structure).

Self-describing: database contains a description of its data. Metadata is data about the data (data type, description) using “field properties”. Makes more useful than spreadsheets.

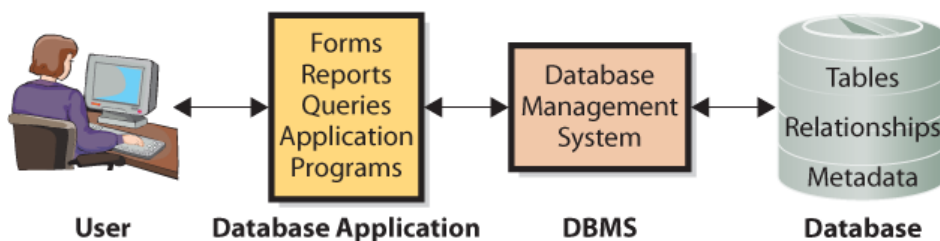
Key: column or group of columns that identify a unique row in a table. Every table must have a key.

Foreign keys: are columns, but are keys from a different table where they reside.

Relational Databases: carry data in tables, and relationships via foreign keys.

Database Management System DBMS

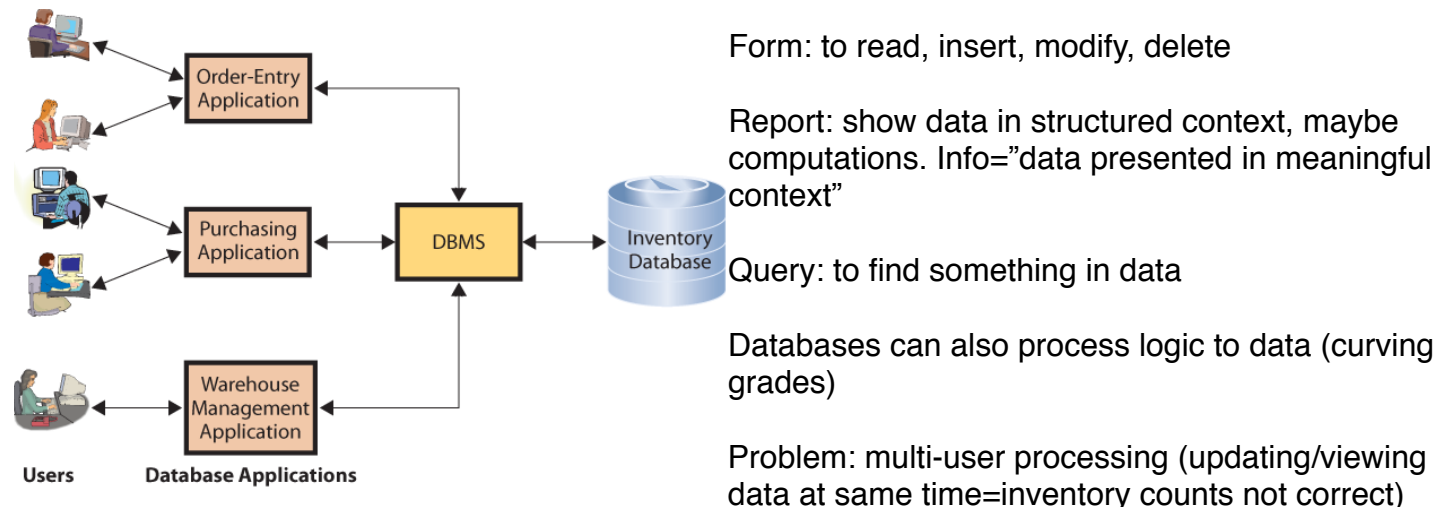
Program to create, process, administer a database. IBM, Access, SQL server, Oracle.



DBMS 4 operations: read, insert, modify, delete

Structured Query Language (**SQL**): international standard language/syntax for processing a database

Applications



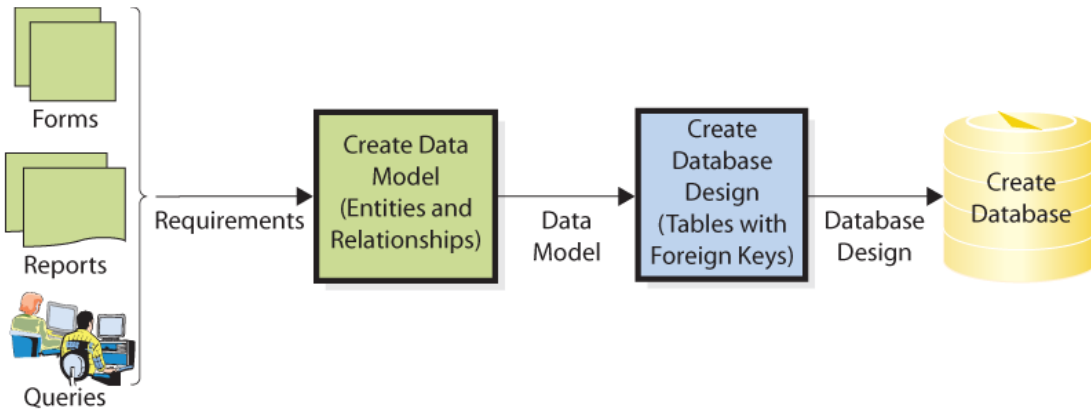
“Lost-update problem”

Enterprise DBMS: large organizational or workgroup databases, 24/7 ops= Oracle

Personal DBMS: Microsoft Access

Database Design (ch5a)

Process: interview users, develop requirements, analyze existing forms, reports, queries, activities. Determine needs for new forms, reports, queries. Requirements then summarized in **DataModel**, logical representation of structure of data. Most common: entity-relationship (**E-R**), or Unified modeling language (**UML**).



Entity: something users want to track (order, customer, item)

Attribute: describe characteristics of an entity (order# order date)

Identifier: attribute who's value is unique to only one entity instance (order#=unique) Primary Key

Relationships: between entities. Shown by Entity Relationship Diagrams (ERD), using Crows-foot. (1:N) one to many, (N:M) many to many, 1:1 one to one. Shows **cardinality Maximums**, but for **cardinality Minimums**, vertical lines and O's.

Data Model --> Data Design

Normalization: process of converting ONE poorly constructed table into two-more constructed tables.

Data-Integrity: produces incorrect and inconsistent info. Changes in some rows not in others to match (ex: changing department title from A, to A&B, not getting translated on all applicable rows.

Occurs when data is duplicated. Solve by normalizing, turn 1 table into 2. Ex: turn department into separate table, and then assign ID #, that corresponds to ONE entry in the other table.

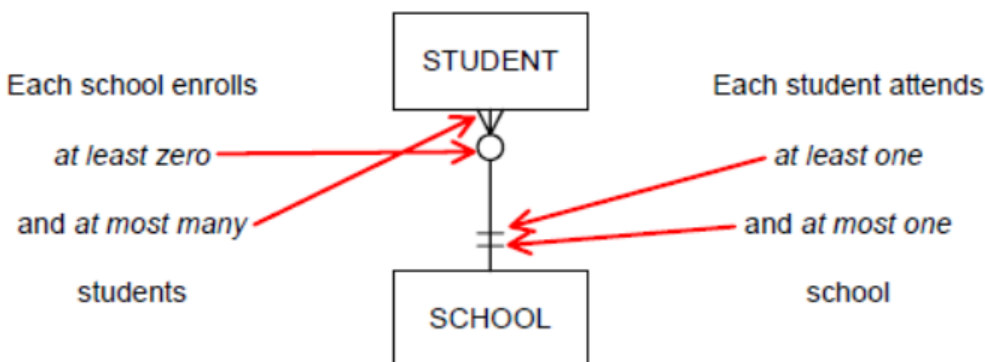
Goal of normalization to construct tables with only ONE topic/theme.

Relationships in ERD

One to Many must put Foreign Key in the ONE table ex: student has only 1 advisor, put advisor in student table. If Many to Many, need a third table (intersection) to show relationship between on both sides ex: student could have many advisors, and an advisor has many students.

If data model isn't don't well, and need to change later from 1:N, to N:M then many hours wasted to convert data.

Relationship	Key to be used
One-to-one (1:1)	primary or foreign key
One-to-many (1:N)	foreign key
Many-to-many (N:M)	associative table combining the primary keys of associated tables



Data Dictionaries: Data Dictionary

- Presents the metadata (data about data)
- Helps users understand the purpose of each attribute of an entity
- Helps ensure consistency
- Saves data modellers from needing to make the same decisions repeatedly
- Helps guide the transition from the logical model to the physical model
- Provides detailed accounting of all tables found within the user/designer-created database
- Contains (at least) all the attribute names and characteristics for each table in the system
- Contains metadata: data about data

Logical Property	Example
Field name	Name of field such as <i>Customer ID</i> or <i>Product ID</i>
Type	Alphanumeric, numeric, date, time, currency, etc.
Form	Each phone number must have the area code (XXX) XXX-XXXX
Default value	The default value for area code is (303)
Validation rule	A discount cannot exceed 100 percent
Entry rule	The field must have a valid entry—no blanks are allowed
Duplicate rule	Duplicate information is not allowed

TABLE NAME	ATTRIBUTE NAME	CONTENTS	TYPE	FORMAT	RANGE	REQUIRED	PK or FK	FK REFERENCED TABLE
CUSTOMER	CUS_CODE	Customer account code	CHAR(5)	99999	10000–99999	Y	PK	AGENT_CODE
	CUS_LNAME	Customer last name	VARCHAR(20)	Xxxxxxxx		Y	FK	
	CUS_FNAME	Customer first name	VARCHAR(20)	Xxxxxxxx		Y		
	CUS_INITIAL	Customer initial	CHAR(1)	X				
	CUS_RENEW_DATE	Customer insurance renewal date	DATE	dd-mmm-yyyy				
AGENT_CODE	Agent code	CHAR(3)	999					
AGENT	AGENT_CODE	Agent code	CHAR(3)	999		Y	PK	
	AGENT_AREACODE	Agent area code	CHAR(3)	999		Y		
	AGENT_PHONE	Agent telephone number	CHAR(8)	999-9999		Y		
	AGENT_LNAME	Agent last name	VARCHAR(20)	Xxxxxxxx		Y		
	AGENT_YTD_SLS	Agent year-to-date sales	NUMBER(9,2)	9,999,999.99				

FK	=Foreign key
PK	=Primary key
CHAR	=Fixed character length data (1–255 characters)
VARCHAR	=Variable character length data (1–2,000 characters)
NUMBER	=Numeric data (NUMBER(9,2)) are used to specify numbers with two decimal places and up to nine digits, including the decimal places. Some RDBMSs permit the use of a MONEY or CURRENCY data type.

Data Queries

- Language used to search for stored data
- SQL: Standard query language relational databases
- Can combine rows from related tables
- Summarize data from multiple rows of a table

Data Warehousing

- Integrated repository of corporate data
- Organizes data to facilitate decision making
- Star schema including:
 - A fact table
 - A collection of dimension tables

Business Intelligence (ch8)

Decision making: **rational** act where individuals/groups consider possible options, likely consequences and choose best alternative. Problems: complexity/consistency, infooverload, Dquality

Rationality:

- Result in positive outcomes or lead to
- Positive outcomes may result from irrational processes and vice-versa
- Humans intend to be rational, but are cognitively limited “**Bounded rationality**”

Satisfice: choose most reasonable and available solution instead of perfect choice.

Data-driven decisions, data mining/analytical systems

Assumptions

- Managers have no problem making decision if they get data they need
 - Too many possibilities exist, should not expect to make better decisions even with perfect data
 - Uncertainty and complexity of decisions=challenging
- Poor decisions made because manager lack info
 - Contrary: managers suffer from overabundance of irrelevant data (information overload)
- Managers know what data they need
 - Often not sure, and don't know what they don't know.
 - Tendency to ask for as much as they can get--> info overload.

Data Quality

Data may be problematic, or Dirty data “[name@website.ca](#)”

Missing Values: no age for donator

Inconsistent Data: telephone area codes changing

Data not integrated: different sources of incompatible with intended purpose

Granularity: too fine or coarse, details too precise or not specific enough ex: want click behavior for one graphic, but data is clickstream of everything.

Online Transaction Processing (OLTP)

Way 1: transactions entered and processed immediately=ops in real time

2: wait for many transactions then process them all at once=batch processing

Real-time vs. Batch = cost, nature of transactions, needs of org.

Data Resource Challenge: data can be competitive advantage, but must be used for this. Not all orgs use data effectively, may collect and not use at all. Data is an asset which is a resource from which future economic benefits may be obtained.

Decision Support Systems (**DSSs**) make data useful for decision making, or Online analytics

Processing (**OLAP**)=dynamic, has measures, facts, dimensions,

Business Intelligence Systems (BIS)

Business Intelligence System	Characteristics	Competitive Advantage
Group Decision Support Systems (GDSS)	Allow multiple decision makers to collaborate, often anonymously and at different times and in different locations.	Improve decision outcomes by reducing many of the biases inherent in group discussion and option evaluation.
Reporting Systems	Integrate and process data by sorting, grouping, summing, and formatting. Produce, administer, and deliver reports.	Improve decisions by providing relevant, accurate, and timely information to the right person.
Data-Mining Systems	Use sophisticated statistical techniques to find patterns and relationships.	Improve decisions by discovering patterns and relationships in data to predict future outcomes.
Knowledge Management Systems	Share knowledge of products, product uses, best practices, etc., among employees, managers, customers, and others.	Improve decisions by publishing employee and others' knowledge. Create value from existing intellectual capital. Foster innovation, improve customer service, increase organizational responsiveness, and reduce costs.
Expert Systems	Encode human knowledge in the form of If/Then rules and process those rules to make a diagnosis or recommendation.	Improve decision making by non-experts by encoding, saving, and processing expert knowledge.

RFM analysis:

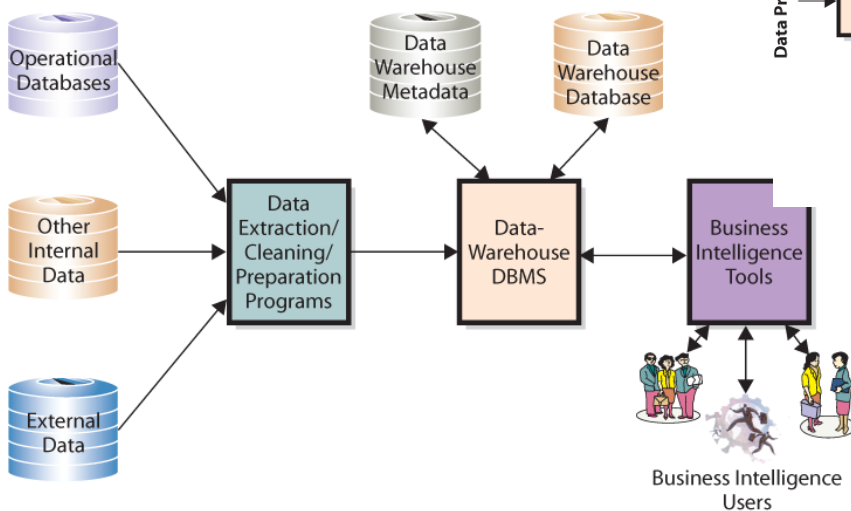
Analyzing and ranking customers.

Recently, frequency, money \$

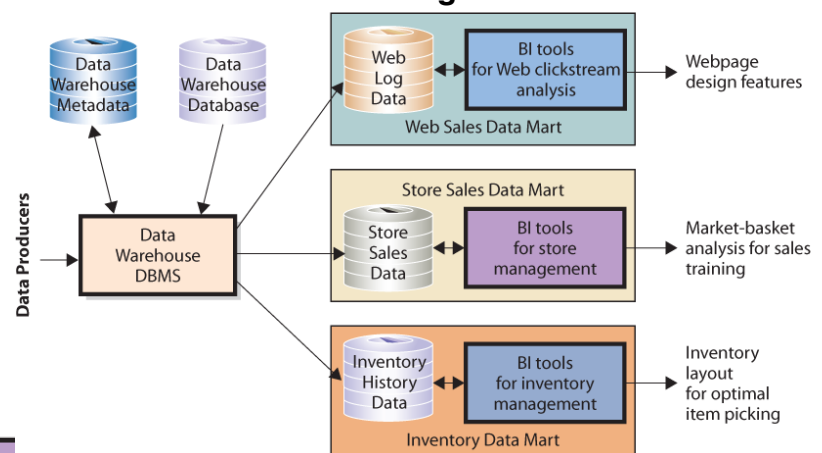
Data Warehouse

Extract and clean data from ops systems, store/catalogue for BI tools.

Data Mart=smaller collection for specific needs.
Data mining=supervised and unsupervised. No model or hypothesis, using cluster analysis, VS.



Data Mining



Model designed and hypothesis known then regression used to measure statistical change of parameters of model.
Market-based analysis=sales patterns

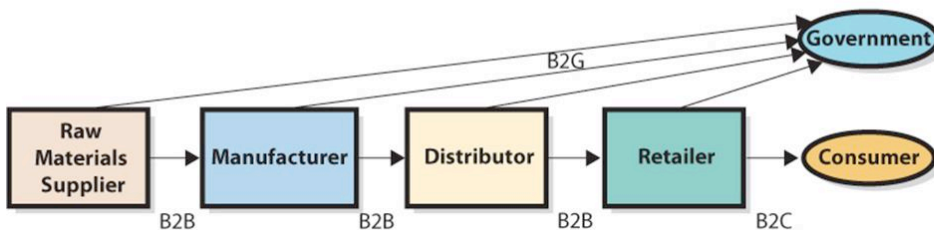
Internet (ch9)

E-commerce: the buying and selling of goods/services over public/private networks
 Subset of broader definition of electronic business (application of info and coms tech to conducting business). Implications include: customers being more knowledgeable, additional infrastructure is required, increased coordination between orgs and systems.

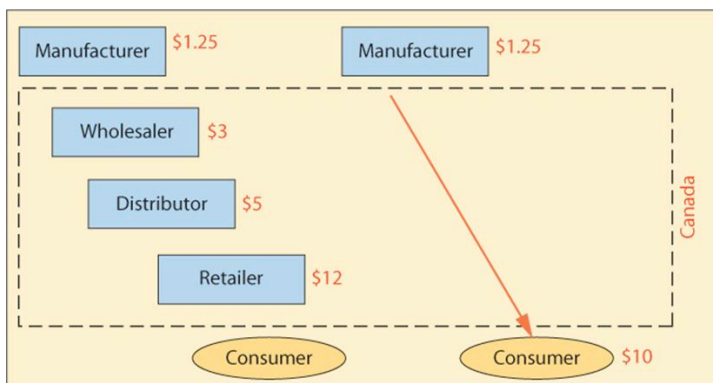
Merchant Companies: buy goods and resell them via taking title. B2C, B2B, B2G

Nonmerchant: arrange for sale of goods, without ever owning/taking title.

Auctions=ebay, clearinghouses=amazon, exchanges=craigslist



Benefits of E-commerce



1. Disintermediation
 - a. Removal of intermediaries
 - b. Higher revenues, lower prices
 - c. Distribution channels efficient
2. Improve Flow of price info
 - a. Makes market more efficient
3. Info on Price elasticity available to sellers
 - a. Buyer behavior
 - b. Experiments

Issues w/ Ecommerce

- Channel conflict: competition between manufacturer and retailer
- Price conflict: with traditional channels
- Logistics expense: higher for small quantities
- Customer service expense: need to train customer
- Showrooming: customer shops in brick/mortar then buys online
- Determining tax: when locations of sale are different
- Reduced profitability/margin squeeze: competitive price information, customer ability to negotiate

Social Network

Structure of individuals and organizations that are related to each other in some way

Social networking: the process by which individuals use relationships to communicate with others in a social network. Social capital is earned through networking.

Capital:

- Physical: investment of resources for future profit
- Human: investment of human know/skills for future profit
- Social: investment in social relationships in expectation of returns in marketplace
 - Number
 - Strength: high=most capital, low=most social network growth
 - Resources controlled by the relationships

Social Networks add value to business:

- Provide info on opportunities, alternatives, problems & others factor important
- Opportunities to influence decision makers critical to one's success
- Create social credentials when connected to highly regarded people
- Reinforce professional image

Negative? Assumptions and scrutiny

IS/IT?

Computer available

Low cost

Search capabilities

Tradeoff richness/reach=reduced

Network effects: more added=more valuable

Web 2.0

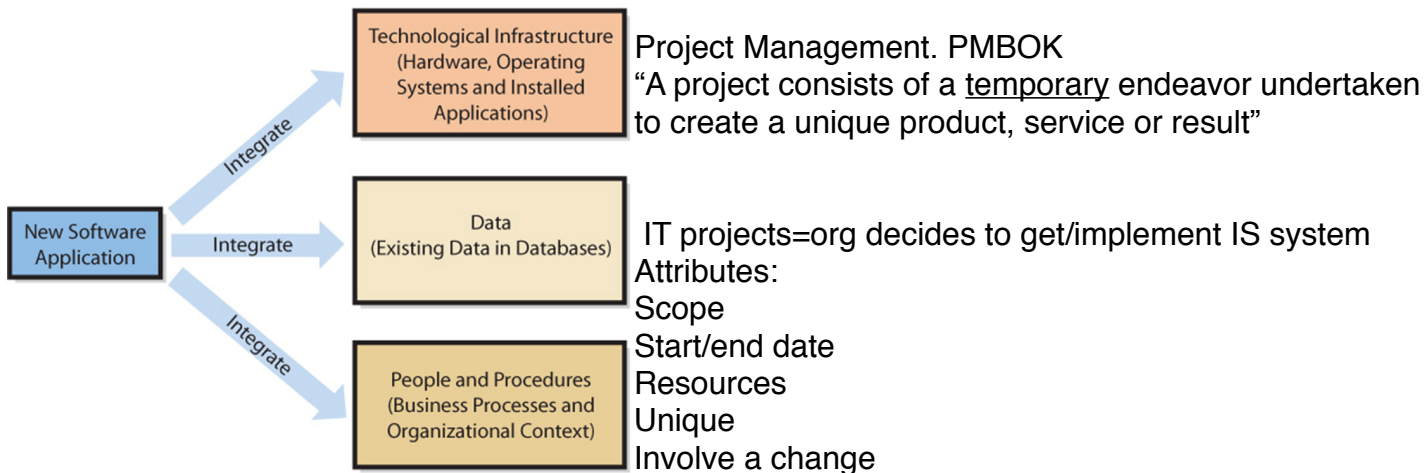
2005 via Tim O'reilly= interaction and integration of products/services.

- Smartphones
- User created content
- Context/location based services
- Social networking
- Dynamic marketplaces
- SAAS software as a service (no license fees=Office 365)=advertising for revenue
- Crowdsourcing/crowdfunding
- Organic user interfaces
- Mashups: watching movie on Netflix, and able to buy costume on target
- Participation/ownership differences
- Advertising is more targeted (vs print ads)

Acquiring IS systems through Projects (ch10)

Acquisition

- Buy, use as-is
- Buy, customize: most common
- Rent/lease it
- Build yourself
- Outsource it



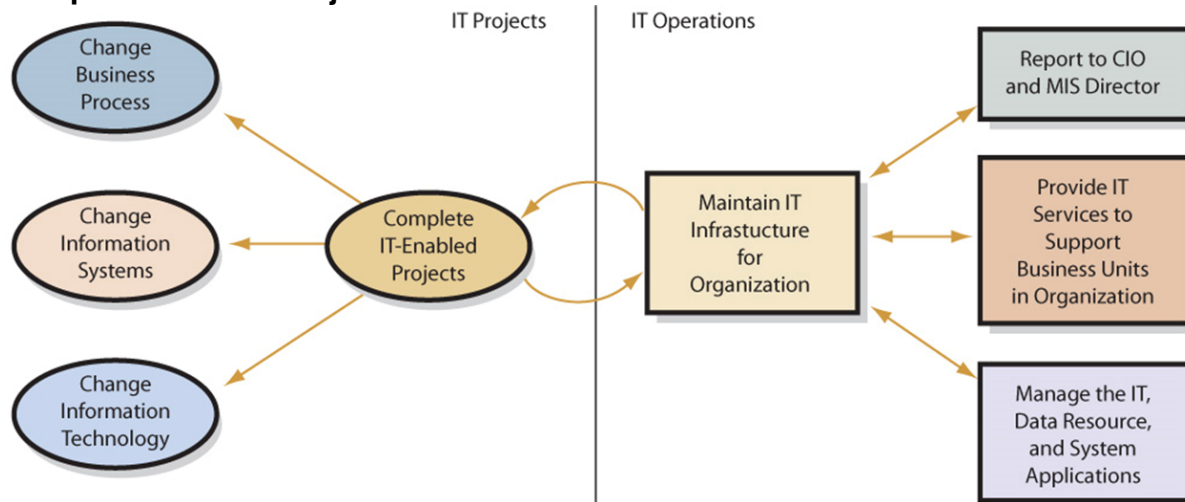
ITPM: collection of techniques and methods that project managers use to plan, coordinate, and complete IT projects

Areas:

- Integration management
- Scope management
- Time management
- Cost management
- Quality management
- Human resource management
- Communications management
- Risk management
- Procurement management

IT projects: stability, predictability, accountability, reliability, security

IT Operations vs. Projects



IT Projects Risky?

- Models are not easy to understand
- Precise estimates difficult, tech+costs constantly change
- Hard to monitor progress, because of changing requirements
- Lack of support from top management
- Lack of participation
- Technical complexity
- Lack of experience

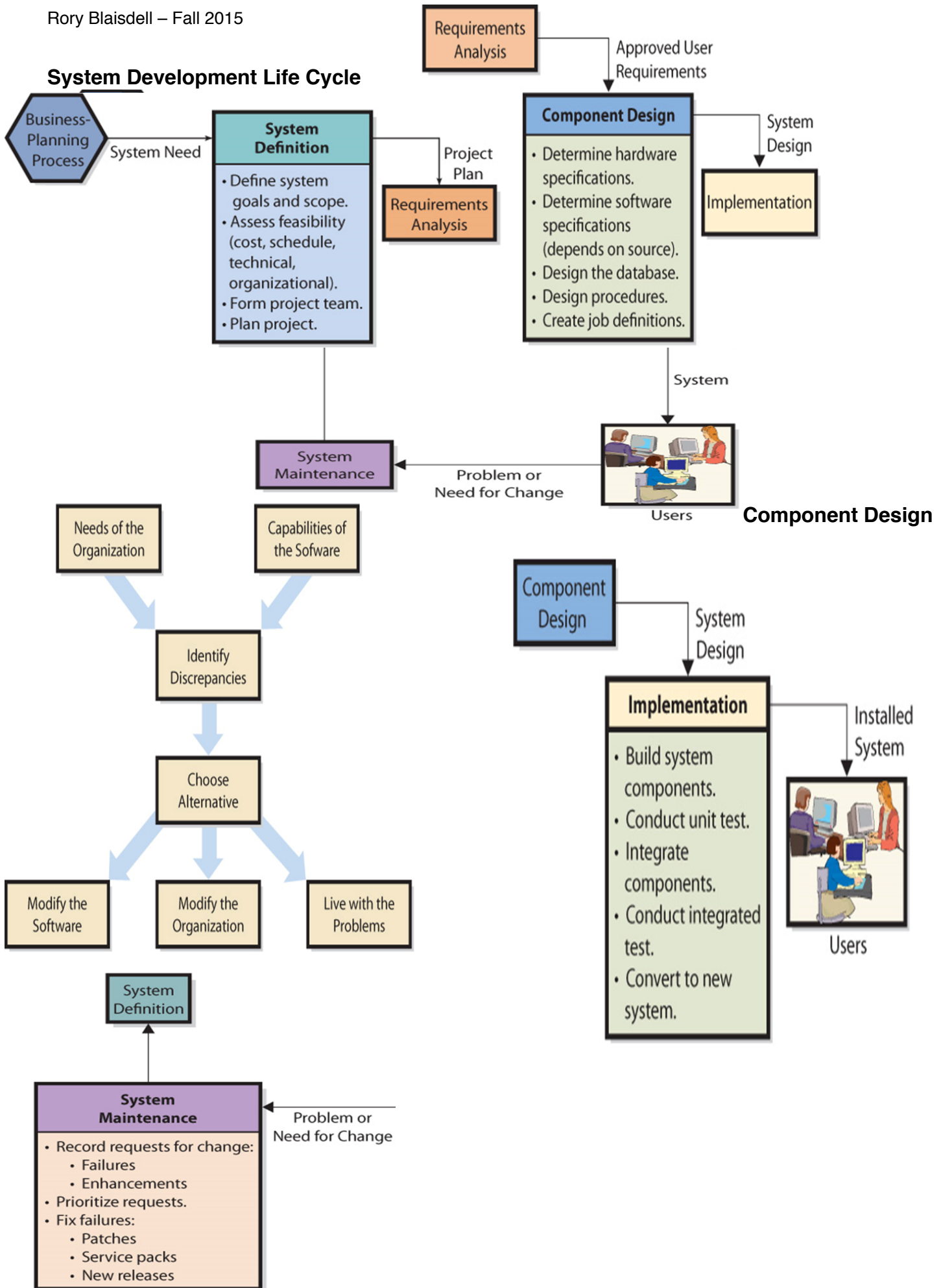
Methodologies

- System development Life Cycle (SDLC)
 - Systems definition: goals and scope of new IS
 - Requirements analysis: features/functions
 - Component design: Commercial off the shelf COTS?
 - Approved user requirements
 - Implementation: test install, etc
 - Components obtained
 - Components tested, test-plan + quality insurance
 - System converted/installed
 - Pilot
 - Phased
 - Parallel
 - plunged
 - System maintenance: repair/add new features, maintain, backup. Fix/adapt
 - Problems: waterfall/linear sequence, difficult documenting requirements, est time/budget
 - Outsourced, or Application Service providers (onsite)
- Object Oriented Development (OOD)
- Agile Dev
- Rapid Application Dev (RAD)

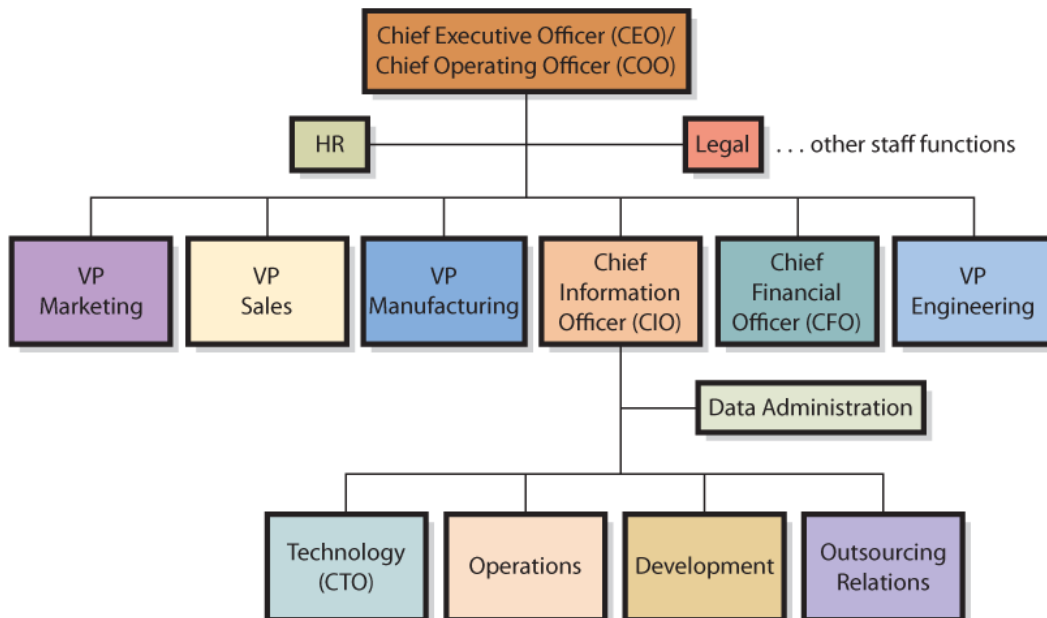
	Hardware	Software	Data	Procedures	People
Design	Determine hardware specifications.	Select off-the-shelf programs. Design alterations and custom programs, as necessary.	Design database and related structures.	Design user and operations procedures.	Develop user and operations job descriptions.
Implementation	Obtain, install, and test hardware.	License and install off-the-shelf programs. Write alterations and custom programs. Test programs.	Create database. Fill with data. Test data.	Document procedures. Create training programs. Review and test procedures.	Hire and train personnel.
Integrated Test and Conversion					

} Unit test each component

System Development Life Cycle



Structure, Ethics, IT Governance (ch11)



Structure depends on

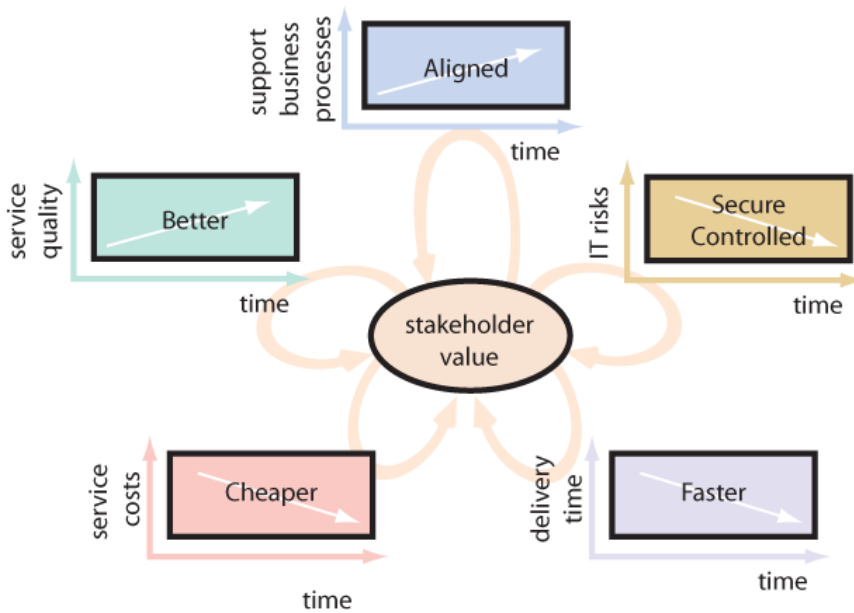
- Size
- Culture
- Competitive environment
- Industry

Web-dev team? PMP, lead analyze, developer, technical, designer, etc

IT architecture, Zachman's framework, enterprise architect, creates framework blueprint for org's IS, and how to manage. Considers:

- Organizational objectives,
- Business processes,
 - databases,
 - information flows,
 - operating systems,
 - applications and software, and
 - supporting technology
- IS Governance is
 - Development of consistent, cohesive management policies and verifiable
- internal processes for IT & related services
- Goal of IS governance is to improve the benefits of an organization's IT investment over time by
 - Improving service quality
 - Reducing service costs and delivery time
- Reduce IT risks
- Better support business processes
 - The goals can be reached by establishing
- reporting structures
- review processes

Creating Benefits



IS Audit

Examination and verification of a company's information resources that are used to collect, store, process, and retrieve information including organization's IS policies and procedures

Control objectives for Information and Related Technologies (COBIT)

IS Ethics:

UN declaration on human rights,
 Canada's Charter of Rights and Freedoms
 Association of Computing Machinery's code of ethics

Green IT: considers the effects of choices an organization makes on people and the environment, uses IT for tripple bottom line, profit, eco, social.

IS Security, Management, Privacy (Ch12)

Identity Theft: Vital info

PIPEDA: personal information protection and electronic documents act

Security Threats: human error/mistakes, malicious human activity, natural disasters/ events

Safeguards

Hardware	Software	Data	Procedures	People
Technical Safeguards		Data Safeguards	Human Safeguards	
Identification and authentication Encryption Firewalls Malware protection Application design		Data rights and responsibilities Passwords Encryption Backup and recovery Physical security	Hiring Training Education Procedure design Administration Assessment Compliance Accountability	

		Source		
		Human Error	Malicious Human Activity	Natural Events and Disasters
Problem	Unauthorized data disclosure	Procedural mistakes	Pretexting Phishing Spoofing Sniffing Computer crime	Disclosure during recovery
	Incorrect data modification	Procedural mistakes Incorrect procedures Ineffective accounting controls System errors	Hacking Computer crime	Incorrect data recovery
	Faulty service	Procedural mistakes Development and installation errors	Computer crime Usurpation	Service improperly restored
	Denial of service	Accidents	DOS attacks	Service interruption
	Loss of infrastructure	Accidents	Theft Terrorist activity	Property loss

System procedures

	System Users	Operations Personnel
Normal Operation	Use the system to perform job tasks, with security appropriate to sensitivity.	Operate data centre equipment, manage networks, run web servers, and do related operational tasks.
Backup	Prepare for loss of system functionality.	Back up website resources, databases, administrative data, account and password data, and other data.
Recovery	Accomplish job tasks during failure. Know tasks to do during system recovery.	Recover systems from backed-up data. Perform role of help desk during recovery.

Disaster Preparedness Guidelines:

1. Keep computer infrastructure in a safe location

- Away from locations prone to natural disasters
- Fire-resistant buildings
- Remote locations for backups

2. Identify mission-critical systems

3. Identify resources needed to run the mission critical systems

4. Prepare remote backup facilities (Hot and cold sites)

5. Train and rehearse the use of switching to the backup system in case of disaster

Security Incident Response

1. Have a plan
2. Centralized Reporting: isolated or not?
3. Respond
 - a. Speed
 - b. Be prepared: critical employees/Training
4. Practice Incident Response

The exam has three parts:

Short answer problems (approx. 20 marks)

Multiple choice questions (60 questions; approx. 50 marks)

Database (approx. 15 marks)

BPMN (approx. 15 marks)

There will be two short answer problems (4-7 sentences long). The requirements will include:

- Problem diagnosis (e.g., identification of advantages and disadvantages of a particular approach presented in the problem)
- Application of a relevant approach or model
- Suggesting a solution

Note: Not every problem will require each of the three types of solutions.

1. BPMN

- Interpreting a Business Process Model
 - Identifying a sequence of activities in a swimlane
 - Identifying the updates to a database
 - Identifying the outcomes of gateways
 - Identifying actors

2. ERD

- Identifying entities and attributes
- Identifying primary & foreign keys
- Drawing the relationships
- Identifying the ordinalities & cardinalities
- Association entities