



FUNDAMENTALS OF BUSINESS INFORMATION SYSTEMS (INF1059) – new textbook (notes made of Summary notes in book)

CHAPTER 1

Components of computer-based information systems (CBIS) include hardware (h/ware), software (s/ware), databases (d/bases), telecommunications (telecoms) and Internet (Net), people and procedures

Types of CBISs that Organisations (Orgs) use:

1. E-commerce and M-commerce, TPS and ERP systems
2. MIS and DSS
3. Specialised business information (info) systems

E-commerce -

- a) business to business (B2B)
- b) business to consumer (B2C)
- c) business to public sector
- d) consumer to public sector
- e) consumer to consumer (C2C)

M-commerce -

- 'Anywhere, anytime', relies on wireless, ie PDAs, mobile phones and smart phones
- Can be improved by addressing ease of use, security and network speed

Transaction Processing System (TPS): large volumes of daily business (bus) transactions

Enterprise Resource Planning (ERP): manages vital bus operations

Management Information System (MIS): for management decision making

Decision Support System (DSS): make problem-specific decisions

Specialised bus info systems include:

- knowledge management – create, store, share and use Org's knowledge
- artificial intelligence – takes on human intelligence characteristics
- expert – acts as an expert consultant to a user
- virtual reality systems, eg 3D

Robotics, eg welding car frames

Neural networks – recognise and act on patterns/trends

**see Pg 21 for an overview of Systems Development*

Value chain of activities include:

1. Inbound logistics
2. Warehouse and storage
3. Production
4. Finished product storage
5. Outbound logistics
6. Marketing and sales
7. Customer service

Supply Chain Management (SCM)

Customer Relationship Management (CRM)

Technology diffusion – measure of how widely technology is in place throughout Org

Technology infusion – extent to which technology permeates area/department

Technology Acceptance Model (TAM) – predicts IS usage and performance



CH 1 CONT.

Five-forces model (factors that lead firms to seek competitive advantage):

- rivalry among existing competitors
- threat of new market entrants
- threat of substitute products and services
- bargaining power of buyers
- bargaining power of suppliers

Three strategies to address these factors (competitive advantage):

- alter the industry structure
- create new products and services
- improve existing product lines and services

Return on Investment (ROI) – measures value of IS project

Total Cost of Ownership (TCO)

* see Pg 31 *The IS Department*

Careers in Information Systems:

1. Operations
2. Systems Development
3. Support
4. Information Service Units

Typical IS Titles and Functions -

- a) Chief Information Officer
- b) LAN Administrator
- c) Internet Careers
- d) Systems Developers

Global challenges in IS -

- Cultural
- Language
- Time and Distance
- Infrastructure
- Currency
- Product and Services
- Technology transfer issues
- National laws
- Trade agreements



CHAPTER 2

Central Procession Unit (CPU)

Primary storage/memory provides working storage for program instructions and data to be processed, together with the CPU it processes data and execute instructions

Multiprocessing – several processing units

Multicore processing combines 2/more independent processors

Parallel processing involves linking several processors to solve problems

Grid computing uses a collection of computers

Random Access Memory (RAM) – secondary storage (permanent), less volatile and has greater capacity than memory

ROM

Secondary storage:

1. Sequential access – magnetic tape
2. Direct access – magnetic disks (hard disks and diskettes)
3. RAID (easier to recover data in event of hardware failure)
4. SAN (uses computer servers, networks, etc)
5. optical disks (ie CD-R; CD-RW)
6. DVD
7. Flash memory
8. PC memory cards

Input devices -

- Keyboard and mouse
- Speech recognition technology
- Digital cameras
- Terminals
- Touch-sensitive screens
- Bar-code scanners
- Magnetic Ink Character Recognition (MICR) devices
- Pen Input devices/Handwriting recognition software
- Radio Frequency Identification (RFID) – uses a microchip

Output devices -

- Display monitors (quality = size, number of colours and resolution)
- Liquid Crystal Displays (LCDs)
- Organic Light-Emitting Diodes (OLED)
- Printers and plotters
- Digital audio player, eg iPod

Types of Computer Systems -

- Handheld
- Portable, ie laptops, etc
- Thin client
- Desktop
- Workstations
- Servers
- Mainframe
- Super computers

Computer system platform > combination of h/ware configuration and systems s/ware

Software:

1. **Systems** – collection of programs that interact between h/ware and application (app) s/ware
2. **Applications** – can be proprietary or off the shelf



CH 2 CONT.

Systems include operating systems, utility programs and middleware (software that allows different systems to communicate and transfer data)

Operating System (OS) – set of computer programs that controls computer h/ware to support users' needs

- converts instruction from application into set of instructions needed by h/ware
- manages memory and places data in best storage space
- manages tasks to allocate computer resources through multitasking (runs more than 1 app @ time) and time-sharing (allows more than 1 person to use system @ a time)

Scalability: ability of computer to handle increasing number of concurrent users

GUI: ie Windows (icons & menus)

Application Program Interface (API) – software apps use OS by required services through defined API

Examples of OS' – MS-DOS, MS Vista/XP, UNIX

Workgroup application software – enables groups to work together, ie email

* see Table 2.3 Pg 84 Comparison of Proprietary and Off-the-Shelf software



CHAPTER 3

Relational database – made up of tables, which are made up of records, which are made up of fields. Tables store info about entity. Fields are the characteristics/attributes about the entity. Entity is something a firm wants to store info about.

Primary key uniquely identifies each record.

Designing a d/base involves identifying entities and relationships between them, as well as the attributes of each entity.

Follow rules to convert related entities into datamodel (d/model), list of all tables to be implemented into d/base, with primary and foreign key identified.

Basic **data manipulations** > selectin, projecting and joining

Database Management System (DBMS) – group of programs used as interface between d/base, users and other application programs (IBM/Oracle/Microsoft)

Logical record – what it contains

Physical record – where record is stored

Schemas used to describe entire d/base, it's record types and their relationships to the DBMS. Entered into computer via a **Data Definition Language (DDL)** (describes data and relationships in specific d/base)

Data dictionary – contains detailed descriptions of all data in d/base

After DBMS has been installed, d/base can be accessed, modified and queried via a **Data Manipulation Language (DML)**, eg SQL (structured query language)

Important characteristics of d/bases:

- size
- number of concurrent users
- performance
- ability of DBMS to be integrated with other systems
- features of DBMS
- vendor considerations
- cost of DBMS

Data mining – automated discovery of patters and relationships in data warehouse (w/house) (used to predict future behaviour), eg predictive analysis

Business Intelligence, eg competitive (not espionage) – business strategy, tactics and operations

Counterintelligence – steps taken to protect info sought by 'hostile' intelligence gatherers

Distributed d/bases allow multiple users and different sites access to data stored in different physical locations

Replicated d/bases built to reduce telecom costs (duplicate set of frequently used data)

Online Analytical Processing (OLAP) programs used to store data and allow users to explore data from a number of different perspectives.

Object-oriented d/base / programming ...refer to Chapter 4

Object-Relational D/base Management System (ORDBMS) – complete set of relational d/base capabilities and ability for third parties to add new data types and operations to d/base.



CHAPTER 4

Telecommunications removes barriers of time and distance.

Types of Telecoms:

1. **Guided transmission media** (guided along solid medium) ie twisted-pair wire cable, coaxial cable, fibre-optic cable and broadband (powerlines)
2. **Wireless media** (sent over airwaves) ie microwave, cellular and infrared

Modem – hardware device that converts comm signals

Multiplexer – device that encodes data from 2/more data sources onto single comm channel

Front-end processor – special purpose computer that manages comms

Networks allow users to share h/ware, programs and d/bases:

- **Personal Area Network (PAN):** Approximately 10m
- **Local Area Network (LAN):** network interface card, file server, bridge/gateway
- **Metropolitan Area Network (MAN):** geographical area > LAN < WAN
- **Wide Area Network (WAN):** links systems around the world

Transborder data flow – electronic data flow across international and global boundaries

Mesh network – way to route comms between network nodes

Client/server system – network that connects user's computer to 1/more host computers; more complex than centralised mainframe computer, but more popular

Comm protocol – set of rules, including international, national and industry standards

Switch – determines which output port to use

Bridge – connects one LAN to another

Router – forwards data packets across 2/more networks

Gateway – network device, serves as entrance to another network

Data-processing strategies:

1. **Centralised** – all processing occurs in single location/facility, highest degree of control
2. **Decentralised** – processing devices placed @ various remote locations
3. **Distributed** – same as Decentralised, but they are connected via telecom devices (disaster recovery)

Internet started with **ARPANET**

Internet Protocol (IP) – set of conventions used to pass packets from 1 host to another

Transmission Control Protocol (TCP) ie TCP/IP

Uniform Resource Location (URL) – computer 'address'

Internet Service Providers (ISP) value-added services:

- electronic commerce
- intranets and extranets
- web hosting
- web transaction processing
- network security and admin
- integration services

* *steps to creating a web page – Pg 161*



<http://wikistudent.ws/Unisa>

Extranet – 'clients can see parts of the Org's Intranet'



CHAPTER 5

Transaction Processing Systems (TPS) perform following activities:

- data collection – capturing of source data to complete set of transactions
- data editing – checks for data validity and completeness
- data correction – providing feedback of potential problem and enables users to change (exception report)
- data manipulation – calculations, sorting, categorising, summarising and storing
- data storage – placing transaction data into d/base
- documentation production – outputting records and reports

Methods -

1. **Batch:** collection of transactions entered into system @ regular intervals
2. **Online/online transaction processing (OLTP):** entered as they occur

TRS objectives -

- process data generated by and about transactions
- maintain high level of accuracy and info integrity
- compile accurate and timely reports and documents
- increase labour efficiency
- help provide increased and enhanced service
- build and maintain customer loyalty
- and even gain competitive advantage

Order processing business function TPS include -

- order entry
- sales config
- shipment planning
- shipment execution
- inventory control
- accounts receivable

Purchasing function TPS include -

- inventory control
- purchase order processing
- accounts payable
- receiving

Accounting business function TPS include -

- budget
- accounts receivable
- payroll
- asset management
- general ledger

Enterprise Resource Planning (ERP) supports efficient operation of business processes by integrating activities throughout business, including sales, marketing, manufacturing, logistics, accounting and staffing. They support production and supply change management, CRM, sales ordering, financial and managerial accounting.

Advantages of implementing an ERP:

- provides access to data for operational decision making
- eliminates costly, inflexible legacy systems
- provides improved work processes
- creates opportunity to upgrade technology infrastructure

Disadvantages of ERP:

- time consuming
- difficult
- expensive to implement

CH 5 CONT.

Sales Forecasting

Sales and Operations Plan

Production Plan

Demand Management

Detailed Scheduling

Detailed Production Schedule

Materials Requirement Planning

TPS 'Challenges':

- different languages and cultures
- disparities in IS infrastructure
- varying laws
- multiple currencies



CHAPTER 6

Decision making divided into intelligence, design and choice

Problem solving, includes implementation and monitoring

Decisions:

1. **Programmed** – made using a rule, procedure/quantitative method
2. **Non-programmed decisions** – deals with unusual/exceptional situations

Optimization – best solution

Satisficing – good, but not necessarily best decision

Heuristic – 'rule of thumb' or commonly used guideline

Management Information Systems (MIS) reports support managerial decision making at higher levels of management.

Input to MIS:

1. **External:** extranets, customers, suppliers, competitors and stockholders
2. **Internal:** TPS, ERP, Data w/houses and marts

Output to MIS – collection of reports, distributed to Managers

MIS characteristics:

- scheduled, demand, exception and drill-down reports
- reports with fixed and standard formats
- hard and soft-copy reports
- uses internal data stored in organizational computerised d/bases
- reports developed and implemented by IS personnel/end users

Decision Support Systems (DSS) used when faced with unstructured/semi-structured business problems.

DSS characteristics:

- handles large amounts of data
- obtain and process data from different sources
- report and presentation flexibility
- support drill-down analysis
- perform complex statistical analysis
- offer textual and graphical orientations
- support all 3 'approaches'
- perform what-if, simulation and goal-seeking analysis

Adhoc/institutional DSS

Components of DSS:

- d/base
- model base
- user interface/dialogue manager
- link to external d/bases, Net, intranet, extranet and other systems

Group Support Systems (GSS)/Groupware

Executive Support Systems (ESS) for Senior Management

- indicate issues of importance to Org
- indicate new directions company might take
- help Execs monitor progress
- provide an overall vision
- strategic planning and organizing
- strategic control
- crisis management

CHAPTER 7

Knowledge Management System (KMS) used to create, store, share and use Org's knowledge and experience.

1. **Explicit knowledge** – objective, can be measured and documented in reports, papers and rules
2. **Tacit knowledge** – hard to measure and document, not formalized

Knowledge workers create, use and disseminate knowledge

Chief Knowledge Office (CKO) – top Exec who helps Org use KMS

Artificial Intelligence: can replicate human (intelligence) decision making

- ability to learn from experience and apply knowledge to new experiences
- handle complex situations and solve problems where info might be missing
- determine relevant info
- think in logic/relevant manner; give quick and correct response
- understand visual images and process symbols

Computers are good at transferring info, making calculations rapidly and accurately, and making complex calculations.

AI includes:

- **expert systems:** expert in specialised area
- **robotics:** perform precision/hazardous tasks
- **vision systems:** eg face recognition
- **natural language processing:** understand and react to commands in 'English'
- **learning systems:** change how react based on feedback, eg Chess game
- **neural networks:** simulate functioning of human brain

Generic algorithm – approach to solve large, complex problems in which a number of related operations/models change til the best one emerges.

Expert system consists of a knowledge base (extension of d/base & DSS), inference engine, explanation facility, knowledge acquisition facility and user interface.

Rules composed of **IF-THEN** statements.

Fuzzy logic – incorporates facts and relationships that might be imprecise/unknown

Inference engine processes rules, data, etc to provide answers, predictions, etc

Backward (starts with conclusion) and **forward** (starts with fact to find conclusion) **chain processing**

Explanation facility – explains what rules were used in arriving at decision

Knowledge acquisition facility helps user add/update knowledge

Development of expert system – domain expert (has knowledge/expertise), knowledge engineer (developer who extracts expertise from expert) and knowledge users (person who benefits from use of system)

1. Determine requirements
2. Identify experts
3. Construct system components
4. Implement results
5. Maintain and review system

Virtual reality – enables users to move in computer-simulated environment (3D)



CHAPTER 8

Systems Development team – Stakeholders, users, managers, systems development specialists, various support personnel. Determines objectives of info system.

Analyst: analyses and designs business system

Programmer: modifies/develops programs

Technical specialists

IS Manager

Benefits of IS planning:

- long- range view of info technology use
- better use of resources

Planning requires:

- developing overall IS objectives
- identifying IS projects
- setting priorities and selecting projects
- analyzing resource requirements
- setting schedules, milestones and deadlines
- developing IS planning document

SDLC (Systems Development Lifecycle):

- **Investigation** – identifies potential problems
- **Analysis** – seeks general understanding of solution
- **Design** – creates new/modifies existing system requirements
- **Implementation** – includes programming, testing, training, conversion and operation
- **Maintenance and Review** – monitoring system and performing enhancements

Prototyping – iterative approach (Proof of Concept?)

Rapid Application Development (RAD):

- uses tools and techniques to speed application development
- reduces paper-based documentation
- source code generation
- facilitates user participation in development activities, ie by using JAD sessions

CASE tools automate many of the systems development tasks

Object-oriented system development (OOSD) – project can be broken down into group of objects that interact.



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WERKOPDRAGSKRYFBLOK - ASSIGNMENT WRITING PAD
Skryf - Write

Dosent se Kommentaar
Tutorial Comments

- CASE tools automate many of the systems dev. tasks
Object-oriented sys dev (OOSD) - proj can be broken down into grp of objects that interact
- Inv. Systems Request form initiates investigation process
Net present value analysis often used to determine proj's economic feasibility
Feasibility analysis
Data collection methods incl. observation, interviews, questionnaires + ^{sampling} statistical.
Purpose of requirements analysis is to determine user + org. needs
- Des. Purpose is to prepare detailed design needs + new system/modifications to ^{existing}
logical design - way various components of IS work together
Physical " - specification of actual physical components
Financial options: purchase, lease/rent
Request for Proposal (RFP) req. for purchasing h/ware or s/ware from vendor.
Final evaluation can use group consensus, cost-benefit analysis, point evaluation + benchmark tests
Final design report developed
- Imp. Right info > right person > right format > right time
Make-or-buy decision: s/ware purchased / developed inhouse
Testing incl. program (unit), systems, volume, integration + acceptance testing
Start-up begins with final tested info sys.
start-up approaches:
- g bang? * direct conversion Reviews:
* phase-in / piecemeal > Event-driven - triggered by ^{opportunity} problem/
* pilot > Time-driven - started after specific ^{amt of time}
* parallel
- lan./Rev. Major causes -
• new requests from s/holders + managers • chgs in org. structure
• enhancement requests from users • government regulations
• bugs/errors
• technical/h/ware problems → Reviews ↑
• newly added equipment



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Chapter 9:

Computer waste: inappropriate use of computer technology + resources in public
Components
→ poor integration of IS [] + private sectors
+ spam
Computer mistakes: errors, failures + other output problems (ie. incomplete/no value
↳ inappropriate processing instructions, inaccurate data entry, mishandling
of IS output + poor systems design

To prevent this, need to establish, implement, monitor + review effective policies +
procedures.

Also careful programming practices, thorough testing, flexible network intercon-
nections, rigorous backup procedures, develop manuals + training programs,
specify criteria for new resource purchases + user-developed processing tools

Computer crime, eg. identity theft, cyberterrorist, criminal hackers, script kiddies,
insiders, software + Internet piracy

Virus - program that attaches itself to other programs

Worm - independent program + replicates its own program files

Malware - harmful s/ware

Trojan horse - malicious program disguises itself as useful app.

Logic bomb - executes @ specific time + date

Antivirus

Intrusion Detection System (IDS)

Managed security service providers (MSSPs) - outsourced

Passwords

Data encryption

Public-key infrastructure (PKI): cryptographic key pair

Melitz
Biometrics: iris, retina, voice pattern

Platform for Privacy Preferences (P3P) - shields users from websites that don't
provide ^{certain} level of privacy protection.

Ergonomics - study of designing + positioning computer equip.