Course Code : MCS-052
Course Title : Principles of Management and Information Systems
Assignment Number : MCA (V)/052/Assignment/2019-20
Maximum Marks : 100
Last Date of Submission : 15th October, 2019 (for July, 2019 session)
15th April, 2020(for January, 2020 session)

Q1: Explain in brief the basic principles that should be considered while designing an organization structure. Explain organizational characteristics?

A1: The organizational structure of a business affects critical elements such as decision making, employee behavior, performance and rewards, individual accountability and managed information. It's important for businesses to understand the principles of organizational structure in order to implement, change and use them effectively. The basic principles of organizational structures can be applied to any size business, from small start-ups to large corporations.

Types of Structures

The key principle of an organizational structure is how authority is passed down and around the company. Understanding what everyone's roles and responsibilities are helps to create accountability for individuals, teams and departments. A clearly outlined hierarchy with specified roles leads to efficiency and productivity within the organization.

Some businesses are organized by function, so people who do the same kinds of tasks are grouped together. For example, all salespeople work together in a sales department, overseen by a sales manager. For organizations that have multiple product lines, a divisional structure may work better, in which each product category might have a sales, marketing and production department.

For flat organizations, authority flows horizontally instead of vertically, and manager positions are nonexistent. Employees take responsibility for hitting company objectives on their own. A matrix structure combines two or more different kinds of structures based on the projects the company is working on.

Job Descriptions and Optimizing Employees

Regardless of what kind of structure an organization uses, it's critical to clearly identify job descriptions so that employees are aware of what is expected of them. In addition, businesses should ensure they are optimizing their top talent well. For example, if an employee excels at a certain task, it benefits the business to enable that employee to hone in on her strengths and pass on knowledge to others.

Establishing and Attaining Objectives

The design of an organization should be in line with achieving company goals. The business should be structured to enable the employees to most effectively help the company reach its targets. This means companies should not strictly adhere to a specific organizational structure if it limits their potential.

For example, to optimize its structure to meet its objectives, a business may consider removing layers of management. This can help increase the flow of information from the top down and increase accountability for individuals. However, if an organization is too flat, the business may find that executives end up managing too many people, which can lead to oversight and missed opportunities due to lack of resources and time.

It's important for businesses to track and analyze the performance of their organizational structure and see how well it enables the business to reach its goals. This way, businesses can see if something is hindering their progress and work to correct it.

Remaining Stable Yet Flexible to Promote Growth

An organization's structure needs to be stable to provide a steady work environment for employees. If a company institutes several organizational changes in a short period of time, employees may feel nervous about their position in the company and may be distracted from their day-to-day tasks, leading to a loss of productivity.

However, at the same time, it's essential that an organization be flexible to adapt to changes that are not under its control. For example, key individuals within the company can leave, economic factors can affect the profitability of the business or environmental changes can affect production and manufacturing supplies. The business needs to be nimble enough to shift organizationally to accommodate these kinds of external challenges. By changing the structure on a grand level or shifting around key personnel to better solve certain issues, the business has a better chance of meeting its objectives in the face of adversity.

organizational characteristics

1. Clarity of Direction

Means that the organization has a:

- Clearly defined Strategic Direction, and that
- Every Associate, unit and the organization as a whole knows what must be done and how to get it done, and
- The organization has the will and means for maintaining Clarity of Direction.

2. Clarity of Structures

Means that:

- The many organizational tasks and their Technological Support Systems are understood,
- Their interdependencies are recognized and understood,
- There is position clarity throughout the organization,
- The Organizational Logic and the Organizational Architecture are congruent, and

- The organization has the will and the means to maintain Clarity of Structures.

3. Clarity of Measurement

Means that, throughout the organization. there are:

- Clearly defined performance standards which are defined by and linked to the work itself and
- Supported by an Organizational Rewards System that is linked to the work itself and the Technological Support Systems that
- Motivate each Associate and unit to achieve these standards and those of the entire organization and
- The organization has the will and the means for maintaining this Clarity of Measurement.

4. Successful Goal Achievement

Means that, given the Strategic Direction, the following three-step process is followed throughout the organization:

1. Deciding what must be done, then
2. Determining how to get it done, and then
3. Making sure that it gets done successfully.

Furthermore, the means and will exist for ensuring that this process for Successful Goal Achievement is operating throughout the organization.

5. Results Oriented Problem Solving

Means that the following seven-step process is followed throughout the organization:

1. Decisions are made at the lowest possible level at which the work or problem occurs
2. The best available resources are brought to bear on the problem solving tasks
3. These resources are utilized in problem solving
4. There is clear identification of the accountable decision maker and those Associates who are in support
5. The problem solving process is healthy and nonpolitical
6. The rewards for successful problem solving and for positive results are clearly defined, and
7. The result of problem solving is an implementable best decision.

These three criteria are essential:

1. Results Oriented Problem Solving is working for the organization as a whole

2. Results Oriented Problem Solving is working at the unit-level and for individuals, and

3. The will and means exist to ensure Results Oriented Problem Solving

And the final organizational characteristic,

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6. Associates Are Assets and Resources

Means that, given the Strategic Direction, the following conditions are met throughout the organization:

- Associates are a continuing source of results as the organization evolves
- Associates continually contribute knowledge, information and energy to solve the organization's problems and enable it to seize opportunities as it adapts to its dynamically complex environments.
- The means and will exist for ensuring that Associates are treated as assets and resources throughout the organization.

Q2: What are different levels of management? Explain functions of employees at different levels of management.

A2:

The term "Levels of Management' refers to a line of demarcation between various managerial positions in an organization. The number of levels in management increases when the size of the business and work force increases and vice versa. The level of management determines a chain of command, the amount of authority & status enjoyed by any managerial position. The levels of management can be classified in three broad categories:

1. Top level / Administrative level
2. Middle level / Executory
3. Low level / Supervisory / Operative / First-line managers

Managers at all these levels perform different functions. The role of managers at all the three levels is discussed below:

LEVELS OF MANAGEMENT

1. **Top Level of Management**

It consists of board of directors, chief executive or managing director. The top management is the ultimate source of authority and it manages goals and policies for an enterprise. It devotes more time on planning and coordinating functions.

The role of the top management can be summarized as follows -

a. Top management lays down the objectives and broad policies of the enterprise.
b. It issues necessary instructions for preparation of department budgets, procedures, schedules etc.
c. It prepares strategic plans & policies for the enterprise.
d. It appoints the executive for middle level i.e. departmental managers.
e. It controls & coordinates the activities of all the departments.
f. It is also responsible for maintaining a contact with the outside world.
g. It provides guidance and direction.
h. The top management is also responsible towards the shareholders for the performance of the enterprise.

Functions of the Top Management

The principal functions of.the top management can be outlined as follows:

1. Determination of Objectives

It is the top level management which determines the broad objectives of the enterprise. Within the framework of the Memorandum of the company, the Board must determine the goals of the enterprise. The objectives may be either general or specific.

2. Formulation of Policies

For realizing the cherished goals of the company, the top management must also formulate the policies. The objectives and policies must guide the activities of the company, the selection of policies also calls for the Board's judgement.

3. Long Range Planning and Strategy

Since long range plans and strategies are major decisions, they are also rested in the hands of the top level management. If the long range planning proves faulty, the company shall find itself in serious financial difficulties.

4. Organizing for Action

Setting up of the administrative organization of large companies with thousands of employees is a complex problem and calls for greater caution and skill. Hence, this function also vests with the top management. Responsibilities which are necessary to execute the policies must be assigned to different employees and relationship among the jobs should also be clarified.

5. Developing of Major Resources

This function includes the finding out of the various ways and means for procuring the resources required to put the plans into action. Resources also include physical resources such as machinery, tools, furniture, equipment, building, etc.

6. Selecting Key Personnel

The managerial personnel not only dominate the success or failure of the existing policies but they are key figures in formulating future plans. Right type of men must be selected and placed at the right places. Hence, this function also vests with the top management.

7. Co-ordination and Controlling

Although the top management is primarily concerned with the future, it must maintain guiding influence on the current activities. It must guide in the execution of plans through the organization with the resources assembled. This calls for co-coordinating and controlling the operation.

1. **Middle Level of Management**

The branch managers and departmental managers constitute middle level. They are responsible to the top management for the functioning of their department. They devote more time to organizational and directional functions. In small organization, there is only one layer of middle level of management but in big enterprises, there may be senior and junior middle level management. Their role can be emphasized as -

- They execute the plans of the organization in accordance with the policies and directives of the top management.
- They make plans for the sub-units of the organization.

- They participate in employment & training of lower level management.
  1. They interpret and explain policies from top level management to lower level.
2. They are responsible for coordinating the activities within the division or department.
3. It also sends important reports and other important data to top level management.
4. They evaluate performance of junior managers.
5. They are also responsible for inspiring lower level managers towards better performance.

Functions of the Middle Management

The principal functions of the middle level management can be outlined as follows:

1. Middle level management interprets the policies of the company

2. It is the responsibility of the Middle Management to prepare organizational set up in their department.

3. They issue orders to the subordinates and others in their department,

4. Middle level management motivate the personnel for higher productivity.

5. Collecting reports and other information about the work turned out in their respective departments, and

6. Providing information and assisting the top management in revising the plans to secure better performance.

1. Lower Level of Management

Lower level is also known as supervisory / operative level of management. It consists of supervisors, foreman, section officers, superintendent etc. According to R.C. Davis, "Supervisory management refers to those executives whose work has to be largely with personal oversight and direction of operative employees". In other words, they are concerned with direction and controlling function of management. Their activities include -

1. Assigning of jobs and tasks to various workers.
2. They guide and instruct workers for day to day activities.
3. They are responsible for the quality as well as quantity of production.
4. They are also entrusted with the responsibility of maintaining good relation in the organization.
5. They communicate workers problems, suggestions, and recommendatory appeals etc to the higher level and higher level goals and objectives to the workers.
6. They help to solve the grievances of the workers.
7. They supervise & guide the sub-ordinates.
8. They are responsible for providing training to the workers.
9. They arrange necessary materials, machines, tools etc for getting the things done.
10. They prepare periodical reports about the performance of the workers.
11. They ensure discipline in the enterprise.
12. They motivate workers.
13. They are the image builders of the enterprise because they are in direct contact with the workers.

Functions of the Lower Management

The important functions of the personnel in lower management can be summed up as follows:

1. Executing of the work entrusted to them,
2. Maintaining of the standard, quality and workmanship of the product,
3. Eliminating wastage of material, time, etc.,
4. Maintaining strict discipline amongst the workers,
5. Preserving the morale of the workers, and
6. Providing instructions and other information to the workers and guiding them while in action.

Q3. What is Information System? What is need requirement analysis ? Explain. Also describe tools used in requirement analysis of Information System.

A3. Information systems (IS) are formal, sociotechnical, organizational systems designed to collect, process, store, and distribute information.In a sociotechnical perspective, information systems are composed by four components: task, people, structure (or roles), and technology.

A computer information system is a system composed of people and computers that processes or interprets information. The term is also sometimes used in more restricted senses to refer to only the software used to run a computerized database or to refer to only a computer system.

Information Systems is an academic study of systems with a specific reference to information and the complementary networks of hardware and software that people and organizations use to collect, filter, process, create and also distribute data. An emphasis is placed on an information system having a definitive boundary, users, processors, storage, inputs, outputs and the aforementioned communication networks.

Any specific information system aims to support operations, management and decision-making. An information system is the information and communication technology (ICT) that an organization uses, and also the way in which people interact with this technology in support of business processes.

Some authors make a clear distinction between information systems, computer systems, and business processes. Information systems typically include an ICT component but are not purely concerned with ICT, focusing instead on the end use of information technology. Information systems are also different from business processes. Information systems help to control the performance of business processes.

Alter argues for advantages of viewing an information system as a special type of work system. A work system is a system in which humans or machines perform processes and activities using resources to produce specific products or services for customers. An information system is a work system whose activities are devoted to capturing, transmitting, storing, retrieving, manipulating and displaying information.

As such, information systems inter-relate with data systems on the one hand and activity systems on the other. An information system is a form of communication system in which data represent and are

processed as a form of social memory. An information system can also be considered a semi-formal language which supports human decision making and action.

Information systems are the primary focus of study for organizational informatics.

Need of requirement analysis

Requirements analysis, also called requirements engineering, is the process of determining user expectations for a new or modified product. These features, called requirements, must be quantifiable, relevant and detailed. In software engineering, such requirements are often called functional specifications. Requirements analysis is an important aspect of project management.

Requirements analysis involves frequent communication with system users to determine specific feature expectations, resolution of conflict or ambiguity in requirements as demanded by the various users or groups of users, avoidance of feature creep and documentation of all aspects of the project development process from start to finish. Energy should be directed towards ensuring that the final system or product conforms to client needs rather than attempting to mold user expectations to fit the requirements.

Requirements analysis is a team effort that demands a combination of hardware, software and human factors engineering expertise as well as skills in dealing with people.

Tools for Requirement Analysis

Use of proper tools for requirement analysis helps in avoiding rework, which typically accounts for 40% of a development organisation's total spend — time, and money that organisations cannot afford in today's highly competitive business landscape. Most of this rework effort focuses on correcting requirements defects, which could cost 50 to 200 times as much as defects that, are corrected close to the point of creation.
It is important for IT organisations to deliver software Requirements Definition and Management Solution at less cost by getting requirements right the first time and ensuring business IT alignment throughout the software lifecycle. In addition the approach needs to be that it takes into account an organisation's process maturity and leverages industry best practices to evaluate current performance and identify specific areas for improvement. The tool should provide a scalable, integrated Software Requirements Definition and Management solution that enables IT organisations to:
Define: Produce accurate and complete requirements by eliciting, specifying, analysing, and validating requirements early, reducing costly rework later in the development lifecycle.
Manage: Deliver the right product the first time, every time by tracking progress, communicating changes and focusing resources.
Verify: Ensure quality by tracing requirements though implementation to testing.
The tool should help organisations answer the following key questions:

How can we define accurate and complete requirements?

How can we document or specify requirements to communicate them without ambiguity?

How can we perform impact analysis and prioritisation on changing requirements?

How can we effectively manage project scope?

Process-Led Approach for Improving Software Requirements Definition and Management.

The tool should help meeting the following Five Critical Process Areas in Software Requirements Definition and Management:

• Elicitation

• Analysis

• Specification

• Validation

• Management.

Elicitation

To eliminate rework, steps need be taken to help organisations mature their existing and Business Processes

requirements elicitation process by:

• Selecting appropriate stakeholders,

• Identifying appropriate elicitation techniques,

• Training team members, including business partners, business analysts, systems

analysts, architects and others, to use the preferred techniques with the appropriate

stakeholders,

• Customizing templates for elicitation, and

• Capture user scenarios in a simple visual form that users readily understand.

MANAGEMENT

To maximize responsiveness and control, organisations may mature their existing

requirements management process by:

• Establishing processes for managing changes to existing requirements, including a standard process for requesting changes to enable better control of scope and commitment, improved impact analysis and more reliable project planning, and
• Defining procedures for evaluation and acceptance among stakeholders — in some cases establishing a Change Control Board.
With the use of the appropriate tool, organisations are expected to improve their ability to handle ongoing changes, maximizing business impact, while minimizing schedule and scope impact, gain greater ability to manage the ever-increasing requests from business teams in a collaborative, factual way, and increase business stakeholder satisfaction because development is more responsive, delivering the right software on time and within budget.

Analysis

To ensure the most important business requirements are delivered, steps need be taken so that organisations mature their existing analysis process by:

• Implementing an effective approach for evaluating and prioritising requirements,

• Enhancing the skills of analysts for analysing and clarifying requirements, and

• Enabling a robust, requirements-based estimation and planning process.

IT organisations deliver increased value to business stakeholders based on greater alignment between business and IT, while business stakeholders deliver more value to their customers because priorities are aligned with IT. The organisation also gains better estimation and thus, improved predictability of system deliveries.

Specification

To improve accuracy and relevancy, organisations may mature their existing requirements specification process by:

• Defining a consistent hierarchy of requirement types, attributes and traces, so all stakeholders can easily find, filter and sort on the most relevant data,

• Developing standard templates for each requirement scenario to ensure completeness,

• Identifying various specification techniques (e.g., use case models, business process models, prototypes, and traditional requirements specifications) and their

appropriate use so that requirements are captured in a meaningful, easy-to-understand way,

• Configuring a tools infrastructure to support custom templates and integrations,
• Training development teams in the appropriate use of the tools,
• Providing automated trace ability across the various requirements types,
• Training team members to leverage traces throughout the lifecycle to achieve overall project control, and
• Leveraging selected technology to detail requirements with attributes, trace ability, screenshots, images, office documents and more to make requirements

clear and understandable to drive development most effectively.

Validation

To improve accuracy and completeness, organisations may mature their existing

requirements validation process by:

• Defining and implementing a verification process with clear quality metrics to

reduce defects,

• Automating validation and verification processes through the storyboard execution

to drive process adoption and enforcement and improve consistency and quality,

and

• Defining and implementing a process for validating requirements with

stakeholders that ensures requirements signoff.

Management

To maximize responsiveness and control, organisations may mature their existing

requirements management process by:

• Establishing processes for managing changes to existing requirements, including a

standard process for requesting changes to enable better control of scope and

commitment, improved impact analysis and more reliable project planning, and

• Defining procedures for evaluation and acceptance among stakeholders — in

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time and within budget.

Q4. (a) Explain functions of DSS and ESS.

A4(a) **Decision Support System**

A decision support system (DSS) is a computerized program used to support determinations, judgments, and courses of action in an organization or a business. A DSS sifts through and analyzes massive amounts of data, compiling comprehensive information that can be used to solve problems and in decision-making.

Typical information used by a DSS includes target or projected revenue, sales figures or past ones from different time periods, and other inventory- or operations-related data.

Functions of DSS: •There are five functions of a DSS facilitating managerial decision making. They are

1.Model building

2.'What if' analysis

3.Goal seeking

4.Risk analysis

5.Graphical analysis.

Model building: This allows decision makers to identify the most appropriate model for solving the problem on hand. It takes into account input variables, interrelationships among the variables, problem assumptions and constraints.

'What-if' analysis : This is the process of assessing the impact of changes to model variables, the values of the variables, or the interrelationships among variables. This helps managers to be proactive, rather than reactive, in their decision making.

Goal seeking : It is the process of determining the input values required to achieve a certain goal. For example, house buyers determine the monthly payment they can afford (say for example, Rs. 5,000) and calculate the number of such payments required to pay the desired house)

Risk analysis: It is a function of DSS that allows managers to assess the risks associated with various alternatives. Decisions can be classified as low risk, medium risk, and high risk. A DSS is particularly useful in medium risk and high risk environments.

Graphical analysis : This helps managers to quickly digest large volumes of data and visualize the impacts of various courses of action. graphical analysis can be used in following situations:

• Seeking a quick summary of data
• Detecting trends over time
• Comparing points and patterns at different variables
• Forecasting activities
• Seeking relatively simple impressions from a vast amount of information.

Function of ESS: Executive Support System (ESS) is a reporting tool (software) that allows you to turn your organization's data into useful summarized reports. These reports are generally used by executive level managers for quick access to reports coming from all company levels and departments such as billing, cost accounting , staffing, scheduling, and more.

In addition to providing quick access to organized data from departments, some Executive Support System tools also provide analysis tools that predicts a series of performance outcomes over time using the input data. This type of ESS is useful to executives as it provides possible outcomes and quick reference to statistics and numbers needed for decision-making.

The exact reporting tools and outcome of an Executive Support System completely depends on the ESS developer and it's intended industry use. For example, Cambridge Systematics has ESS to support the investment planning process for the Ministry of Transportation. The features and functions of this Executive Support System are entirely different from the Executive Support System developed by Meditech, which is useful to health care organizations.

Several companies offer pre-designed Executive Support System packages (usually suited to one particular industry), while others offer packages which can be customized your your organization's needs.

Q4. (b) What is data modelling? Differentiate between logical and physical models. Give any three reasons why logical models are superior for structuring business requirements.

Ans. Data Modeling: Data modeling is the process of documenting a complex software system design as an easily understood diagram, using text and symbols to represent the way data needs to flow. The diagram can be used to ensure efficient use of data, as a blueprint for the construction of new software or for re-engineering a legacy application.

Data modeling is an important skill for data scientists or others involved with data analysis. Traditionally, data models have been built during the analysis and design phases of a project to ensure that the requirements for a new application are fully understood. Data models can also be invoked later in the data lifecycle to rationalize data designs that were originally created by programmers on an ad hoc basis.
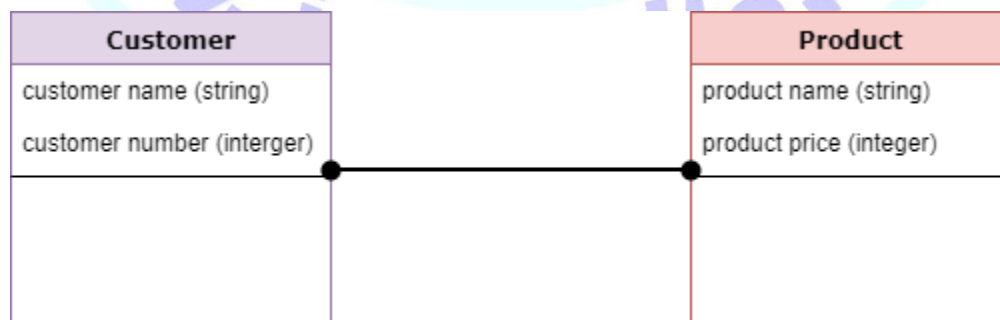
Data modeling can be a painstaking upfront process and, as such, is sometimes seen as being at odds with rapid development methodologies. As Agile programming has come into wider use to speed development projects, after-the-fact methods of data modeling are being adapted in some instances. Typically, a data model can be thought of as a flowchart that illustrates the relationships among data. It enables stakeholders to identify errors and make changes before any programming code has been written. Alternatively, models can be introduced as part of reverse engineering efforts that extract models from existing systems, as seen with NoSQL data.

Data modelers often use multiple models to view the same data and ensure that all processes, entities, relationships and data flows have been identified. They initiate new projects by gathering requirements from business stakeholders. Data modeling stages roughly break down into creation of logical data models that show specific attributes, entities and relationships among entities and the physical data model. The logical data model serves as the basis for creation of a physical data model, which is specific to the application and database to be implemented. A data model can become the basis for building a more detailed data schema.

Differentiate between logical and physical models

Logical Data Model

Logical data models add further information to the conceptual model elements. It defines the structure of the data elements and set the relationships between them.

Customer	Product
customer name (string)	product name (string)
customer number (interger)	product price (integer)

The advantage of the Logical data model is to provide a foundation to form the base for the Physical model. However, the modeling structure remains generic.

At this Data Modeling level, no primary or secondary key is defined. At this Data modeling level, you need to verify and adjust the connector details that were set earlier for relationships.

Characteristics of a Logical data model

- Describes data needs for a single project but could integrate with other logical data models based on the scope of the project.
- Designed and developed independently from the DBMS.
- Data attributes will have datatypes with exact precisions and length.
- Normalization processes to the model is applied typically till 3NF.

Physical Data Model

A Physical Data Model describes the database specific implementation of the data model. It offers an abstraction of the database and helps generate schema. This is because of the richness of meta-data offered by a Physical Data Model.
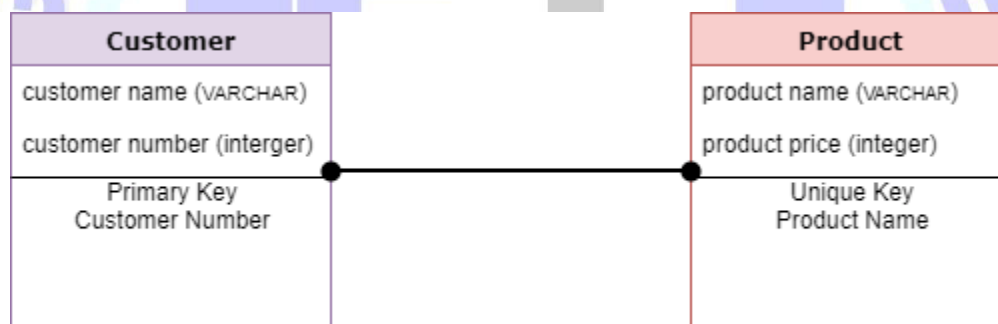
This type of Data model also helps to visualize database structure. It helps to model database columns keys, constraints, indexes, triggers, and other RDBMS features.

Characteristics of a physical data model:

- The physical data model describes data need for a single project or application though it maybe integrated with other physical data models based on project scope.
- Data Model contains relationships between tables that which addresses cardinality and nullability of the relationships.
- Developed for a specific version of a DBMS, location, data storage or technology to be used in the project.
- Columns should have exact datatypes, lengths assigned and default values.
- Primary and Foreign keys, views, indexes, access profiles, and authorizations, etc. are defined.

Q5. (a) Explain job of system analyst. Why are interpersonal and technical skills necessary in system development? Explain issues and challenges in system analysis.

Ans. Systems analyst

systems analyst is an information technology (IT) professional who specializes in analyzing, designing and implementing information systems. Systems analysts assess the suitability of information systems in terms of their intended outcomes and liaise with end users, software vendors and programmers in order to achieve these outcomes. A systems analyst is a person who uses analysis and design techniques to solve business problems using information technology. Systems analysts may serve as change agents who identify the organizational improvements needed, design systems to implement those changes, and train and motivate others to use the systems.

Although they may be familiar with a variety of programming languages, operating systems, and computer hardware platforms, they do not normally involve themselves in the actual hardware or software development. They may be responsible for developing cost analysis, design considerations, staff impact amelioration, and implementation timelines.

A systems analyst is typically confined to an assigned or given system and will often work in conjunction with a business analyst. These roles, although having some overlap, are not the same. A business analyst will evaluate the business need and identify the appropriate solution and, to some degree, design a solution without diving too deep into its technical components, relying instead on a systems analyst to do so. A systems analyst will often evaluate and modify code as well as review scripting.

Some dedicated professionals possess practical knowledge in both areas (business and systems analysis) and manage to successfully combine both of these occupations, effectively blurring the line between business analyst and systems analyst.

What does a systems analyst do?

Systems analysts analyse how well software, hardware and the wider IT system fit the business needs of their employer or of a client. They write requirements for new systems and may also help implement them and monitor their effectiveness.

Typical responsibilities of the job include:

- examining current systems
- talking to users (requirements gathering)
- producing specifications for new or modified systems
- liaising with other IT staff such as programmers to produce new systems
- implementing new systems

They are also responsible for user training and feedback. Travel is a key feature of the job as the majority of work is undertaken at clients' premises.

Interpersonal And Technical Skills Necessary In System Development

Computer personnel need a balance of both technical and interpersonal skills to develop information systems (ISs) that meet users' requirements. Organizations which recruit IS graduates were surveyed to better understand the necessary skills for new IS personnel, and the relative importance of those different skills.

New IS graduates must have strong written and oral communication abilities. No single technical skill was rated above the interpersonal skills of writing and speaking. Additionally, new IS hires must be able to work in a crossfunctional group.

New graduates should be proficient in client-server development, object-oriented programming techniques, third-generation languages, and systems development methodologies. Low-level languages, multimedia computing, desktop publishing, and experience with workgroup software received lower ratings than interpersonal skills and familiarity with contemporary development techniques. Because employers see the value of practical application of technical and interpersonal skills, an internship or some other form of full-time work experience is important for IS graduates.

Issues And Challenges In System Analysis

Addressed to an audience acquainted with the concept of systems analysis, the paper explains the systems analyst's function, briefly suggesting the purpose of his investigation and his methods of analysis. Two types of pitfalls are explained: those externally generated by the problemsolving situation, such as the selection of measures of effectiveness, the treatment of uncertainties, the handling of "nonquantifiables"; and those peculiar to the analyst, such as bias, attention to problem formulation, his "role." The statement of each problem is reinforced by real or hypothetical examples. The systems analyst does more than simply apply his own judgment and intuition: he structures discussions and prepares models that simulate the real situation in a simplified, stylized representation. The process of systems analysis, although not without its limitations, offers more to the decisionmaker than older, more conventional methods of analysis. 24 pp.

Q5. (b) Discuss Social Global impact of Information System.

Ans. As a matter of fact, changes in technology often affect the society. This can change individuals, jobs, education, government and social interactions. As component of a society, each group has rights and responsibilities to one another, such as right to privacy and obligations regarding ethics. The effect of technology on individuals can be beneficial or detrimental. But in most cases an alteration in technology may help a group of individuals and be harmful to another set of people. Typical challenges include loss of privacy, depersonalization and change in incentives. The benefits include lower prices, better products and services. Many of these issues does not only affect our society as a whole, but also raise lots of questions for organizations and our working place at large

Social Impact of Information Systems

The increase in the application of information systems in our society has changed the face of almost every aspect of our society and cultures. The most obvious effect of information system has been the rise of the internet and its consequences in terms of how we communicate, socialize, learn and do business to mention but few. However, before considering the implications of the internet, which is basically linked to that of the computer, we shall foremost explore some important features of information systems and what they mean to us.

Firstly, we must not forget that the computer was primarily designed as a means of solving arithmetic and logic problems, and data storage. The development of the computer from these modest roots are the complex machines of today which allow us to work out more complex problems in a way that would have otherwise been impossible and store more information. This affects our society in two ways: On an individual basis it means that any person in possession of some kind of a computer has the capacity to store every document they will ever need in a single compact machine. This connotes that computer allows people to set up businesses and work from home on a scale never seen before, not to mention taking the human progress a step beyond that of the printing press by removing the need for hand writing for the first time in our history. On a larger scale, it allows scientific progress to accelerate as mathematical problems incomprehensible to humans can be worked out by simple programmed machines. The effect of computer storage capacity is to totally change how large scale businesses function, by assisting inventory management, by facilitating and expediting the storage of data important to organizations, for instance: customer preferences or phone numbers.

Another effect of information systems is the rise in computer games. This has caused serious worries over how they affect those who use them, and especially their effects on youth. The debate still rages over whether the large number of violent computer games available influences those who play to imitate such behavior, with a host of scientific research being done on the issue. Yet almost worrying are the statistics which seem to be highly addictive to the quality of such games - most notably internet based ones. In contrast many have begun to see the potential computers held as a means of education, since, unlike other traditional forms of teaching tools, computer game based learning has a propensity to entertain the student. Businesses and organizations are already using computers as educational devices and technology development tools, especially in the field of virtual reality games and more would still follow. Whatever one's feelings on the growth of these video games, in both recreational and educational formats they are becoming ever more of a reality, for instance the United States military uses one of such game as a recruitment device. Another interesting and undeniable effect is the use of internet in the societies worldwide; in fact, it could be said to connect and eliminate differences between geographically and culturally separated societies. The effects of the computer are still developing; nevertheless it is already obvious that they are sufficiently wide reaching to far surpass an answer of this length. Ultimately the internet is a means of communication. One of the results is to make learning democratic. At the click of a mouse anyone with a computer, regardless of their wealth, status, or education, can access a practically limitless supply of knowledge. A benefit of this is that with the correct internet know-how, one can find out almost anything in a matter of seconds; it revolutionizes the way people go about research.

However, the same capacity for multiplying information which makes the internet great and threatens the whole organizations as music, films and other forms of entertainment and information are released free of charge onto the web. Inevitably sales of CD's and DVD's have fallen as the use of the internet has grown, and indeed the speed of the web's growth has made it

nearly impossible for media companies to find ways of stemming the problem. Equally, in the same way that the internet gives every single person with a computer a voice with which they can share their thoughts and ideas with the world, so too has the number of offensive sites grown with the development of the internet, from pornographic sites to the more worrying cases of websites designed for the sharing of pedophilic materials, as well as racism and even terrorism supporting sites. The technology field has been overtaken with other types of behavior that can affect anyone who uses technology such as computer crime.

Computer crime is another prevalent social impact of information system in our society. The term computer crime as described by Valacich is the act of using a computer to commit an illegal act, such as targeting a computer while committing an offence, using a computer to commit an offence, or using computers in the course of a criminal activity. Computer virus and hacker attacks are intended to destroy data and software and disrupt computer services. In the year 2002 alone, more than 7,000 computer viruses were reported . Phishing attacks frequently target a specific group of people and are intended to secure personal information, usually financially related, from innocent and unsuspecting responders . Other types of the crime that are ubiquitous include carding, cloning, data diddling, phishing, shoulder-surfing, salami slicing and social engineering.

Correspondingly, the increasing recognition of social networking sites is a double-edged sword. On the one hand it has allowed people to connect and communicate with one another with ease and scale never seen before. At the most basic level this began with email, which alone can be seen as nearly equal to the invention of the telephone in terms of communication. Some social sites like the www.facebook.com have more members than the average national population. The fact that the internet allows such forms of communication to be free makes it democratic. The potential of such sites to be used for the good of the people can be seen recently in the part played by Face book in Middle Eastern uprisings of Egypt, Tunisia, Algeria and Libya, when it was used by rebelling citizens as a way of coordinating strikes and marches. Yet equally there are many cases of children being groomed by sex offenders through these websites.

Q6. (a) What is portfolio management? Explain its benefits.

Ans Portfolio Management is a process which facilitates determining the right (project) investments mix, i.e., deploying limited resources to maximize business performance, which is a key management challenge. Most capital investment activities take the form of projects that need to be managed as part of a portfolio. Project portfolio management entails balancing resources, business needs, business risks and changing parameters, while at the same time maximizing the return on (project) investment. Portfolio Management was originally coined in the financial and investment community, and the term was used for the process of managing the assets of a mutual fund; including choosing and monitoring appropriate investments and allocating funds accordingly.

The adoption of the terminology into other industries such as real estate resulted in a modification of the term to reflect industry specific purposes. Similarly, within the technology sector, the term now applies to a set of projects or programs grouped collectively and monitored. We can define portfolio management as the expression of

the alignment of the corporate and IT strategic plans, viewing the portfolio as a suite of complementary investments that collectively provide the best possible allocation of resources to meet the business needs of the corporation.

Portfolio Management (PM) applications integrate all project-related informations within a single, web-based enterprise solution. Organisations use PM solutions to better align and manage their projects, people, and partners so that they can achieve greater return on their portfolio of investments.

Basically, Portfolio Management is a discipline used to ensure that a correct mix of investment activity is initiated, grouped, funded and managed. Technology assets are categorised as an investment portfolio allowing for:
• Investment bundling
• Prioritisation
• Evaluation
• Decision insight and support
• Balance between timing, current needs, and future requirements

Considering the complexities, the problem of managing the technology portfolio is broken into set of smaller problems to facilitate analysis. Among the issues to be considered when discussing the technology portfolio are:
• Technology / business alignment
• Investment balance
• Resource management
• Negotiation between competing projects or goals
• Risk mitigation and management
• Technology performance and reporting

Considered as part of the whole, each contributes to the overall portfolio. Considered independently, each is both a manageable problem and a powerful tool.
Portfolio Management Objectives allow the organisation to be focused, fast, and agile. Achieving these high level objectives necessitates a variety of inter-related steps. These include the following:

• **Grouping**: Synergies between technology spending plans with business strategy;

• **Investment Focus**: Viewing expenditures (human, asset, capital) as investments. This also includes a process to track performance;

• **Governance**: Process for making IT investment decisions;

• **Cost Control**: Understanding the main drivers of IT costs for restraint purposes, and

• **Efficiency**: Use of financial resources efficiently, leveraging wherever possible.

Benefits of Portfolio Management

1. Better Decision Making

Our first branch of PPM benefits concerns its ability to drive better business decisions. To make good decisions, you need good data, making visibility crucial from both a strategic, top-down perspective and from a tactical bottoms-up perspective.

When you have a firm handle on past project metrics, it makes it much easier to predict future factors like resource utilization.

Moreover, when you know what is happening in your current project portfolio, you can find out which projects are not contributing to corporate objectives. As part of project portfolio management, it is better for you to discover this than hear about it from the line of business managers or even worse, from senior executives.

2. Risk Management

It is extremely necessary for companies to create portfolios that lessen any risks, but at the same time, balances the deeds necessary to produce just enough risk to make the profits good. You must set a happy medium between playing is so safe that you never reach your full potential and taking too much risk and losing everything.

Even successful projects can reflect overspending. Overspending can be caused by numerous factors such as poor project estimating, inaccurate scheduling, improper resource allocation, and no visibility into project data.

Forrester reported that organizations can expect a decrease overspending by 10% on average, sometimes more, if utilizing a PPM toolset. PPM tools provide the estimation capabilities needed to ensure that projects are estimated more accurately and the right resources are put on the right work at the right time.

3. Faster project turn times

There are many reasons why PPM can reduce project turn times by an average of 10%. Governance, workflow, and standardization tend to reflect repeatable processes that are proven. The defined processes aligned with PPM technology allow team members to keep the work flowing and will typically increase productivity because it answers the question – "what do I do next?"

As we all know, strategically aligned projects should always result in business value. With a shorter time to market, this value can be realized sooner and in many cases can give businesses a head start on their competition.

4. Increase project delivery success

Unsuccessful project delivery leads to project failure. Project failure can be caused by many factors such as cost overruns, schedule delays, poorly defined requirements, mismanaged resources, lack of strategy alignment, unresolved issues, or technical limitations. PPM allows organizations to ensure these factors are minimized within project delivery.

In recent years, the Project Management Institute (PMI) surveyed organizations and showed that successful PPM tools enable organizations to execute on approximately 30% more projects and reduce project failure rates by up to 60%.

PPM tools provide organizations with the functionality they need to more accurately plan their projects based on resource capacity, score projects to ensure strategic alignment, better estimate project costs, and increase the success of project execution resulting in overall increased value to the business.

5. Streamline data and increase collaboration

Many businesses today still rely on manual tools for project planning and reporting. Many are still using excel worksheets. These tools are typically located on a client's computer and are not intended for enterprise use. Data that is transferred and updated through email or other means is not considered to be real-time information and can become out of date quickly leading to project conflicts and inconsistencies.

Project transparency is critical for proper decision making and improved project performance. With PPM, users can access real-time data, giving them the insight they need to get work done. Team members no longer have to rely on hallway conversations or meetings to give project status.

Reduction of resource time can also be significant when leveraging an enterprise PPM system. Centralized data leads to insight and effective real-time collaboration leads to increased productivity.

Managers can potentially decrease their administrative tasks by 25% with an effective PPM tool in place.

Q6. (b) What is risk management? Explain risk management process.
Ans. With the Information Technology, although management needs to be aware of all potential risks, operational risk is the primary risk associated with it. Operational risk (also referred to as transaction risk) is the risk of loss resulting from inadequate or failed processes, people, or systems. The root cause can be either internal or external events. Operational risk is present across all business lines.
Operational risk may arise from fraud or error. Management's inability to maintain a competitive position, to manage information, or to deliver products and services can also create and compound operational risk. Weak operational risk management can result in substantial losses from a number of IT threats including business disruptions or improper business practices.
All organisations should properly identify, measure, monitor, and control operational

risk. Management should distinguish the operational risk component from other risks to enable a stronger focus on operational risk mitigation. The board should ensure that a program exists to manage and monitor this risk. The program should address the institution's tolerance for risk, the effectiveness of internal controls, management's accountability in regards to risk mitigation, and the processes needed to manage IT effectively.

Operational risk includes not only back office operations and transaction processing, but also areas such as customer service, systems development and support, internal controls and processes, and capacity planning. Operational risk from IT also affects credit, compliance, strategic, reputation, and market risks. Management should be aware of the implications of operational risk including:

• Liquidity, interest, and price risks: Credit and market risks can materialize from external changes in markets, industries, or specific customers. Internal controls that rely heavily on the availability and performance of technology create additional operational risk exposure. For example, a failure to properly implement changes to underwriting, account management, or collection systems can lead to significant losses, and higher loan servicing and collection costs

• Reputation risk: Reputation risk stems from errors, delays, or omissions in information technology that become public knowledge or directly affect business partners, customers and consumers resulting in a loss of confidential information and potential customer withdrawal of funds. Two activities that can lead to reputation risk are the unauthorised disclosure of confidential customer information and the hacking/modifying of an institution's website

• Strategic risk: Strategic risk can stem from inaccurate information or analysis that causes management to make poor strategic decisions. For example, IT management could decide to save money by delaying an infrastructure upgrade to increase network bandwidth, which could result in a business line losing market share due to an inability to compete.

• Compliance (legal) risk: Compliance risk results from the institution's inability to meet the regulatory and legal requirements associated with its IT products and services. Legal risk may lead to civil or criminal liability if, for example, an institution discloses confidential information or provides inaccurate or untimely consumer compliance disclosures.

IT management should have a corporate-wide view of technology. It should maintain an active role in corporate strategic planning to align technology with established business goals and strategies. It also should ensure effective technology controls exist

throughout the organisation either through direct oversight or by holding business lines accountable for IT-related controls. From a control standpoint, management
should assess risks and determine how to control and mitigate the risks. Management should continually compare its risk exposure to the value of its business activities to determine acceptable risk levels.

risk management process.

IT controls result from an effective risk assessment process. Therefore, the ability to mitigate IT risks is dependent upon risk assessments. Senior management should identify, measure, control, and monitor technology to avoid risks that threaten the safety and soundness of an institution. The institution should
1) plan for use of technology,
2) assess the risk associated with technology,
3) decide how to implement the technology, and
4) establish a process to measure and monitor risk that is taken on. All organisations should have:
• An effective planning process that aligns IT and business objectives;
• An ongoing risk assessment process that evaluates the environment and potential changes;
• Technology implementation procedures that include appropriate controls, and
• Measurement and monitoring efforts that effectively identify ways to manage risk exposure.
This process will typically require a higher level of formality in more complex institutions with major technology-related initiatives.
The risk identification and management process for technology-related risks is not complete without consideration of the overall IT environment in which the technology resides. Management may need to consider risks associated with IT environments from two different perspectives:
• If the IT function is decentralized, and business units manage the risk, then management should coordinate risk management efforts through common organisation-wide expectations.
• If the IT department is a centralised function that supports business lines across shared infrastructure, management should centralize their IT risk management efforts.

Q7. (a) What is ERP? Explain ERP components.
Ans. "ERP" stands for enterprise resource planning. It refers to a suite of software that organizations use to manage day-to-day business activities, such as accounting, procurement, project management, risk

management and compliance, and supply chain operations. A complete ERP suite also includes enterprise performance management, software that helps to plan, budget, predict, and report on an organization's financial results.

ERP systems tie together and define a plethora of business processes and enable the flow of data between them. By collecting an organization's shared transactional data from multiple sources, ERP systems eliminate data duplication and provide data integrity with a "single source of truth."

Today, ERP systems are critical for managing thousands of businesses of all sizes and in all industries. To these companies, ERP is as indispensable as the electricity that keeps the lights on.

ERP systems are designed around a common, defined data structure (schema) that typically has a common database. This helps provide information across the enterprise using normalized data based on common definitions and user experiences With ERP, these core constructs are then interconnected with defined business processes driven by workflows across business departments (e.g. finance, human resources, engineering, marketing, operations), connecting systems and the people who use them. Simply put, ERP is the vehicle for integrating people, processes and technologies across a modern enterprise.

For example: consider a company that builds cars by procuring parts and supplies from multiple suppliers. An ERP system not only tracks the requisition and purchase of these goods, it ensures that each component across the entire procure-to-pay process uses uniform and clean data connected to integrated enterprise workflows, business processes, and reporting with analytics. When ERP is properly deployed at this automotive manufacturing company, the example component, "front brake pads", is uniformly identified by part name, size, material, source, lot number, supplier part number, serial number, cost, and specification, along with a plethora of other descriptive and data-driven items. Since data is the lifeblood of every modern company, ERP makes it easier to collect, organize, analyze and distribute this information to every individual and system that needs it to best fulfill their role and responsibility.

ERP also ensures that these data fields and attributes roll up to the correct account in the company's general ledger (e.g. "Brake Pads") so that all costs are properly tracked and represented. If the front brake pads were called "front brakes" in one software system (or maybe a set of spreadsheets), "brake pads" in another and "frnt-pads" in a third, it would be tough for the automotive manufacturing company to figure out how much is spent annually on front brake pads, and whether it should switch suppliers or negotiate for better pricing.

A key ERP principle is the central collection of data for wide distribution. Instead of several standalone databases with an endless inventory of disconnected spreadsheets, ERP systems bring order to the chaos so that all users—from the CEO to accounts payable clerks—create, store, and use the same data derived through common processes. With a secure and centralized data repository, everyone in the organization can be confident that data is correct, up to date, and complete. Data integrity is assured for every task performed throughout the organization, from a quarterly financial statement to a single outstanding receivables report, without relying on error-prone spreadsheets.

ERP COMPONENTS

If your requirements go ahead of the capabilities of accounting software, and you find

the prospect of implementing conventional ERP software overwhelming, you need

ERP. All application modules share data through the ERP database, which contains

the data for all modules. This is a new implementation of the old key database concept

of entering data one time and then using it in all other processing. The world's finest

easy-to-use ERP solution is fully web-enabled, seamlessly integrated and can be

implemented in weeks. And it can computerize your complete operations globally.

ERP can furnish assistance in accomplishing unimaginable efficiency of operations,

significant cost savings, and maximize profits. ERP is packed with powerful features,

tremendously easy to implement and use, comprehensive in its scope, modular and

flexible, fully customizable, totally secure, and incredibly robust. It is the way

companies will manage their businesses tomorrow. With ERP, you can assimilate

transactions of any pulse of the entire organization, all the time. This drives costs

number of your company's branches into one system. ERP can be completely web-

enabled and from any type of software on any platform, you can deal with your entire

business by exception. ERP modules are a most excellent way to integrate all the

departments. It is like a four-wheeler which can not shift single steps without its

underneath, for ERP the underneath are its modules which sometimes also known as

components. These modules enables all the employees of an enterprise to operate like

CEO, giving them the tools, information, and insights they necessitate detecting

problems earlier and taking action faster. To facilitate the easy handling of the system

the ERP has been divided into the following core subsystems as shown in Figure .

ERP Components

a) Finance: ERP takes care of complete financial accounting of the enterprise over the web. It maintains all the books and records that are essential for proper bookkeeping and accounting. All transactions affect and update the entire system, and the entire reporting is on the fly, for the most accurate information at all times. ERP helps you to manage all kinds of taxes, bank reconciliation and everything else that is required for efficient and complete financial accounting.

Thus, financials provide real-time visibility into financial results, minute-by-minute control over expenditure, and guidance for better decisions,

b) Human Resources: Handling Software for personnel-related tasks for corporate managers and individual employees of the organisation. Examples: human resources administration, automatic personnel management processes including recruitment, business travel, and vacation allotments, payroll handles accounting and preparation of cheque related to employee salaries, wages, and bonuses. Thus, human resources offers comprehensive HR solutions, from recruitment to compensation to work-force development

c) Manufacturing and Logistics: A group of applications for planning production, taking orders, and delivering products to the customer. Examples: production planning performs capacity planning and creates a daily production schedule for a company's manufacturing plants. Materials management controls purchasing of raw materials needed to build products.

d) Purchasing: Empower the Purchase function just like sales, indents, and orders. ERP covers all aspects of production, including issues quality control, material receipts, purchase invoices and production receipts, multiple bills of material. Thus, purchasing saves the time by simplifying and improving vendor evaluation, performance tracking and quality examination.

e) Production, Planning and Control: ERP enables you to plan for material requirements based on a production planning process. The system reports inventory requirements based on work orders initiated, stocks committed and existing stocks. Thus, PPC provides all possible reports and analysis, which facilitates in managing and keep good control of inventory.

f) Multi currency and Forex: ERP supports accounting for multi-currency operations, with exchange rate tables, transactions in any currency, accounting and reporting in all currencies, and accounting for forex gains and losses.

g) Business 2 Business (B2B): ERP is a virtual portal that can be accessed by customers, distributors, suppliers, and auditors. Anyone with a computer and a modem, and the necessary access permissions, they can place orders and monitor deliveries, and view account statements. To improve your service efficiency you can allow your business associates to manage their own interaction with your enterprise. All reporting can be individual, grouped, or instantly consolidated across the enterprise.

h) Funds Management: ERP enables you to manage funds efficiently. For each wing maintains your complete customer database and does kind of transaction type you may specify its effect on funds flow.

i) Marketing, Sales and Distribution: Helps to optimize all the everyday jobs

and activities carried out in sales, delivery and billing. Key elements are: pre-sales support, inquiry processing, quotation processing, sales order processing,

delivery processing, and billing and sales information system. This module also includes a Point-of-Sale, which comes under retailing, can optimize the sales figures and also facilitate in having more delighted customers. Billing system with barcode label provides better reading, printing, quick billing and collections.

Q7. (b) Discuss the role of intelligent systems in e-business. Also, explain different roles of business intelligence tools in different management levels.

Ans ROLE: Intelligence is the capability to solve perceptual problems. By the term "perceptual",we mean individual, special, random, fuzzy, sensory, and/or emotional. Solving such problems requires accumulation, induction and inference of experiences to form new knowledge.

Artificial intelligence (abbreviated AI) is defined as intelligence exhibited by an

artificial entity. Such an entity is generally computer-controlled; therefore artificial intelligence in this context is pre-programmed. Humans use intuition and viewpoints to make judgments and choices instead of using precise rules or procedures. However, almost none of those used by human beings can be done programmatically. In conclusion, we can say that no matter how powerful a computer might be, if it works only upon a given set of rules/programs, it is not regarded as having real intelligence. Research in AI is concerned with producing machines to automate tasks requiring intelligent behavior. Examples include control, planning and scheduling, the ability to answer diagnostic and consumer questions, handwriting, speech, and facial recognition. As such, it has become a scientific discipline, focused on providing solutions to real life problems. AI systems are now in routine use in economics, medicine, engineering and the military, as well as being built into many common home computer software applications, traditional strategy games like computer chess and other video games.

Schools of thought

AI is divided roughly into two schools of thought: Conventional AI and Computational Intelligence (CI).

Conventional AI mostly involves methods now classified as machine learning, characterized by formalism and statistical analysis. This is also known as symbolic AI, logical AI, neat AI and Good Old Fashioned Artificial Intelligence (GOFAI). AI Methods include

• Expert systems: apply reasoning capabilities to reach a conclusion. An expert system can process large amounts of known information and provide conclusions based on them.

• Case based reasoning.

• Bayesian networks.

• Behaviour based AI: a modular method of building AI systems by hand.

Computational Intelligence involves iterative development or learning (e.g. parameter tuning e.g., in connectionist systems). Learning is based on empirical data and is associated with non-symbolic AI, scruffy AI and soft computing. Methods mainly include: Neural networks: systems with very strong pattern recognition capabilities.

• Fuzzy systems: techniques for reasoning under uncertainty, has been widely used in modern industrial and consumer product control systems.

• Evolutionary computation: applies biologically inspired concepts such as populations, mutation and survival of the fittest to generate increasingly better solutions to the problem. These methods most notably divide into evolutionary algorithms (e.g., genetic algorithms) and swarm intelligence (e.g., ant algorithms).

With hybrid intelligent systems attempts are made to combine these two groups. Expert inference rules can be generated through neural network or production rules from statistical learning such as in ACT-R.

TOOLS

Business intelligence tools are a type of Application software designed to help the business intelligence (BI) business processes. Specifically they are generally tools that

aid in the analysis and presentation of data. While some business intelligence tools include ETL functionality, ETL tools are generally not considered business intelligence tools.

Types of business intelligence tools

• OLAP (including HOLAP, ROLAP and MOLAP)
• Reporting software (also called Pixel perfect reporting software)
• Data mining
• Business performance management (BPM)

Open Source Business Intelligence Products

• Pentaho: enterprise-class reporting, analysis, dashboard, data mining and workflow capabilities.
• OpenI: simple web application that does out-of-box OLAP reporting.
• Greenplum Inc.: first open source powered database server that can scale to support multi-terabyte data warehousing demands.
• YALE (Yet Another Learning Environment): free open source software for Business Intelligence, Knowledge Discovery, Data Mining, Machine Learning, etc.
• BEE Project: BI Suite of tools ideal for mid size companies that has 50GB or less of data. It has ETL and uses ROLAP and is under the GPL license.
• MarvelIT: open source Business Intelligence solution based on the Apache Jetspeed Enterprise Portal and the popular OpenReports reporting application.
• SpagoBI: complete suite for the development of Business Intelligence that covers data and metadata organisation, static reporting and dimensional analysis, hidden information discovering by means of data mining techniques, the building of a structured and dynamic control suite with dashboard components.
• DecisionStudio-Professional: Comprehensive GPL desktop BI platform built on best-of-breed open source projects including MySQL, R Environment, DBDesigner, iReport, Python, etc. It is an advanced graphical desktop data mining, reporting, modeling, and analysis environment comprehensive capabilities to each role in the analytics value chain.

On Line Analytical Processing (OLAP)

OLAP is an acronym for On Line Analytical Processing. It is an approach to quickly provide the answer to analytical queries that are multi-dimensional in nature. It is part of the broader category business intelligence, which also includes ETL (Extract, Transform, Load), relational reporting and data mining. The typical applications of OLAP are in business reporting for sales, marketing, management reporting, business performance management (BPM), budgeting and forecasting, financial reporting and similar areas. The term OLAP was created as a slight modification of the traditional database term OLTP (On Line Transaction Processing).

Databases configured for OLAP employ a multidimensional data model, allowing for complex analytical and ad-hoc queries with a rapid execution time. Nigel Pendse has suggested that an alternative and perhaps more descriptive term to describe the concept of OLAP is Fast Analysis of Shared Multidimensional Information (FASMI). They borrow aspects of navigational databases and hierarchical databases that are speedier than their relational kin.

OLAP Functionality

OLAP takes a snapshot of a set of source data and restructures it into an OLAP cube. The queries can then be run against this. It has been claimed that for complex queries OLAP can produce an answer in around 0.1% of the time for the same query on OLTP relational data.

The cube is created from a star schema or snowflake schema of tables. At the centre is the fact table which lists the core facts which make up the query. Numerous dimension tables are linked to the fact tables. These tables indicate how the aggregations of relational data can be analyzed. The number of possible aggregations is determined by every possible manner in which the original data can be hierarchically linked. For example a set of customers can be grouped by city, by district or by country; so with 50 cities, 8 districts and two countries there are three hierarchical levels with 60 members. These customers can be considered in relation to products; if there are 250 products with 20 categories, three families and three departments then there are 276 product members. With just these two dimensions there are 16,560 (276 * 60) possible aggregations. As the data considered increases the number of aggregations can quickly total tens of millions or more.

The calculation of the aggregations and the base data combined make up an OLAP cube, which can potentially contain all the answers to every query which can be answered from the data. Due to the potentially large number of aggregations to be calculated, often only a predetermined number are fully calculated while the remainder are solved on demand.

Q8. What is business intelligence (BI)? Explain role of BI in successful business. Critically explain use of Information Technology in BI.

Ans. BI: The term business intelligence (BI) typically refers to a set of business processes for collecting and analyzing business information. This includes the technology used in these processes, and the information obtained from these processes.

BI business processes

Organisations typically gather information in order to assess the business environment, and cover fields such as marketing, research, industry or market research, and competitor analysis. Competitive organisations accumulate business intelligence in order to gain sustainable competitive advantage, and may regard such intelligence as a valuable core competence in some instances.

Generally, BI-collectors glean their primary information from internal business sources. Such sources help decision-makers understand how well they have performed. Secondary sources of information include customer needs, customer

decision-making processes, the competition and competitive pressures, conditions in relevant industries, and general economic, technological, and cultural trends. Industrial espionage may also provide business intelligence by using covert techniques. A gray area exists between "normal" business intelligence and industrial espionage.
Each business intelligence system has a specific goal, which derives from an organisational goal or from a vision statement. Both short-term goals (such as quarterly numbers to share market) and long term goals (such as shareholder value, target industry share / size, etc.) exist.

BI technology
Some observers regard BI as the process of enhancing data into information and then into knowledge. Persons involved in business intelligence processes may use application software and other technologies to gather, store, analyze, and provide access to data, and present that data in a simple, useful manner. The software aids in Business performance management, and aims to help people make "better" business decisions by making accurate, current, and relevant information available to them when they need it.
Some people use the term "BI" interchangeably with "briefing books" or with "executive information systems", and the information that they contain. In this sense, one can regard a business intelligence system as a decision-support system (DSS).

BI software types
People working in business intelligence have developed tools that ease the work, especially when the intelligence task involves gathering and analyzing large quantities of unstructured data. Each vendor typically defines Business Intelligence his/her own way, and markets tools to do BI the way that they see it.
Business intelligence includes tools in various categories, including the following:
• AQL - Associative Query Logic
• Scorecarding
• Business Performance Management and Performance Measurement
• Business Planning
• Business Process Re-engineering
• Competitive Analysis
• Customer Relationship Management (CRM) and Marketing
• Data mining (DM), Data Farming, and Data warehouses
• Decision Support Systems (DSS) and Forecasting
• Document warehouses and Document Management
• Enterprise Management systems
• Executive Information Systems (EIS)
• Finance and Budgeting
• Human Resources
• Knowledge Management
• Mapping, Information visualization, and Dashboarding
• Management Information Systems (MIS)
• Geographic Information Systems (GIS)
• Online Analytical Processing (OLAP) and multidimensional analysis;

sometimes simply called Analytics (based on the so-called hypercube or cube)
• Statistics and Technical Data Analysis
• Supply Chain Management/Demand Chain Management
• Systems intelligence
• Trend Analysis
• User/End-user Query and Reporting
• Web Personalization and Web Mining
• Text mining.