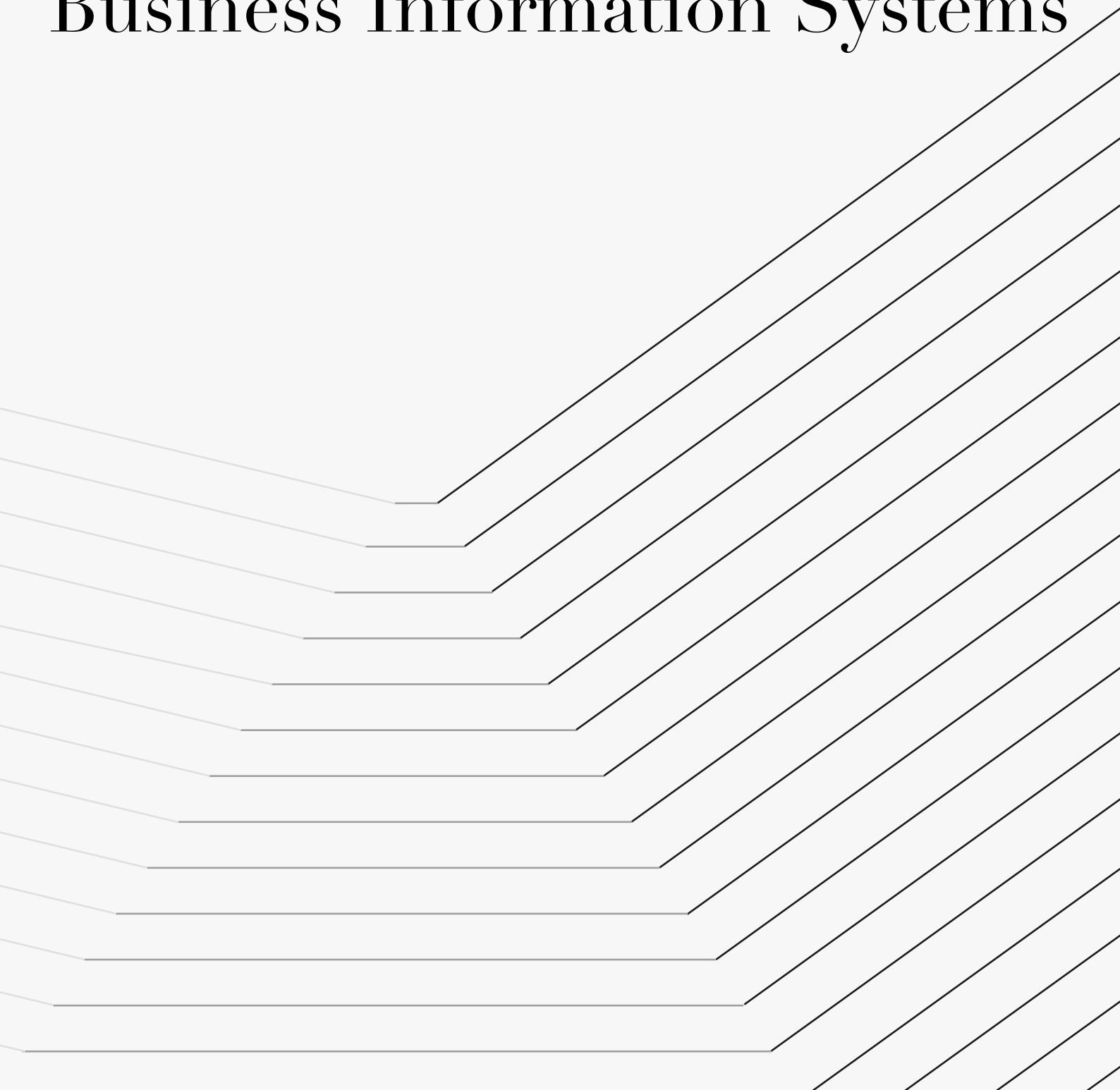


Fundamentals of Business Information Systems



Chapter 1

Introduction to Information Systems



1.1

Information Technology	computer-based tools. work with information support information & information processing needs
Information System	collect, process, store, analyze, disseminate information for specific purpose
Informed User	knowledgeable about IS & IT
	Why should I be informed user? <ol style="list-style-type: none">1. More benefit from application by understanding behind the application2. enhance application3. assist in select application4. aware new IT & development of existing tech5. understand how IT improve performance6. make own business with IT
	IT Career Opportunity
Chief Information Officer	charge in IS
IT Staff	programmers Business Analysts System Analysts Designers
	Managing Information Resources Managing Information System → Difficult & Complex
Factors	<ul style="list-style-type: none">• Strategic values of IS Corp. rely on IS. no IS → Corp. cannot function• Expensive to acquire, operate, manage IS• Evolution in IS function mainframe → Client & Server → Cloud

1.1

Managing Information Resources (cont.)

Traditional function of MIS

- managing systems development, systems project management.
- Managing computer operation including Computer center
- Staffing, training, developing IS skills
- providing technical service.
- Infra planning, development, control

New function of MIS

- Initiating & designing specific strategic IS
- Incorporating Internet & e-commerce into business
- Managing integration of (Internet, Intranet, Extranet)
- Educating about IT for Non-MIS
- Educating about business for MIS
- Partnering business unit executives
- Managing outsourcing
- innovative idea about IT from biz, tech knowledges.
- business alliances with partners

1.2

Data

elementary description of something.
recorded, classified, stored
not organized → No meaning

Information

refer to data, organized → Meaning & value

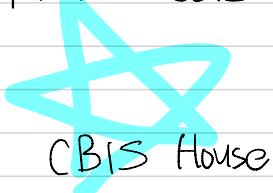
knowledge

Consists of data and/or information } Convey understanding, experience, ...
organized, processed

CBIS

Computer-Based Information System

Components of CBIS



Biz Intelligence Systems
Dashboards

FAIS

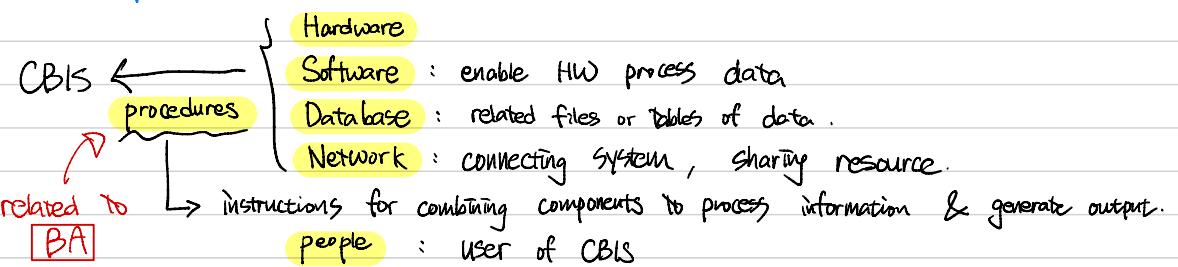
- Accounting
- Finance
- Production Operation management
- Marketing
- Human Resource

⇒ Enterprise Resource Planning (ERP) Systems

Transaction Processing System

IT Services
IT Personnels
IT components

IT Components



IT Services

IT personnel use IT components to

develop IS

oversee security, risk

manage data

→ IT Services

IT Infrastructure

IT Components + IT Services

Application

program designed to support specific task

Functional Area Information Systems (FAIS)

Collection of application in a department or functional area.

IT Architecture (Enterprise Architecture)	<table border="1" style="border-collapse: collapse; width: 100%;"> <tr> <td style="padding: 2px;">BA</td><td style="padding: 2px;">Business ~</td></tr> <tr> <td style="padding: 2px;">AA</td><td style="padding: 2px;">Application ~</td></tr> <tr> <td style="padding: 2px;">DA</td><td style="padding: 2px;">Data ~</td></tr> <tr> <td style="padding: 2px;">TA</td><td style="padding: 2px;">Technical ~</td></tr> <tr> <td style="padding: 2px;">SA</td><td style="padding: 2px;">Security ~</td></tr> </table>	BA	Business ~	AA	Application ~	DA	Data ~	TA	Technical ~	SA	Security ~	<table border="0" style="width: 100%;"> <tr> <td style="width: 50%; padding-right: 10px;">HW</td><td style="width: 50%;">Network</td></tr> <tr> <td style="padding-right: 10px;">System SW</td><td></td></tr> </table>	HW	Network	System SW	
BA	Business ~															
AA	Application ~															
DA	Data ~															
TA	Technical ~															
SA	Security ~															
HW	Network															
System SW																
Major capability of IS		<p>high speed, high-volume processing fast, accurate communication & collaboration within organizations. huge info. in small space. quick, cheap access worldwide quick, efficient analysis & interpretation (semi) automate tasks</p>														
Type of CBIS	<ul style="list-style-type: none"> • Breadth of support for IS • Support for Organizational Employees 	<p style="text-align: center;"><i>Customer relationship management</i></p>  <pre> graph TD Supplier[Supplier] -- B2B --> Company[Company] Company -- B2B --> Business[Business] Company -- B2C --> Customers[Customers] </pre> <p style="text-align: center; color: blue; margin-top: 10px;">Supply chain management</p>														

Breadth of
Support for IS

In Finance & Accounting

- Forecasting revenue.
- Determining the best sources and uses of funds
- Performing audits

In Sales & Marketing

- Product Analysis
- Site Analysis
- Promotion Analysis
- Price Analysis

In Manufacturing

- Production Scheduling
- Inventory management
- Computer Aided Design (CAD)
- Computer Aided Manufacturing (CAM)

In Human Resources

- Recruiting Process
- Career management
- Employee evaluation

Types of organizational IS

Function Area IS	a collection of app. in a department / functional area.
Enterprise Resource Planning	Correct a lack of communication among FAIS, span FAIS.
Transaction Processing System	Monitor, collect, store, process data from transactions
Interorganizational IS	connect multiple organizations.
E-commerce IS	Interorganizational IS of conducting transaction (B2B, B2C) in e-commerce.
Knowledge Workers	expert in particular area
Office Automation Systems	support employees (low-mid manager, knowledge worker, clerical staff)
Biz Intelligence Systems	computer-based support for complex decision (primarily - mid manager, knowledge worker)
Expert Systems	duplicate works of human experts by reasoning capability, knowledge, expertise.
Dashboards	special form of IS for all managers. Providing access to timely, structured information
Executive dashboard	Present structured, summarized info about biz important part to executives
Management IS	Produce summary report from transactional data usually in one functional area
Decision Support System	Provide access to data, analysis tool
Supply chain Management system	Manage flow of products, services, and info among org.

1.3

IT impact on industry	Book Financial Service Fashion	Music Motion Picture (Animation) Education	Video Automotive Legal	Videogame Agriculture	Photography Marketing	Recruiting National Defence
IT Impact on employees at work			<ul style="list-style-type: none"> • Health & Safety ☢/▢ • Chance for the disabled 			
1.4						
Importance of IS to society	<ul style="list-style-type: none"> - Quality of Life - Robot revolution - Improvements in healthcare. 					

Chapter 2

Organization Strategy,
Competitive Advantage,
and Information Systems

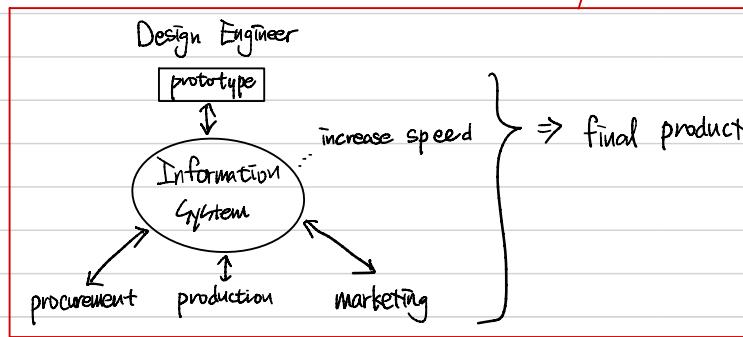


2. Introduction

Competitive Advantage

any asset provide an **edge** against competitors.
Control market, accrue **larger-than-average profit.**
in **cost, quality, speed, flexibility**

- { COST → low cost operation
- quality → high performance
 → consistent
- time → fast delivery
 → on-time delivery
 → development speed
- flexibility → customization - postponement
 → volume flexibility



Business Environment

combination of { social
legal
economic
physical
political } factors
change of factor → business pressure.

Organization Response

respond to various pressure by implementing IT

2.1. Biz pressure, Org. n't Response, IT support

Business Pressure

• Market pressures

- **globalization** : integration, interdependence, increment competitors
ex) NAFTA, EU, multinational corp., WTO

- **Changing nature of workforce** : diversified workforce
such as women, minorities, the disabled, etc.

- **Powerful Customers** : more knowledgeable, higher expectation.

CBIS response → Customer Relationship Management (CRM)

• Technology Pressures

- **Technical Innovation & obsolescence** : today's state-of-art → tomorrow's obsolescence

- **Information Overload** : flood of information

| effective, efficient decision by accessing, navigating, utilizing vast of info. data.
| supported by IT.

• Social / Political / legal pressures

- **Social Responsibility** : spend time, money to address social issues.

topics { - Green IT | facilities design, mg
 | Carbon mg
 | Environmental law.

- Digital Divide : Gap between info rich & info poor

- **Compliance with Gov. regulation** : expensive constraints for corp.

| deregulation → intense competition

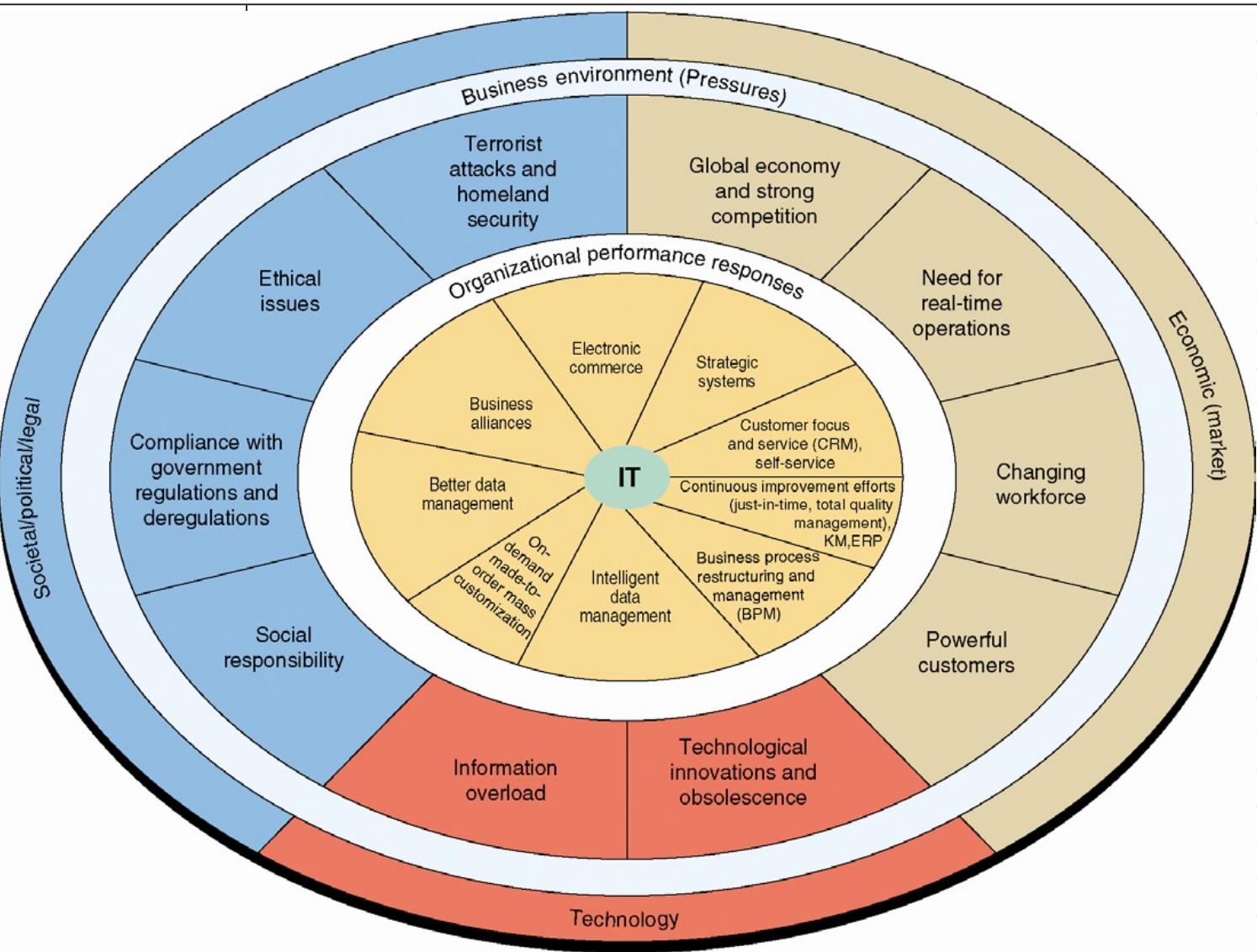
IT support → provide necessary controls and info. for compliance.

- **Terrorist Attacks** : IT → security system

ex) Office of Biometric Identity Management.

- **Ethical Issues** : general std of right and wrong.

can damage image, destroy employee's morale



Organizational Responses

- **Strategic IS** : provide advantages
 - profit
 - negotiation
 - competitors
 - :
- **Customer focus (CRM)** : superb CS → retain customers
keep customer happy.
- **Make to Order** : customization, how to produce customized products efficiently?
- **Mass Customization** : Make to Order in large scale

E-business & E-commerce

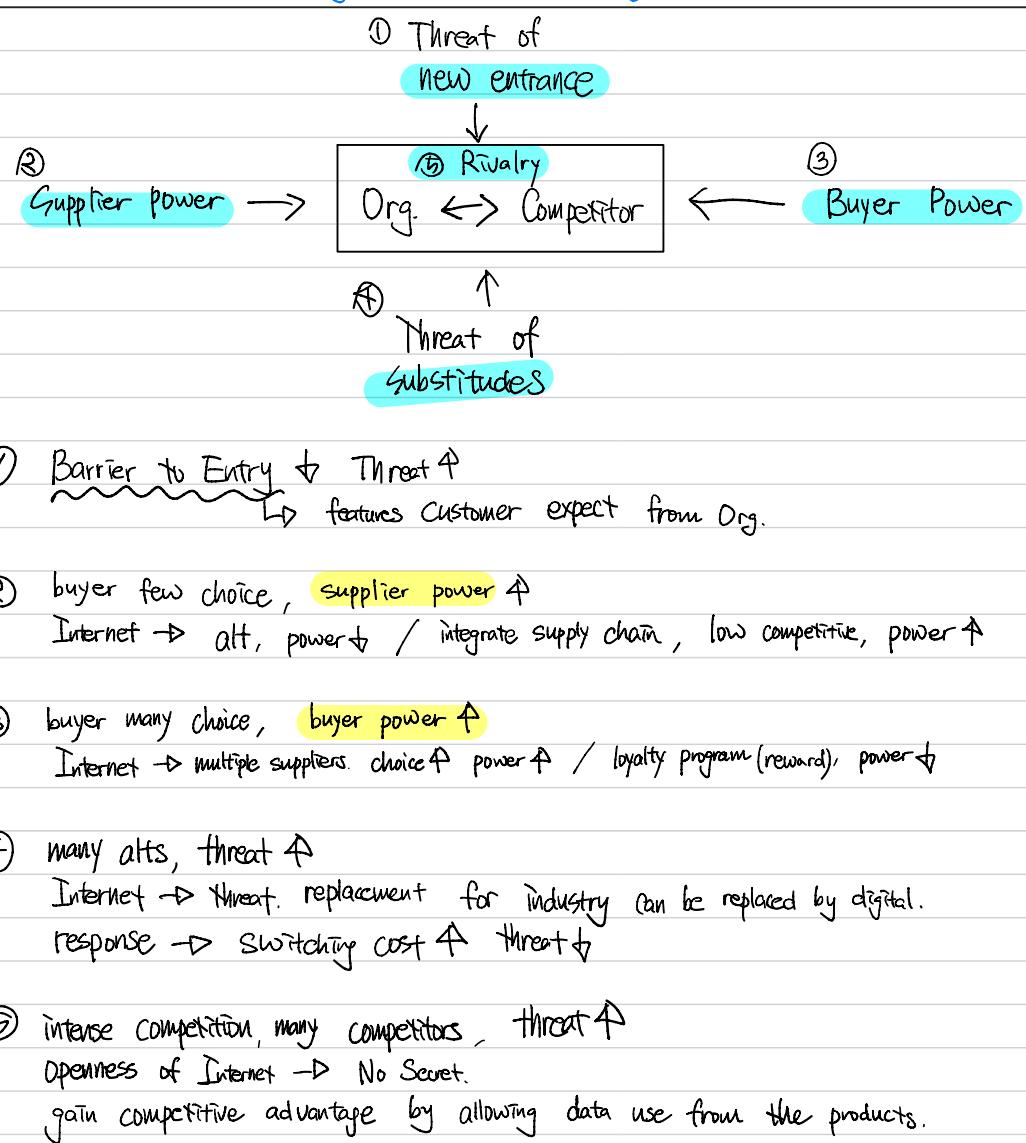
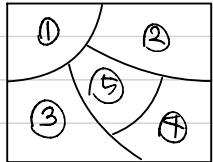
↳ buy sell transfer, exchange products, services, or info. via networks.
 ↳ broader than E-commerce.
 service customer. collaborate partners . perform electronic transactions

2.2. Competitive Advantage and Strategic IS

Porter's five forces model

- ↳ framework for analyzing competitiveness
- ↳ MECE is important

MECE, Mutual Exclusive
Collectively Exhaustive



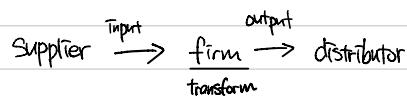
Porter's Value Chain Model

Value Chain

→ Sequence of activities make input more valuable output.

Value System

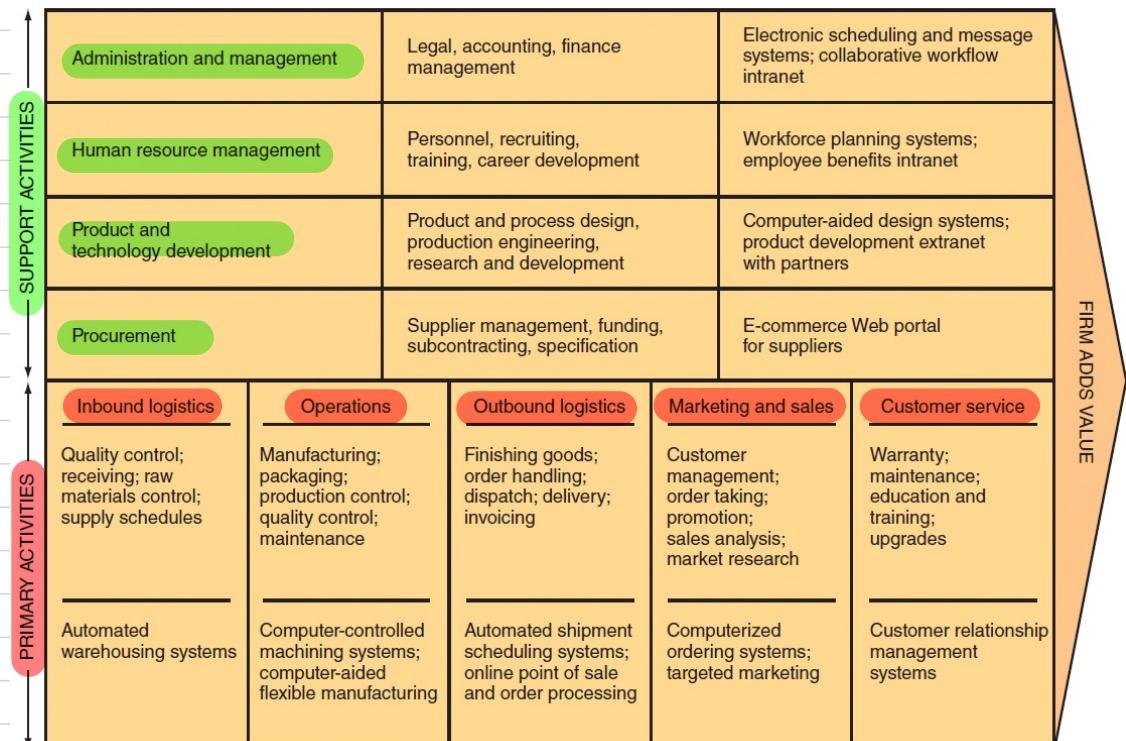
→ All parts of value chain is included.
Suppliers, distributors



Two categories of activities in value chain

- Primary activities
 - related to production & distribution
 - Create value
- Support activities
 - contribute competitive advantage by supporting primary activities.
 - no add value directly.

Value chain of manufacturer.



Strategy for competitive advantage	<p>① cost leadership : the lowest cost in the industry</p> <p>② differentiation : different products or service, features</p> <p>③ innovation : new products & service add new feature. develop new way to produce</p> <p>④ Org. n'l effectiveness : Improve internal business process → quality, productivity, satisfaction ↗</p> <p>⑤ Customer orientation : focusing on customers' happiness. personalize, one-to-one relationship by Web-based system</p>
	<p><u>Biz IT alignment</u> → Maximize strategic value of IT</p> <p>→ IT support biz obj through integration of IT and org's strategy, goal, mission.</p> <p>6 Characteristics of org's view</p> <ul style="list-style-type: none"> ① IT as a engine of innovation ; continually transform, creating new revenue ② internal & external customers CS → important ③ rotate biz & IT professionals across the dept. and job functions. ④ provide clear goals to employees (IT & biz) ⑤ It professionals understand how org makes money. ⑥ vibrant & inclusive culture

Chapter 3

Data and Knowledge Management



3.1 Managing Data

Difficulties of Managing Data

Data	<ul style="list-style-type: none">→ increases exponentially.→ scattered throughout org.→ multiple sources<ul style="list-style-type: none">{ internal sourcespersonal sourcesexternal sourcesclickstream data	<ul style="list-style-type: none">corp DB, docsthought, opinion, experiencecommercial DB, gov report, corp web sitesdata of activities & log from web-sites' visitors
	<ul style="list-style-type: none">→ new sources of data: blog, podcast, videocast, wireless sensors (RFID, ...)→ data degradation→ data rot→ security, quality, integrity→ Legal requirements.→ inconsistent data	

Data Governance

Data governance

→ Managing info across entire org
involving formal sets of rules for (creating, collecting, handling, protecting info)

Master Data

- Set of core data span enterprise IS
 - TXN data are generated, captured by operational system, TXN data → describe biz activities, TXN
 - applied to multiple TXNs
- Categorize, aggregate, evaluate TXN data.

Master Data Management

- process span all biz processes & applications.
- provide abilities to store, maintain, exchange, sync single ver. of truth for corp.'s master data.

Master Data vs TXN Data

info of meaning of data & value specific value + master data

"price" → "\$4,000"

3.2 DB Approach

Data File

collection of related records.

File system & DB system

DB System

Minimizing

→ Data redundancy

→ Data isolation

→ Data inconsistency

cannot access data associated with other apps.

Maximizing

→ Data Security

risk of losing data one time ↑ security ↑

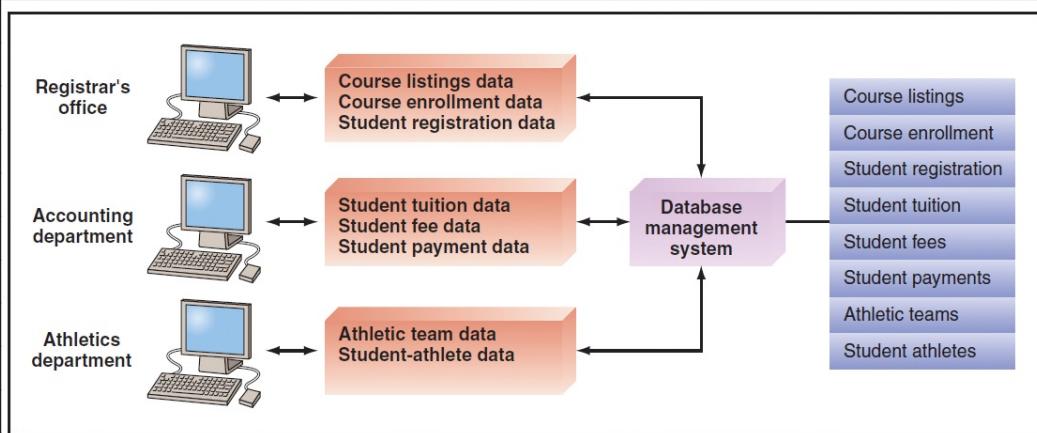
→ Data Integrity

constraints for data. (e.g., no alphabet in student ID)

→ Data Independence

app & data are independent, not linked.

DBMS



Data hierarchy

bit

0 & 1 - smallest unit

byte

8 bit

field

Word, String, ID Number, ...

record

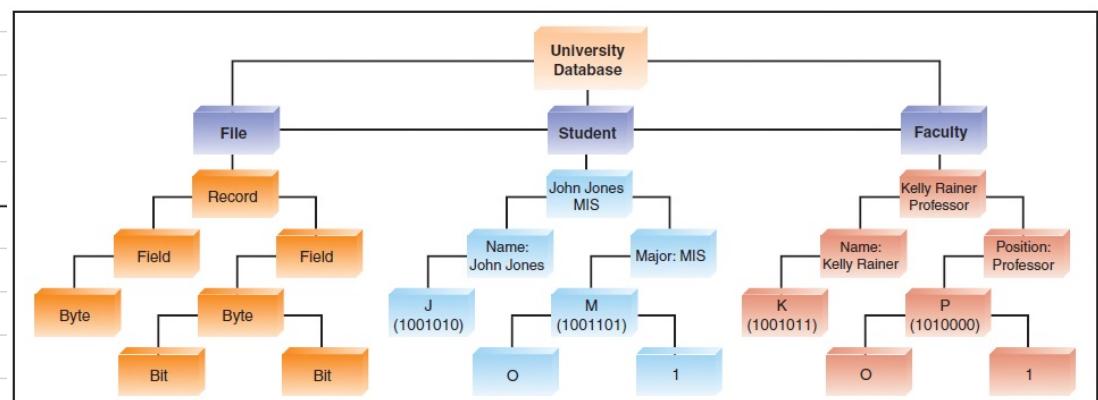
grouping of related fields

data file/table

grouping of related records

database

grouping of related data files



Relational DB model

DBMS

→ provide tools to create & manage DB.

Relational DB Model

→ Based on 2D tables

designed with a number of related tables
records in row
attributes in column.

Data Model

→ diagram that represent entities in DB & their relationships
↳ person, place, thing, or event

Instance

→ An entity refers to each row in a relational table

Attributes

→ Each characteristics or quality of particular entity.

e.g.,
entity : employee
attribute : employee number

Primary Key

→ A field in DB, uniquely identify each records

Secondary Key

→ A field has some identifying information, not completely

Foreign Key

→ A field in one table uniquely identifies a row of another table.
Establish & link between two tables.

Unstructured Data

→ Not in traditional relational DB. (e.g., e-mail msg, docs, videos, ...)
80-90% data!

7.3 Big Data

Def. Big Data

- diverse, high volume, high velocity info assets that require new forms of processing to enable enhanced decision making, insight discovery, process optimization.
- Vast dataset
 - exhibit variety
 - structured un-structured, semi-structured data
 - generated with high velocity, uncertain pattern
 - not fit traditional, structured, relational DB
 - captured, processed, transformed, analyzed in reasonable amount of time only by sophisticated IS.

Big Data Component

- Traditional Enterprise Data
- Machine / Sensor Data
- Social Data
Customer feedback comments, Social Media
- Images

Examples of Big Data

27 PB data was processed in 2015 by Google
More than 10M photos uploaded in Facebook every hour, 3B 'likes' every day
Over 550 M tweets per day
800 M users upload 1+ hours videos in YouTube every second.

Features of Big Data

- Volume → incredible
- Velocity → data flow ↑, feedback loop speed ↑
Corp ↔ customer
- Variety → format change rapidly

Issues with Big Data

- Unstructured data sources
- dirty data
 - refer to inaccurate, duplicate data
- Big data changes, especially data streams
 - data quality can change
 - data itself can change ∵ condition can change

Managing Big Data

make possible ...

biz trends rapidly
tracking spread of disease
crime
detecting fraud

Step 1.

Integrate info silos into a DB environment

develop data warehouse for decision making

* info silo?

↳ IS that doesn't communicate other, related IS in org.

Step 2.

org's attention to biz of info mgmt

turning NoSQL DB for processing Big Data

SQL: Structured Query Language

RDB: Oracle, MySQL, MS Access

NoSQL DB: structured, unstructured, inconsistent, missing data ⇒ manipulate

alts for corp. which has Big Data

Hadoop, Mongo DB, Apache Cassandra, Couch DB

↳ collection of programs that allow storage, retrieval, and analysis of large scale dataset
using massively parallel processing

↳ coordinated processing of multiple apps by processors that work at diff part of app.

each processing → own DS, Memory

Hadoop → enable to process NoSQL DB

Putting Big Data to Use

- Making Big Data Available for relevant stakeholders
→ help org gain value.
- Creating New BM
 - e.g., Transportation Corp. sensor on truck (telematics) → improving | drivers' skill, preventive maintenance, truck conditions
- Org can analyze for more data
 - process all the data relating to a particular phenomenon.
don't have to rely on sampling.
e.g., political polling by landline phones ⇒ bias in sample!
- Enable Org to conduct experiment
 - improve performance
e.g., Amazon A/B experiment by offer different visual on web-site.
only two outcome
- Micro-Segmentation of customers
 - Segmentation of customer → divide groups that share some features.
e.g., Paytronics Systems → loyalty & rewards program to restaurant.
data about restaurant guest → Micro-segmentation based on Big Data
customize the program.

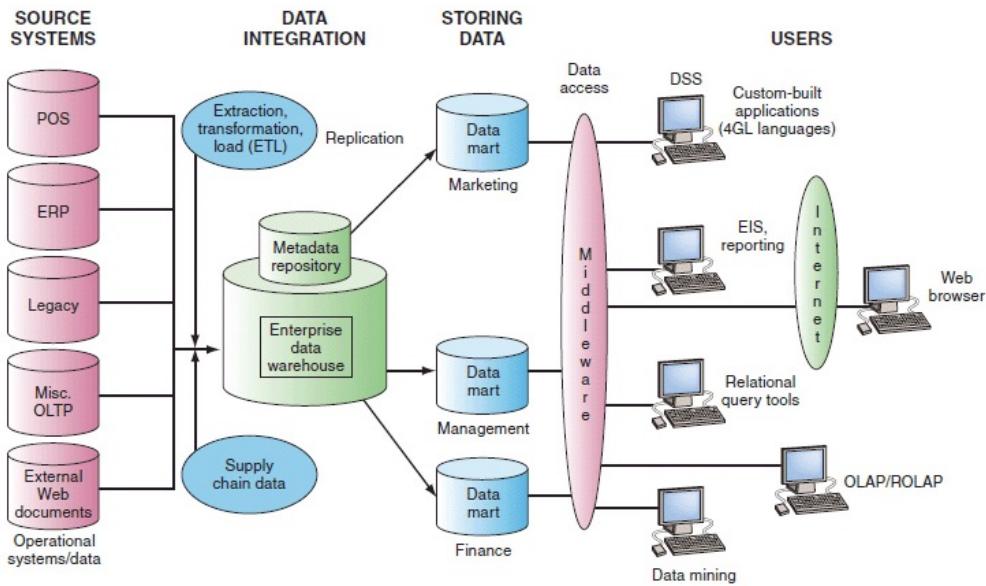
Big Data used in the functional areas in Org.

- Human resource.
- Product development
- Operations
- Marketing
- Gov Operations

3.4. Data Warehouse & Data Marts

Data Warehouse	repo of historical data organized by subject ↳ to support decision making
Data Mart	low-cost, low-scale ver of data warehouse. designed for end-user needs in strategic biz unit (SBU) or individual dept.
Basic Characteristics	<ul style="list-style-type: none">Organized by biz dimension / subjectOnLine Analytical Processing (OLAP)IntegratedTime VariantNonvolatileMulti-dimensional
Generic Data Warehouse Environment	<h3>Source Systems</h3> <p>→ provide source of org data. e.g., operational/transactional systems enterprise resource planning (ERP) system. web-site data third party data</p>
	<h3>Data Integration Tech & Processes</h3> <p>→ Reflect growing # of ways that Source system can be handled. Extract, Transform, Load (ETL) data from source system into a data warehouse/mart</p>
	<h3>Architectures Storing the data</h3> <p>↳ Store decision support data e.g., one central data warehouse, without data marts. independent data marts → data for a few app hub & spoke → central data warehouse (data + multiple dependent data marts) from central repo</p>
Metadata	→ data maintained about the data within the data warehouse.
Data Quality	→ Satisfy users' need.
Governance	→ for data quality, org implement governance to plan and ctrl their BI activities. requirement: people, committees, processes
Users	→ potential BI user info producer / info consumer.

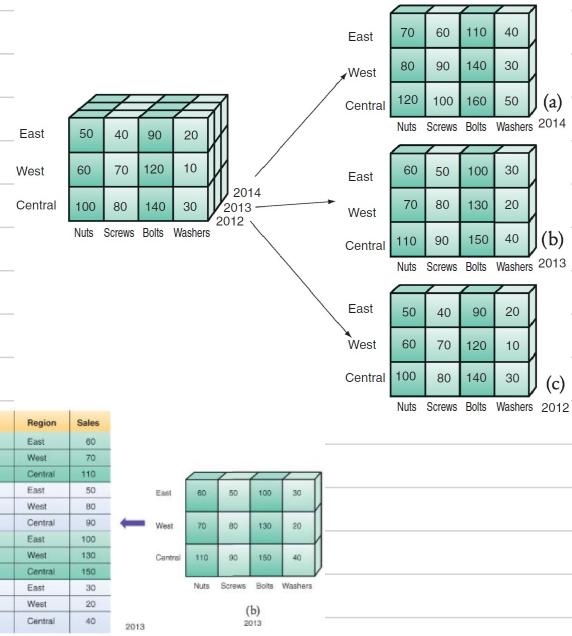
Data Warehouse



RDB & Multi-dimensional data warehouse

(a) 2012			(b) 2013			(c) 2014		
Product	Region	Sales	Product	Region	Sales	Product	Region	Sales
Nuts	East	50	Nuts	East	60	Nuts	East	70
Nuts	West	60	Nuts	West	70	Nuts	West	80
Nuts	Central	100	Nuts	Central	110	Nuts	Central	120
Screws	East	40	Screws	East	50	Screws	East	60
Screws	West	70	Screws	West	80	Screws	West	90
Screws	Central	80	Screws	Central	90	Screws	Central	100
Bolts	East	90	Bolts	East	100	Bolts	East	110
Bolts	West	120	Bolts	West	130	Bolts	West	140
Bolts	Central	140	Bolts	Central	150	Bolts	Central	160
Washers	East	20	Washers	East	30	Washers	East	40
Washers	West	10	Washers	West	20	Washers	West	30
Washers	Central	30	Washers	Central	40	Washers	Central	50

2012			2013			2014		
Product	Region	Sales	Product	Region	Sales	Product	Region	Sales
Nuts	East	50	Nuts	East	60	Nuts	East	70
Nuts	West	60	Nuts	West	70	Nuts	West	80
Nuts	Central	100	Nuts	Central	110	Nuts	Central	120
Screws	East	40	Screws	East	50	Screws	East	60
Screws	West	70	Screws	West	80	Screws	West	90
Screws	Central	80	Screws	Central	90	Screws	Central	100
Bolts	East	90	Bolts	East	100	Bolts	East	110
Bolts	West	120	Bolts	West	130	Bolts	West	140
Bolts	Central	140	Bolts	Central	150	Bolts	Central	160
Washers	East	20	Washers	East	30	Washers	East	40
Washers	West	10	Washers	West	20	Washers	West	30
Washers	Central	30	Washers	Central	40	Washers	Central	50



2012			2013			2014		
Product	Region	Sales	Product	Region	Sales	Product	Region	Sales
Nuts	East	50	Nuts	East	60	Nuts	East	70
Nuts	West	60	Nuts	West	70	Nuts	West	80
Nuts	Central	100	Nuts	Central	110	Nuts	Central	120
Screws	East	40	Screws	East	50	Screws	East	60
Screws	West	70	Screws	West	80	Screws	West	90
Screws	Central	80	Screws	Central	90	Screws	Central	100
Bolts	East	90	Bolts	East	100	Bolts	East	110
Bolts	West	120	Bolts	West	130	Bolts	West	140
Bolts	Central	140	Bolts	Central	150	Bolts	Central	160
Washers	East	20	Washers	East	30	Washers	East	40
Washers	West	10	Washers	West	20	Washers	West	30
Washers	Central	30	Washers	Central	40	Washers	Central	50

Benefits & Limitation of data warehousing

Benefits

- end users can access data quickly, easily via Web
:: data in one place!
- end user conduct extensive analysis with data
- end users can obtain consolidated view of org'nl data.
⇒ improve biz knowledge, competitive advantage,
enhance customer service & satisfaction
facilitate decision making
Streamline biz processes

Limitation

- expensive to build & maintain
- incorporating data from obsolete mainframe systems
can be difficult and expensive
- people in one dept may be reluctant to share data with other depts.

3.5 Knowledge Management

Knowledge Management

process that helps org manipulate knowledge that comprise part of org's memory, usually unstructured format

knowledge
= useful info.

Collection of facts, measurements, statistics \Rightarrow data
organized data that are timely, accurate \Rightarrow info.

Explicit Knowledge

- objective, rational, technical knowledge
- consist of policies, procedural guide, report, product, strategies, goals, core competencies, IT Infra
- documented in a form that can be distributed to others or transformed into a process or a strategy.

Tacit Knowledge

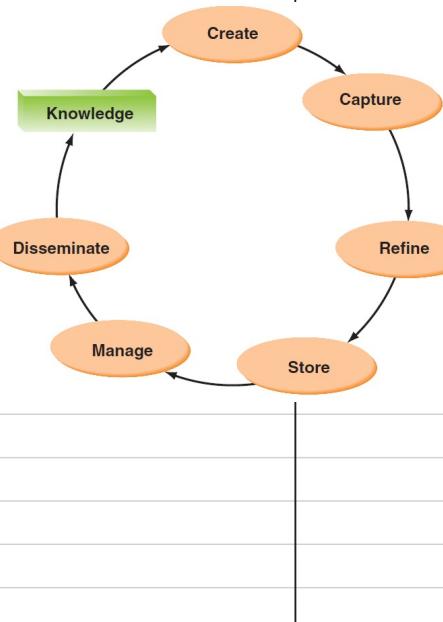
cumulative store of subjective & experiential learning

consist of org's experiences insights expertise know-how trade secrets
skill sets understanding learning
+ culture: reflect experience of org's people & process
imprecise, costly to transfer, highly personal
: unstructured. difficult to copy or document

Knowledge Management Systems (KMS)

refer modern IT to systemize, enhance, expedite intra-firm, inter-firm knowledge mgmt
help org cope with [turnover, rapid change, and downsizing] by making expertise of org's human capital widely accessible

KMS Cycle



Create : determine new way or develop know-how

Capture : new knowledge \rightarrow valuable, represented in reasonable way

refine : new knowledge \rightarrow in actionable context
 \rightarrow tacit qualities are captured along with explicit facts.

Store : stored in reasonable format. in knowledge repo. \rightarrow can access

Manage : keep current. review regularly verify relevant, accurate

disseminate : available in useful format anyone anywhere anytime

Chapter 4

Telecommunications
and Networking



4. Introduction

Computer networks

→ essential to modern org.

why? 1st. networked computer systems → flexible org.

adapt rapidly changing biz environment

2nd. share HW, App, Data

3rd. share docs, ideas, insights anywhere anytime

... encourage teamwork, innovation, effective & efficient interactions

critical link between business, partners, customers.

→ essential tool

Networking & Internet → foundation for commerce in 21C

4.1 What is a Computer Network

Computer Network (C.N.)

system that connects computers & other devices via communication media
data & info transmit

Bandwidth (bps)

transmission capacity of network
from narrowband to broadband
low capacity high capacity

Broadband (def by FCC)

transmission capacity medium faster than 25 Mbps for download
5 Mbps for upload

Types of C.N.

{ Personal Area Networks (PAN)
Local Area Networks (LAN) : connect multiple devices in limited region.
Metropolitan Area Networks (MAN)
Wide Area Networks (WAN) : cover large area,

connect multiple LAN

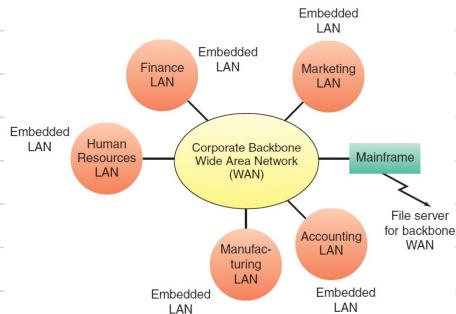
large capacity, multiple channels

example - Internet

contain routers → communication processor that routes
msg from LAN to Internet

Enterprise Network

org'n'l interconnected networks → multiple (LANs + WANs)



Traditional Networks

rigid,
lack flexibility (to keep pace with increasing biz networking requirements)

why? functions are distributed across multiple HWs.

⇒ implement changes by configuring network devices individually.

Software-defined Networks → help org manage data flow across enterprise networks.

dynamically managing network traffic flow by SW

4.2 Network Fundamentals.

Network via digital signal. (0 & 1)
public telephone system, a.k.a. plain Old Telephone System (POTS)

⇒ analog network with analog wave format

info. converted to analog wave pattern by dial-up modem

modulation: digital → analog

demodulation: analog → digital

Cable Modem → operate over coaxial cable

e.g., cable TV

share bandwidth subscribers in locality, same cable + multiple TV

Digital Subscriber Modem (DSL) → operate on same lines as telephone & dial-up modem
always connected, immediately available

Communication Media & Channels

Communications Channel

→ pathway communicating data from one to other.

Communications Media

→ physical media used to send data.

◦ Cables: twisted-pair wire, coaxial cable, fiber-optic cable

◦ broadcast: microwave, satellite, radio, infrared

Twisted-Pair wire: copper, prevalent form, almost telephone wiring, cheap, widely available, easy to use

Coaxial cable: (insulated) single copper, more data flow, low interference, high speed data traffic + TV

Fiber-optic cable: (glass fibers) + cladding, transmit via light pulse.

Channel	Advantages	Disadvantages
Twisted-pair wire	Inexpensive	Slow (low bandwidth)
	Widely available	Subject to interference
	Easy to work with	Easily tapped (low security)
Coaxial cable	Higher bandwidth than twisted-pair	Relatively expensive and inflexible
		Easily tapped (low to medium security)
Fiber-optic cable	Less susceptible to electromagnetic interference	Somewhat difficult to work with
	Very high bandwidth	Difficult to work with (difficult to splice)
	Relatively inexpensive	
Difficult to tap (good security)		

Network Protocol

Protocol

→ common set of rules & procedures enable (nodes on network) to communicate

→ Major Protocols

Ethernet

Transmission Control Protocol / Internet Protocol

Ethernet

→ common LAN protocol

usually 100 Gb Ethernet : 100 Gbps speed

Transmission Control Protocol / Internet Protocol

(TCP) (IP)

→ protocol of Internet, mainly TCP/IP

TCP : manage moving of data (packet) by establishing connection
Sequence transfer of (packet)
Acknowledge transmitted (packet)

IP : disassembling, delivering, reassembling data during transmission

Packets

→ divided bundles of data before transmission

Packet Switching

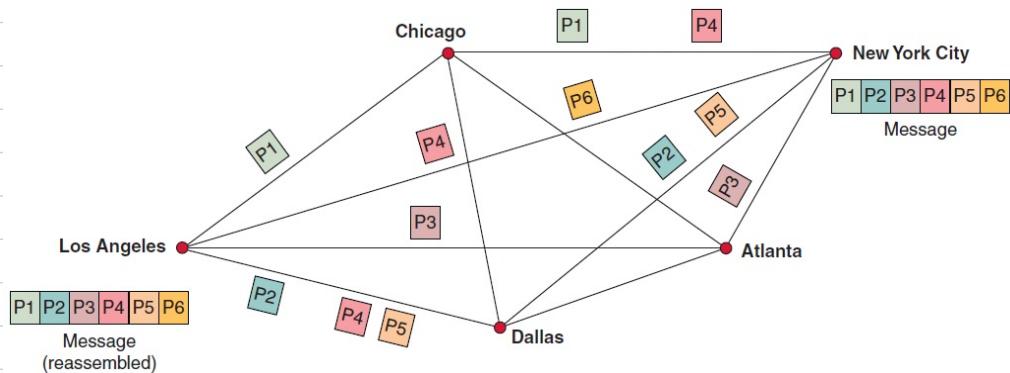
→ break up blocks of data into packets

→ each packet carries info. that help to reach its destination

→ each packet travel indep. ... routed through diff paths in network

→ reach dest, reassembled into orig.

→ Why? reliability!



7 layers for TCP/IP

① App Layer

→ enable App access the other layer

→ define protocols for exchanging data

e.g, HTTP (Hypertext Transfer Protocol)

how formulated & interpreted.

② Transport Layer

→ provide communication & packet service to App layer

* include TCP & other protocols

③ Internet Layer

→ addressing, routing, packaging data packets,

+ IP

④ Network Interface Layer

→ place & receive packets via network medium



①
②
③
④

Email: Sending a Message via SMTP (Simple Mail Transfer Protocol)	Application	Email: Message received
Break Message into packets and determine order	Transport	Packets reordered and replaced (if lost)
Assign sending and receiving IP addresses and apply to each packet	Internet	Packets routed through internal network to desired IP address
Determine path across network/Internet to intended destination	Network Interface	Receipt of packets

④
③
②
①

Types of Network Processing

- **Distributed processing**

→ multiple computer systems, distribute processing to multiple computers, communicate via telecommunication link

- **Client / Server Computer**

→ link multiple computers.

Server provide computing service for client

→ Client : request App, data, processing
server : serve desired commodity against requests

→ fat client | Storage / processing ↑
thin client | Storage / Processing ↘

- **Peer-to-Peer Processing**

→ type of client/server distributed processing

each computer acts as both a client & a server

access all files on all other computers

3 types

① Access unused CPU power among networked computers → SETI

② real time, P2P collaboration → MS SharePoint

③ advanced search & file sharing → torrent

4.3 Internet & WWW

Internet

Internet : global WAN that connects 1M org computer networks in 200+ countries

Internet Backbone : primary network connection line that link the node.
fiber-optic network
by large telecommunication company.

Origin of Internet : by ARPANET, (DARPA now)

Intranet : network that use Internet Protocol

advantage of familiarity - apps & work habits

support discovery, communication, collaboration inside the org

Extranet : connect parts of diff orgs.

communicate with biz partner securely with Internet VPNs (Virtual private Networks)

Accessing the Internet

by online service

- Internet Service Provider (ISP)

→ charges for Internet

ISPs connect to one another through Network Access Points (NAPs)

- Network Access Points (NAP)

→ exchange points for Internet traffic
determine how traffic is routed.

key component of Internet backbone.

- IP Address

→ distinguish each device

□.□.□.□ → format

Accessing the Internet

by other means.

- **Satellite**

e.g., Starlink, OneWeb

- **Google Fiber**

ultrafast fiber-optic cable

IP Addressing Schemes

- IPv4 most widely used, 32-bit

- IPv6 128-bit

IP Address → unique. To know where to find another.

ICANN : Coordinate unique address throughout the world

↳ Internet Corporation for Assigned Names and Number

→ accredit certain company (registrars) to register these names, which are derived from DNS (Domain Name System)

Top-Level Domain (TLD)

→ highest level in DNS of the internet

Management of most TLDs is delegated to responsible org. by ICANN

Country-code top-level domains (ccTLD) : two letter domains e.g., .ko, .it, .ru, ...

Internationalized Country code top-level domains (IDN ccTLD) : ccTLD in non-Latin character e.g., '.th'

Generic top-level domains (gTLD) : Top-level domains with 3+ characters

e.g., .gov .edu .com .mil .org .net
.aero .biz .coop .info .museum .name
.pro

Future of Internet

- High User Demand ⇒ Reduced Performance in near future
no improvement of bandwidth, then speed reduce.

too slow for data intensive app

- Internet is unreliable & not secure

- Internet 2 : fast, always on, everywhere, natural, intelligent, easy, trusted
not physically separated from Internet

World Wide Web (WWW)

Internet \neq WWW

- Internet : function as transport mechanisms
- WWW : app that use transport mechanisms

WWW

→ Standard system for storing, retrieving, formating, and displaying info via client/server architecture.

Hypertext

→ (text displayed on a display with reference to other text)
hyperlink

that reader can immediately access.

Webmaster

→ Person in charge of org web sites.

Uniform Resource Locator (URL)

→ points to the address of specific resource on web.

Browser

→ provide graphical front-end
user can point & click their way
surfing

→ same interface on any OS

4.4 Network App: Discovery

Search Engine

- search specific information by keywords & report result
- maintain index of billions of web pages
Created, updated by web-crawlers → browse web and create copy of all visited pages.
→ provide fast search

Metasearch Engine

- search several engines at once. Integrate results to answer users' queries

Publication of material in foreign languages

- automatic translation web page is essential

portals

- Web-based, personalized gateway to info. & knowledge
 - : provide relevant info. from diff IT system.

Internet using advanced search & indexing technique.

Commercial (public) portal

- most popular type of portal on the Internet
for broad & diverse audience MSN

Affinity Portal

- offer single point of entry community of affiliated interests ZDNET

Corporate Portal

- offer personalized, single point of access through web browser to critical biz info inside of corp.
a.k.a. enterprise portal, info. portal

Industrywide portal

- serve an entire industry. Trucknet

4.5 Network App : Communication

Communication	major category of network App related to communication tech delivered online
Unified Communication	simplify & integrates all forms of communications on common HW & SW Electronic Teleconferencing → people at diff location for conference.
Telecommuting	→ the process that knowledge workers can work anywhere, anytime.

4.6 Network App : Collaboration

Collaboration	efforts by multiple entities who work together to accomplish certain task.
Working group	multiple individuals who act together to perform some task.
Workflow workflow mg	Movement of info. as it progress through sequence of work procedures pass data from one to another in org's rule or procedures.
Virtual group	conduct virtual meeting
virtual collaboration	collaborate anytime, anywhere.
Synchronous Collaboration	all team members meet at the same time
Asynchronous Collaboration	team members cannot meet at the same time
Collaboration by SW: Google Drive, MS SharePoint ... → online collaboration capabilities.	
Version Management System	provide version management track changes to docs features to accommodate multiple people working on the same docs, at the same time.
Version Control System	each team member → account with permissions before edit → check out docs, other users cannot access after check in → available to others
Crowdsourcing	→ org outsource task to undefined large group in form of an open call e.g., help desk, recruitment, scitable, Procter & Gamble (P&G)
Teleconferencing	electronic communication tech to hold conference
Telephone Conference Call	talk (O) face to face (X) visual reference (X)
Videoconference	talk (O) face to face (O) visual reference (O)

4.7 Network App: Educational

E-Learning

learning supported by web. offline or online.

Distance Education

any learning situation where no face-to-face.

MOOC (Massive Open Online Course)

→ democratizing higher education.

growth ↑ ∵ improve tech, expensive universities

automated system

Virtual Universities

Online Universities.

Chapter 5

Business Analytics



BA vs. BI

BA : process of developing decision or recommendation for actions
based on historical data
examine data, formulate models, communicate result to org's decision makers

BI : broad category of app. tech. process
→ gathering, storing, accessing, analyzing data
help biz user to make better decision

5.1 Managers & Decision Making

The managers' job
& decision making

Management

→ process, by which org achieve goals through use of resources.

productivity

→ ratio between input & output

3 roles of manager

① Interpersonal figurehead, leader, liaison

② Informational monitor, disseminator, spokesperson, analyzer

③ Decisional entrepreneur, disturbance handler, resource allocator, negotiator

Decision.

→ one choice from multiple alts.

→ diverse, continuously made,

→ decision making: systematic process

Four phase of
decision making

- Intelligence phase

→ examine situation, identify & define problem/opportunity

- Design phase

→ model for addressing situation: Simplify, relationship among all variables

evaluation criteria of potential solns

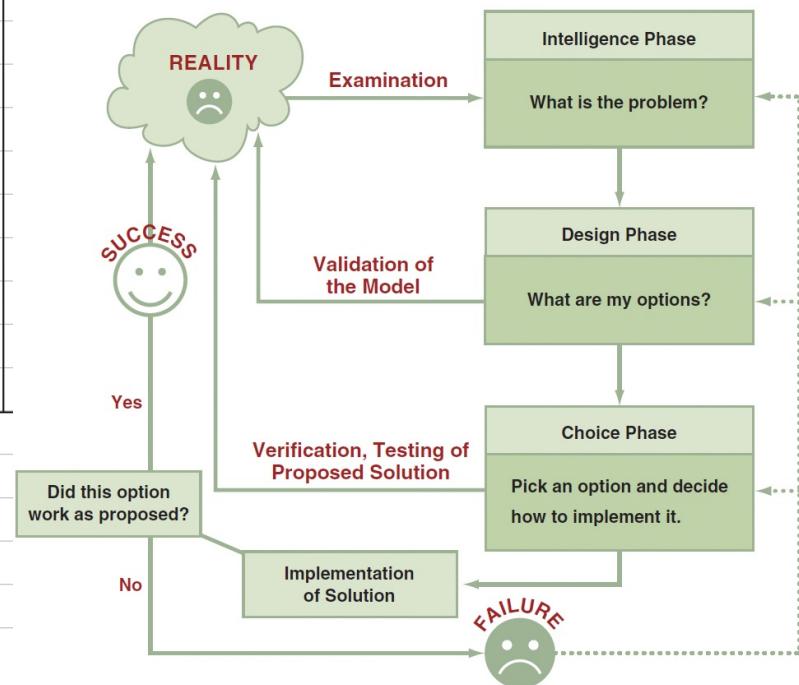
- Choice phase

→ select a soln, implement it.

- Implementation phase

→ Success | sol'n solve problem

fail | return previous phase



<p>Why Managers need IT support?</p>	<p># of alts ↑ Time constraints uncertainty ↑ sophisticated analysis is important group decision → no incurring major expense</p>																
<p>A framework for computerized decision analysis</p> <ul style="list-style-type: none"> • Problem Structure <ul style="list-style-type: none"> → from highly structured to highly unstructured • The nature of decisions <ul style="list-style-type: none"> ① Operational Control ② Management Control ③ Strategic Planning • Decision Matrix 	<table border="1" data-bbox="371 862 1335 1581"> <caption>THE NATURE OF DECISIONS</caption> <thead> <tr> <th data-bbox="371 929 605 997">PROBLEM STRUCTURE</th> <th data-bbox="605 929 854 997">Operational Control</th> <th data-bbox="854 929 1103 997">Management Control</th> <th data-bbox="1103 929 1335 997">Strategic Planning</th> </tr> </thead> <tbody> <tr> <td data-bbox="371 997 605 1208">Structured</td> <td data-bbox="605 997 854 1208"> <u>Accounts receivable</u> <u>Accounts payable</u> <u>Order entry</u> </td> <td data-bbox="854 997 1103 1208"> Budget analysis Short-term forecasting Personnel reports Make-or-buy analysis </td> <td data-bbox="1103 997 1335 1208"> <u>Financial management</u> <u>Investment portfolio</u> <u>Warehouse location</u> </td> </tr> <tr> <td data-bbox="371 1208 605 1419">Semistructured</td> <td data-bbox="605 1208 854 1419"> Production scheduling, Inventory control </td> <td data-bbox="854 1208 1103 1419"> Credit evaluation Budget preparation Plant layout Project scheduling Reward system Design </td> <td data-bbox="1103 1208 1335 1419"> Building a new plant Mergers and acquisitions New product planning Compensation planning HR policies </td> </tr> <tr> <td data-bbox="371 1419 605 1581">Unstructured</td> <td data-bbox="605 1419 854 1581"> <u>Building software</u> <u>Approving loans</u> <u>Operating a help desk</u> </td> <td data-bbox="854 1419 1103 1581"> Negotiating Recruiting an executive Lobbying </td> <td data-bbox="1103 1419 1335 1581"> <u>R & D planning</u> <u>New technology development</u> <u>Social responsibility planning</u> </td> </tr> </tbody> </table>	PROBLEM STRUCTURE	Operational Control	Management Control	Strategic Planning	Structured	<u>Accounts receivable</u> <u>Accounts payable</u> <u>Order entry</u>	Budget analysis Short-term forecasting Personnel reports Make-or-buy analysis	<u>Financial management</u> <u>Investment portfolio</u> <u>Warehouse location</u>	Semistructured	Production scheduling, Inventory control	Credit evaluation Budget preparation Plant layout Project scheduling Reward system Design	Building a new plant Mergers and acquisitions New product planning Compensation planning HR policies	Unstructured	<u>Building software</u> <u>Approving loans</u> <u>Operating a help desk</u>	Negotiating Recruiting an executive Lobbying	<u>R & D planning</u> <u>New technology development</u> <u>Social responsibility planning</u>
PROBLEM STRUCTURE	Operational Control	Management Control	Strategic Planning														
Structured	<u>Accounts receivable</u> <u>Accounts payable</u> <u>Order entry</u>	Budget analysis Short-term forecasting Personnel reports Make-or-buy analysis	<u>Financial management</u> <u>Investment portfolio</u> <u>Warehouse location</u>														
Semistructured	Production scheduling, Inventory control	Credit evaluation Budget preparation Plant layout Project scheduling Reward system Design	Building a new plant Mergers and acquisitions New product planning Compensation planning HR policies														
Unstructured	<u>Building software</u> <u>Approving loans</u> <u>Operating a help desk</u>	Negotiating Recruiting an executive Lobbying	<u>R & D planning</u> <u>New technology development</u> <u>Social responsibility planning</u>														

5.2 The biz Analytics Process

Business Analytics

process of developing decision or recommendation for actions

based on historical data

examine data, formulate models, communicate result to org's decision makers

Cover app, tech, process.

(get data in) & (get data out)
to data mart/warehouse to BA app

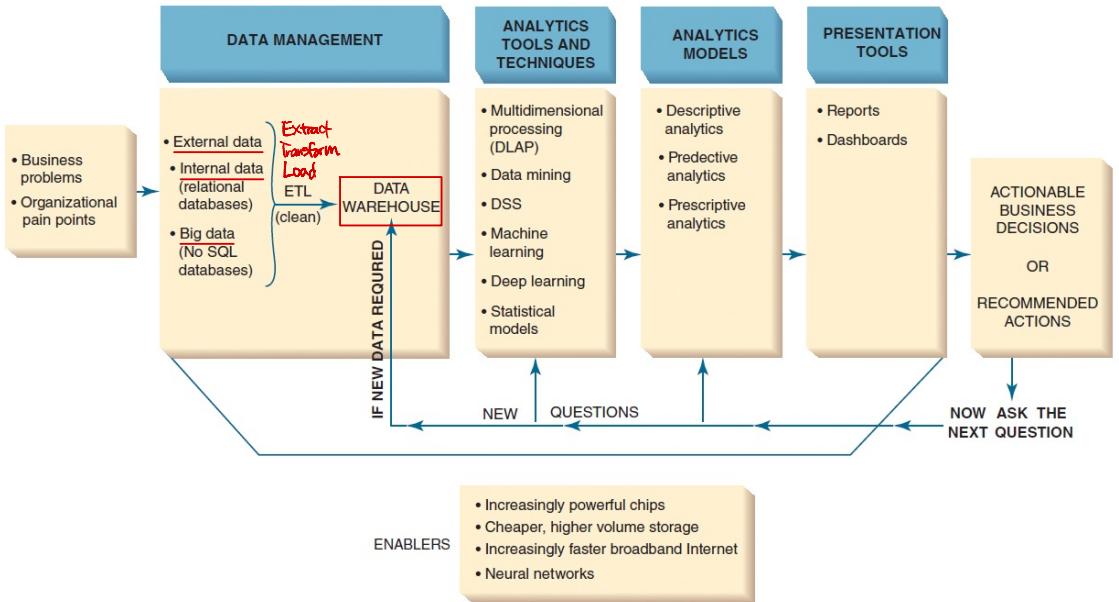


FIGURE 5.3 The Business Analytics Process

The scope of BA

- develop a few related analytics app
- develop infra to support enterprisewide analytics
- support org'n'l transformation

5.3 BIZ Analytics Tools

Excel	the most popular tool pivot table
multidimensional Analysis or online analytical processing	slicing & dicing data in dimensional format. → { drilling down, greater detail aggregating data}
Data Mining	process of searching valuable biz info. from large DB, Data warehouse, Data mart basic operations : ① predict trend & behavior automate finding predictive info. ② identify unknown patterns explain why it happen. what will happen identify biz opportunity for creating sustainable competitive advantage
Used area.	- retail, sales - banking - manufacture, production - insurance - police work - health care - marketing - politics - weather - higher education - social good
Decision Support System (DSS)	combine model & data → analyze semi- or un-structured problems biz manager & analyst → access data interactively manipulate data conduct appropriate analyses.
Sensitivity Analysis	→ study of impact from changes in parts of model
What-if Analysis	→ accurate prediction & assumption regarding on <u>input</u> ↗ assessment of uncertain future
Goal-seeking Analysis	→ backward sol'n attempt to calculate values of input necessary to achieve a desired level of output

5.4 Biz Analytics Models : Descriptive, Predictive, Prescriptive

Data Reduction	raw data → smaller amount of useful info.														
Descriptive Analytics	Summarize past, learn from past behaviors reports that provide historical insights														
Predictive Analytics	Examine recent, past data to detect pattern predict future outcome & trends provide estimates about likelihood of future outcome														
Prescriptive Analytics	recommend multiple way & show expected outcome of each decision. predict multiple future outcomes based on actions attempt to quantify effect of future decision in order to advise possible outcome before action														
Data Visualization	presented data in visual format IT App more attractive, understandable - Dashboard : easy access to timely info. & mgmt report														
presentation tools	<p>TABLE 5.1 The Capabilities of Dashboards</p> <table border="1"> <thead> <tr> <th>Capability</th><th>Description</th></tr> </thead> <tbody> <tr> <td>Drill down</td><td>The ability to go to details, at several levels; it can be done by a series of menus or by clicking on a drillable portion of the screen.</td></tr> <tr> <td>Critical success factors (CSFs)</td><td>The factors most critical for the success of business. These can be organizational, industry, departmental, or for individual workers.</td></tr> <tr> <td>Key performance indicators (KPI)</td><td>The specific measures of CSFs.</td></tr> <tr> <td>Status access</td><td>The latest data available on KPI or some other metric, often in real time.</td></tr> <tr> <td>Trend analysis</td><td>Short-, medium-, and long-term trend of KPIs or metrics, which are projected using forecasting methods.</td></tr> <tr> <td>Exception reporting</td><td>Reports highlight deviations larger than certain thresholds. Reports may include only deviations.</td></tr> </tbody> </table> <p>- GIS : Capture, integrate, manipulate, display data using digitized map. < every record or object has identified geographical location > ⇒ geocoding, user generate info. for planning, problem solving, decision making</p> <p>Real-time Biz Analytics</p> <p>use real-time data for analysis rather than historical data.</p>	Capability	Description	Drill down	The ability to go to details, at several levels; it can be done by a series of menus or by clicking on a drillable portion of the screen.	Critical success factors (CSFs)	The factors most critical for the success of business. These can be organizational, industry, departmental, or for individual workers.	Key performance indicators (KPI)	The specific measures of CSFs.	Status access	The latest data available on KPI or some other metric, often in real time.	Trend analysis	Short-, medium-, and long-term trend of KPIs or metrics, which are projected using forecasting methods.	Exception reporting	Reports highlight deviations larger than certain thresholds. Reports may include only deviations.
Capability	Description														
Drill down	The ability to go to details, at several levels; it can be done by a series of menus or by clicking on a drillable portion of the screen.														
Critical success factors (CSFs)	The factors most critical for the success of business. These can be organizational, industry, departmental, or for individual workers.														
Key performance indicators (KPI)	The specific measures of CSFs.														
Status access	The latest data available on KPI or some other metric, often in real time.														
Trend analysis	Short-, medium-, and long-term trend of KPIs or metrics, which are projected using forecasting methods.														
Exception reporting	Reports highlight deviations larger than certain thresholds. Reports may include only deviations.														

Chapter 7

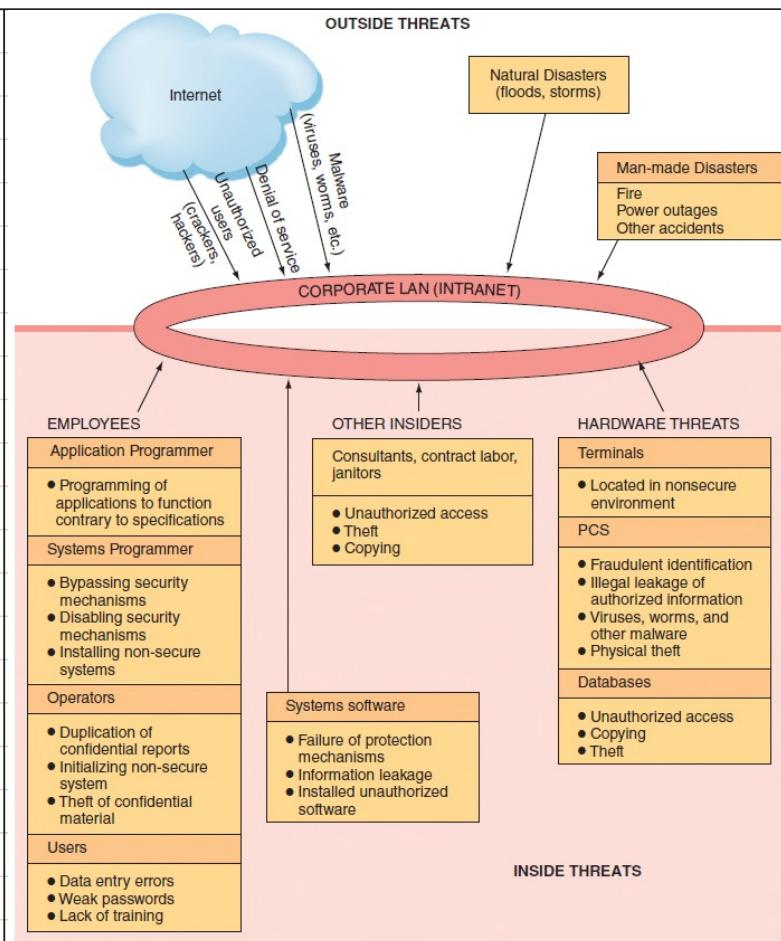
Information Security



7.1 Intro to Information Security

Security	degree of protection
Information Security	policy & process designed to protect info & info sys
threat	danger which sys be exposed
exposure	harm, loss, damage when threat compromises the info resource.
vulnerability	possibility that the sys will be harmed by threat
cyber crime	illegal activities conducted over computer networks
Increasing vulnerability	<ul style="list-style-type: none">{ interconnected, interdependent wireless network business environmentsmaller, faster, cheaper computers & storage devicesdecreasing skills necessary to be hacker.international cybercrimelack of management support.

T.2. Unintentional Threats to Information Sys



Human Error

Higher Employee Level = Higher levels of security risk
greater access to data. info sys

Most Dangerous Employees

- Human Resource Dept. | personal data.
- Information Systems Dept. | org. data

Janitor & Guards : outsource

Human Mistake

Carelessness of laptop & computer devices

Open email from unknown

Careless internet surfing

poor pw

Carelessness with office, discarded equipment

Careless using unmanaged devices. & monitoring of environmental hazards,

Social Engineering

An attack by perpetrator who use social skill to manipulate employees for providing confidential company info.

2023

7.3

Deliberate Threats to Info Sys

Espionage or Trespass	Unauthorized individual attempts to gain illegal access to org. info.																											
Info. Extortion (勒索)	Attackers threaten to steal or actually steal. They demand payment.																											
Sabotage, Vandalism (破坏)	Defacing web-site. Image of org. → lose customer faith. Hacktivist / cyberactivist																											
Theft of equipment or info.	Small device → easy to steal, useful to steal. Dumpster diving ⇒ find discarded info.																											
Identity theft (窃取)	Deliberate assumption of another person's ID																											
Compromises to intellectual property	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="padding: 5px; vertical-align: top;"> Trade Secret (商业秘密) Patent Copyright Intellectual Property </td><td style="padding: 5px; vertical-align: top;"> Intellectual work, company secret, not based on public info. Official document grants holder exclusive rights on invention for specified period of time Statutory grant provide ownership of intellectual property for designated period Property protected under trade secret, patent, and copyright laws. </td></tr> </table>		Trade Secret (商业秘密) Patent Copyright Intellectual Property	Intellectual work, company secret, not based on public info. Official document grants holder exclusive rights on invention for specified period of time Statutory grant provide ownership of intellectual property for designated period Property protected under trade secret, patent, and copyright laws.																								
Trade Secret (商业秘密) Patent Copyright Intellectual Property	Intellectual work, company secret, not based on public info. Official document grants holder exclusive rights on invention for specified period of time Statutory grant provide ownership of intellectual property for designated period Property protected under trade secret, patent, and copyright laws.																											
SW Attacks	Malicious SW (malware) to infect as many computer as possible																											
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>Type</th><th>Description</th></tr> </thead> <tbody> <tr> <td><u>Remote Attacks Requiring User Action</u></td><td></td></tr> <tr> <td>Virus</td><td>Segment of computer code that performs malicious actions by attaching to another computer program</td></tr> <tr> <td>Worm</td><td>Segment of computer code that performs malicious actions and will replicate, or spread, by itself (without requiring another computer program)</td></tr> <tr> <td>Phishing attack</td><td>Phishing attacks use deception to acquire sensitive personal information by masquerading as official-looking e-mails or instant messages.</td></tr> <tr> <td>Spear phishing</td><td>Phishing attacks target large groups of people. In spear phishing attacks, the perpetrators find out as much information about an individual as possible to improve their chances that phishing techniques will obtain sensitive, personal information.</td></tr> <tr> <td><u>Remote Attacks Needing No User Action</u></td><td></td></tr> <tr> <td>Denial-of-service attack</td><td>An attacker sends so many information requests to a target computer system that the target cannot handle them successfully and typically crashes (ceases to function).</td></tr> <tr> <td>Distributed denial-of-service attack</td><td>An attacker first takes over many computers, typically by using malicious software. These computers are called <i>zombies</i> or <i>bots</i>. The attacker uses these bots—which form a <i>botnet</i>—to deliver a coordinated stream of information requests to a target computer, causing it to crash.</td></tr> <tr> <td><u>Attacks by a Programmer Developing a System</u></td><td></td></tr> <tr> <td>Trojan horse</td><td>Software programs that hide in other computer programs and reveal their designed behavior only when they are activated</td></tr> <tr> <td>Back door</td><td>Typically a password, known only to the attacker, that allows him or her to access a computer system at will, without having to go through any security procedures (also called a <i>trap door</i>).</td></tr> <tr> <td>Logic bomb</td><td>A segment of computer code that is embedded within an organization's existing computer programs and is designed to activate and perform a destructive action at a certain time or date.</td></tr> </tbody> </table>		Type	Description	<u>Remote Attacks Requiring User Action</u>		Virus	Segment of computer code that performs malicious actions by attaching to another computer program	Worm	Segment of computer code that performs malicious actions and will replicate, or spread, by itself (without requiring another computer program)	Phishing attack	Phishing attacks use deception to acquire sensitive personal information by masquerading as official-looking e-mails or instant messages.	Spear phishing	Phishing attacks target large groups of people. In spear phishing attacks, the perpetrators find out as much information about an individual as possible to improve their chances that phishing techniques will obtain sensitive, personal information.	<u>Remote Attacks Needing No User Action</u>		Denial-of-service attack	An attacker sends so many information requests to a target computer system that the target cannot handle them successfully and typically crashes (ceases to function).	Distributed denial-of-service attack	An attacker first takes over many computers, typically by using malicious software. These computers are called <i>zombies</i> or <i>bots</i> . The attacker uses these bots—which form a <i>botnet</i> —to deliver a coordinated stream of information requests to a target computer, causing it to crash.	<u>Attacks by a Programmer Developing a System</u>		Trojan horse	Software programs that hide in other computer programs and reveal their designed behavior only when they are activated	Back door	Typically a password, known only to the attacker, that allows him or her to access a computer system at will, without having to go through any security procedures (also called a <i>trap door</i>).	Logic bomb	A segment of computer code that is embedded within an organization's existing computer programs and is designed to activate and perform a destructive action at a certain time or date.
Type	Description																											
<u>Remote Attacks Requiring User Action</u>																												
Virus	Segment of computer code that performs malicious actions by attaching to another computer program																											
Worm	Segment of computer code that performs malicious actions and will replicate, or spread, by itself (without requiring another computer program)																											
Phishing attack	Phishing attacks use deception to acquire sensitive personal information by masquerading as official-looking e-mails or instant messages.																											
Spear phishing	Phishing attacks target large groups of people. In spear phishing attacks, the perpetrators find out as much information about an individual as possible to improve their chances that phishing techniques will obtain sensitive, personal information.																											
<u>Remote Attacks Needing No User Action</u>																												
Denial-of-service attack	An attacker sends so many information requests to a target computer system that the target cannot handle them successfully and typically crashes (ceases to function).																											
Distributed denial-of-service attack	An attacker first takes over many computers, typically by using malicious software. These computers are called <i>zombies</i> or <i>bots</i> . The attacker uses these bots—which form a <i>botnet</i> —to deliver a coordinated stream of information requests to a target computer, causing it to crash.																											
<u>Attacks by a Programmer Developing a System</u>																												
Trojan horse	Software programs that hide in other computer programs and reveal their designed behavior only when they are activated																											
Back door	Typically a password, known only to the attacker, that allows him or her to access a computer system at will, without having to go through any security procedures (also called a <i>trap door</i>).																											
Logic bomb	A segment of computer code that is embedded within an organization's existing computer programs and is designed to activate and perform a destructive action at a certain time or date.																											
Supervisory Control Attack	→ large scale, distributed measurement and control system. SCADA sys																											
Data Acquisition Attacks	→ attacker gain access, serious damage!																											
Cyberterrorism & Cyberwarfare	Attacker use target's computer sys to cause physical harm. political agenda																											

Alien SW	Secret SW. Installed in computer through duplicate method. Use sys resource, tracking	
Adware	Pop-up ad	
Spyware	Collect personal info. without consent	Keystroke logger
Spamware	Use computer as launch pad for spammers	Screen scraper

7.4 What Org. are doing to protect Info Resource

Risk

Hundreds of potential threats exist.

Computing resources may be situated in many locations.

Many individuals control or have access to information assets.

Computer networks can be located outside the organization, making them difficult to protect.

Rapid technological changes make some controls obsolete as soon as they are installed.

Many computer crimes are undetected for a long period of time, so it is difficult to learn from experience.

People tend to violate security procedures because the procedures are inconvenient.

The amount of computer knowledge necessary to commit computer crimes is usually minimal. As a matter of fact, a potential criminal can learn hacking, for free, on the Internet.

The costs of preventing hazards can be very high. Therefore, most organizations simply cannot afford to protect themselves against all possible hazards.

It is difficult to conduct a cost-benefit justification for controls before an attack occurs because it is difficult to assess the impact of a hypothetical attack.

Risk Management

Identify, control, minimize impact of threat. reduce risk

- 1. risk analysis
- 2. risk mitigation
- 3. control evaluation

1. risk analysis

- 1. assessing the value of each being protected
- 2. estimating probability that each asset will be compromised
- 3. compare probable cost between damaged & protected

2. Risk Mitigation

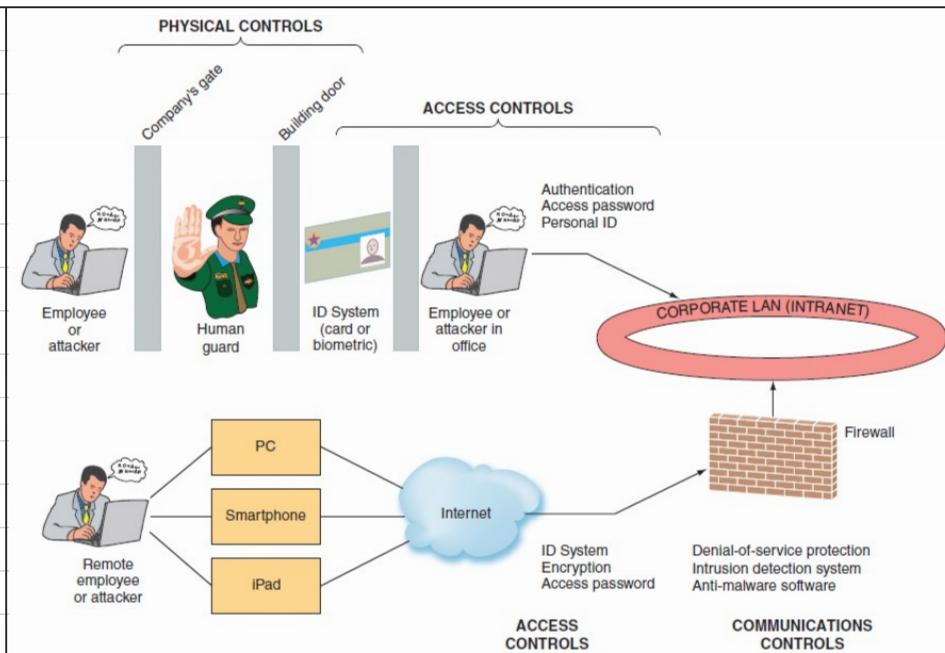
Concrete action against risks [prevent threat from occurring
develop recovery mean.

Strategies	Risk Acceptance	accept potential risk. Continue operating with no control.
	Risk Limitation	Limit risk by control, minimize impact of threat
	Risk Transference	Transfer risk by other means to compensate for the loss, insurance

3. control evaluation

Org examine cost of control measure & value of info
implement control cost > asset value => ineffective

17.5 Info Sys Control



Physical Controls

Access Controls

restrict unauthorized individual from info resource.

◦ Authentication

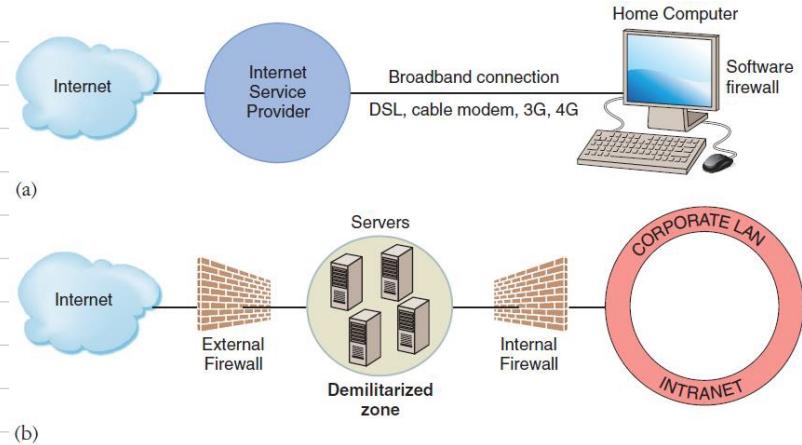
Is has does knows	biometrics
	ID card
	voice, signature
	pw

◦ Authorization - rights emitted by org's sys are established in a process

Communication Controls (Network controls -)

secure movement of data across network

firewall : prevent specific type of info from untrusted networks. home ~ orgs
DMZ → located between firewalls.



filter network traffic according to categories of activities.

anti-malware : SW package, identify & eliminate virus, worm, etc

filter network traffic according to DB of specific problems.

whitelisting : identify allowed SW. permit to run allowed SW.
prevent SW until validity check.
run only on quarantined environment

blacklisting : not allowed certain type of SW in company environment

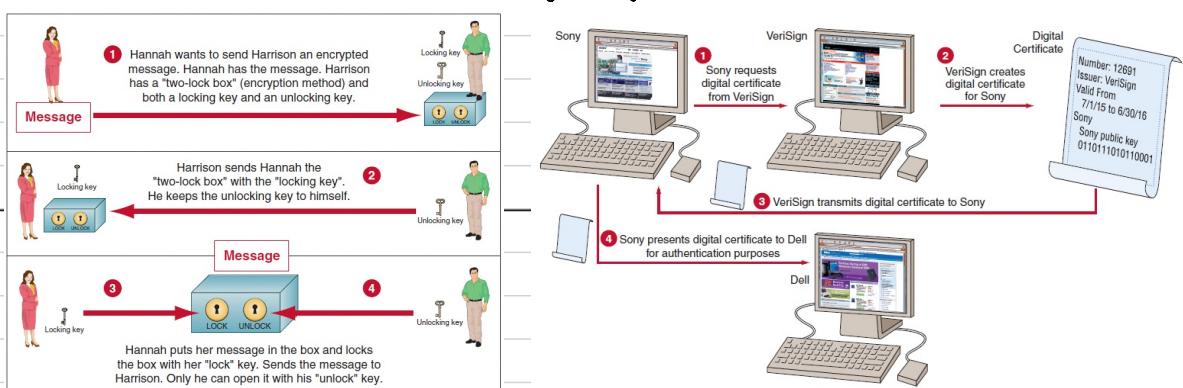
encryption : converting OG msg into a form that only can be read by intended reader
(objekt) use a key → code that scramble & decodes msg,
public-key encryption, asymmetric encryption → usually use, diff keys [public key
private key]

public key | all parties can access

private key | secret, no share

Certificate authority (3rd party) trusted intermediary.

→ Issue digital certificates, verify integrity,
certify origin and original.



virtual private network (VPN) : private network use public network to connect user. integrates global connectivity of the Internet with security of private network.
extend org network
no separate physical existence.

secure Socker layer (SSL) : Standard for secure txrn
Transport layer security . encrypt & decrypt data web server ↔ browser

employee mgmt sys : scrutinize employees' log.

Business Continuity

chain of events linking planning to protection and to recovery.
purpose → provide guidance to people who keep business operating after disaster

Business Continuity Planning

Information Auditing

audit → examination of Info Sys, input, output, processing
Internal / External audit
focusing on f operation, data integrity, SW App. security, privacy, budgets, expenditures
cost control, productivity)

Guideline → Isaca
Info Sys Audit & Control Association

Auditing around computer → verifying processing by checking for known output using specific inputs.

Auditing through computer → check In/put, processing
review logic, test data.

Auditing with the computer → comb of f client data, auditor SW
client & auditor HW
sim perform task with live data

Chapter 8

Social Computing



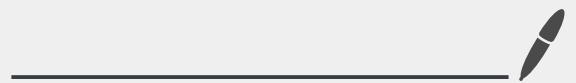
Chapter 9

E-Business & E-Commerce



Chapter 10

Wireless Mobile Computing
&
Mobile Commerce



Chapter 11

Information Systems
within the Organization



Chapter 12

Customer Relationship Management



