MANAGEMENT INFORMATION SYSTEMS ANALYSIS AND DESIGN

SIT 400

INFORMATION SYSTEMS

- An **information system** (IS) is an arrangement of people, data, processes, and information technology that interact to collect, process, store, and provide as output the information needed to support an organization.

INFORMATION TECHNOLOGY

- **Information technology** is a contemporary term that describes the combination of computer technology (hardware and software) with tele-communications technology (data, image, and voice networks).

Information and Communication Technologies

- ICTs stands for "Information and Communication Technologies." ICT refers to technologies that provide access to information through telecommunications. It is similar to Information Technology (IT), but focuses primarily on communication technologies. This includes the Internet, wireless networks, cell phones, and other communication media.

A TRANSACTION PROCESSING SYSTEM

(TPS) is an information system that captures and processes data about business transactions.

Characteristics

High volume

Data capture focus

Goal is efficiency of data movement

Processing and interfacing different TPSs

A MANAGEMENT INFORMATION SYSTEM

- **MIS** is an information system that provides for management-oriented reporting based on transaction processing and operations of the organization.
- **CHARACTERISTICS OF MIS:** Draws on diverse yet predictable data resources to aggregate and summarize data; may involve forecasting future data from historical trends and business knowledge

A DECISION SUPPORT SYSTEM

(DSS) is an information system that either helps to identify decision making opportunities or provides information to help make decisions. They:

- Identify negative trends
- Better allocation of resources
- Can support Individual, Group or Organization

Characteristics of DSS

- Provides guidance in identifying problems
- Finding and evaluating alternative solutions
- Selecting or comparing alternatives
- Potentially involves groups of decision makers

- Often involves semi-structured problems
- The need to access data at different levels of details
- They facilitate rather than automate decision making
- Intended for repeated use (routinely or ad hoc decision support tasks
- Should improve accuracy, timeliness, quality, and overall effectiveness of specific or a set of related decisions

EXPERT SYSTEMS

An **expert system** is an information system that captures the expertise of workers and then simulates that expertise to the benefit of non-experts. They emulate human advisers.

Human experts in a particular area can be interviewed the information is then organized into rules that govern that knowledge

A COMMUNICATIONS AND COLLABORATION SYSTEM

This is an information system that enables more effective communications between workers, partners, customers, and suppliers to enhance their ability to collaborate.

- Instant communication to board members
- Online access to important documents
- One can track deadlines, on-going projects
- Document views of each member
- Create a virtual boardroom by discussing online

OFFICE AUTOMATION SYSTEMS

an information system that supports the wide range of business office activities that provide for improved work flow between workers. Copiers, fax machines etc. Automation of order entry, invoicing, purchasing

The backbone is :

- Data transmission
- Mail transmission
- Voice transmission

STAKEHOLDERS:

- A **stakeholder** is any person who has an interest in an existing or proposed information system. Stakeholders can be technical or non-technical workers. They may also include both internal and external workers.

- **Information workers** are those workers whose jobs involve the creation, collection, processing, distribution, and use of information.
- **Knowledge workers** are a subset of information workers whose responsibilities are based on a specialized body of knowledge.

SYSTEM OWNERS

System owners – an information system's sponsor and executive advocate, usually responsible for funding the project of developing, operating, and maintaining the information system.

SYSTEM USERS

System users – a “customer” who will use or is affected by an information system on a regular basis – capturing, validating, entering, responding to, storing, and exchanging data and information.

- **Internal users**
  - Clerical and service workers
  - Technical and professional staff
  - Supervisors, middle managers, and executive managers
  - Remote and mobile users (internal but disconnected)
- **External users**

SYSTEM DESIGNERS AND SYSTEM BUILDERS

System designer – a technical specialist who translates system users' business requirements and constraints into technical solution. She or he designs the computer databases, inputs, outputs, screens, networks, and software that will meet the system users' requirements.

System builders – a technical specialist who constructs information systems and components based on the design specifications generated by the system designers.

Systems analyst – a specialist who studies the problems and needs of an organization to determine how people, data, processes, and information technology can best accomplish improvements for the business.

- A **programmer/analyst** (or **analyst/programmer**) includes the responsibilities of both the computer programmer and the systems analyst.
- A **business analyst** focuses on only the non-technical aspects of systems analysis and design.

CAUSES OF SYSTEMS ANALYSIS

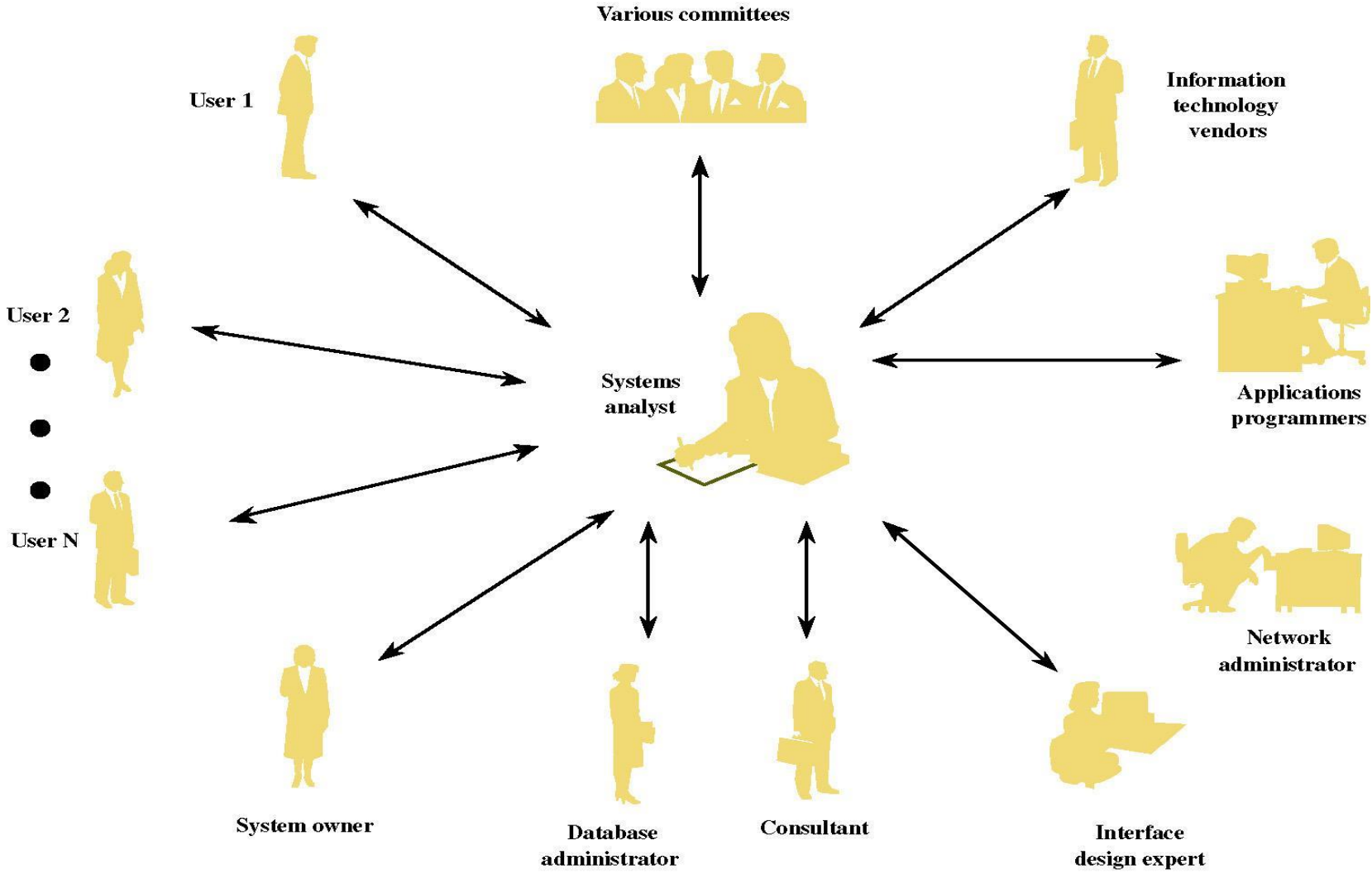
- True problem situations, either real or anticipated, that require corrective action
- Opportunities to improve a situation despite the absence of complaints
- Directives to change a situation regardless of whether anyone has complained about the current situation

SKILLS NEEDED BY THE SYSTEMS ANALYST

- Working knowledge of information technology
- Computer programming experience and expertise
- General business knowledge
- General problem-solving skills

- Good communication skills interpersonal
- Good interpersonal relations skills
- Flexibility and adaptability
- Character and ethics

THE SYSTEMS ANALYST AS A FACILITATOR



A SIMPLE SYSTEM DEVELOPMENT PROCESS

System development process – a set of activities, methods, best practices, deliverables, and automated tools that stakeholders use to develop and maintain information systems and software.

A GENERAL PROBLEM-SOLVING APPROACH

1. Identify the problem.
2. Analyze and understand the problem.
3. Identify solution requirements or expectations.
4. Identify alternative solutions and choose the “best” course of action.
5. Design the chosen solution.
6. Implement the chosen solution.
7. Evaluate the results. If the problem is not solved, return to step 1 or 2 as appropriate.

The PIECES Problem-Solving Framework

P - the need to improve performance

I - the need to improve information (and data)

E - the need to improve economics, control costs, or increase profits

C - the need to improve control or security

E - the need to improve efficiency of people and processes

S - the need to improve service to customers, suppliers, partners, employees, etc.

SYSTEM DEVELOPMENT PROCESS OVERVIEW

System initiation – the initial planning for a project to define initial business scope, goals, schedule, and budget.

System analysis – the study of a business problem domain to recommend improvements and specify the business requirements and priorities for the solution.

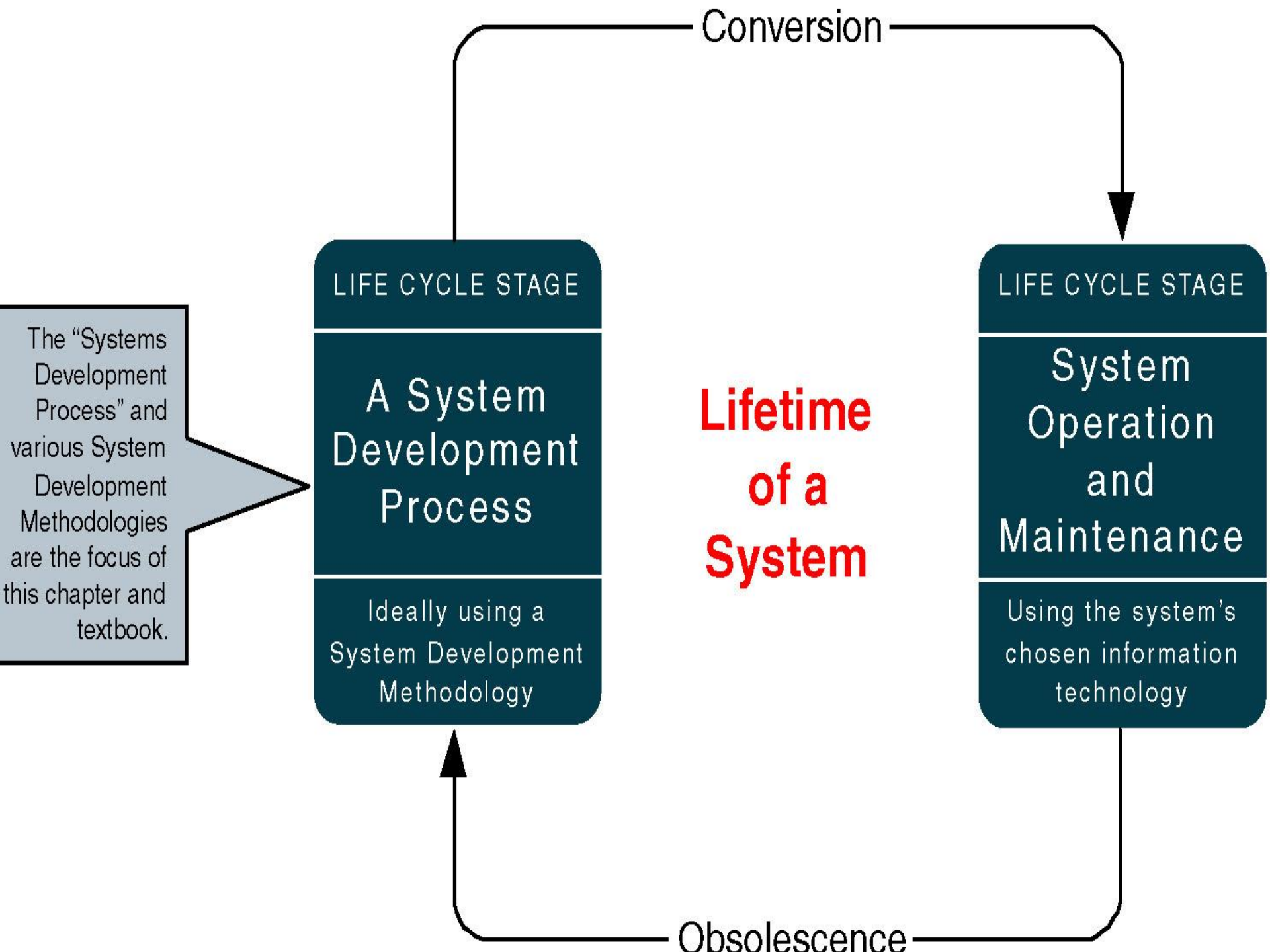
System design – the specification or construction of a technical, computer-based solution for the business requirements identified in a system analysis.

System implementation – the construction, installation, testing, and delivery of a system into production.

PROJECT AND PROCESS MANAGEMENT

Project management – the activity of defining, planning, directing, monitoring, and controlling a project to develop an acceptable system within the allotted time and budget.

Process management – the ongoing activity that defines, improves, and coordinates the use of an organization's chosen methodology (the "process") and standards for all system development projects.


Conversion
LIFE CYCLE STAGE
A System Development Process
Ideally using a System Development Methodology
LIFE CYCLE STAGE
System Operation and Maintenance
Using the system's chosen information technology
Lifetime of a System
Obsolescence
The "Systems Development Process" and various System Development Methodologies are the focus of this chapter and textbook.

PRINCIPLES OF SYSTEM DEVELOPMENT

- Use a problem-solving approach.
- Get the system users involved.
- Establish phases and activities.
- Document through development.
- Establish standards.

- Manage the process and projects
- Justify systems as capital investments.
- Don’t be afraid to cancel or revise scope.
- Divide and conquer.
- Design systems for growth and change.

Where do systems development projects come from?

- **Problem** – an undesirable situation that prevents the organization from fully achieving its purpose, goals, and/or objectives.
- **Opportunity** – a chance to improve the organization even in the absence of an identified problem.

- **Directive** - a new requirement that is imposed by management, government, or some external influence.
- **Unplanned projects**
  - Triggered by a specific problem, opportunity, or directive that occurs in the course of doing business.

- Steering committee – an administrative body of system owners and information technology executives that prioritizes and approves candidate system development projects.
- Backlog – a repository of project proposals that cannot be funded or staffed because they are a lower priority than those that have been approved for system development.

SYSTEM PROJECTS

- **Planned Projects**
  - An **information systems strategy plan** has examined the business as a whole to identify those system development projects that will return the greatest strategic (long-term) value to the business

- A **business process redesign** has thoroughly analyzed a series of business processes to eliminate redundancy and bureaucracy and to improve efficiency and value added. Note it is time to redesign the supporting information system for those redesigned business processes.

SYSTEMS DEVELOPMENT LIFE CYCLE

- Traditionally, there are seven steps in the development of a new system, but some of the steps can be merged to form one step. Modern methods bypass some of the steps and there are development tools on the market that assist a system analyst in designing a computer system.

PROBLEM RECOGNITION

- The purpose of this step is to establish whether there is a need for a new system and if so the system analyst specifies the objectives of the new system. Management gives the **symptoms** and the analyst **establishes** the real problem. It is like a patient going to the doctor, he/she describes the symptoms and the doctor identifies the problem. This is usually accomplished by preliminary survey or study.

FEASIBILITY STUDY

- This step is for determining whether or not a new system is feasible**, and** is divided in two sections: **Fact finding** and **feasibility assessment**.

FACT FINDING

- The job of information gathering is absolutely vital. Without an understanding of the business and its present activities, **design** and **development** of the computer information system, cannot go forward. One must know where to find the needed information. Following are some categories of information that would be helpful in designing a computer system:

Categories of information

- **Information about the organization:** Goals, organization structure, objectives of functional units, and policies. Information systems implement **goals** and **objectives**, and therefore any request for systems services must be viewed in the light of its contribution to the company goals and objectives.

- **Information about People:** Their authority and responsibility, and their information needs: The system should be able to provide the users with the information they need to enable them to work efficiently.

- **Information About Work:** Tasks and work flows, methods and procedures for performing work, work schedules and volumes, performance criteria and the control mechanism. Information systems are going to be used for work in the organization, so one must understand what is going on before computerizing.

- **Information About Work Environment:** Physical arrangement of work areas and the resources available. This is important because the computer system will come with its components which might require specific work environment.

NOTE:

- One cannot say one category is more important than the other or all categories are needed. The decisions are judgmental. What should be left out, and how much effort should be put where, varies with the nature and complexity of the individual system.

METHODS FOR GATHERING INFORMATION

commonly used methods are:-

- Interviews
- Questionnaires
- Observation
- Work sampling and measurement
- Joint Requirements Planning (JRP)
- Joint Application Development (JAD)
- Rapid Application Development (RAD)

FEASIBILITY ASSESSMENT

After information has been gathered, it is analyzed to determine if it is feasible for the organization to acquire computer, or improve on the present computer system. Something feasible can be done. Most organizations consider only the financial aspect.

DECISION ANALYSIS

- Candidate solutions are evaluated in terms of:
  - **Technical feasibility** – Is the solution technically practical? Does our staff have the technical expertise to design and build this solution?
  - **Operational feasibility** – Will the solution fulfill the users' requirements? To what degree? How will the solution change the users' work environment? How do users feel about such a solution?

- **Economic feasibility** – Is the solution cost-effective?
- **Schedule feasibility** – Can the solution be designed and implemented within an acceptable time?
- **Risk feasibility** – What is the probability of a successful implementation using the technology and approach?

NOTE:

- The analyst must acknowledge that there is no perfect system; even the best system has its own weak points.
- The human factor plays an important role during this phase, the trend should be towards designing system that has users in mind, that is a user friendly system.

ANALYSIS AND PHYSICAL DESIGN PHASE:

- This is the most technical phase of the life cycle
- During the **Analysis** the requirements of the proposed new system are determined, either by using dataflow diagrams or models
- The objective is to design a new system that fulfills the requirements of users and management (using models).

PHYSICAL DESIGN & INTEGRATION

- **Physical design** – the translation of business user requirements into a system model that depicts a technical implementation of the users' business requirements. Common synonyms include *technical design* or *implementation model*.
- Two extreme philosophies of physical design

- *Design by specification* – physical system models and detailed specification are produced as a series of written (or computer-generated) blueprints for construction.
- *Design by prototyping* – Incomplete but functioning applications or subsystems (called *prototypes*) are constructed and refined based on feedback from users and other designers.

Commercial application package implementation strategy

- **Commercial application package** – a software application that can be purchased and customized to meet the business requirements of a large number of organizations or a specific industry. A synonym is *commercial off-the-shelf* (COTS) system.

- **Gap analysis** – a comparison of business and technical requirements for a commercial application package against the capabilities and features of a specific commercial application package for the purpose of defining the requirements that cannot be met.

Application Development Environments

- **Application development environments** (ADEs) – an integrated software development tool that provides all the facilities necessary to develop new application software with maximum speed and quality. A common synonym is *integrated development environment* (IDE)

- ADE facilities may include:
  - Programming languages or interpreters
  - Interface construction tools
  - Middleware
  - Testing tools
  - Help authoring tools
  - Repository links (warehouse etc)

Implementation Phase

- The objective of this phase is to produce a complete new system or improved system that encompasses computer processing, manual procedures, and all interfaces between computerized and manual processes, and also to secure approval to proceed with the system installation.

Post Implementation

- Post implementation review should be done after the system has been working 4 to 6 months. It could be by the same analysts or a different one. Standard system analysis techniques are used. Users should be interviewed to find out if user objectives are being met.

End User Development

- End User Development is the current trend; Information system professionals are playing a consulting role. Application capabilities built into end user software packages have made it easier for many users to develop their own computer-based solutions.

THANK YOU

BY

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