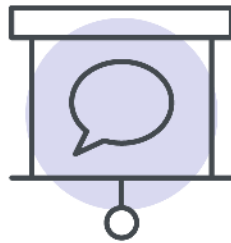

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ITM 102
Final EXAM
STUDY GUIDE



Lecture Notes

Introduction to Information Systems

What is IT?

- Computer system that performs business tasks
- Usually repetitive tasks (ie bank machine)

How is IT transforming businesses?

- Global market
- Increases efficiency of businesses
- Safe and secure
- Can perform complex calculations and algorithms
- Competitive advantage
- Mobile digital platform
- Expanding ecommerce and internet advertising

Business Process

- Input → Output
 - ie ATM machine
- Set of activities/steps
- Manufacturing and production
 - Assembling product
- Sales and marketing
 - Identifying customers
- Finance and accounting
 - Creating financial statements
- Human resources
 - Hiring employees

Digital Firm: Organizations that have enabled core business relationships with employees, customers, suppliers, and other external partners through digital networks

Competitive Advantage: Gives one business advantage over another (price, quality, location, accessibility, etc.)

Different Types of Systems: TPS, MIS, DSS, ESS

Enterprise Application: Complex, scalable, distributed, component-based, and mission-critical application

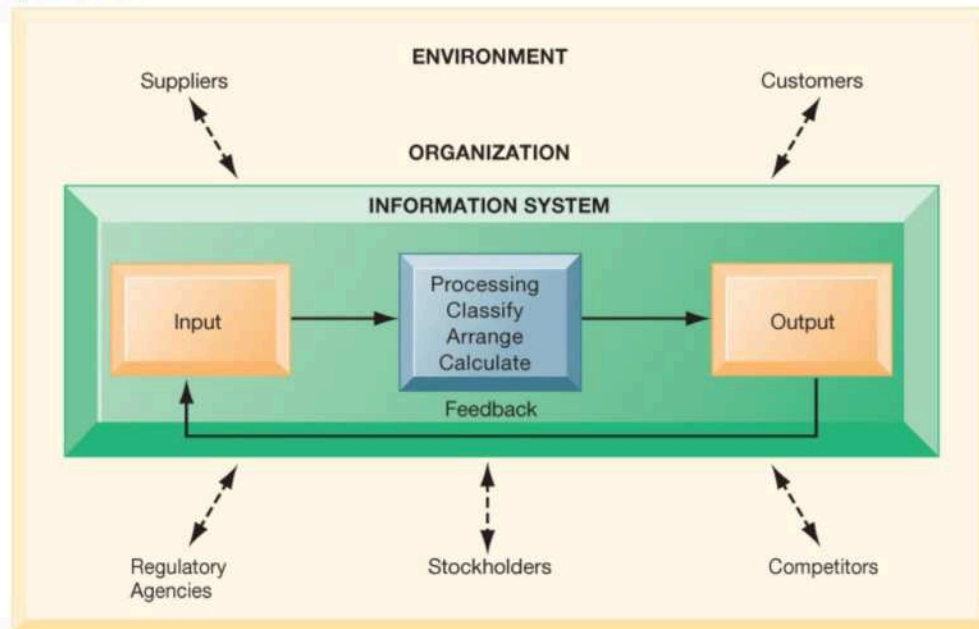
Globalization Challenges and Opportunities

- Internet has drastically reduced costs of operating globally
- Increases in foreign trade and outsourcing
- Presents both challenges and opportunities

Emerging Digital Firm

- Significant business relationships are digitally enabled and mediated
- Core business processes are accomplished through digital network

Figure 1.4: Functions of an Information System



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Order Fulfillment Process

- Sales
 - Generates order →
 - Submit order →
- Accounting
 - Check credit →
 - Approve credit →
- Manufacturing and Production
 - Assemble product →
 - Ship product

Improving Business Processes with Technology

- Increasing efficiency of existing processes
 - Automating steps that were manual → faster, cheaper, 24/7
- Enabling new processes
 - Changing flow of information
 - Replacing sequential steps with parallel stapes
 - Eliminating delays in decision making

Transaction Processing Systems (TPS)

- Serve operational managers and staff
- Perform and record daily routine transactions necessary to conduct business
 - Shipping, payroll, etc
- Systems for business intelligence
 - Software for organizing and analyzing data
 - Help make improved decisions, maximize profit margins

Management Information Systems (MIS)

- Serve middle management
- Provide reports on current performance based on tps data
- Gives answers to routine questions
 - Ie green: go, red: stop
- Little analytical capability

Decision Support Systems (DSS)

- Supports non-routine decision making
 - Ie green: go, red: go
 - Cannot be easily predicted
- Model driven and data driven DSS
 - Model driven: what if?
 - Data driven: accurate projections
- May use external information in addition to TPS/MIS data

Executive Support Systems (ESS)

- Support senior management
- Addresses nonroutine decisions
 - Requires judgement, evaluation, and insight
- Incorporate data about external events as well as summarized info from MIS and DSS
- ie Digital dashboard with real time view of a firm's financial performance

Enterprise Applications

- Systems for linking enterprise
- Execute business processes across the firm

Supply Chain Management (SCM) Systems

- Manage firm's relationship with suppliers
- Communicating with suppliers
 - Right amount of inventory
 - Supplier sees that a company is out of light bulbs → supplier sends light bulbs
- Shares info about orders, production, inventory, etc

Customer Relationship management (CRM)

- Provide info to coordinate all the business processes dealing with customers
 - Sales, marketing, customer service

Intranets and Extranets

- Used to increase integration and expedite flow of information
- Intranet – internal network accessible by employees only
- Extranet – company websites accessible by vendors and suppliers

Collaboration

- Synergy
- In person or virtually
- Growing importance of collaboration
 - Changing nature of work
 - Growth of “interaction jobs”
 - Changing organization of the firm
 - Changing scope of the firm
 - Emphasis on innovation
 - Changing culture of work
- Collaboration quality → firm performance
- Tools for collaboration
 - Email and instant messaging, virtual worlds, cloud collaboration

Information Systems Department

- Headed by Chief Information Officer (CIO)
- Programmers
- System analysts
- Information systems managers
- End users

Ethical and Social Issues in Information Systems

The Dark Side of Big Data

- Problem
 - Opportunities from new technology
- Solutions
 - Develop big data strategy
 - Develop privacy policies
 - Develop big data predictive models
 - Develop big data mining technology
 - Develop big data analytics tools and predictive modeling systems
- Predictive modeling identifies individuals that fit risk or vulnerability profiles
- Technological innovation is a double edged sword

Ethics: Principles of right and wrong that individuals, acting as free, moral agents, use to make choices to guide their behaviour

- Information systems raise new ethical questions because they create opportunities for:
 - Intense social change, threatening existing distributions of power, money, rights, and obligations

Key Trends That Raise Ethical Issues

- Computing power doubles every 18 months
- Data storage costs rapidly decline
- Data analysis advances
- Networking advances
- Mobile device growth impact

Five Moral Dimensions of the Information Age

- Information rights and obligations
- Property rights and obligations
- Accountability and control
- System quality
- Quality of life

NORA: Nonobvious Relationship Awareness

- Combining data from multiple sources to find obscure hidden connections that might help identify criminals or terrorists
 - Watch lists, incident and arrest systems, customer transaction systems, telephone record, human resources systems

Basic Concepts

- Responsibility
 - Accepting the potential costs, duties, and obligations for decisions

- Accountability
 - Mechanisms for identifying responsible parties
- Liability
 - Permits individuals (and firms) to recover damages done to them
- Due Process
 - Laws are well known and understood, with an ability to appeal to higher authorities

Ethical Analysis

- Identify and clearly describe the facts
- Define the conflict or dilemma and identify the higher order values involved
- Identify the stakeholders
- Identify the options that you can reasonably take
- Identify the potential consequences of your options

Conflicting Interests

- Monitoring employees
 - Right of company to maximize productivity of workers versus workers right to use internet for short personal tasks
 - Facebook monitors users and sells information to advertisers and app developers

Privacy

- Claim of individuals to be left alone, free from surveillance or interference from other individuals, organizations, or state; claim to be able to control information about yourself
 - Used to drive changes in privacy legislation (FIPPA)
- Internet challenges to privacy
 - Cookies
 - Identify browser and track visits to sites
 - Web Beacons
 - Tiny graphics embedded in emails and web pages
 - Monitor who is reading emails or visiting site
 - Spyware
 - Secretly installed on users computer
 - May transmit users keystrokes

Technical Solutions

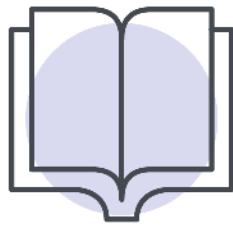
- Email encryption
 - Makes file unreadable to others
- Anonymity tools
- Anti Spyware tools

Property Rights

- Intellectual Property
 - Intangible property of any kind created by individuals or corporations
- Three main ways intellectual property is protected
 - Trade Secret: Public domain does not have access to the work/product
 - Copyright: Protects from being copied for the life of the author plus 70 years
 - Patent: Grants creator an exclusive monopoly on ideas for 20 years
- Challenges to intellectual property rights
 - Digital media is different from physical media
 - Ease of replication
 - Ease of transmission
 - Ease of alteration
 - Compactness
 - Difficulties in establishing uniqueness

Quality of Life: Equity, Access, and Boundaries

- Balancing power
- Maintaining boundaries
- Computer crime and abuse



Textbook Notes

ITM CHAPTER 1-4

Chapter One

What is IT?

- Computer system that performs business tasks
- Usually repetitive tasks (ie bank machine)
- **Information Technology:** Hardware and software that a firm needs in order to achieve its business objectives
- **Information System:** A set of interrelated components that collect, process, store, and distribute information in an organization
 - Input (raw data) → processing → output

How is IT transforming businesses?

- Global market
- Increases efficiency of businesses
- Safe and secure
- Can perform complex calculations and algorithms
- Competitive advantage
- Mobile digital platform
- Expanding ecommerce and internet advertising

Business Process

- Input → Output
- Logically related tasks and behaviours that organizations develop

Dimensions of information systems

- Organization
 - Manufacturing and production
 - Assembling product
 - Sales and marketing
 - Identifying customers
 - Finance and accounting
 - Creating financial statements
 - Human resources
 - Hiring employees
 - Unique business processes and culture
- Management
- Technology
 - Hardware and software
 - IT infrastructure
 - Data management, networking, telecommunication technology
- Business Information Value Chain
 - Raw data is transformed to add value to the information

- Value is determined by extent it leads to better decisions, greater profits, etc
- No guarantee that investing in IT will benefit a business
- Factors:
 - Adopting the right business model
 - Investing in complimentary assets
 - Assets required to derive value from an investment
 - Invest in technology and people to make it work properly
- Organizational assets
 - Appropriate business model
 - Efficient business processes
- Managerial assets
 - Incentive for innovation, increased collaboration
- Social assets
 - Internet and telecommunication infrastructure

Technical Approach

- Mathematical based models
- Computer science, management science, operation research

Behavioural Approach

- Psychology, economics, sociology

Sociotechnical Approach

- Optimizing both social and technical systems used in production

Operational Intelligence

- Improvement of efficiency → higher profitability
- Technology is important in achieving greater efficiency
-

Time Shifting: Business being conducted 24/7

Space Shifting: Business taking place on a global scale

Key Corporate Assets: intellectual property, core competencies, and financial and human assets

Strategic Business Objectives

- Operational Excellence
- New products, services, and business models
- Customer and supplier intimacy
- Improved decision making
 - Without accurate information, managers must use forecasts/predictions
- Competitive advantage
- Survival
 - IT as a necessity of businesses, ie govt regulations

Chapter Two

Business Processes Cont

- Flows of materials, information, knowledge
- May be assets or liabilities
- Businesses are a collection of business processes
- Functional Business Processes
 - Manufacturing and production
 - Assembling product
 - Sales and marketing
 - Identifying customers
 - Finance and accounting
 - Creating financial statements
 - Human resources
 - Hiring employees

How IT improves Business Processes

- Increasing efficiency
 - Automating steps that were manual
- Enabling new processes
 - Parallel steps, no delay

Digital Firm: Organizations that have enabled core business relationships with employees, customers, suppliers, and other external partners through digital networks

- Growing interdependence between firms ability to use it and its ability to implement corporate strategies and achieve corporate goals

Competitive Advantage: Gives one business advantage over another (price, quality, location, accessibility, etc.)

Enterprise Application: Complex, scalable, distributed, component-based, and mission-critical application

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- Serve operational managers and staff
- Perform and record daily routine transactions necessary to conduct business
 - Shipping, payroll, etc
- Systems for business intelligence
 - Software for organizing and analyzing data
 - Help make improved decisions, maximize profit margins

Management Information Systems (MIS)

- Serve middle management
- Combines comp sci, management sci, operations research, practical orientation, behavioural issues
- Provide reports on current performance based on tps data
- Gives answers to routine questions
 - Ie green: go, red: stop
- Little analytical capability

Changes in MIS

- IT innovations
 - Cloud
- New business models
- Ecommerce expanding

- Management changes
- Changes in firms and organizations
 - Telework

Decision Support Systems (**DSS**)

- Supports non-routine decision making
 - ie green: go, red: go
 - Cannot be easily predicted
- Model driven and data driven DSS
 - Model driven: what if?
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- Support senior management
- Addresses nonroutine decisions
 - Requires judgement, evaluation, and insight
- Incorporate data about external events as well as summarized info from MIS and DSS
- ie Digital dashboard with real time view of a firm's financial performance

Enterprise Applications

- Systems for linking enterprise
- Execute business processes across the firm
- Four major applications:
 - Enterprise systems
 - Supply chain management (SCM) systems
 - Customer relationship management (CRM) systems
 - Knowledge management systems

Enterprise Systems

- Collect data from different firm functions and store in a single place
- Resolve problems of fragmented data
- Enables:
 - Coordination of daily activities
 - Efficient response to customers
 - Decision making by managers

Supply Chain Management (SCM) Systems

- Manage firm's relationship with suppliers
- Communicating with suppliers
 - Right amount of inventory
 - Supplier sees that a company is out of light bulbs → supplier sends light bulbs
- Shares info about orders, production, inventory, etc

Customer Relationship Management (CRM)

- Provide info to coordinate all the business processes dealing with customers
 - Sales, marketing, customer service
- Helps firms attract and retain most profitable customers

Knowledge Management Systems (KMS)

- Support processes for applying knowledge and expertise
 - How to create, produce, and deliver goods/services
- Collects internal knowledge and links to external knowledge

Intranets and Extranets

- Used to increase integration and expedite flow of information
- Intranet – internal network accessible by employees only
- Extranet – company websites accessible by vendors and suppliers

E-Business: Use of digital technology and Internet to drive business processes

E-Commerce: Buying and selling goods and services through the internet

E-Government: Using internet technology to deliver information and services

Collaboration

- Synergy
- In person or virtually
- Growing importance of collaboration
 - Changing nature of work
 - Growth of “interaction jobs”
 - Changing organization of the firm
 - Changing scope of the firm
 - Emphasis on innovation
 - Changing culture of work
- Collaboration quality → firm performance
- Tools for collaboration
 - Email and instant messaging, virtual worlds, cloud collaboration
- Benefits of collaboration
 - Productivity
 - Quality
 - Innovation
 - Customer Service
 - Financial Performance

Social Business

- Use of social networking to engage employees, customers, and suppliers
- Deepens interactions and accelerate information sharing
- Requires information transparency

Collaborative Culture

- “Command and Control” organizations
 - No value placed on teamwork or lower level participation
- Collaborative organizations
 - Relies on teams of employees
 - Manager’s purpose is to build teams

Tools for Collaboration

- Email and instant messaging
- Wikis
- Virtual worlds
- Social business platforms
 - Telepresence, cloud, etc

Information Systems Department

- Headed by Chief Information Officer (CIO)
- Programmers
- System analysts
- Information systems managers
- End users

IT Governance

- Strategies and policies for using IT
- Decision rights
- Accountability
- Organization of information systems function (centralized, decentralized, etc)

Evaluating Software Tools

- Identify collaboration challenges
- Identify available solutions
- Analyze costs and benefits
- Evaluate security risks
- Consult users for implementation issues
- Evaluate product vendors

Time/Space Matrix

	Same Time	Different Time
Same Place	Face to Face Interactions	Continuous Task
Different Place	Remote Interactions	Communication and Coordination

Chapter Four

The Dark Side of Big Data

- Problem
 - Opportunities from new technology
 - Undeveloped legal environment
- Solutions
 - Develop big data strategy
 - Develop privacy policies
 - Develop big data predictive models
 - Develop big data mining technology
 - Develop big data analytics tools and predictive modeling systems
- Predictive modeling identifies individuals that fit risk or vulnerability profiles
- Technological innovation is a double edged sword

Ethics: Principles of right and wrong that individuals, acting as free, moral agents, use to make choices to guide their behaviour

- Information systems raise new ethical questions because they create opportunities for:
 - Intense social change, threatening existing distributions of power, money, rights, and obligations

Pond Analogy

- Society = Calm pond
- IT is dropped in pond, creating ripples
- May take years for social and political institutions to develop expectations and laws
 - Legally grey areas

Key Trends That Raise Ethical Issues

- Computing power doubles every 18 months
- Data storage costs rapidly decline
- Data analysis advances
- Networking advances
- Mobile device growth impact

Five Moral Dimensions of the Information Age

- Information rights and obligations
- Property rights and obligations
- Accountability and control
- System quality
- Quality of life

NORA: Nonobvious Relationship Awareness

- Combining data from multiple sources to find obscure hidden connections that might help identify criminals or terrorists
 - Watch lists, incident and arrest systems, customer transaction systems, telephone record, human resources systems

Profiling

- Combining data from multiple sources to create records of information on an individual

Basic Concepts

- Responsibility
 - Accepting the potential costs, duties, and obligations for decisions
- Accountability
 - Mechanisms for identifying responsible parties
- Liability
 - Permits individuals (and firms) to recover damages done to them
- Due Process
 - Laws are well known and understood, with an ability to appeal to higher authorities

Ethical Analysis

- Identify and clearly describe the facts
- Define the conflict or dilemma and identify the higher order values involved
- Identify the stakeholders
- Identify the options that you can reasonably take
- Identify the potential consequences of your options

Candidate Ethical Principles

- Golden rule: do unto others as you would have them do unto you
- **Kant's Categorical Imperative:** If an action is not right for everyone, it is not right for anyone
- **Descartes Rule of Change:** If an action cannot be taken repeatedly, it is not right to take
- **Utilitarian Principle:** Take the action that achieves the greatest value
- **Risk Aversion Principle:** Take the action that produces the least harm
- **Ethical "no free lunch" Rule:** Virtually all objects are owned by someone

Professional Codes of Conduct

- Broadcasted by associations of professionals
 - American Medical Association
 - American Bar Association
- Promises by professions to regulate themselves in the interest of society

Conflicting Interests

- Monitoring employees
 - Right of company to maximize productivity of workers versus workers right to use internet for short personal tasks
 - Facebook monitors users and sells information to advertisers

Privacy

- Claim of individuals to be left alone, free from surveillance or interference from other individuals, organizations, or state; claim to be able to control information about yourself
 - Used to drive changes in privacy legislation (FIPPA)
 - Protected by (in USA):
 - First Amendment (freedom of speech)
 - Fourth Amendment (unreasonable search and seizure)
 - Additional federal statutes (privacy act of 1974)
- Fair information practices
 - Principles governing the use and collection of information
 - Used to drive changes in privacy laws
 - COPPA, HIPAA, Do Not Track Online act of 2011
- FTC FIP Principles
 - Notice/awareness
 - Choice/consent
 - Access/participation
 - Security
 - Enforcement

Internet challenges to privacy

- Cookies
 - Identify browser and track visits to sites
- Web Beacons
 - Tiny graphics embedded in emails and web pages
 - Monitor who is reading emails or visiting site
- Spyware
 - Secretly installed on users computer
 - May transmit users keystrokes
- USA allows businesses to gather transaction information and use it for marketing purposes
 - Opt in/opt out → promotes self regulation over privacy legislation

Technical Solutions

- Email encryption
 - Makes file unreadable to others
- Anonymity tools
- Anti Spyware tools

Property Rights

- Intellectual Property
 - Intangible property of any kind created by individuals or corporations
- Three main ways intellectual property is protected
 - Trade Secret: Public domain does not have access to the work/product
 - Copyright: Protects from being copied for the life of the author plus 70 years
 - Patent: Grants creator an exclusive monopoly on ideas for 20 years
- Challenges to intellectual property rights
 - Digital media is different from physical media
 - Ease of replication
 - Ease of transmission
 - Ease of alteration
 - Compactness
 - Difficulties in establishing uniqueness
 - Digital Millennium Copyright Act
 - Illegal to bypass technology based security of copyrighted material

Computer Related Liability Problems

- Who is Responsible if Software Fails?
 - If a machine injures/harms, software producer and operator are liable
 - If similar to book, author/publisher is responsible

System Quality

- Flawless software is economically impossible
- Three sources of poor system performance
 - Software bugs
 - Hardware failures
 - Poor input data quality

European Directive on Data Protection

- Use of data requires informed consent of customer
- Nations cannot transfer data to countries without similar laws
- Stricter enforcement under consideration
 - Right of access, right to be forgotten
- Safe harbour framework
- Edward Snowden
 - Known for revealing details of classified United States government surveillance programs

Quality of Life: Equity, Access, and Boundaries

- Balancing power
 - Center vs periphery

- Rapidity of change
 - Reduced response time
- Negative social consequences of systems
- Maintaining boundaries
 - Family, work, leisure
- Computer crime and abuse
 - CAN-SPAM act of 2003
- Employment
 - Reengineering job loss
- Equity and Access
 - The digital divide
- Health Risks
 - Repetitive stress injury (RSI), Carpal Tunnel syndrome, Computer vision syndrome (CVS), Technostress

ITM - Chapter 5

IT Infrastructure: “Highway that connects computers together”

- Set of physical devices and software required to operate an enterprise
- Set of firm wide services
- Mainframe/minicomputer → Personal computer → client/server

Moore’s law and micro processing power → computer power doubles every 2 years

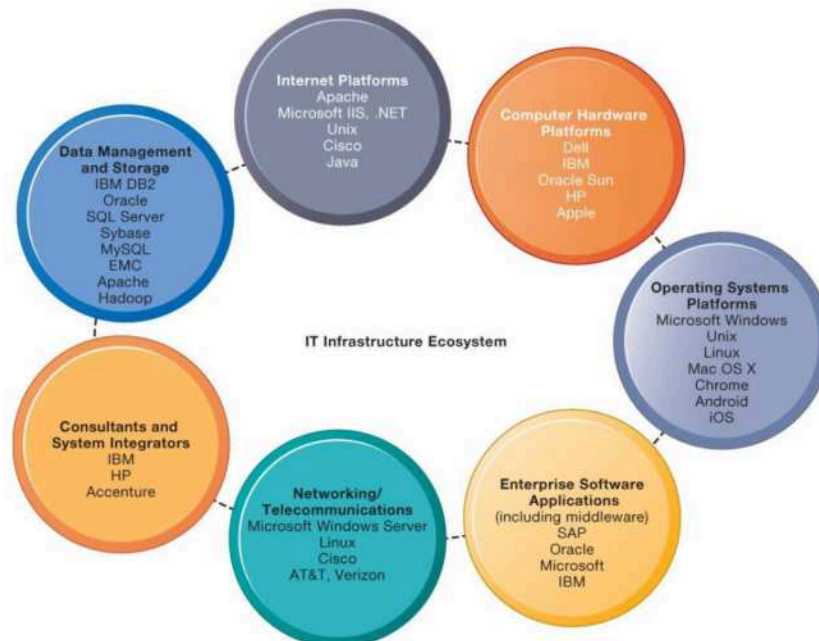
Law of mass digital storage → amount of data being stored each year doubles

Metcalf’s Law and network economics → value or power of a network grows exponentially

Components

- Computer hardware platforms
- Operating system platforms
- Enterprise software application
- Data management and storage
- Networking/telecommunications
- Internet platforms
- Consulting system integration services

Scalability – Ability to expand to serve larger numbers of users

Figure 5.8: The IT Infrastructure Ecosystem

ITM CHAPTER 5-12

Chapter Five

Defining IT Infrastructure

- Set of physical devices and software required to operate an enterprise
- Set of firm-wide services including:
 - Computing platforms providing computing services
 - Physical facilities management services
 - IT management, education, other services
- **“Service platform”** perspective
 - More accurate view of value of investments

Evolution of IT Infrastructure

- General purpose mainframe and minicomputer era: 1959-present
- Personal computer era: 1981-present
- Client/server era: 1992-present
- Cloud and mobile computing: 2000-present

Technology Drivers of Infrastructure Evolution

- **Moore’s law** and microprocessing power
 - Computing power doubles every 2 years
 - Nanotechnology
- **Law of Mass Digital Storage**
 - The amount of data being stored each year doubles
- **Metcalfe’s Law** and Network Economics
 - Value or power of a network grows exponentially as a function of the number of network members
- Declining communication costs and the Internet
 - Exponential growth in size of the internet
- Standards and network effects
 - Technology standards
 - Specifications that establish the compatibility of products and the ability to communicate in a network
 - Unleash powerful economies of scale and result in price declines

Components of IT Infrastructure

- Computer hardware platforms
- Operating system platforms
- Enterprise software applications
- Data management and storage
- Networking/telecommunications platforms
- Internet platforms
- Consulting system integration services

Computer Hardware Platforms

- Client machine
 - Desktop PCs, laptops
 - Mobile computing
 - Desktop chips vs mobile chips
- Servers
- Mainframes
 - IBM mainframe
 - Digital workhorse for banking and telecommunications networks

Operating System Platforms

- Corporate servers
 - Windows, unix, linux
- Client level
 - Windows, android, iOS
 - Google Chrome OS (cloud computing)

Enterprise Software Applications

- Firms spent \$321 billion on enterprise applications software in 2016
- Largest providers: SAP and Oracle
- Middleware providers: IBM and Oracle

Data Management and Storage

- Database software providers
 - IBM (DB2), Oracle, Microsoft (SQL), Sybase (Adaptive Server Enterprise), MySQL, Apache Hadoop
- Physical data storage for large scale systems
 - EMC Corporation

Networking/Telecommunications Platforms

- Network operating systems
 - Windows, linux, unix
- Network hardware providers
 - Cisco, Juniper
- Telecommunication services
 - Telecommunications, cable, telephone company
 - AT&T, Verizon

Internet Platforms

- Hardware, software, management services to support company websites
 - Web hosting services, routers, cabling or wireless equipment
- Internet hardware server market
 - IBM, Dell, Oracle, HP
- Web development tools/suites
 - Microsoft (Visual Studio), Oracle-Sun (Java), Adobe

Consulting and System Integration Services

- Firms do not have resources for full range of support for new, complex infrastructure
- Leading consulting firms: Accenture, IBM Global Services, HP
- Software integration
 - Ensuring new infrastructure works with legacy systems
- Legacy systems
 - Older TPS created for mainframes that would be too costly to replace or redesign

Current Trends in Computer Hardware Platforms

- Mobile digital platform
 - Smartphones, netbooks, ebook readers, tablets, wearable devices
- Consumerization of IT and BYOD
 - Forces businesses and IT departments to rethink how IT equipment and services are acquired and managed
- Quantum computing
 - Uses quantum physics to represent and operate on data
 - Dramatic increases in computing speed
- Virtualization
 - Allows single physical resource to act as multiple resources (multiple instances of OS)
 - Reduces hardware and power expenditures
 - Facilitates hardware centralization
 - Software-defined storage (**SDS**)
- Cloud computing
 - On demand computing services obtained over network
 - Infrastructure as a service (**IaaS**)
 - Software as a service (**SaaS**)
 - Platform as a service (**PaaS**)
 - Cloud can be public or private
 - Allows companies to minimize IT investments
 - Drawbacks: concerns of security and reliability
- Green computing (green IT)
 - Practices and technologies for manufacturing, using, disposing of computing and networking hardware
 - Reducing power consumption is a high priority
 - High performance, power saving processors
 - Multicore processors
 - Power efficient microprocessors

Current Computer Software Platforms and Trends

- Linux and open source software
 - Produced by community of programmers
- Software for the web

- Java, HTML, HTML5, Web browsers
- Web services and service-oriented architecture
 - Web services
 - **XML**: Extensible Markup Language
 - **SOA**: Service Oriented Architecture
 - Self contained services that communicate with one another to create a working software application
 - Developers reuse these services to assemble other applications
- Software outsourcing and cloud services
 - Software packages and enterprise software
 - Software outsourcing
 - Cloud based software services and tools

Dealing with Platform and Infrastructure Change

- As firms shrink/grow, IT needs to be **scalable**
 - Ability to expand to serve larger number of users
- Mobile computing and cloud computing
 - New policies and procedures for management
 - Contracts with firms running clouds and distributing software

Management and Governance

- How should IT department be organized?
 - Centralized
 - Central department makes decisions
 - Decentralized
 - Business unit IT departments make own decisions
- How are costs allocated between departments?

Wise Infrastructure Investments

- Under/over investment hampers firm performance
- Rent vs buy
- Cloud computing
 - Security requirements
 - Impact on business processes
- Outsources

Total Cost of Ownership (TCO) Model

- Analyzes direct and indirect costs
- Hardware and software account for approx. 20% of TCO
- Other costs: installation, training, support, maintenance, infrastructure, downtime, space, energy
- How to reduce TCO:
 - Use of cloud services, greater centralization and standardization

Competitive Forces Model for IT Infrastructure Investment

- Market demand for firm's services
- Firm's business strategy
- IT strategy, infrastructure, cost
- Information technology assessment
- Competitor firm IT infrastructure investments

Chapter Six

File Organization Terms

- Database: group of related files
- File: group of records of same type
- Record: group of related fields
- Field: group of characters as words or numbers
- Entity: person, place, or thing on which we store information
- Attribute: Each characteristic or quality describing entity

Problems with File Environment

- Files maintained separately by different departments
- Data redundancy
- Data inconsistency
- Program-data dependence
- Lack of flexibility
- Poor security
- Lack of data sharing and availability

Database Management Systems

- Database
 - Serves many applications by centralizing data and controlling redundant data
- Database Management System (DBMS)
 - Interfaces between application
 - Separates logical and physical views of data
 - Solves problems of traditional file environment
 - Controls redundancy
 - Eliminates inconsistency
 - Uncouples programs and data
 - Enables organization to centrally manage data

Relational DBMS

- Represent data as two dimensional tables
- Each tables contains data on entity and attributes
- Table: columns and rows
 - Rows: Records for different entities

- Fields: Represents attribute for entity
- Key field: Field used to uniquely identify each record
- Primary key: Field in table used for key fields
- Foreign key: Primary key used in second table as look up field to identify records from original table

Operations of Relational DBMS

- Three basic operations used to develop useful sets of data
 - Select
 - Creates subset of data of all records that meet stated criteria
 - Join
 - Combines relational tables to provide user with more info than available in individual tables
 - Project
 - Creates subset of columns in table, creating tables with only the information specified

Capabilities of Database Management Systems

- Data definition capability
- Data dictionary
- Query and reporting
 - Data manipulation language
 - Structured query language (SQL)
- Many DBMS have report generation capabilities for creating polished reports
 - Microsoft access

Designing Databases

- Conceptual vs physical design
- Normalization
 - Streamlining complex groupings of data to minimize redundant data elements and awkward many to many relationships
- Referential integrity
 - Rules used by RDBMS to ensure relationship is consistent
- Entity relationship diagram
- A correct data model is essential for a system serving the business

Non Relational Databases and Databases in the Cloud

- Non relational databases: NoSQL
 - Flexible data model
 - Stored across distributed machines
 - Easier to scale
 - Handle large volumes of data
- Cloud databases
 - Appealing to smaller businesses
 - Amazon relational database service, Microsoft SQL

The Challenge of Big Data

- Big data
 - Massive sets of unstructured data from web traffic, social media, etc
 - Volumes too great for typical DBMS
 - Petabytes/exabytes of data
- Can reveal more patterns, relationships, and anomalies
- Requires new tools and technologies to manage

Business intelligence infrastructure

- Array of tools for obtaining info from separate systems
- Data warehouse
 - Stores current and historical data from many core operational transaction systems
 - Consolidates and standardizes information for use across enterprise
 - Provides analysis and reporting tools
- Data marts
 - Subset of data warehouse
 - Focus on single subject of business
- Hadoop
 - Enables distributed parallel processing of big data across inexpensive computers
- In-memory computing
 - Used in big data analysis
 - Uses computer's RAM for storage to avoid delays in retrieval
 - Requires optimized hardware
- Analytic platforms
 - High speed platforms using both relational and non relational tools optimized for large datasets

Online Analytical Processing (OLAP)

- Supports multidimensional data analysis
 - Viewing data using multiple dimensions
 - Each aspect of info is different dimension
- Enables rapid, online answers to ad hoc queries

Data Mining

- Finds hidden patterns and relationships in data
- Infers rules to predict future behaviour
- Associations, sequences, classification, clustering, forecasting

Text Mining

- Extracts key elements from large data sets

Web Mining

- Discovery and analysis of useful patterns and info from the web

Databases and the Web

- Many companies use the web to make some internal databases available to customers or partners
- Includes: web server, application server, database server
- Advantages:
 - Ease of use of browser software
 - Web interface requires few or no changes to database
 - Inexpensive to add web interface to system

Establishing an Information Policy

- Firm's rules, procedures, roles for sharing, managing, standardizing data
- Data administration
 - Establishes policies and procedures to manage data
- Data governance
 - Deals with policies and processes for managing availability, usability, integrity, and security of data
- Database administration
 - Creating and maintaining database

Ensuring Data Quality

- Before new database is in place, firm must
 - Identify and correct faulty data
 - Establish better routines for editing data
- Data quality audit
- Data cleansing

Chapter Seven

Networking and Communication Trends

- Convergence
 - Telephone networks and computer networks converging into single digital network using internet standards
- Broadband and broadband wireless

What is a Computer Network?

- Two or more connected computers
- Major components:
 - Client and server computers
 - Network interfaces (NICs)
 - Connection medium
 - Network operating system (NOS)
 - Hubs, switches, routers
- Software defined networking (SDN)
 - Functions of switches and routers managed by central program

Networks in Large Companies

- Hundreds of local area networks linked to firm wide corporate network
- Various powerful servers
 - Website, corporate intranet, extranet
 - Backend systems
- Mobile wireless LANs (WiFi)
- Videoconferencing system
- Telephone network, wireless cell phones

Key Digital Networking Technologies

- Client/server computing
 - Distributed computing model
 - Clients linked through network controlled by network server
 - Server sets rules of communication for network
 - Largely replaced centralized mainframe computing
- Packet switching
 - Slicing digital messages into parcels, sending packets along different communication paths as they become available, and then reassembling packets at destination
 - More efficient use of network communication capacity than circuit switched networks
- TCP/IP and connectivity
 - Protocols: rules that govern transmission of information between two points
 - Transmission control protocol/internet protocol
 - Common worldwide standard that is basis for the internet
 - Department of defence reference model
 - Application, transport, internet, and network interface layer

Types of networks

- Signals: digital vs analog
 - Modem translates digital signals into analog form
- Types of networks
 - Local area networks (LANs)
 - Ethernet
 - Client/server vs peer to peer
 - WAN, MAN, CAN (wide, metropolitan, campus area networks)

Transmission Media and Transmission Speed

- Physical transmission media
 - Twisted pair wire (CAT5)
 - Coaxial cable
 - Fibre optics cable
 - Wireless transmission

- Transmission speed
 - Bits per second, hertz, bandwidth

What is the Internet?

- Most extensive network
- Internet service providers (ISPs)
 - Provide connections

Internet Addressing and Architecture

- Each device on internet assigned IP address
- 32 bit number
- Domain name system (DNS)
 - Converts IP addresses to domain names
 - Hierarchical structure

IPv6 and Internet 2

- IPv6
 - New addressing scheme for IP numbers
 - More than a quadrillion new addresses
- Internet2
 - Advanced networking consortium
 - Leading edge new technologies for internet

Internet Services and Communication Tools

- Internet services
 - Email, world wide web, telnet, chatting
- Voice over IP (VoIP)
 - Digital voice communication using IP, packet switching
- Unified communications
 - Communications systems that integrate voice, data, email, conferencing
- Virtual private network (VPN)
 - Secure, encrypted, private network run over internet

The Web

- Hypertext
 - HTML, HTTP, URL
- Web servers
 - Software for locating and managing web pages

Web 2.0

- Second generation services
- Enabling collaboration, sharing info, creating new services
- Features:

- Interactivity, real time user control, social participation, user generated content
- Blogs
 - RSS (Really simple syndication)
 - Blogosphere
 - Microblogging
- Wikis
 - Collaborative websites where visitors can modify content

Web 3.0 and the Future Web

- More tools to make sense of trillions of pages on the internet
- Pervasive web
- Internet of things
- Internet of people
- Increased cloud computing and SaaS

Cellular Systems

- Competing standards
 - CDMA, GSM
- Third generation (3G) networks
 - Suitable for email access, web browsing
- Fourth generation (4G) networks
 - Up to 100 Mbps, LTE, suitable for internet video

Wireless Computer Networks

- Bluetooth
 - Links up to 8 devices in 10m
 - Useful for personal networking
- WiFi
 - Used for wireless LAN and wireless internet access
 - Device with radio transmitter for connecting wireless devices
 - Hotspots: one or more access points in public place
- WiMax
 - Wireless access range of 31 miles
 - Require WiMax antennas

Radio Frequency Identification

- Use tiny tags with microchips containing data
- Reduction in cost of tags makes RFID viable for many firms

Wireless Sensor Networks (WSNs)

- Network of interconnected wireless devices
- Used to monitor building security, detect hazardous substances, monitor environmental changes
- Built in processing, storage, and RFID

Chapter Eight

SWIFT Banking Hack → example

- Problems
 - Loose management structure
 - Tempting hacker target
 - Uneven security and controls
- Solutions
 - Develop security policies, plan, procedures
 - Firewalls
 - Anti Malware
 - Two factor authentication

Why Systems are Vulnerable

- Security
 - Policies, procedures, and technical measures used to prevent unauthorized access, alteration, theft, or physical damage to information systems
- Controls
 - Methods, policies, and organizational procedures that protect an organization's assets
- Accessibility of networks
- Hardware problems
- Software problems
- Use of networks outside of firm's control
- Loss and theft of devices

Internet Vulnerabilities

- Network open to anyone
- Size of internet → abuse can have wide impact
- Use of fixed internet addresses with cable/DSL modems creates fixed targets for hackers
- Unencrypted VOIP
- Email interception & attachments

Wireless Security Challenges

- Radio frequency bands are easy to scan
- SSID (service set identifiers)
 - Identify access points and can be identified by external programs
- War driving
 - Eavesdroppers drive by and try to detect SSID to gain access to networked drives and files
- Rogue access points

Malicious Software

- Malware
- Viruses
- Worms
- Spread by downloads, email, IM attachments
- Trojan horse
- SQL injection attacks
- Ransomware
- Spyware
 - Key loggers, etc

Hackers and Computer Crimes

- Hackers vs crackers
- Activities:
 - System intrusion
 - System damage
 - Cybervandalism
 - Intentional disruption, defacement, destruction of corporate information system
 - Spoofing and sniffing
- Denial of Service attacks (DoS)
- Distributed denial of service attacks (DDoS)
- Botnets
- Spam
- Identity theft
 - Phishing, evil twins, pharming
- Click fraud
- Cyberterrorism
- Cyberwarfare

Internal Threats: Employees

- Security threats may exist inside an organization
- Inside knowledge
- Social engineering
- Both end users and information systems specialists are sources of risk

Software Vulnerability

- Commercial software contains flaws that create security vulnerabilities
 - Bugs (code defects) can open networks to intruders
- Patches
 - Small pieces of software to repair flaws
 - Exploits often created faster than patches

Business Value of Security and Control

- Failed computer systems can lead to significant or total loss of business function
- Firms now are more vulnerable than ever
 - Confidential data, trade secrets, strategies, new products
- A security breach may cut into a firm's market value almost immediately
- Inadequate security and controls also bring forth issues of liability

Legal and Regulatory Requirements for Electronic Records Management

- HIPAA: Medical, security, and privacy rules and procedures
- Gramm-Leach-Bliley Act: Requires financial institutions to ensure the security of customer data
- Sarbanes-Oxley Act: Imposes responsibility on companies and their management to safeguard the accuracy and integrity of financial information

Electronic Evidence and Computer Forensics

- Electronic evidence
 - Evidence for white collar crimes is often in digital form
 - Proper control of data can save time and money when responding to legal discovery request
- Computer forensics
 - Scientific collection, examination, authentication, preservation, and analysis of data from computers for use as evidence

Information Systems Controls

- May be automated or manual
- General controls:
 - Govern design, security, use of computer programs, and security of data files
 - Software, hardware, computer operations, data security, system development, and administrative controls
- Application controls
 - Controls unique to each application
 - Input, processing, and output controls

Risk Assessment

- Determines level of risk to firm if specific activity or process is not properly controlled
 - Types of threat
 - Probability of occurrence during year
 - Potential losses, value of threat
 - Expected annual loss

Security Policy

- Ranks information risks, identifies acceptable security goals, identifies mechanisms for achieving these goals
- Drives other policies
 - Acceptable use policy (**AUP**)
 - Defines acceptable uses of firm's information resources and computing equipment
- Identity management
 - Identifying valid users
 - Controlling access

Disaster Recovery Planning and Business Continuity Planning

- Disaster recovery planning
 - Devises plans for restoration of disrupted services
- Business continuity planning
 - Focuses on restoring business operations after disaster
- Both plans need to identify the firm's most critical systems
 - Business impact analysis to determine impact of an outage

Auditing

- Information systems audit
 - Examines firm's overall security environment as well as controls governing individual information systems
- Security audits
 - Review technologies, procedures, documentation, training, and personnel
 - May simulate disaster in order to test responses
- List and rank control weaknesses
- Assess financial and organization impact of each threat

Important Tools and Technologies for Safeguarding Information Systems

- Identity management software
 - Automates keeping track of all users and privileges
 - Authenticates users, protects identities
- Authentication
 - Passwords, tokens, smart cards, biometric authentication
- Firewall
 - Combination of hardware and software that prevents unauthorized users from accessing private networks
 - Packet filtering, stateful inspection, network address translation (NAT), application proxy filtering
- Intrusion detection system
 - Monitors hot spots on corporate networks to detect and deter intruders
- Antivirus and antispyware software
 - Checks computers for presence of malware

- Requires continual updating
- Unified threat management (UTM) systems

Securing Wireless Networks

- **WEP** security
 - Static encryption keys are relatively easy to crack
 - Improved if used in conjunction with VPN
- **WPA2** specification
 - Stronger standards, continually changing

Encryption and Public Key Infrastructure

- Encryption
 - Transforming text or data into code text that cannot be read by unintended recipients
 - Secure Sockets Layer (**SSL**) and Secure Hypertext Transfer Protocol (**S-HTTP**)
- Two methods of encryption
 - Symmetric key encryption
 - Sender and receiver use single, shared key
 - Public key encryption
 - Uses two, mathematically related keys: public and private
- Digital certificate
 - Data file used to establish the identity of users and electronic assets for protection of online transactions
 - Uses a trusted third party, certification authority (CA), to validate identity
- Public key infrastructure (PKI)
 - Use of public key cryptography working with certificate authority
 - Widely used in e-commerce

Ensuring System Availability

- Online transaction processing requires 100% availability
- Fault-tolerant computer systems
 - Provides continuous, uninterrupted service
- Deep packet inspection
- Security outsourcing
 - Managed security service providers (MSSPs)

Security Issues for Cloud Computing and the Mobile Digital Platform

- Security in the cloud
 - Responsibility for security belongs to company that owns the data
 - Firms must ensure providers provide adequate protection
- Securing mobile platforms
 - Policies should include and cover any special requirements for mobile devices
 - Mobile device management tools

- Authorization, inventory records, control updates, lock down/erase devices, encryption

Ensuring Software Quality

- Software metrics: Objective assessments of system in form of quantified measurements
 - Number of transactions, online response time, payroll checks
- Regular testing
- Walkthrough: review of specification or design document
- Debugging: eliminating errors

Chapter Ten

Ecommerce Today

- E-Commerce: use of the internet and web to transact businesses
- Began in 1995 and exponentially grew
- Social, mobile, local

Why is Ecommerce Different?

- Ubiquity
 - Marketplace is virtual
 - Transaction costs are reduced
- Global reach
 - Transactions cross cultural and national boundaries
- Universal standards
 - One set of technology standards
- Richness
 - Supports video, audio, and text
- Interactivity
- Information density
 - Greater price and cost transparency
 - Enables price discrimination
- Personalization/customization
 - Technology permits modification of goods
- Social technology
 - Promotes user generated content

Key Concepts in Ecommerce

- Internet and digital markets have changed the way that companies conduct business
- Information asymmetry is reduced
- Dynamic pricing enabled
 - Changing prices based on consumers willingness to pay
- Delayed gratification
- Disintermediation

- Reduces need of middlemen between producers and consumers

Digital Goods

- Goods that can be delivered over a digital network
- Cost of producing first unit is almost the entire cost of the product
- Costs of delivery are very low
- Marketing costs remain the same
- Industries with digital goods are undergoing changes
 - Ie publishers, record labels, etc

Types of E-Commerce

- Three major types
 - Business to Consumer (B2C)
 - Business to Business (B2B)
 - Consumer to Consumer (C2C)
 - Ie ebay
- Can be categorized by platform
 - Mobile commerce (m-commerce)

E-Commerce Business Models

- Portal
- E-tailer
 - A retailer selling goods via electronic transactions on the Internet
- Content provider
- Transaction broker
- Market creator
- Service provider
- Community provider

E-Commerce Revenue Models

- Advertising
- Sales
- Subscription
- Free/freemium
 - Product or is provided free of charge, but money (premium) is charged for additional features, services, or virtual goods
- Transaction fee
- Affiliate

How E-Commerce has Transformed Marketing

- Internet provides new ways to identify and communicate with customers
- Long tail marketing
- Internet advertising formats
- Behavioural targeting

- Tracking online behaviour of individuals
- Programmatic ad buying
- Native advertising

Social E-Commerce and Social Network Marketing

- Social e-commerce is based on digital social graph
- Features of social ecommerce driving its growth
 - Newsfeed
 - Timeline
 - Social search
 - Collaborative shopping
- Social media
 - Fastest growing media for branding and marketing
- Social network marketing
 - Seeks to leverage individuals' influence over others
 - Targeting a social network of people sharing interests and advice
 - Facebook's 'like' button
 - Social networks have huge audiences
- Social shopping sites
- Wisdom of crowds
- Crowdsourcing

Business-to-Business Transactions through E-Commerce

- B2B trade in 2015 was 14.6 trillion
- Internet and networking helps automate procurement
- Variety of internet enabled technologies used in B2B
 - Electronic data interchange (EDI)
 - Private industrial networks
 - Net marketplaces
 - Exchanges

Electronic Data Interchange (EDI)

- Computer to computer exchange or standard transactions (invoices, purchases, etc)
- Major industries have EDI standards
 - Define structure and information fields of electronic documents
- More companies are moving toward web-enabled private networks'
 - Can link to a wider variety of firms
 - Enables sharing a wider range of information

New Ways of B2B Buying and Selling

- Private industrial networks
 - Private exchanges
 - Large firm using a secure website to link to suppliers and partners
- Net Marketplaces (e hubs)

- Single digital marketplace for many buyers and sellers
- May focus on direct or indirect goods
- Exchanges
 - Independently owned third party marketplaces for spot purchasing

M-Commerce

- M-Commerce in 2017 is 37% of all e-commerce
- Fastest growing form of e-commerce
 - Growing upwards of 50%
- Areas of growth
 - Mass market retailing (Amazon, eBay, etc)
 - Sales of digital content (music, tv, etc)
 - In app purchases to mobile devices

Location Based Services and Applications

- Used by 74% of smartphone owners
- Based on GPS map services
- **Geosocial** services
 - Where friends are
- **Geoadvertising**
 - What shops are nearby
- **Geoinformation** services
 - Price of the house you are passing

Other Mobile Commerce Services

- Financial account management apps
- Mobile advertising market
 - Google, Facebook, ads in videos, etc
- 55% of online retailers have m-commerce websites

What Issues Must be Addressed in E-Commerce

- Most important management challenges
 - Developing clear understanding of business objectives
 - Knowing how to choose the right technology to achieve those objectives
- Develop an e-commerce presence map
 - **Four areas:** Websites, email, social media, offline media
- Develop a timeline
 - Breaking a project into discrete phases

Chapter Twelve

How Does the Decision Making Process Work?

- Business value of improved decision making
 - Improvements on hundreds of thousands of small decisions adds up to a large value
- Types of decisions
 - **Unstructured:** Decision maker must provide judgment, evaluation, and insight
 - **Structured:** Repetitive and routine decisions
 - **Semistructured:** Only part of a problem has clear cut answers
- Senior managers
 - In charge of making many unstructured decisions
- Middle managers
 - Make more structured decisions but these may include unstructured components
- Operation managers and employees
 - Make structured decisions

The Decision Making Process

- Intelligence
 - Discovering, identifying, and understanding the problems occurring
- Design
 - Identifying and exploring solutions to the problems
- Choice
 - Choosing among alternative solutions
- Implementation
 - Making chosen alternative work and continuing to monitor how well the solution is working

Managerial Roles

- Information systems can only assist in some of the roles played by managers
- Classical model of management
 - **Functions:** Planning, organizing, coordinating, deciding, controlling
- Contemporary behavioural models
 - Actual behaviour appears to be less systematic, more informal, and more reactive

Mintzberg's 10 Managerial Roles

- Interpersonal roles
 - Figurehead, leader, liaison
- Informational roles
 - Nerve centre, disseminator, spokesperson
- Decisional roles
 - Entrepreneur, disturbance handler, resource allocator, negotiator

Real World Decision Making

- Three main reasons why investments in IT are not always positive
 - Information quality
 - High quality decisions require high quality information
 - Management filters
 - Managers have selective attention and have a variety of biases
 - Organizational inertia and politics
 - Strong forces within organizations resist making decisions calling for major change

High Velocity Automated Decision Making

- Made possible through computer algorithms defining steps for a highly structured decision
 - Ie High speed computer trading programs
 - Trades are executed in 30 milliseconds
- Require safeguards to ensure proper operation and regulation

What is Business Intelligence?

- Business intelligence
 - Infrastructure for collecting, storing, and analyzing data produced by a business
 - Databases, data warehouses, data marts
- Business analytics
 - Tools and techniques for analyzing data
 - OLAP, statistics, models, data mining
- Business intelligence vendors
 - Create business intelligence and analytics purchased by firms

The Business Intelligence Environment

- Six elements in the business intelligence environment
 - Data from the business environment
 - Business intelligence infrastructure
 - Business analytics toolset
 - Managerial users and methods
 - Delivery platform – MIS, DSS, ESS
 - User interface
 - Data visualization tools

Business Intelligence and Analytics Capabilities

- Goal is to deliver accurate real time information to decision makers
- Main analytic functionalities of BI systems
 - Production reports
 - Parameterized reports
 - Dashboards/scorecards

- Ad hoc queries
- Drill down
- Forecasts, scenarios, models

Predictive Analytics

- Uses variety of data techniques to predict future trends and behaviour patterns
 - Statistical analysis, data mining, historical data, assumptions
- Incorporated into numerous BI applications for sales, marketing, finance, fraud detection, health care

Big Data Analytics

- Big data: massive datasets collected from social media, customer data, etc
- Help create personalized shopping experiences for major online retailers
- Smart cities
 - Public records, location sensors, ability to evaluate effect of one service change on the system

Operational Intelligence and Analytics

- Operational intelligence: business activity monitoring
- Collection and use of data generated by sensors
- **Internet of things (IoT)**
 - Creating huge streams of data from web activities, sensors, and other monitoring devices
- Software for operational intelligence and analytics enable companies to analyze their big data

Location Analytics

- Ability to gain business insight from the location component of data
- Geographic information systems (GIS)
 - Ties location related data to maps
 - Ie helping local gov't calculate response times to disasters

Management Strategies for Developing BI and BA Capabilities

- One stop integrated solution
 - Hardware firms sell software that run optimally on their hardware
 - Makes firm dependent on single vendor
- Multiple best of breed solution
 - Greater flexibility and independence
 - Potential difficulties in integration
 - Must deal with multiple vendors
- BI and BA systems bring high switching costs

Support for Semistructured Decisions

- Decision support systems
 - Support for semistructured decisions
- Use mathematical or analytical models
- Allow varied types of analysis
 - 'What if,' sensitivity, backward sensitivity, multidimensional

Decision Support for Senior Management

- **ESS:** decision support for senior management
 - Helps executives focus on important performance information
- Balanced scorecard method
 - Measures outcomes on four dimensions
 - **Financial, business process, customer, learning and growth**
 - Key performance indicators (KPIs) measure each dimension
- Business performance management (BPM)
 - Translates firm's strategies into operational targets
 - KPIs developed to measure progress toward targets
- Data for ESS
 - Internal data from enterprise applications
 - External data (ie financial market databases)
 - Drill down capabilities

Group Decision Support Systems (GDSS)

- Interactive system to facilitate solution of unstructured problems by group
- Specialized tools
 - Virtual collaboration rooms
 - Software to collect, rank, edit participant ideas
- Promotes collaborative atmosphere
- Cisco's collaboration meeting rooms (CMR)
- Skype for business

ITM Chapter 6

Database

- Stores related files
- DBMS – Database management systems

Capabilities of DBMS

- Data definition
- Data dictionary
 - Eliminates redundancy
 - Same term consistently
- Query and reporting
- Report generation capabilities

Conceptual vs physical design

- Different views help run businesses
- Normalization
 - Minimize duplication

Non Relation Databases (NoSQL)

- Flexible, easy to scale, handle large volumes of data
- Social media

Challenge of Big Data

- Massive sets of unstructured data
- Volumes too great for typical DBMS
- Requires new tools/technology to manage
 - Ability to analyze in many ways

Mining

- Finds patterns and relationships in datasets
- Text mining
 - Extracts key elements from large data sets
- Web mining
 - Analysis of useful patterns and information from the web

Data Quality

- Firm must identify faulty data and establish better editing routines
- Data quality audit
- Data cleansing

ITM 102: Chapter 7

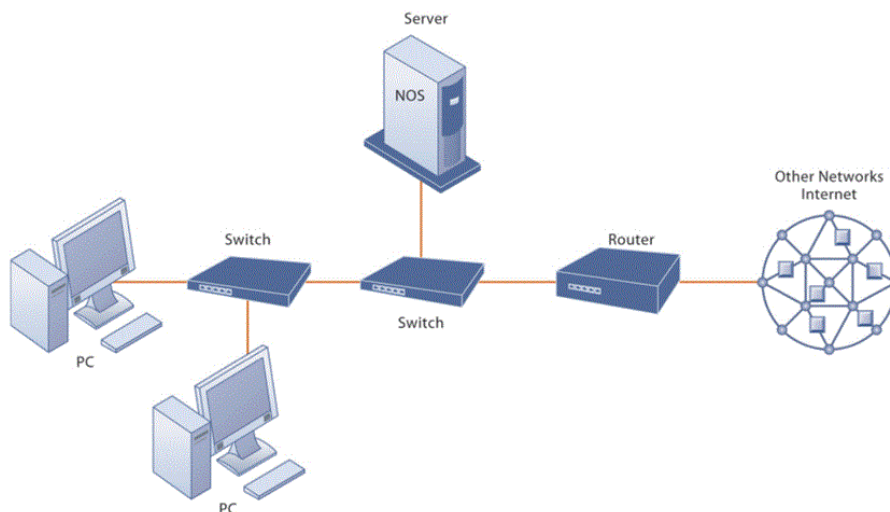
Networking and Communication Trends

- Convergence: Telephone networks and computer networks converging into single digital network using Internet standards
- Broadband: More than 74 percent U.S. Internet users have broadband access
- Broadband wireless: Voice, data communication are increasingly taking place over broadband wireless platforms

What Is a Computer Network?

- Two or more connected computers
- Major components in simple network
 - Client and server computers
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 - Network operating system (NOS)
 - Hubs, switches, routers
- Software-defined networking (SDN)
 - Functions of switches and routers managed by central program

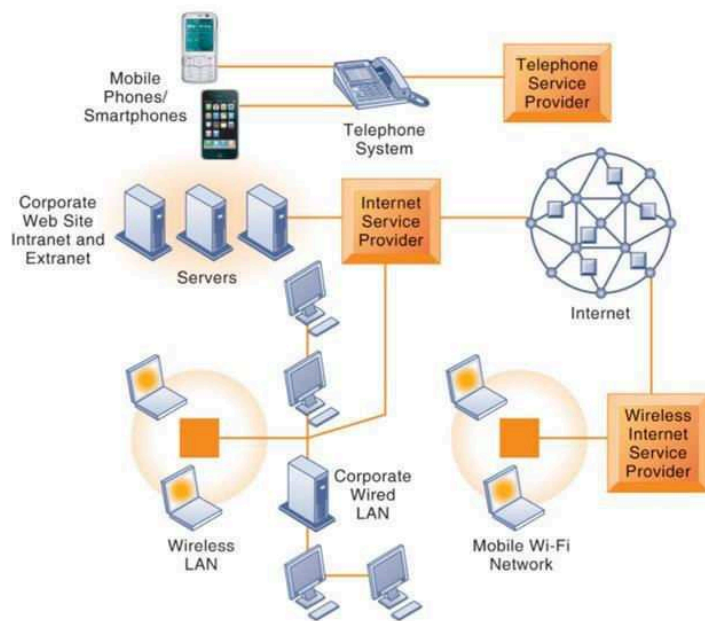
Figure 7.1: Components of a Simple Computer Network



Networks in Large Companies

- Hundreds of local area networks (LANs) linked to firm-wide corporate network
- Various powerful servers
 - Website, corporate intranet, extranet
 - Backend systems
- Mobile wireless LANs (Wi-Fi networks)
- Videoconferencing system
- Telephone network, wireless cell phones

Figure 7.2: Corporate Network Infrastructure



Key Digital Networking Technologies

- Client/server computing
 - Distributed computing model
 - Clients linked through network controlled by network server computer
 - Server sets rules of communication for network and provides every client with an address so others can find it on the network
 - Has largely replaced centralized mainframe computing
 - The Internet: largest implementation of client/server computing
- Packet switching
 - Method of slicing digital messages into parcels (packets), sending packets along different communication paths as they become available, and then reassembling packets at destination
 - Previous circuit-switched networks required assembly of complete point-to-point circuit
 - Packet switching more efficient use of network's communications capacity
- TCP/IP and connectivity
 - Protocols: rules that govern transmission of information between two points
 - Transmission Control Protocol/Internet Protocol (TCP/IP)
 - Common worldwide standard that is basis for the Internet
 - Department of Defense reference model for TCP/IP
 - Four layers
 - Application layer
 - Transport layer
 - Internet layer
 - Network interface layer

Types of Networks

- Signals: Digital versus analog
 - Modem: translates digital signals into analog form (and vice versa)
- Types of networks
 - Local area networks (LANs)
 - Ethernet
 - Client/server vs. peer-to-peer
 - Wide area networks (WANs)
 - Metropolitan area networks (MANs)
 - Campus area networks (CANs)

Figure 7.5: Functions of the Modem

Transmission Media and Transmission Speed

- Physical transmission media
 - Twisted pair wire (CAT5)
 - Coaxial cable
 - Fiber optics cable

- Wireless transmission media and devices
 - Satellites
 - Cellular systems
- Transmission speed
 - Bits per second (bps)
 - Hertz
 - Bandwidth

Internet Addressing and Architecture

- Each device on Internet assigned Internet Protocol (IP) address
- 32-bit number, e.g. 207.46.250.119
- The Domain Name System (DNS)
 - Converts IP addresses to domain names
 - Hierarchical structure
 - Top-level domains

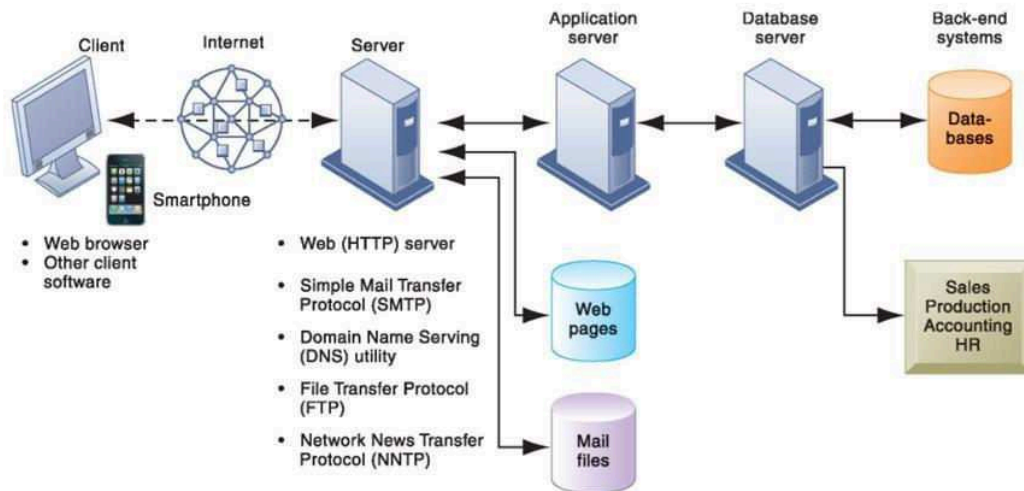
Internet Architecture and Governance

- Network service providers
 - Own trunk lines (high-speed backbone networks)
- Regional telephone and cable TV companies
 - Provide regional and local access
- Professional organizations and government bodies establish Internet standards
 - IAB
 - ICANN
 - W3C

The Future Internet: IPv6 and Internet 2

- IPv6
 - New addressing scheme for IP numbers
 - Will provide more than a quadrillion new addresses
 - Not compatible with current IPv5 addressing
- Internet2
 - Advanced networking consortium
 - Universities, businesses, government agencies, other institutions
 - Developed high-capacity 100 Gbps testing network
 - Testing leading-edge new technologies for Internet
- Voice over IP (VoIP)
 - Digital voice communication using IP, packet switching

Figure 7.8: Client/Server Computing on the Internet



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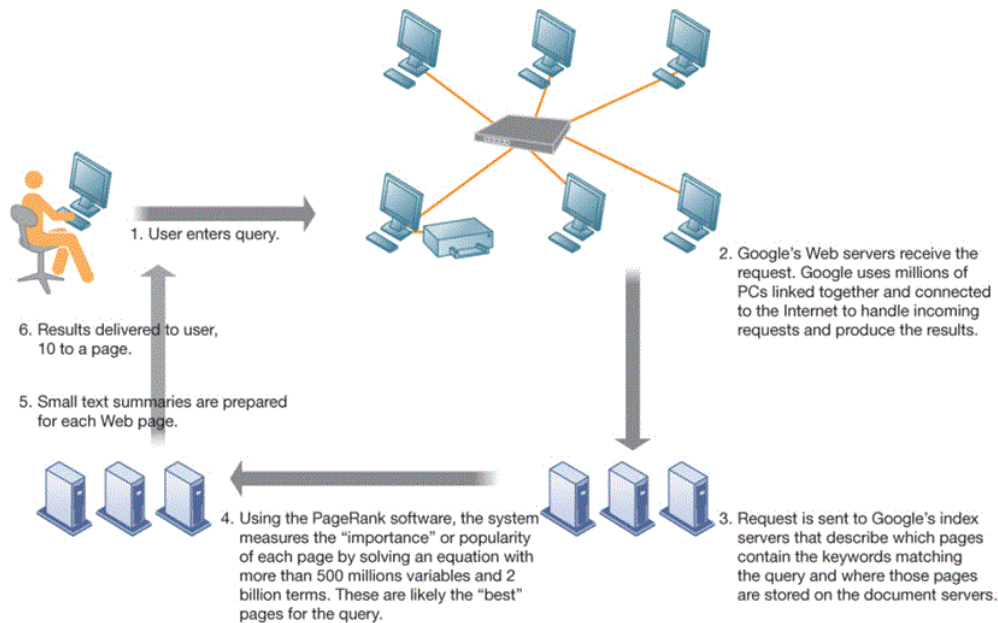
Internet Services and Communication Tools

- Unified communications
 - Communications systems that integrate voice, data, e-mail, conferencing
- Virtual private network (VPN)
 - Secure, encrypted, private network run over Internet
 - PPTP
 - Tunneling

The Web

- Hypertext
 - Hypertext Markup Language (HTML)
 - Hypertext Transfer Protocol (HTTP):
 - Uniform resource locator (URL):
<http://www.megacorp.com/content/features/082602.html>
- Web servers
 - Software for locating and managing web pages

Figure 7.12: How Google Works



Web 2.0

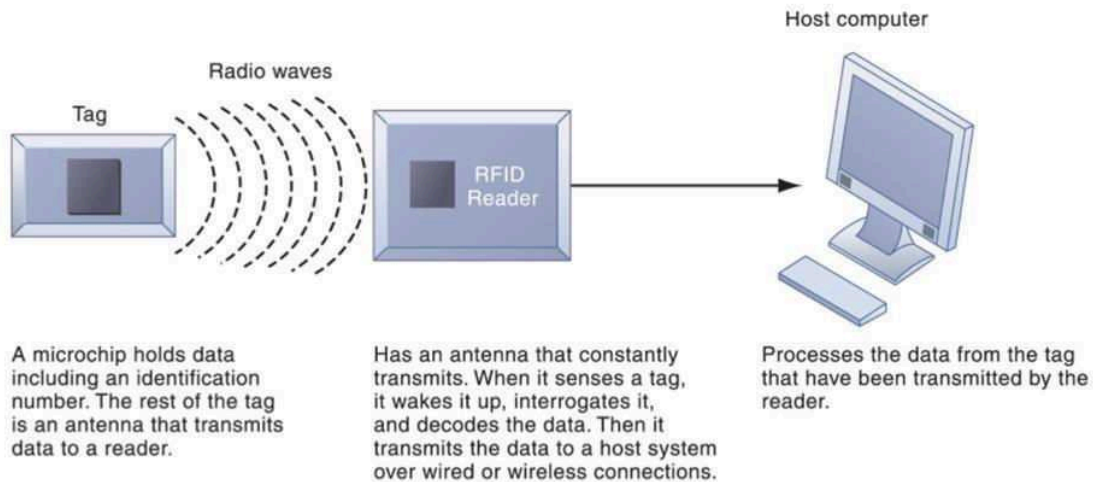
- Second-generation services
- Enabling collaboration, sharing information, and creating new services online
- Features
 - Interactivity
 - Real-time user control
 - Social participation (sharing)
 - User-generated content
- Blogs: chronological, informal websites created by individuals
 - RSS (Really Simple Syndication)
 - Blogosphere
 - Microblogging
- Wikis: collaborative websites where visitors can add, delete, or modify content on the site
- Social networking sites: enable users to build communities of friends and share information

Radio Frequency Identification (RFID)

- Use tiny tags with microchips containing data about an item and location
- Tag antennas to transmit radio signals over short distances to special RFID readers
- Common uses:
 - Automated toll-collection

- Tracking goods in a supply chain
- Reduction in cost of tags making RFID viable for many firms

Figure 7.15: How RFID Works



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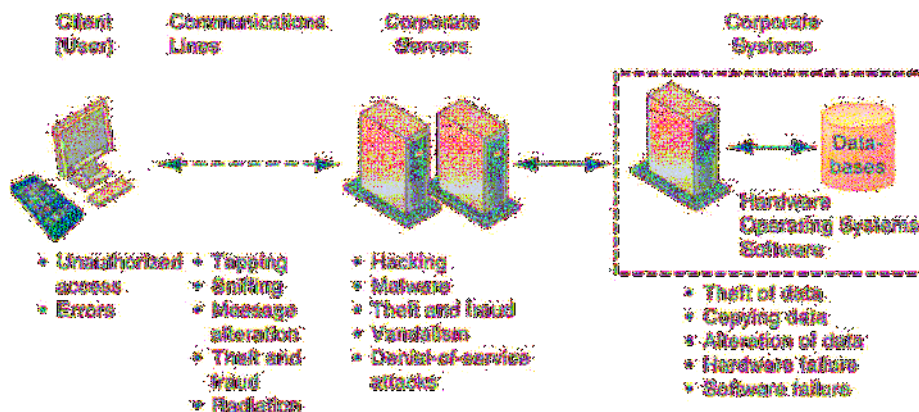
Wireless Sensor Networks (WSNs)

- Networks of hundreds or thousands of interconnected wireless devices
- Used to monitor building security, detect hazardous substances in air, monitor environmental changes, traffic, or military activity
- Devices have built-in processing, storage, and radio frequency sensors and antennas
- Require low-power, long-lasting batteries and ability to endure in the field without maintenance
- Major sources of “Big Data” and fueling “Internet of Things”

ITM 102: Chapter 8**Why Systems Are Vulnerable**

- Security
 - Policies, procedures, and technical measures used to prevent unauthorized access, alteration, theft, or physical damage to information systems
- Controls
 - Methods, policies, and organizational procedures that ensure safety of organization's assets; accuracy and reliability of its accounting records; and operational adherence to management standards
- Accessibility of networks
- Hardware problems (breakdowns, configuration errors, damage from improper use or crime)
- Software problems (programming errors, installation errors, unauthorized changes)
- Disasters
- Use of networks/computers outside of firm's control
- Loss and theft of portable devices

Figure 8.1: Contemporary Security Challenges and Vulnerabilities



Internet Vulnerabilities

- Network open to anyone
- Size of Internet means abuses can have wide impact
- Use of fixed Internet addresses with cable / DSL modems creates fixed targets for hackers
- Unencrypted VOIP
- E-mail, P2P, IM
 - Interception
 - Attachments with malicious software
 - Transmitting trade secrets

Wireless Security Challenges

- Radio frequency bands easy to scan
- SSIDs (service set identifiers)
 - Identify access points, broadcast multiple times, can be identified by sniffer programs
- War driving
 - Eavesdroppers drive by buildings and try to detect SSID and gain access to network and resources
 - Once access point is breached, intruder can gain access to networked drives and files
- Rogue access points

Internal Threats: Employees

- Security threats often originate inside an organization
- Inside knowledge
- Sloppy security procedures
 - User lack of knowledge
- Social engineering
- Both end users and information systems specialists are sources of risk

Software Vulnerability

- Commercial software contains flaws that create security vulnerabilities
 - Bugs (program code defects)
 - Zero defects cannot be achieved because complete testing is not possible with large programs
 - Flaws can open networks to intruders
- Patches
 - Small pieces of software to repair flaws
 - Exploits often created faster than patches can be released and implemented

What Is the Business Value of Security and Control?

- Failed computer systems can lead to significant or total loss of business function
- Firms now are more vulnerable than ever
 - Confidential personal and financial data
 - Trade secrets, new products, strategies
- A security breach may cut into a firm's market value almost immediately
- Inadequate security and controls also bring forth issues of liability

Legal and Regulatory Requirements for Electronic Records Management

- HIPAA
 - Medical security and privacy rules and procedures
- Gramm-Leach-Bliley Act
 - Requires financial institutions to ensure the security and confidentiality of customer data
- Sarbanes-Oxley Act
 - Imposes responsibility on companies and their management to safeguard the accuracy and integrity of financial information that is used internally and released externally

Electronic Evidence and Computer Forensics

- Electronic evidence
 - Evidence for white collar crimes often in digital form
 - Proper control of data can save time and money when responding to legal discovery request
- Computer forensics
 - Scientific collection, examination, authentication, preservation, and analysis of data from computer storage media for use as evidence in court of law
 - Recovery of ambient data

Information Systems Controls

- May be automated or manual
- General controls
 - Govern design, security, and use of computer programs and security of data files in general throughout organization
 - Software controls, hardware controls, computer operations controls, data security controls, system development controls, administrative controls,
- Application controls
 - Controls unique to each computerized application
 - Input controls, processing controls, output controls

Risk Assessment

- Determines level of risk to firm if specific activity or process is not properly controlled
 - Types of threat
 - Probability of occurrence during year
 - Potential losses, value of threat
 - Expected annual loss

Disaster Recovery Planning and Business Continuity Planning

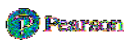
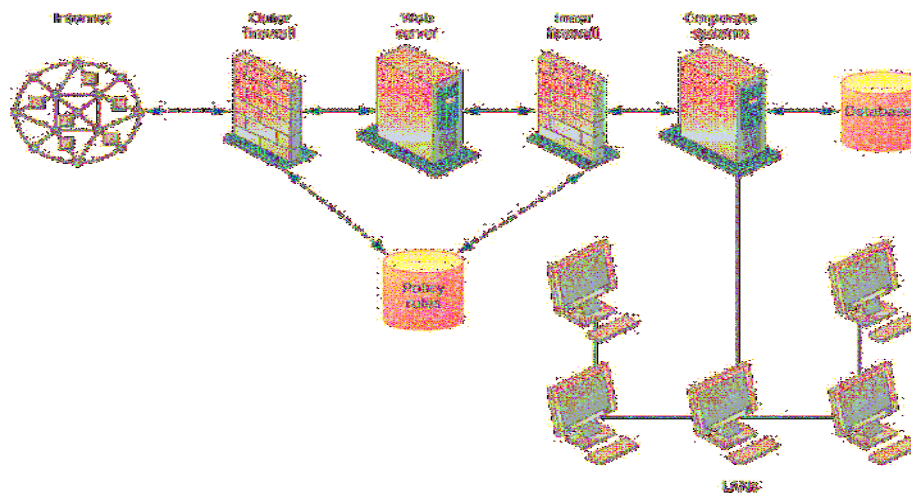
- Disaster recovery planning
 - Devises plans for restoration of disrupted services
- Business continuity planning
 - Focuses on restoring business operations after disaster
- Both types of plans needed to identify firm's most critical systems
 - Business impact analysis to determine impact of an outage
 - Management must determine which systems restored first

The Role of Auditing

- Information systems audit
 - Examines firm's overall security environment as well as controls governing individual information systems
- Security audits
 - Review technologies, procedures, documentation, training, and personnel
 - May even simulate disaster to test responses
- List and rank control weaknesses and the probability of occurrence
- Assess financial and organizational impact of each threat

Firewall

- Combination of hardware and software that prevents unauthorized users from accessing private networks Technologies include:
 - Packet filtering
 - Stateful inspection
 - Network address translation (NAT)
 - Application proxy filtering

Figure 8.5: A Corporate Firewall

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What Are the Most Important Tools and Technologies for Safeguarding Information Systems?

- Intrusion detection system
 - Monitors hot spots on corporate networks to detect and deter intruders
- Antivirus and antispyware software
 - Checks computers for presence of malware and can often eliminate it as well
 - requires continual updating
- Unified threat management (UTM) systems

Securing Wireless Networks

- WEP security
 - Static encryption keys are relatively easy to crack
 - Improved if used in conjunction with VPN
- WPA2 specification
 - Replaces WEP with stronger standards
 - Continually changing, longer encryption keys

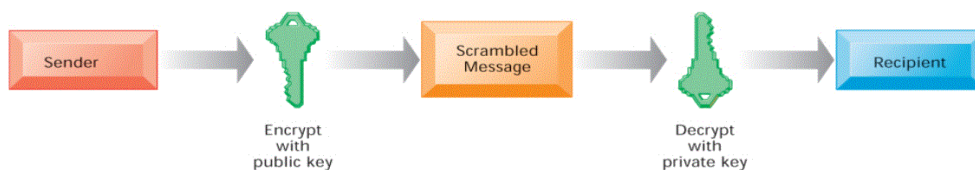
Encryption and Public Key Infrastructure

- Encryption
 - Transforming text or data into cipher text that cannot be read by unintended recipients
- Two methods for encryption on networks
 1. Secure Sockets Layer (SSL) and successor Transport Layer Security (TLS)
 2. Secure Hypertext Transfer Protocol (S-HTTP)

Two methods of encryption

- Symmetric key encryption
 - Sender and receiver use single, shared key
- Public key encryption
 - Uses two, mathematically related keys: public key and private key
 - Sender encrypts message with recipient's public key
 - Recipient decrypts with private key

Figure 8.6: Public Key Encryption



- Digital certificate
 - Data file used to establish the identity of users and electronic assets for protection of online transactions
 - Uses a trusted third party, certification authority (CA), to validate a user's identity
 - CA verifies user's identity, stores information in CA server, which generates encrypted digital certificate containing owner ID information and copy of owner's public key
- Public key infrastructure (PKI)
 - Use of public key cryptography working with certificate authority
 - Widely used in e-commerce

Ensuring System Availability

- Online transaction processing requires 100% availability
- Fault-tolerant computer systems
 - Contain redundant hardware, software, and power supply components that create an environment that provides continuous, uninterrupted service
- Deep packet inspection
- Security outsourcing
 - Managed security service providers (MSSPs)

Security Issues for Cloud Computing and the Mobile Digital Platform

- Security in the cloud
 - Responsibility for security resides with company owning the data
 - Firms must ensure providers provide adequate protection:
 - Where data are stored
 - Meeting corporate requirements, legal privacy laws
 - Segregation of data from other clients
 - Audits and security certifications
- Service level agreements (SLAs)
- Securing mobile platforms
 - Security policies should include and cover any special requirements for mobile devices
 - Guidelines for use of platforms and applications
- Mobile device management tools
 - Authorization
 - Inventory records
 - Control updates
 - Lock down/erase lost devices
 - Encryption
- Software for segregating corporate data on devices

Ensuring Software Quality

- Software metrics: Objective assessments of system in form of quantified measurements
 - Number of transactions
 - Online response time
 - Payroll checks printed per hour
 - Known bugs per hundred lines of code
- Early and regular testing
- Walkthrough: Review of specification or design document by small group of qualified people
- Debugging: Process by which errors are eliminated

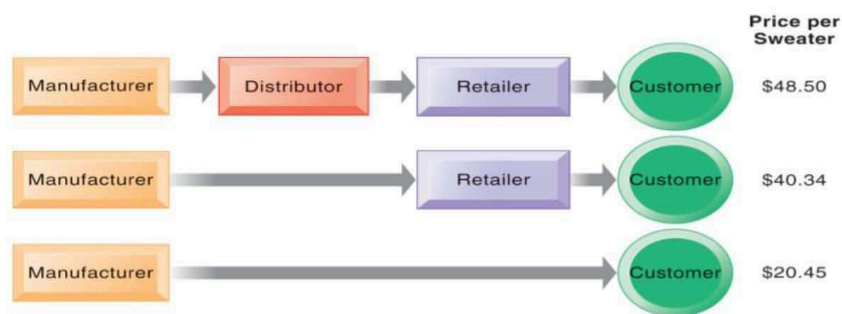
ITM 102: Chapter 9**Why E-commerce Is Different**

- Ubiquity
 - Marketplace is virtual
 - Transaction costs reduced
- Global reach
 - Transactions cross cultural and national boundaries
- Universal standards
 - One set of technology standards: Internet standards
- Richness
 - Supports video, audio, and text messages
- Interactivity
- Information density
 - Greater price and cost transparency
 - Enables price discrimination
- Personalization/customization
 - Technology permits modification of messages, goods
- Social technology
 - Promotes user content generation and social networking

Key Concepts in E-commerce: Digital Markets and Digital Goods in a Global Marketplace

- Internet and digital markets have changed the way companies conduct business
- Information asymmetry reduced
- Menu costs, search and transaction costs reduced
- Dynamic pricing enabled
- Switching costs
- Delayed gratification
- Disintermediation

Figure 10.2: The Benefits of Disintermediation to the Consumer



Digital Goods

- Goods that can be delivered over a digital network
- Cost of producing first unit is almost entire cost of product
- Costs of delivery over the Internet very low
- Marketing costs remain the same; pricing highly variable
- Industries with digital goods are undergoing revolutionary changes (publishers, record labels, etc.)

Types of E-commerce

- Three major types
 - Business-to-consumer (B2C)
 - Example: BarnesandNoble.com
- Business-to-business (B2B)
 - Example: ChemConnect
- Consumer-to-consumer (C2C)
 - Example: eBay
- E-commerce can be categorized by platform
 - Mobile commerce (m-commerce)

E-commerce Business Models

- Portal
- E-tailer
- Content provider
- Transaction broker
- Market creator
- Service provider
- Community provider

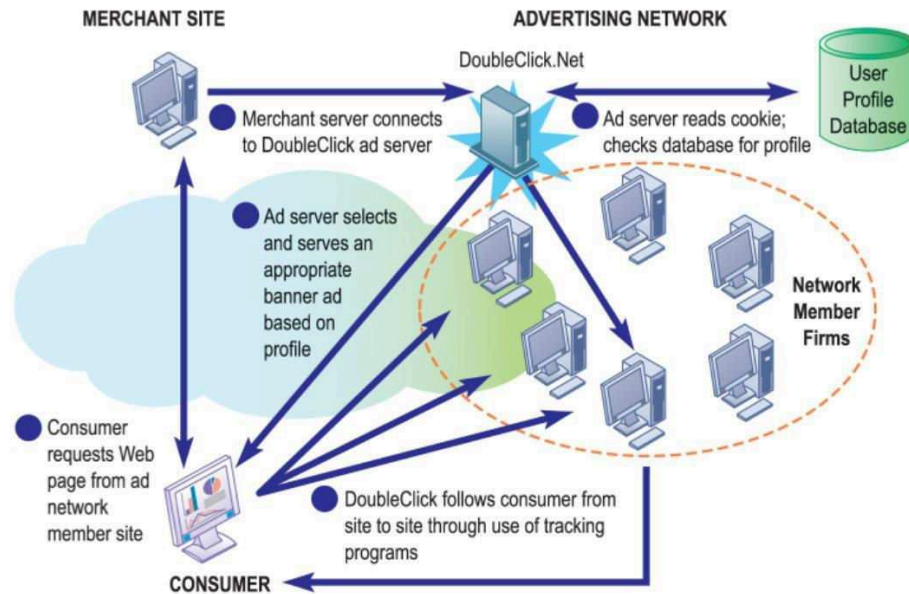
E-commerce Revenue Models

- Advertising
- Sales
- Subscription
- Free/Freemium
- Transaction fee
- Affiliate

How Has E-commerce Transformed Marketing?

- Internet provides new ways to identify and communicate with customers
- Long tail marketing
- Internet advertising formats
- Behavioral targeting
 - Tracking online behavior of individuals
- Programmatic ad buying
- Native advertising

Figure 10.5: How an Advertising Network Such as DoubleClick Works



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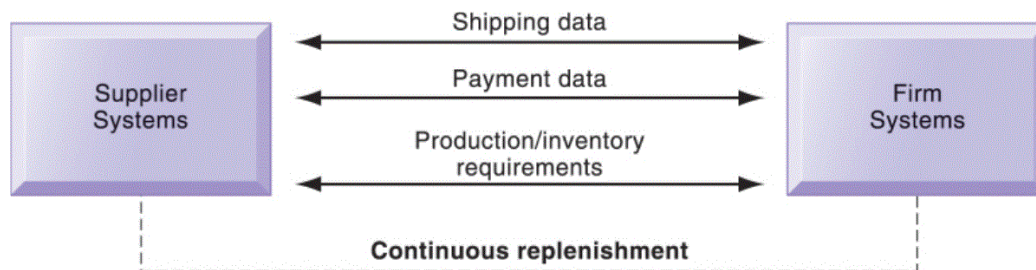
Social E-commerce and Social Network Marketing

- Social e-commerce based on digital social graph
- Features of social e-commerce driving its growth
 - Newsfeed
 - Timelines
 - Social sign-on
 - Collaborative shopping
 - Network notification
 - Social search (recommendations)
- Social media
 - Fastest growing media for branding and marketing
- Social network marketing
 - Seeks to leverage individuals' influence over others
 - Targeting a social network of people sharing interests and advice
 - Facebook's "Like" button
 - Social networks have huge audiences
- Social shopping sites
- Wisdom of crowds
- Crowdsourcing

Electronic Data Interchange (EDI)

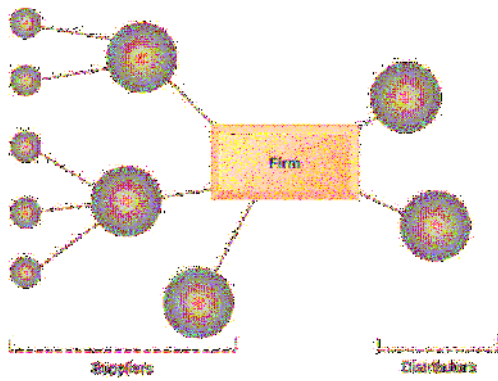
- Computer-to-computer exchange of standard transactions such as invoices, purchase orders
- Major industries have EDI standards
 - Define structure and information fields of electronic documents
- More companies are moving toward web-enabled private networks
 - Allow them to link to a wider variety of firms than EDI allows
 - Enable sharing a wider range of information

Figure 10.6: Electronic Data Interchange



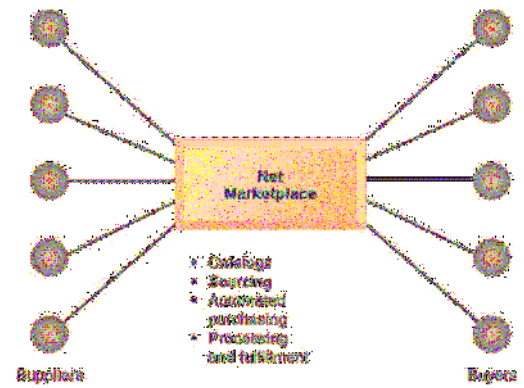
New Ways of B2B Buying and Selling

- Private industrial networks
 - Private exchanges
 - Large firm using a secure website to link to suppliers and partners
- Net marketplaces (e-hubs)
 - Single digital marketplace for many buyers and sellers
 - May focus on direct or indirect goods
 - May be vertical or horizontal marketplaces
- Exchanges
 - Independently owned third-party Net marketplaces for spot purchasing

Figure 10.7: A Private Industrial Network

Pearson

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Figure 10.8: A Net Marketplace

Pearson

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What Is the Role of M-commerce in Business, and What Are the Most Important M-commerce Applications?

- M-commerce in 2017 is 37 percent of all e-commerce
- Fastest growing form of e-commerce
 - Some areas growing at 50 percent or more
- Main areas of growth
 - Mass market retailing (Amazon, eBay, etc.)
 - Sales of digital content (music, TV, etc.)
 - In-app sales to mobile devices

Other Mobile Commerce Services

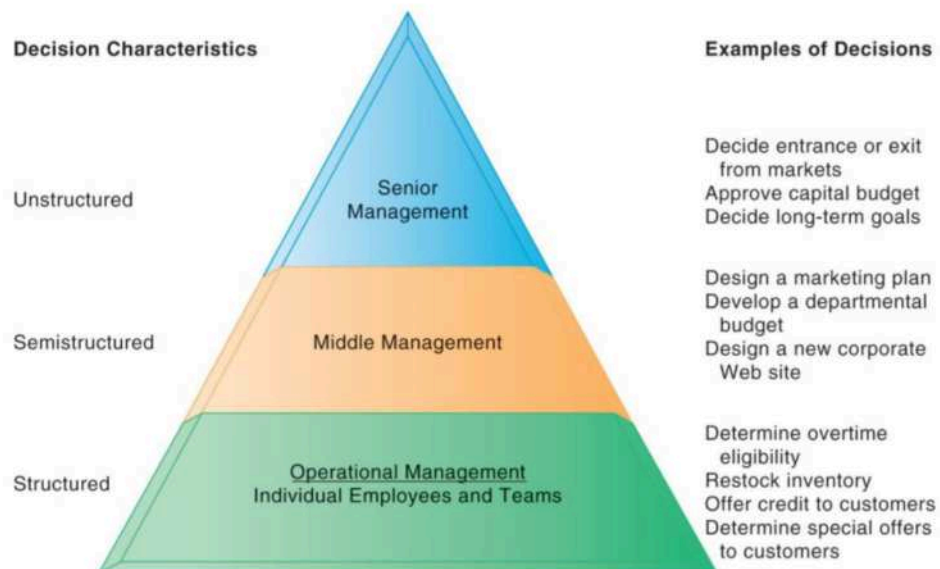
- Financial account management apps
 - Banks, credit card companies
- Mobile advertising market
 - Google and Facebook are largest markets
 - Ads embedded in games, videos, and mobile apps
- 55 percent of online retailers have m-commerce websites

What Issues Must be Addressed when Building an E-commerce Presence?

- Most important management challenges
 - Developing clear understanding of business objectives
 - Knowing how to choose the right technology to achieve those objectives
- Develop an e-commerce presence map
 - Four areas: websites, e-mail, social media, offline media
- Develop a timeline: milestones
 - Breaking a project into discrete phases

ITM 102: Chapter 12**What Are the Different Types of Decisions, and How Does the Decision Making Process Work?**

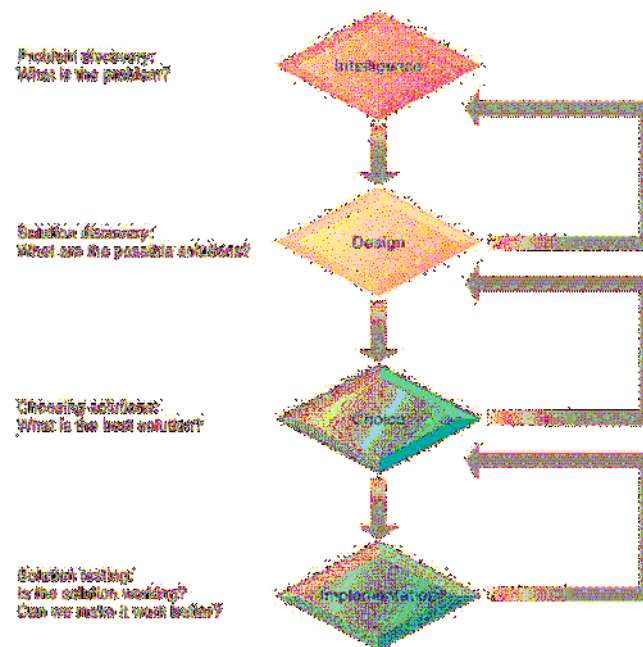
- Business value of improved decision making
 - Improving hundreds of thousands of “small” decisions adds up to large annual value for the business
- Types of decisions
 - Unstructured: Decision maker must provide judgment, evaluation, and insight to solve problem
 - Structured: Repetitive and routine; involve definite procedure for handling so they do not have to be treated each time as new
 - Semistructured: Only part of problem has clear-cut answer provided by accepted procedure
- Senior managers
 - Make many unstructured decisions
- Middle managers
 - Make more structured decisions but these may include unstructured components
- Operational managers and rank and file employees
 - Make more structured decisions

Figure 12.1: Information Requirements of Key Decision-Making Groups in a Firm

The Decision Making Process

- Intelligence: Discovering, identifying, and understanding the problems occurring in the organization
- Design: Identifying and exploring solutions to the problem
- Choice: Choosing among solution alternatives
- Implementation: Making chosen alternative work and continuing to monitor how well solution is working

Figure 12.2: Stages In Decision Making



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Managerial Roles

- Information systems can only assist in some of the roles played by managers
- Classical model of management: five functions
 - Planning, organizing, coordinating, deciding, and controlling
- More contemporary behavioral models
 - Actual behavior of managers appears to be less systematic, more informal, less reflective, more reactive, and less well organized than in classical model

Mintzberg's 10 Managerial Roles

- Interpersonal roles : Figurehead, Leader, Liaison
- Informational roles: Nerve center, Disseminator, Spokesperson
- Decisional roles: Entrepreneur, Disturbance handler, Resource allocator, Negotiator

Real-World Decision Making

- Three main reasons why investments in IT do not always produce positive results
 - Information quality
 - High-quality decisions require high-quality information
 - Management filters
 - Managers have selective attention and have variety of biases that reject information that does not conform to prior conceptions
 - Organizational inertia and politics
 - Strong forces within organizations resist making decisions calling for major change

High-Velocity Automated Decision Making

- Made possible through computer algorithms precisely defining steps for a highly structured decision
 - Humans taken out of decision
- For example: High-speed computer trading programs
 - Trades executed in 30 milliseconds
- Require safeguards to ensure proper operation and regulation

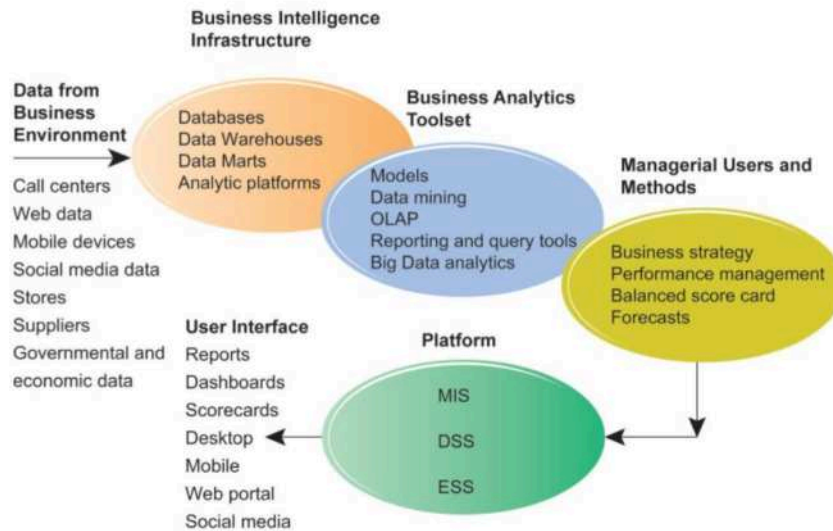
What Is Business Intelligence?

- Business intelligence
 - Infrastructure for collecting, storing, analyzing data produced by business
 - Databases, data warehouses, data marts
- Business analytics
 - Tools and techniques for analyzing data
 - OLAP, statistics, models, data mining
- Business intelligence vendors
 - Create business intelligence and analytics purchased by firms

The Business Intelligence Environment

- Six elements in the business intelligence environment
 1. Data from the business environment
 2. Business intelligence infrastructure
 3. Business analytics toolset
 4. Managerial users and methods
 5. Delivery platform—MIS, DSS, ESS
 6. User interface: Data visualization tools

Figure 12.3: Business Intelligence and Analytics for Decision Support



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Business Intelligence and Analytics Capabilities

- Goal is to deliver accurate real-time information to decision makers
- Main analytic functionalities of BI systems
 - Production reports
 - Parameterized reports
 - Dashboards/scorecards
 - Ad hoc query/search/report creation
 - Drill down
 - Forecasts, scenarios, models

This table lists examples of business intelligence predefined production reports.

Table 12.4: Examples of Business Intelligence Predefined Production Reports

BUSINESS FUNCTIONAL AREA	PRODUCTION REPORTS
Sales	Forecast sales; sales team performance; cross-selling; sales cycle times
Service/call center	Customer satisfaction; service cost; resolution rates; churn rates
Marketing	Campaign effectiveness; loyalty and attrition; market basket analysis
Procurement and support	Direct and indirect spending; off-contract purchases; supplier performance
Supply chain	Backlog; fulfillment status; order cycle time; bill of materials analysis
Financials	General ledger; accounts receivable and payable; cash flow; profitability
Human resources	Employee productivity; compensation; workforce demographics; retention



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Predictive Analytics

- Uses variety of data, techniques to predict future trends and behavior patterns
 - Statistical analysis, Data mining, Historical data, Assumptions
- Incorporated into numerous BI applications for sales, marketing, finance, fraud detection, health care
 - Credit scoring, Predicting responses to direct marketing campaigns

Big Data Analytics

- Big data: Massive datasets collected from social media, online and in-store customer data, and so on
- Help create real-time, personalized shopping experiences for major online retailers
- Smart cities
 - Public records
 - Sensors, location data from smartphones
 - Ability to evaluate effect of one service change on system

Operational Intelligence and Analytics

- Operational intelligence: Business activity monitoring
- Collection and use of data generated by sensors
- Internet of Things
 - Creating huge streams of data from web activities, sensors, and other monitoring devices
- Software for operational intelligence and analytics enable companies to analyze their big data

Location Analytics and Geographic Information Systems

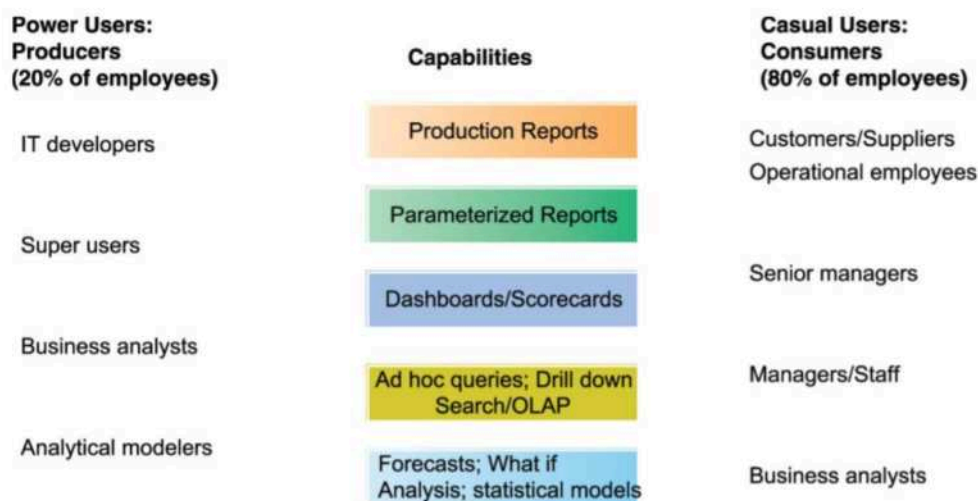
- Location analytics
 - Ability to gain business insight from the location (geographic) component of data
 - Mobile phones, Sensors, scanning devices, Map data
- Geographic information systems (GIS)
 - Ties location-related data to maps
 - Example: For helping local governments calculate response times to disasters

Management Strategies for Developing BI and BA Capabilities

- One-stop integrated solution
 - Hardware firms sell software that run optimally on their hardware
 - Makes firm dependent on single vendor
- Multiple best-of-breed solution
 - Greater flexibility and independence
 - Potential difficulties in integration
 - Must deal with multiple vendors
- All BI and BA systems bring high switching costs

This graphic looks at the different types of users and what they use BI applications for.

Figure 12.4: Business Intelligence Users



Support for Semistructured Decisions

- Decision-support systems
 - Support for semistructured decisions
- Use mathematical or analytical models
- Allow varied types of analysis
 - “What-if” analysis
 - Sensitivity analysis
 - Backward sensitivity analysis
 - Multidimensional analysis / OLAP
 - For example: pivot tables

Decision Support for Senior Management

- ESS: decision support for senior management
 - Help executives focus on important performance information
- Balanced scorecard method
 - Measures outcomes on four dimensions
 - Financial
 - Business process
 - Customer
 - Learning and growth
- Key performance indicators (KPIs) measure each dimension

This graphic depicts the balanced scorecard methodology that many managers use to measure the performance of their business.

Figure 12.7: The Balanced Scorecard Framework



- Business performance management (BPM)
 - Translates firm's strategies (e.g., differentiation, low-cost producer, scope of operation) into operational targets
 - KPIs developed to measure progress toward targets
- Data for ESS
 - Internal data from enterprise applications
 - External data such as financial market databases
 - Drill-down capabilities

Group Decision-Support Systems (GDSS)

- Interactive system to facilitate solution of unstructured problems by group
- Specialized tools
 - Virtual collaboration rooms
 - Software to collect, rank, edit participant ideas and responses
- Promotes collaborative atmosphere, anonymity
- Cisco's Collaboration Meeting Rooms Hybrid (CMR)
- Skype for Business



Exam Notes

ITM MIDTERM REVIEW

Chapter One

What is IT?

- Computer system that performs business tasks
- Usually repetitive tasks (ie bank machine)
- **Information Technology:** Hardware and software that a firm needs in order to achieve its business objectives
- **Information System:** A set of interrelated components that collect, process, store, and distribute information in an organization
 - Input (raw data) → processing → output

How is IT transforming businesses?

- Global market
- Increases efficiency of businesses
- Safe and secure
- Can perform complex calculations and algorithms
- Competitive advantage
- Mobile digital platform
- Expanding ecommerce and internet advertising

Business Process

- Input → Output
- Logically related tasks and behaviours that organizations develop

Dimensions of information systems

- Organization
 - Manufacturing and production
 - Assembling product
 - Sales and marketing
 - Identifying customers
 - Finance and accounting
 - Creating financial statements
 - Human resources
 - Hiring employees
 - Unique business processes and culture
- Management
- Technology
 - Hardware and software
 - IT infrastructure
 - Data management, networking, telecommunication technology
- Business Information Value Chain

- Raw data is transformed to add value to the information
- Value is determined by extent it leads to better decisions, greater profits, etc
- No guarantee that investing in IT will benefit a business
- Factors:
 - Adopting the right business model
 - Investing in complimentary assets
 - Assets required to derive value from an investment
 - Ie invest in technology and people to make it work properly
- Organizational assets
 - Appropriate business model
 - Efficient business processes
- Managerial assets
 - Incentive for innovation, increased collaboration
- Social assets
 - Internet and telecommunication infrastructure

Technical Approach

- Mathematical based models
- Computer science, management science, operation research

Behavioural Approach

- Psychology, economics, sociology

Sociotechnical Approach

- Optimizing both social and technical systems used in production

Operational Intelligence

- Improvement of efficiency → higher profitability
- Technology is important in achieving greater efficiency
-

Time Shifting: Business being conducted 24/7

Space Shifting: Business taking place on a global scale

Key Corporate Assets: intellectual property, core competencies, and financial and human assets

Strategic Business Objectives

- Operational Excellence
- New products, services, and business models
- Customer and supplier intimacy
- Improved decision making
 - Without accurate information, managers must use forecasts/predictions
- Competitive advantage
- Survival
 - IT as a necessity of businesses, ie govt regulations

Chapter Two

Business Processes Cont

- Flows of materials, information, knowledge
- May be assets or liabilities
- Businesses are a collection of business processes
- Functional Business Processes
 - Manufacturing and production
 - Assembling product
 - Sales and marketing
 - Identifying customers
 - Finance and accounting
 - Creating financial statements
 - Human resources
 - Hiring employees

How IT improves Business Processes

- Increasing efficiency
 - Automating steps that were manual
- Enabling new processes
 - Parallel steps, no delay

Digital Firm: Organizations that have enabled core business relationships with employees, customers, suppliers, and other external partners through digital networks

- Growing interdependence between firms ability to use it and its ability to implement corporate strategies and achieve corporate goals

Competitive Advantage: Gives one business advantage over another (price, quality, location, accessibility, etc.)

Enterprise Application: Complex, scalable, distributed, component-based, and mission-critical application

Globalization Challenges and Opportunities

- Internet has drastically reduced costs of operating globally
- Increases in foreign trade and outsourcing
- Presents both challenges and opportunities

Operational Intelligence

- Improvement of efficiency → higher profitability
- Technology is important in achieving greater efficiency

Emerging Digital Firm

- Significant business relationships are digitally enabled and mediated
- Core business processes are accomplished through digital network

Order Fulfillment Process

- Sales
 - Generates order →
 - Submit order →
- Accounting
 - Check credit →
 - Approve credit →
- Manufacturing and Production
 - Assemble product →
 - Ship product

Improving Business Processes with Technology

- Increasing efficiency of existing processes
 - Automating steps that were manual → faster, cheaper, 24/7
- Enabling new processes
 - Changing flow of information
 - Replacing sequential steps with parallel stapes
 - Eliminating delays in decision making

Different Types of Systems: TPS, MIS, DSS, ESS

Transaction Processing Systems (TPS)

- Serve operational managers and staff
- Perform and record daily routine transactions necessary to conduct business
 - Shipping, payroll, etc
- Systems for business intelligence
 - Software for organizing and analyzing data
 - Help make improved decisions, maximize profit margins

Management Information Systems (MIS)

- Serve middle management
- Combines comp sci, management sci, operations research, practical orientation, behavioural issues
- Provide reports on current performance based on tps data
- Gives answers to routine questions
 - Ie green: go, red: stop
- Little analytical capability

Changes in MIS

- IT innovations
 - Cloud
- New business models

- Ecommerce expanding
- Management changes
- Changes in firms and organizations
 - Telework

Decision Support Systems (DSS)

- Supports non-routine decision making
 - Ie green: go, red: go
 - Cannot be easily predicted
- Model driven and data driven DSS
 - Model driven: what if?
 - Data driven: accurate projections
- May use external information in addition to TPS/MIS data

Executive Support Systems (ESS)

- Support senior management
- Addresses nonroutine decisions
 - Requires judgement, evaluation, and insight
- Incorporate data about external events as well as summarized info from MIS and DSS
- ie Digital dashboard with real time view of a firm's financial performance

Enterprise Applications

- Systems for linking enterprise
- Execute business processes across the firm
- Four major applications:
 - Enterprise systems
 - Supply chain management (SCM) systems
 - Customer relationship management (CRM) systems
 - Knowledge management systems

Enterprise Systems

- Collect data from different firm functions and store in a single place
- Resolve problems of fragmented data
- Enables:
 - Coordination of daily activities
 - Efficient response to customers
 - Decision making by managers

Supply Chain Management (SCM) Systems

- Manage firm's relationship with suppliers
- Communicating with suppliers
 - Right amount of inventory
 - Supplier sees that a company is out of light bulbs → supplier sends light bulbs

- Shares info about orders, production, inventory, etc

Customer Relationship Management (CRM)

- Provide info to coordinate all the business processes dealing with customers
 - Sales, marketing, customer service
- Helps firms attract and retain most profitable customers

Knowledge Management Systems (KMS)

- Support processes for applying knowledge and expertise
 - How to create, produce, and deliver goods/services
- Collects internal knowledge and links to external knowledge

Intranets and Extranets

- Used to increase integration and expedite flow of information
- Intranet – internal network accessible by employees only
- Extranet – company websites accessible by vendors and suppliers

E-Business: Use of digital technology and Internet to drive business processes

E-Commerce: Buying and selling goods and services through the internet

E-Government: Using internet technology to deliver information and services

Collaboration

- Synergy
- In person or virtually
- Growing importance of collaboration
 - Changing nature of work
 - Growth of “interaction jobs”
 - Changing organization of the firm
 - Changing scope of the firm
 - Emphasis on innovation
 - Changing culture of work
- Collaboration quality → firm performance
- Tools for collaboration
 - Email and instant messaging, virtual worlds, cloud collaboration
- Benefits of collaboration
 - Productivity
 - Quality
 - Innovation
 - Customer Service
 - Financial Performance

Social Business

- Use of social networking to engage employees, customers, and suppliers
- Deepens interactions and accelerate information sharing
- Requires information transparency

Collaborative Culture

- “Command and Control” organizations
 - No value placed on teamwork or lower level participation
- Collaborative organizations
 - Relies on teams of employees
 - Manager’s purpose is to build teams

Tools for Collaboration

- Email and instant messaging
- Wikis
- Virtual worlds
- Social business platforms
 - Telepresence, cloud, etc

Information Systems Department

- Headed by Chief Information Officer (CIO)
- Programmers
- System analysts
- Information systems managers
- End users

IT Governance

- Strategies and policies for using IT
- Decision rights
- Accountability
- Organization of information systems function (centralized, decentralized, etc)

Evaluating Software Tools

- Identify collaboration challenges
- Identify available solutions
- Analyze costs and benefits
- Evaluate security risks
- Consult users for implementation issues
- Evaluate product vendors

Time/Space Matrix

	Same Time	Different Time
Same Place	Face to Face Interactions	Continuous Task
Different Place	Remote Interactions	Communication and Coordination

Chapter Four

The Dark Side of Big Data

- Problem
 - Opportunities from new technology
 - Undeveloped legal environment
- Solutions
 - Develop big data strategy
 - Develop privacy policies
 - Develop big data predictive models
 - Develop big data mining technology
 - Develop big data analytics tools and predictive modeling systems
- Predictive modeling identifies individuals that fit risk or vulnerability profiles
- Technological innovation is a double edged sword

Ethics: Principles of right and wrong that individuals, acting as free, moral agents, use to make choices to guide their behaviour

- Information systems raise new ethical questions because they create opportunities for:
 - Intense social change, threatening existing distributions of power, money, rights, and obligations

Pond Analogy

- Society = Calm pond
- IT is dropped in pond, creating ripples
- May take years for social and political institutions to develop expectations and laws
 - Legally grey areas

Key Trends That Raise Ethical Issues

- Computing power doubles every 18 months
- Data storage costs rapidly decline
- Data analysis advances
- Networking advances
- Mobile device growth impact

Five Moral Dimensions of the Information Age

- Information rights and obligations
- Property rights and obligations
- Accountability and control
- System quality
- Quality of life

NORA: Nonobvious Relationship Awareness

- Combining data from multiple sources to find obscure hidden connections that might help identify criminals or terrorists
 - Watch lists, incident and arrest systems, customer transaction systems, telephone record, human resources systems

Profiling

- Combining data from multiple sources to create records of information on an individual

Basic Concepts

- Responsibility
 - Accepting the potential costs, duties, and obligations for decisions
- Accountability
 - Mechanisms for identifying responsible parties
- Liability
 - Permits individuals (and firms) to recover damages done to them
- Due Process
 - Laws are well known and understood, with an ability to appeal to higher authorities

Ethical Analysis

- Identify and clearly describe the facts
- Define the conflict or dilemma and identify the higher order values involved
- Identify the stakeholders
- Identify the options that you can reasonably take
- Identify the potential consequences of your options

Candidate Ethical Principles

- Golden rule: do unto others as you would have them do unto you
- **Kant's Categorical Imperative:** If an action is not right for everyone, it is not right for anyone
- **Descartes Rule of Change:** If an action cannot be taken repeatedly, it is not right to take
- **Utilitarian Principle:** Take the action that achieves the greatest value
- **Risk Aversion Principle:** Take the action that produces the least harm
- **Ethical "no free lunch" Rule:** Virtually all objects are owned by someone

Professional Codes of Conduct

- Broadcasted by associations of professionals
 - American Medical Association
 - American Bar Association
- Promises by professions to regulate themselves in the interest of society

Conflicting Interests

- Monitoring employees
 - Right of company to maximize productivity of workers versus workers right to use internet for short personal tasks
 - Facebook monitors users and sells information to advertisers

Privacy

- Claim of individuals to be left alone, free from surveillance or interference from other individuals, organizations, or state; claim to be able to control information about yourself
 - Used to drive changes in privacy legislation (FIPPA)
 - Protected by (in USA):
 - First Amendment (freedom of speech)
 - Fourth Amendment (unreasonable search and seizure)
 - Additional federal statutes (privacy act of 1974)
- Fair information practices
 - Principles governing the use and collection of information
 - Used to drive changes in privacy laws
 - COPPA, HIPAA, Do Not Track Online act of 2011
- FTC FIP Principles
 - Notice/awareness
 - Choice/consent
 - Access/participation
 - Security
 - Enforcement

Internet challenges to privacy

- Cookies
 - Identify browser and track visits to sites
- Web Beacons
 - Tiny graphics embedded in emails and web pages
 - Monitor who is reading emails or visiting site
- Spyware
 - Secretly installed on users computer
 - May transmit users keystrokes
- USA allows businesses to gather transaction information and use it or marketing purposes
 - Opt in/opt out → promotes self regulation over privacy legislation

Technical Solutions

- Email encryption
 - Makes file unreadable to others
- Anonymity tools

- Anti Spyware tools

Property Rights

- Intellectual Property
 - Intangible property of any kind created by individuals or corporations
- Three main ways intellectual property is protected
 - Trade Secret: Public domain does not have access to the work/product
 - Copyright: Protects from being copied for the life of the author plus 70 years
 - Patent: Grants creator an exclusive monopoly on ideas for 20 years
- Challenges to intellectual property rights
 - Digital media is different from physical media
 - Ease of replication
 - Ease of transmission
 - Ease of alteration
 - Compactness
 - Difficulties in establishing uniqueness
 - Digital Millennium Copyright Act
 - Illegal to bypass technology based security of copyrighted material

Computer Related Liability Problems

- Who is Responsible if Software Fails?
 - If a machine injures/harms, software producer and operator are liable
 - If similar to book, author/publisher is responsible

System Quality

- Flawless software is economically impossible
- Three sources of poor system performance
 - Software bugs
 - Hardware failures
 - Poor input data quality

European Directive on Data Protection

- Use of data requires informed consent of customer
- Nations cannot transfer data to countries without similar laws
- Stricter enforcement under consideration
 - Right of access, right to be forgotten
- Safe harbour framework
- Edward Snowden
 - Known for revealing details of classified United States government surveillance programs

Quality of Life: Equity, Access, and Boundaries

- Balancing power
 - Center vs periphery
- Rapidity of change
 - Reduced response time
- Negative social consequences of systems
- Maintaining boundaries
 - Family, work, leisure
- Computer crime and abuse
 - CAN-SPAM act of 2003
- Employment
 - Reengineering job loss
- Equity and Access
 - The digital divide
- Health Risks
 - Repetitive stress injury (RSI), Carpal Tunnel syndrome, Computer vision syndrome (CVS), Technostress