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Analysis and Design of Systems (ADS) [BCA – 2]

UNIT 1 – SYSTEM ANALYSIS BASICS

WHAT IS A SYSTEM?

✓ System means A SOFTWARE.

✓ A set of ideas or rules for organizing something that is called "System/Software".

✓ A particular way of doing something.

✓ A group of things or parts that work together.

✓ A system is a group of interacting or interrelated elements that act according to a set of rules to form a unified whole. A system, surrounded and influenced by its environment, is described by its boundaries, structure, and purpose and expressed in its functioning.

TYPES OF SYSTEM

- ❑ Transaction processing systems (TPS).

- ❑ Office automation systems (OAS) and knowledge work systems (KWS).

- ❑ Management information systems(MIS).

- ❑ Decision support systems (DSS).

- ❑ Artificial Intelligence (AI) and Expert Systems.(ES)

- ❑ Group decision support systems (GDSS).

- ❑ Computer-supported collaborative work systems (CSCWS).

- ❑ Executive support systems (ESS).

TPS

❑ A transaction processing system is software that ensures a **business transaction's** completion and keeps track of transactions. TPS reduces the time required to perform day-to-day transactions rather than manually.

❑ For example, if a customer purchases a book from a shop, they might pay with a credit card. A transaction processing system takes the customer's card information, communicates with their bank, and approves or declines the purchase based on their account balance.

❑ It is essential to the business's day-to-day operations that these systems function smoothly and without interruption.

❑ TPS is also known as transaction processing or real-time processing.

OAS

- ❑ An office automation system (OAS) is an information system that is computer-based that **collects, processes, stores, and transmits electronic messages,** supports data workers who do not usually create new knowledge. OR

- ❑ An office automation system (OAS) is a collection of communication technology, computers, and persons to **perform official tasks.** It executes office transactions and supports official activities at every organizational level.

- ❑ They analyze information to transform data or manipulate it in some way before sharing it with the organization and sometimes beyond.

- ❑ The backbone of this is LAN, which allows users to transmit data, mail, and even voice across the network. ALL office functions including dictation, typing, filing, copying, fax, record management, and telephone operations are falls under this category.

KWS

- ❑ Knowledge work system (KWS) support professional workers.

- ❑ such as **scientists, engineers, and doctors** by aiding them in their efforts to **create new knowledge**.

- ❑ Allowing them to contribute it to their organization or to society at large.

MIS

❑ MIS are computerized information systems that work because of the **purposeful interaction between people and computers**.

❑ In most of the cases, Management Information System **used by managers to monitor the organization's current performance status**.

❑ Examples - Billing and payment processing, budgeting systems, content management, IT services, Form automation, Customer relationship management etc

MIS
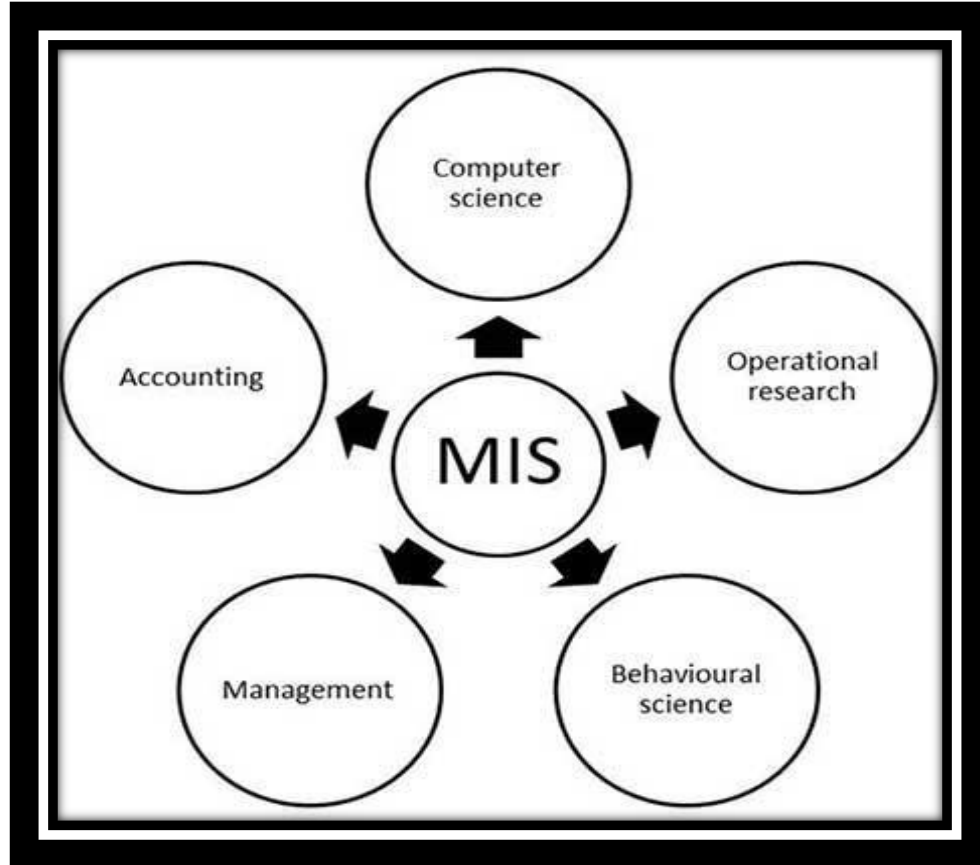
DSS

❑ A higher-level class of computerized information systems is decision support systems (DSS).

❑ A decision support system (DSS) **is a computer program application used to improve a company's decision-making capabilities**. It analyses large amounts of data and presents an organization with the best possible options available.

❑ DSS used AI, Machine learning, mathematical models, and statistical techniques to provide solutions.

❑ Examples – **financial planning systems, Bank loan management system**

AI

- Artificial intelligence (AI).

- The general thrust of AI has been to develop machines that behave intelligently.

- Two avenues of AI research are (1) understanding natural language and (2) analysing the ability to reason through a problem to its logical conclusion.

- Expert systems use the approaches of AI reasoning to solve the problems put to them by business (and other) users.

- Examples – Alexa, robots, etc

ES

- An expert system also called a knowledge-based system.

- An expert system means a computer program, **that uses artificial intelligence methods to solve problems within a specialized domain that ordinarily requires human expertise**.

- Expert systems now have commercial applications in fields as diverse as **medical diagnosis, petroleum engineering, and financial investing**.

- The basic components of an expert system are the knowledge base, an inference engine connecting the user with the system by processing queries via languages such as structured query language(SQL), and the user interface.

ES

Example -

- ❏ **Cadet:** One of the best Expert System Examples that can identify cancer at its early stages.

- ❏ **DENDRAL:** Expert system used for chemical analysis to predict molecular structure.

GDSS

❑ A group decision support system (GDSS) is an interactive computer-based system, in that, several decision-makers (work together in a group) to find solutions to problems that are unstructured in nature.

❑ They are designed in such a way that they take input from multiple users interacting simultaneously with the systems to arrive at a decision as a group.

❑ Groupware and web-based tools for electronic meetings and videoconferencing also support some of the group decision-making processes, but their main function is to make communication possible between the decision-makers.

GDSS is a more general term because it discussed under the CSCWS.

GDSS

CSCWS

- ❑ Computer-supported cooperative work (CSCW) consists of software tools and technology that support groups of individuals working on projects at different sites. **It is based on e principle of group coordination and collaborative activities** supported through computer systems.

- ❑ May include software support called groupware for team collaboration via network computers

- ❑ **Example**: video conferencing, Web survey system

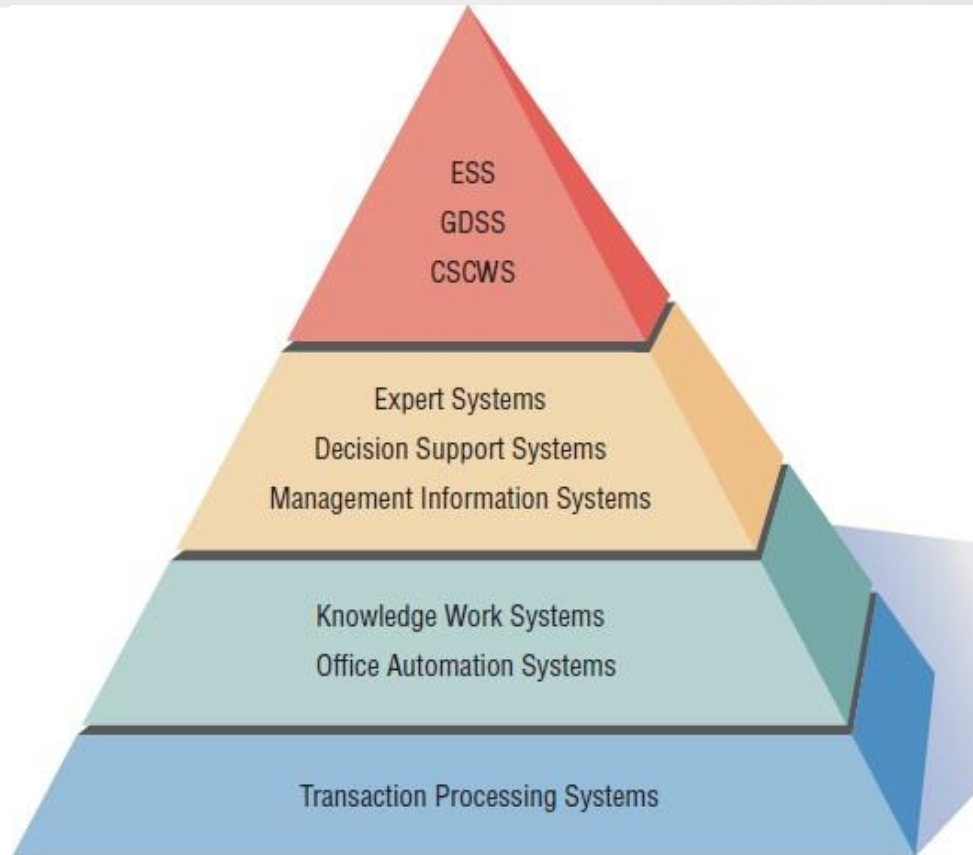- ❑ Sometimes GDSS are discussed under the more general term *computer-supported collaborative work systems (CSCWS).*

CSCWS

❑ which might include software support called groupware for team collaboration via networked computers.

❑ Group decision support systems can also be used in a virtual setting.

ESS

❏ It is a type of management support system that **supports senior executive information and decision-making needs**. **It provides information to meet organizational goals.**

❏ Executive support systems (ESS) help executives organize their interactions with the external environment by providing graphics and communications technologies in accessible places such as boardrooms or personal corporate offices.

❏ Although **ESS relies on the information generated by TPS and MIS**.

ESS

❑ Executive supportsystems help their users address unstructured decision problems, which are not application specific, by creating an environment that helps them think about strategic problems in an informed way.

❑ Examples – Market reports, Financial reports and information, Technology reports like patent records, etc.

TYPES OF SYSTEM

Pyramid diagram (top to bottom):

ESS / GDSS / CSCWS

Expert Systems / Decision Support Systems / Management Information Systems

Knowledge Work Systems / Office Automation Systems

Transaction Processing Systems

INTEGRATING TECHNOLOGY FOR THE SYSTEM

❑   E-commerce Applications and Web Systems.

❑   Enterprise Systems.

❑   Systems for Wireless and Mobile Devices.

❑   Open Source Software

E-COMMERCE APPLICATION & WEB SYSTEMS

❑ Many of the systems can be imbued with greater functionality if they are migrated to the World Wide Web or if they are originally conceived and implemented as Web-based technologies.

❑ There are many benefits to mounting or improving an application on the Web.

❑ Increasing user awareness of the availability of a service, product, industry, person, or group.

E-COMMERCE APPLICATION & WEB SYSTEMS

- The possibility of 24-hour access for users.

- Improving the usefulness and usability of the interface design.

- Creating a system that can extend globally rather than remain local, thus reaching people in remote locations without worry about the time zone in which they are located.

ENTERPRISE SYSTEM

❑ Enterprise systems would comprise the top layer.

❑ ERP is **software that manages business processes for a company, or organization, in our case, a School/College**.

❑ The way it works is that **ERPs feature multiple "applications," or tools, that work together to connect departments and bring the data from those various departments together into one database.**

❑ Plus, good ERP software solutions maintain your data in real time, meaning as soon as you enter information into the system, all connected departments immediately begin working from the updated data.

ENTERPRISE SYSTEM

❑ Popular ERP software includes SAP and Oracle.

❑ Typically, analysts as well as some users require vendor training, support, and maintenance to be able to properly design, install, maintain, update, and use a particular ERP package.

SYSTEMS FOR WIRELESS AND MOBILE DEVICES

❑ Analysts are being asked to design new systems and applications for adventurous users.

❑ Wireless and mobile devices such as the Apple iPhone, iPod, or BlackBerry.

❑ wireless communications networks for users that integrate voice, video, text messaging, and email into organizational intranets or industry extranets.

❑ Wireless e-commerce is referred to as commerce (mobile commerce).

❑ In more advanced settings, analysts may be called on to design intelligent, software that can assist users with tasks in which the software learns users' preferences over time and then acts on those preferences.

OPEN SOURCE SOFTWARE

❑ *Open Source* is a licensing mechanism that grants you certain rights to the source code. *Open Source* means that you are making the *source* (design, code, ingredients, etc.) *open* for others to see, share, and improve.

❑ For example, the Android operating system is open source because the public is given access to the SOURCE code of the operating system, other examples of open source projects include Apache for developing a Web server, the browser called Mozilla Firefox, and Linux(open source operating system.)

❑ You can **see** the source code that was used to create the program.

OPEN SOURCE SOFTWARE

❑ You can **share** the code with other people so that they can see it too.

❑ You can **use** the source code and modify it, or combine it with your source code to make something new, and you can share that with other people too.

NEED FOR A SYSTEM ANALYSIS AND DESIGN

❑ System Analysis is important because it provides an avenue for solutions in the system through the various tasks involved in doing the analysis. Through these **various tasks**, the overall **quality of a system** can be **easily modified** or **improved** and **occurrences of errors can ultimately be reduced.**

❑ Systems analysts seek to understand what humans need to analyse data input, process or transform data, store data, and output information in a particular organization.

❑ By doing thorough analysis, analysts seek to identify and solve the right problems.

NEED FOR A SYSTEM ANALYSIS AND DESIGN

❑ Installing a system without proper planning leads to great user dissatisfaction and frequently causes the system to fall into disuse.

❑ It can be thought of as a series of processes systematically undertaken to improve a business through the use of computerized information systems.

ROLE OF SYSTEM ANALYSIS

❑ A system analyst systematically researches problems, plan solutions, recommends software, and coordinates development to meet business or other requirements.

❑ **System analyst is an individual who selects and configures computer systems for business**. This means an analyst must understand the general objective of business. The analyst must be able to work with people of all descriptions and be experienced in working with computers.

❑ The analyst plays many roles, sometimes balancing several at the same time

ROLE OF SYSTEM ANALYSIS

❑ Systems Analyst as <mark>Consultant</mark>

❑ Systems Analyst as <mark>Supporting Expert</mark>

❑ Systems Analyst as <mark>Agent of Change</mark>

SYSTEM ANALYST AS CONSULTANT

❑ The main purpose of a consultant, or system analyst, will be to help clients and companies use computer technology effectively and efficiently.

❑ Consultants, System Analysts consult clients about their business requirements and implement information systems business solutions.

❑ They must measure key performance indicators (KPI) to ensure continual process improvement while providing recommendations to their senior management. These consultants must provide feedback and reports to team managers about their project performance.

SYSTEM ANALYST AS CONSULTANT

Responsibilities of System analyst include:

❑ Achieve faster output using SQL query optimization which helps faster financial processing and fraud detection (credit cards) when required.

❑ Design and write windows applications.

❑ Enhance and build new functionality into a giant ColdFusion base ERP system specific to the food service industry. [*ColdFusion is an application server used to create dynamic internet applications]

❑ The average hourly pay for this role is $42.29, which amounts to $87,957 annually

SYSTEM ANALYST AS SUPPORTING EXPERT

❑ Another role that you may be required to play is that of supporting expert within a business for which you are regularly employed in some systems.

❑ In this role the analyst draws on professional expertise concerning computer hardware and software and their uses in the business.

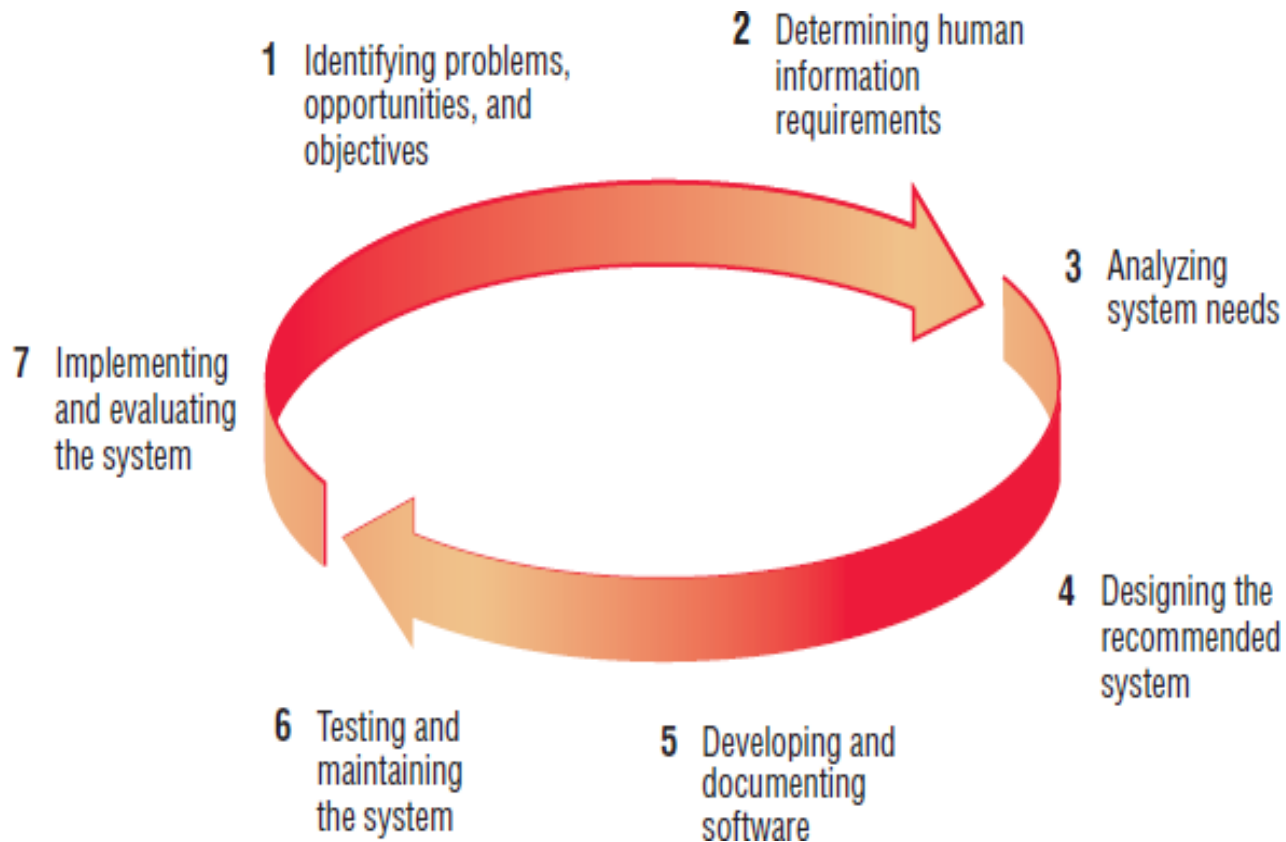❑ As the supporting expert, you are not managing the project, you are merely serving as a resource for those who are.

SYSTEM ANALYST AS AGENT OF CHANGE

❑ The most comprehensive and responsible role that the systems analyst takes on is that of an agent of change.

❑ You are an agent of change whenever you perform any of the activities in the systems development life cycle and are present and interacting with users and the business for an extended period (from two weeks to more than a year).

❑ An agent of change can be defined as a person who serves as a catalyst for change, develops a plan for change, and works with others in facilitating that change.

SYSTEM ANALYST AS AGENT OF CHANGE

❑ each user the process of change, because changes in the information system do not occur independently; rather, they cause changes in the rest of the organization as well.

❑ An agent of change can be defined as a person who serves as a catalyst for change, develops a plan for change, and works with others in facilitating that change.

SDLC

1 Identifying problems, opportunities, and objectives

2 Determining human information requirements

3 Analyzing system needs

4 Designing the recommended system

5 Developing and documenting software

6 Testing and maintaining the system

7 Implementing and evaluating the system

SYSTEM ANALYST AS AGENT OF CHANGE

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SDLC

❑ SDLC Cycle represents the process of developing software. It is a process of building software with the highest quality and lowest cost. It covers the detailed plan for building, deploying, and maintaining the software. **SDLC defines the complete cycle of development** i.e. all the tasks involved in planning, creating, testing, and deploying a Software Product.

OBJECTIVES:

❑ To produce quality software that meets customer expectations, and reaches completion within time and budget.

❑ Increased and enhance development speed

❑ Improved client relations

❑ Helps you to decrease project risk and project management plan overhead

IDENTIFYING PROBLEMS, OPPORTUNITIES, AND OBJECTIVES

- ❑ In this first phase of the systems development life cycle, the analyst is concerned with correctly identifying problems, opportunities, and objectives.

- ❑ The first phase requires that the analyst look honestly at what is occurring in a business.

- ❑ Then, together with other organizational members, the analyst **pinpoints problems**.

- ❑ This stage gives a clearer picture of the scope of the entire project and the anticipated issues, opportunities, and directives which triggered the project.

IDENTIFYING PROBLEMS, OPPORTUNITIES, AND OBJECTIVES

❑ Identifying objectives is component also an important of the first phase

❑ The analyst must first discover **what the business is trying to do**.

❑ The people involved in the first phase are the **users, analysts, and systems managers coordinating the project.**

DETERMINING HUMAN INFORMATION REQUIREMENTS

❑ Requirements Gathering stage needs teams to get detailed and precise requirements. This helps companies to finalize the necessary timeline to finish the work of that system.

❑ For Example, A customer wants to have an application that involves money transactions. In this case, the requirement has to be clear like what kind of transactions will be done, how it will be done, in which currency it will be done, etc.

Asking some questions to themselves

❑ What are the users' physical strengths and limitations?

❑ What needs to be done to make the system

❑ legible(CAPABLE TO UNDERSTAND), and safe?

❑ What information do users need to perform their jobs.

❑ What new tasks are enabled by the new system that users were unable to do without it?

❑ How can the analyst create a system that is rewarding for users to use?

ANALYSING SYSTEM NEEDS

❑ The next phase that the systems analyst analyzing the system needs.

❑ The analysis stage includes gathering all the specific details required for a new system as well as determining the first ideas for prototypes.

Developers may:

1) Define any prototype(working model) system requirements.

2) Evaluate alternatives to existing prototypes.

3) Perform research and analysis to determine the needs of end-users.

❑ Again, special tools and techniques help the analyst make requirement determinations.

❑ Tools such as data flow diagrams (DFD), sequence, or other diagrams, a data dictionary is developed that lists all the data items used in the system, as well as their specifications.

❑ Activity diagrams or sequence diagrams to show the sequence of events, and illustrate systems in a structured, graphical form.

DESIGNING THE RECOMMENDED SYSTEM

❑ In the design phase of the SDLC, the systems analyst uses the information collected earlier to accomplish the logical design of the information system.

❑ In this design phase of work, the team makes software design decisions regarding the architecture and make the software solution.

❑ This can involve creating design documents, and coding guidelines, and discussing the tools, practices, runtimes, or frameworks that will help the team meet the software requirement specification and goals defined in the requirements gathering phase.

DESIGNING THE RECOMMENDED SYSTEM

- ❑ The analyst designs procedures for users to help the accurately enter data so that data going into the information systemize correctly.

- ❑ In addition, the analyst provides for users to complete effective input to the information system by using techniques of good form and Web page or screen design.

DEVELOPING AND DOCUMENTING SOFTWARE

❑ In the fifth phase of the SDLC, the analyst works with programmers to develop any original software that is needed.

❑ During this phase the analyst works with users to develop effective documentation for software, including procedure manuals, online help, and Web sites featuring Frequently Asked Questions (FAQs).

❑ Programmers have a key role in this phase because they design, code, and remove syntactical errors from computer programs.

TESTING AND MAINTAINING THE SYSTEM

❑ Before the information system can be used, it must be tested.

❑ Testing starts once the coding is complete and the modules are released for testing

❑ This can involve unit testing, performing integration and end-to-end tests, verification/validation, and reporting or identifying bugs or defects in the software solution.

❑ This process continues until the software is bug-free, stable, and working according to the business needs of that system.

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TESTING AND MAINTAINING THE SYSTEM

The following 2 activities occur in this phase:

❑ **Bug fixing** – bugs are reported because of some scenarios which are not tested at all

❑ **Enhancement** – Adding some new features into the existing software

IMPLEMENTING AND EVALUATING THE SYSTEM

❑ In this last phase of systems development, the analyst helps implement the information system.

❑ This phase involves training users to handle the system.

❑ Vendors do some training, but oversight of training is the responsibility of the systems analyst.

❑ In addition, the analyst needs to plan for a smooth conversion from the old system to the new one

IMPACT OF MAINTENANCE

❑ After the system is installed, it must be maintained, meaning that the computer programs must be modified and kept up to date.
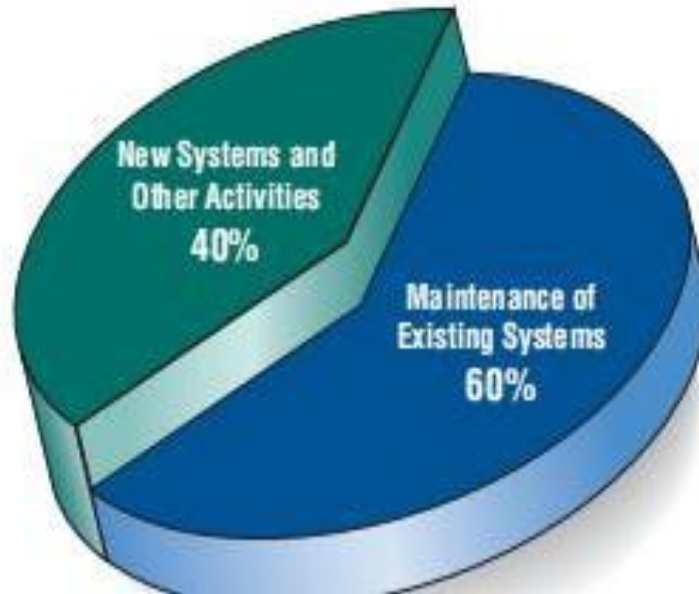
IMPACT OF MAINTENANCE

1) Users often request additional features after they become familiar with the computer system and its capabilities.

2) The business changes over time.

3) Hardware and software are changing based on requirements.

USING CASE TOOLS

❑ Analysts who adopt the SDLC approach often benefit from productivity tools, called Computer Aided Software Engineering (CASE) tools

❑ Visible Analyst (VA) is one example of a CASE tool that enables systems analysts to do graphical planning, analysis, and design to build complex client/server applications and databases.

❑ All the information about the project is stored, Ex -, a large collection of records, elements, diagrams, screens, reports, and other information.

AGILE APPROACH

❑ At its simplest, Agile simply means continuous incremental improvement through small and frequent releases. The term Agile is most commonly associated with software development as a project management methodology

❑ The agile approach is a software development approach based on values, principles, and core practices.

❑ The four values are communication, simplicity, feedback, and courage.

❑ So it is recommended that systems analysts adopt these values in all projects they undertake, not just when adopting the agile approach.

THANK YOU

MOTIVATION GETS YOU STARTED, DISCIPLINE KEEPS YOU GOING.