Chapter 1 – Introduction to Systems Analysis & Design

IT – refers to the combination of hardware, software, and services that people use to manage, communicate, and share information.

IT budgets have high priority, in good times or bad.

1.11 The Changing Nature of IT

It is important to realize that each technological advance is part of a long-term process that often brings dramatic change but never really ends.

1.1.2 Systems Analysis and Design

Step-by-step process for developing high-quality information systems.

An information system combines technology, people, and data to provide support for business functions such as order processing, inventory control, human resources, accounting, and many more.

1.1.3 What Does a Systems Analyst Do?

Valued member of the IT department team who helps plan, develop, and maintain information systems.

* Excellent communicators with strong analytical and critical thinking skills.
* Transform business requirements into IT projects, must be business savvy as well as techincally competent.
* Document business processes, test hardware and software packages, design input screens, train users, and plan e-commerce websites.

1.2 Information Systems

System – Set of related components that produces specific results (e.g. Specialized systems route internet traffic, manufacture microchips, and control complex entities like the Hubble telescope.)

Mission-critical system – Vital to a company’s operations (e.g. order processing system is critical because the company cannot do business without it.)

Data – basic facts that are the system’s raw material.

Information – data that has been transformed into output that is valuable to users.

5 key components – Hardware, software, data, processes, people

1.2. 1 Hardware

Consists of everything in the physical layer of the information system. (e.g. servers, workstations, networks, telecommunications equipment, fiber-optic cables, mobile devices)

Data center – Large concentration of networked computers working together

1.2.2 Software

Programs that control the hardware and produce the desired information or results. Consists of two parts.

System software – manages the hardware components, which can include a single computer or a global network. (e.g. OS, security software, device drivers, utility programs such as data backup and disk management.) Also controls flow of data, data security, and manages network operations.

Application software – Programs that support day-to-day business functions and provide users with the information they need. (e.g. enterprise applications, order processing, payroll, company communications networks.)

Horizontal system – inventory/payroll, that can be adapted for use in many different types of companies

Vertical system – Designed to meet the unique requirements of a specific business or industry. (e.g. online retailer, medical practice, auto dealership.)

Data - Raw material that an information system transforms into useful information.

Processes – Tasks and business functions that users, managers, and IT staff members perform to achieve specific results.

1.2.5 People

Stakeholders – people who have an interest in an information system including the management group responsible for the system, and the users.

Business today is being shaped by 3 major trends: rapidly increasing globalization, technology integration for seamless information access across a wide variety of devices, and the rapid growth of cloud-based computing and software services.

1.3.1 B2C (Business-to-consumer)

Incentives for online transactions because web-based processing costs are lower than traditional methods. Airbnb and VRBO have transformed traditional hospitality service into a way for individuals to rent their properties.

1.3.3 B2B (Business-to-Business)

Volume of transactions is much larger than B2C.

EDI – electronic data interchange is a data sharing arrangement. Used to plan production, adjust inventory levels, or stock up on raw materials using data from another company’s IS.

SCM – Supply chain management software.

Supply chain – Companies who provide materials, services, and functions needed to provide a product to a customer.

1.4 Modeling Business Operations

Modeling – Produces a graphical representation of a concept or process that systems developers can analyze, test, and modify.

Business profile – Overview of a company’s mission, functions, organization, products, services, customers, suppliers, competitors, constraints, and future direction. Starting point for modelling process

Business process modeling involves a business profile and a set of models that document business operations.

Model-based systems engineering (MBSE) is one of the leading methods used to develop information systems.

Business process – specific set of transactions, events, and results, that can be described and documented.

Business process model (BPM) - graphically displays one or more business processes. (e.g. Handling an airline reservation, filling a product order, or updating a customer account.)

Business process modeling notation (BPMN) - includes standard shapes and symbols to represent events, processes, workflows, and more. Ludichart is a popular tool used.

1.5.1 Enterprise Computing

Information systems that support companywide operations and data management requirements.

Enterprise resource planning (ERP) - systems that provide cost-effective support for users and managers throughout the company. Core processes are needed to run a company and integrate them into a single system. The disadvantage is that they may impose an overall structure that might or might not match the way a company operates.

1.5.2 Transaction Processing

TP systems process data generated by day-to-day business operations. (e.g. customer order processing, accounts receivable, and warranty claim processing.)

TP systems perform a series of tasks whenever a specific transaction occurs.

1.5.3 Business Support

Business support systems provide job-related information support to users at all levels of a company.

Radio frequency identification (RFID) - uses high-frequency radio waves to track physical objects such as shirts.

1.5.4 Knowledge Management

Knowledge base – allows users to find info by entering keywords or questions in normal English phrases. Uses inference rules – logical rules that identify data patterns and relationships. (e.g. WolframAplha)

1.5.5 User productivity

User productivity systems include email, voice mail, video and web conferencing, word processing, or database management.

Groupware – enables users to share data, collaborate on projects, and work in teams.

1.6.1 Functions and Organizational Levels

A typical organizational model identifies business functions and organizational levels. System analysts must understand the company’s model to recognize who is responsible for specific processes and decisions.

1.6.2 Top Managers

Develop long-range plans, called strategic plans, which define the company’s overall mission and goals.

1.6.3 Middle Managers and Knowledge Workers

Provide direction, resources, and feedback to supervisors and team leaders.

Team leaders oversee operational employees and carry out day-to-day functions. Coordinate shit.

1.6.5 Operational Employees

Users who rely on transaction processing systems to enter and receive data they need to perform their jobs. Empowerment gives employees more responsibility and accountability.

1.7 Systems Development

Structured analysis is a traditional method.

Object-oriented analysis is a recent approach that many prefer.

Agile methods, which include the latest trends in software development.

Project management – Process of planning, scheduling, monitoring, controlling, and reporting upon the development of an info system.

1.7.1 Structured Analysis

Systems development life cycle (SDLC) - series of phases to plan, analyze, design, implement, and support an information system.

Structured analysis uses a set of process models to describe a system graphically.

Data flow diagram (DFD) - Model that uses various symbols and shapes to represent data flow, processing, and storage.

**Systems Planning –** The systems planning phase usually begins with a formal request to the IT dept, called a systems request, which describes problems or desired changes to an info system or a business process. The purpose of this phase is to perform a preliminary investigation to evaluate an IT-related business opportunity or problem.

**Systems Analysis –** The purpose of this phase is to build a logical model of the new system.

Requirements engineering – analyst investigates business processes and documents what the new system must do to satisfy users. Deliverable is the system requirements document.

**Systems Design –** The purpose of this phase is to create a physical model that w

ill satisfy all documented requirements for the system. Deliverable is the system design specification

**Systems Implementation –** New system is constructed. Programs are written, tested, and documented, and the system is installed. Also includes assessment.

**Systems Support and Security** – the IT staff maintains, enhances, and protects the system.

1.7.2 Object-Oriented Analysis

Combines data and the processes that act on the data as objects.

Class – Collection of similar objects

Properties – characteristics that objects inherit from their class or possess on their own

1.7.3 Agile Methods

Attempt to develop a system incrementally by building a series of prototypes and constantly adjusting them to user requirements. Iterative development. Typically uses spiral model

Spiral model – series of iterations, or revisions, based on user feedback.

Agile methods allow developers to be more flexible and responsive but can be riskier than more traditional methods. Weak documentation, blurred lines of accountability.

1.7.4 Prototyping

Tests systems concepts and provides an opportunity to examine input, output, and UI before final decisions are made.

Prototype – Early working version of an info system.

1.8 The Information Technology Department

Technical support which includes seven main functions: application development, systems support and security, user support, database administration, network administration, web support, and quality assurance.

Application development – Systems are developed by teams consisting of users, managers, and IT staff members.

Systems support and security – Provides vital protection and maintenance services

User support - Provides users with technical info, training, and productivity support (help desk)

Database administration – Involves data design, management, security, backup and access

Network administration – Includes hardware and software maintenance, support, and security

Web support – specialists design and construct web pages, monitor traffic, and manage hardware and software.

Quality assurance (QA) - QA team reviews and tests all applications and systems changes to verify specifications and software quality standards.

1.9 The Systems Analyst

Investigates, analyzes, designs, develops, installs, evaluates, and maintains a company’s information systems – constantly interacts with users and managers within and outside the organization

Roles – Acts as a translator to managers and programmers. Best line of defense in an IT disaster. The ability to listen is the most valuable skill. Seeks feedback from users to ensure that systems do not go off track.

Knowledge, skills, and education

* Technical knowledge
* Communication and business skills
* Critical thinking skills
* Education: college degree in information systems, science, or business. Some IT experience is required

Certification – Helps IT professionals learn new skills and gain recognition for efforts.

Career Opportunities

* Companies will need systems analysts to apply new infor technology.
* Explosion in e-commerce will fuel IT job growth
* Important factors
  + Job Titles
  + Company organization
  + Company size
  + Salary, location and future growth
  + Corporate culture

Trends in Information Technology

One of the fastest evolving industries

* Knowledge of current trends is vital

Key Trends

* Agile Methods
* Cloud computing
* Data science
* Mobile devices
* Service orientation
* Social Media