

MODULE 7. Information systems

The plan

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1. Definition of an information system, its goals, and examples of applications.

Information systems is a set of computer-based tools for collecting, storing, and processing data to provide **relevant, accurate, and timely information** for corporations and users. It helps to do routine tasks automatically (for people) and (for organisations) to get connections between suppliers and customers. Information systems consist of : **networks** (network media, devices, interface and protocols), **software** (system for hardware and application for users) for **hardware** (input, storing and processing devices) , **database** and **people** (users and specialists).

2. Types of information systems and their main characteristics.

1. **Transaction processing system** provides a way to collect, process, store, modify or cancel transactions.
2. **Management information system** is used to analyse data and provide data for decisions. Managers depend on these reports to make routine business decisions.
3. **Decision support system** helps people to make decisions by manipulating and accessing data from external sources
4. **Expert system** is designed to provide recommendations.

3. SDLC and its core phases.

SDLS (or Software Development Life Cycle) - (жизненный цикл разработки системы) - way to construct application system.

Core phases:

1. **Analysis** - we should make a system requirement report, study the current system, and determine system requirements. We analyse the current version or ask the user what is wrong. If we make a new one system we analyse the aims and the current existing system version in the market. The goal is to make a system requirement report.

2.**Planning** - during this phase we assemble a project team, justify the project, choose a development methodology, develop a project schedule and produce a plan.

3.**Design** - the goal is thinking about alternatives(to meet system requirements). During this phase we Make methodology using software and hardware alternatives. We just think about alternatives - what we need to create an information system. We need hardware and software solutions.

4.**Implementation** - is just coding,debugging,testing and conversion(realising).

5.**Maintenance** - during this phase we update the system if necessary through patches(if it is one bug),service pack(group of patches to correct mistakes), new version(if we completely rewrite).

4.Planning phase,its goal,and main activities.

Phase goal is to create a project developing plan.

Project developing plan includes : a short description with its scope, estimate of the cost with potential benefits,list of participants and schedule for the project.

Main activities:

- 1.Assemble the project team.
- 2.Justify the project - it justifies the goal, how much money you need and how much money it brings to the company.
- 3.Choose a development methodology.
- 4.Develop a project schedule.
- 5.Produce a project development plan.

5.Analysis phase,its goal,and main activities.

Phase goal is to produce a list of requirements.

Main activities:

- 1.Study the current system.
- 2.Determine system requirements by asking users and study the current version or making a trial version.
- 3.Write a requirements report,which includes what the system should do,and their requirements.

6.Definition of the design phase. Its purpose and activities.

Design phase - is a third phase,in which you satisfy system requirements by evaluating hardware and software solutions.

Purpose - to meet system requirements.

Main activities:

We just think about alternatives - what we need to create an information system. We need hardware and software solutions.

7.Hardware and software alternatives.

Hardware solutions:

- 1.**Device requirements.** We should identify where these devices will be used, then we identify for what we are going to use in our information system.
- 2.**Network technology.** We choose our network technology : wired or wireless, depending where you are located : in the office, or on the street. And maybe it requires only LAN or WAN.
- 3.**Type of storage** We choose what type of storage we will use : in house or cloud based. Pros and cons: in house it costs more, you can manage your data, but it is more secure, while cloud based is cheaper and it is less secure and you can't manage all your data.
- 4.**Level of automation.** It describes the level of user interference into the information system.

Software solutions:

1. Application development tools. You develop a system with already existing tools. **Pros:** faster, **cons:** they are not satisfy all system requirements as a system from scratch.

2. System from scratch. It's the longest way and moreover it costs much, because you start from the beginning. **Pros :** will meet all system requirements, because you do it according to the list of system requirements, **cons:** costs very much from time and money.

3. Application software. It's an alternative to the turnkey system. The difference is application software has customisation options, so you can customise it to satisfy major parts of your requirements, while turnkey systems cant have any customisation options and can meet basic requirements.

4. Turnkey system. Alternative to the system from scratch. This system is based on an already existing product. **Pros:** faster, **cons:** does not meet all system requirements, just satisfy them.

9. Definition of the implementation phase. Its purpose and activities.

Implementation phase - is the fourth phase of SDLC.

The main goal of the implementation phase is to create a new information system.

Main activities:

1. Coding - is a process of writing the source code that is translated by an interpreter or compiler into object code.

2. Debugging - is a process of finding and fixing bugs using a debugger.

3. Testing. There are five types of testing. You can unit test each module of your program, whole program and integration of how these modules work together, if they are compatible with the system.

4. Conversion.

10. Types of testing.

1. System testing. You ensure that your new information system works correctly with the rest of software and hardware.

2. Acceptance testing. It's done by users or systems analysts often with real data.

3. Unit testing. It tests each model to make sure that each module works correctly.

4. Integration testing. You ensure that each module works correctly together.

5. Business Level testing. Is it being tested by professional testers to ensure it complies with requirements and predict expected results.

11. Types of conversion.

1. Direct conversion. We deactivated the old system and activated the new one.

Pros: the best way to program because it is fast and cheap, **cons:** it doesn't work and you stop work of the whole company.

2. Parallel conversion. Is when the old system and new system are active during a period of time.

It is safer than direct conversion, but we have limited processing and storage resources and that's why they slow down each other and vice versa.

3. Phased conversion. It's when modules of a new system activate one module at time, after the project team determines that the previous module works correctly.

Pros: there are no risks, **cons:** it requires time and money because it's hard to integrate new modules in the old system.

4. Pilot conversion. Its works well in organisations with several branches. We deactivate the old system and activate new, but only in one branch. It's when we use direct conversion in one branch.

Pros: safer, because the whole company continues the work and they can support branch without an information system, **cons:** it's time consuming.

12.Goal,key activities,considerations of the maintenance phase.

Goal - to verify if the new system is satisfying the requirements or not.

Considerations - efficiency,usability and appropriateness :

1.Usability - shows if it is easy to use

2.Appropriateness - shows if it satisfies the needs.

3.Efficiency shows if it works without error and if it helps the user to perform specific tasks.

Key - new system should be deployed to accommodate specific needs.

Main activities:

1.Providing help to users

2.Fixing bugs

3.Support your information system

4.Operate equipment

5.Making backups

13.Types of modification during the maintenance phase.

1. Major modifications. It externally giant changes in all information systems.

2. Routine modifications. It internally small modifications in the information system.

3. Emergency modifications. It changes that is necessary to do quickly.

4. Software patches. It significantly changes in the system.

14.Quality of service and the metric being used to measure it.

The level of performance of any information system defines its quality of service and can be measured with QoS metrics :

1.Throughput - it's the only amount of data,that the system can process at a time.

2.Accuracy - it's the number of system errors occurring in a time interval.

3.Downtime - it's a time when the system is not available.

4.Capacity - its a number of things that are available,for instance user,connection,storage.

5.User levels - its the number of users at peak,average and low times.

6.Response time - it's a time which takes by system to deliver the information to the user.

15.Potential threats to information systems.

1.Natural disasters. Can completely shut down a computer system,cut off services to customers and potentially destroy the system completely.

2.Power outages. Can be caused by natural disasters,overloaded power grids and planned blackouts.

3.Equipment failures. Can occur in any hardware component of an information system.

4.Human errors - are mistakes made by computer operators.Includes entering inaccurate data and failing to follow required procedures.

5.Software failures. Can be caused by bugs or flawed software design.

6.Security breaches. Include stolen data,physical instructions and deliberate sabotage.

7.Acts of war. Can cause physical damage to computer systems,destroy data and disrupt computer-based operations.

8.Malware. Can damage any computer system.

16.Measures to protect data and information systems.

1.Deterrents. Passwords

2.Preventive countermeasures. Firewalls.

3. Corrective procedures. Hardware inventories.

4. Detection activities. Antivirus