CHAPTER 2

THEORETICAL

2.1. Information

Wiig (1993) – He has suggested that the information as, "facts organized to describe a situation or condition. According to Juris and Kelley (2002) – They have suggested the "information is much more refined data that has evolved to the point of being useful for some form of analysis". From these two sources, Information can be defined as: "data that has been processed in such a way as to be meaningful to the person who receives it.**"**

2.1.1. Qualities of Good Information

According to Rush (Free-Education Forum-online), there are several qualities of a good information. These are as follows:

Accurate

There should not be any false facts in the information given and the data and the data should add up to the final decision being made.

Accessible

The parties authorized to the information should have easy access to the information.

Complete

The information should be complete to the level that the user needs not require additional methods or systems to understand or use the information.

Brief

The information should not contain unwanted or facts or lengthy descriptions of facts. This factor is dependent on the level of users within the organizations.

Secure

The information should not be contaminated or easily accessible to unauthorized persons.

Timely

The information should be received on time and should be available for updating on a timely basis.

Up to Date

The information should be based on facts which are current and most recently updated data.

Rare

The information should be available to only a limited number of users otherwise the value of the information will diminish.

2.2. System

According to Vangie Beal (webopedia), a system is:

1. A group of interdependent items that interact regularly to perform a task.

2. An established or organized procedure; a method.

Therefore, in computer, a system is one that is able to take a set of inputs, process them and create a set of outputs. This is done by combination of hardware and software.

In a system, network of components work towards a single objective, if there is lack of co-ordination among components, it leads to counterproductive results

2.2.1. Features of a System

A system may have following features:

1. **Adaptability:** some systems are adaptive to the exterior environment, while some systems are non-adaptive to the external environment.
2. **Limitation:** every system has pre-defined limits or boundaries within which it operates. This limits or boundaries can be defined by law or current state of technology.

2.2.2. Components of a System

Every system comprises of basic components which in a co-ordination formulate a system. These are as follows.

1. **Input elements**

The information entered into a system. For instance raw data input to the computer system.

2. **Process**

Any specific treatment defined in the system to be performed on the data entered into the system, for instance, computation, analysis, application of any model.

3. **Output elements**

The results given by the system after the process has been performed on the data being input to the system.

4. **Control mechanism**

Every system is expected to generate some sort of standardized output. Hence actual output needs to be compared with what it is supposed to generate. This comparison of actual with expected output is done with the help of control mechanism.

5. **Feedback system**

Once the control mechanism has been devised, it needs to a reporting mechanism, which should respond with a corrective action, if required.

6. **Objectives**

We just mentioned that a control mechanism should compare actual output with expected/Ideal output. But before this is being done, there needs to be a list of specific objectives which define expected output.

2.2.3. Types of System

1. **Open System**

An open system is one that interacts with its environment and thus exchange information, material, or energy with the environment, including random and undefined inputs. Open systems are adaptive in nature, as they tend to react with the environment in such a way, so as to favor their continued existence. Such systems are 'self organizing', in the sense that they change their organisation in response to changing conditions.

2. **Closed System**

closed system is one, which does not interact with its environment. Such systems in business world, are rare, but relatively closed systems are common. Thus, the systems that are relatively isolated from the environment but not completely closed, are termed closed system.

3. **Open Loop System**

In open-loop architecture, business decisions made by management have an impact in the marketplace, and the impact of that decision is measured only indirectly by the company's computer systems.

4. **Closed Loop System**

Closed loop system is a system where part of the output is fed back to the system to initiate control to change either the activities of the system or input of the system. In a closed-loop decision environment, the impact of decisions can be measured very precisely.

2.3. Information Systems

According to Vladimir Zwass (Encylopaedia Britannica), Information System is an integrated set of components for collecting, storing, and processing data and for delivering information, knowledge, and digital products. According to Management Study Guide (managementstudyguide.com), an information system, therefore, can be defined as set of coordinated network of components which act together towards producing, distributing and or processing information. An important factor of computer based information system is precision, which may not apply to other types of systems.

2.3.1. Components of Information System

An information system is essentially made up of five components hardware, software, database, network and people. These five components integrate to perform input, process, output, feedback and control.

1. **Hardware** consists of input/output device, processor, operating system and media devices.

2. **Software** consists of various programs and procedures.

3. **Database** consists of data organized in the required structure.

4. **Network** consists of hubs, communication media and network devices.

5. **People** consist of device operators, network administrators and system specialist.

Information processing consists of input; data process, data storage, output and control. During input stage data instructions are fed to the systems which during process stage are worked upon by software programs and other queries. During output stage, data is presented in structured format and reports.

2.4. Secondary Education

According to Wikipedia, secondary education normally takes place in secondary schools, taking place after primary education and may be followed by higher education or vocational training. In some countries, only primary or basic education is compulsory, but secondary education is included in compulsory education in most countries.

According to Encyclopedia Britannica, secondary education, the second stage traditionally found in formal education, beginning about age 11 to 13 and ending usually at age 15 to 18. The dichotomy between elementary education and secondary education has gradually become less marked, not only in curricula but also in organization. The proliferation of middle schools, junior schools, junior high schools, and other divisions has produced systems with more than two stages.

Normally, secondary education lasts for four (4) years and is divided into two cycles: lower (grades 9 and 10) and upper secondary (grades 11 and 12). Students sit two examinations: the School of Certificate Examination at the end of grade 10, and the Higher School Certificate Examination at the end of grade 12.

2.4.1 Terminology

Secondary schools may be called high schools, gymnasia, lyceums, middle schools, sixth-form, sixth-form colleges, vocational schools, or preparatory schools, and the exact meaning of any of these varies between the countries.

2.5. Enrollment

According to Wikipedia, enrollment may refer to the total number of students properly registered and/or attending classes at a school.

2.6. Registration

According to Merriam Webster dictionary, registration refers to the act or process of entering personal (student) information in a system (school) of public records.

2.7. School Fee Ledger

It is a complete record of financial transactions (school fee payment) in the school.

2.8. PHP Programming

PHP is a server-side scripting language designed for web development but also used as a general-purpose programming language. As of January 2013, PHP was installed on more than 240 million websites (39% of those sampled) and 2.1 million web servers. Originally created by Rasmus Lerdorf in 1994, the reference implementation of PHP (powered by the Zend Engine) is now produced by The PHP Group. While PHP originally stood for Personal Home Page, it now stands for PHP: Hypertext Preprocessor, which is a recursive backronym.

PHP code can be simply mixed with HTML code, or it can be used in combination with various templating engines and web frameworks. PHP code is usually processed by a PHP interpreter, which is usually implemented as a web server's native module or a Common Gateway Interface (CGI) executable. After the PHP code is interpreted and executed, the web server sends resulting output to its client, usually in form of a part of the generated web page; for example, PHP code can generate a web page's HTML code, an image, or some other data. PHP has also evolved to include a command-line interface (CLI) capability and can be used in standalone graphical applications.

2.9. JavaScript

JavaScript is the programming language of HTML and the Web. It is also known as ECMAScript (the untrademarked name used for the standard), It is most commonly used as part of web browsers, whose implementations allow client-side scripts to interact with the user, control the browser, communicate asynchronously, and alter the document content that is displayed. JavaScript (at least the strict subset asm.js is also considered an "assembly language of the web – a compile target of source-to-source compilers – for making client side web applications, using other programming languages, supported by all the major browsers without plug-ins. It is also used in server-side network programming with runtime environments such as Node.js, game development and the creation of desktop and mobile applications.

JavaScript is classified as a prototype-based scripting language with dynamic typing and first-class functions. This mix of features makes it a multi-paradigm language, supporting object-oriented, imperative, and functional programming styles. JavaScript is also used in environments that aren't web-based, such as PDF documents, site-specific browsers, and desktop widgets.

2.10. HTML

HyperText Markup Language, commonly referred to as HTML, is the standard markup language used to create web pages. It is written in the form

of HTML elements consisting of tags enclosed in angle brackets (like <html>). HTML tags most commonly come in pairs like <h1> and </h1>, although some tags represent empty elements and so are unpaired, for example <img>. The first tag in a pair is the start tag, and the second tag is the end tag (they are also called opening tags and closing tags).

Web browsers can read HTML files and compose them into visible or audible web pages. Browsers do not display the HTML tags and scripts, but use them to interpret the content of the page. HTML describes the structure of a website semantically along with cues for presentation, making it a markup language, rather than a programming language.

HTML elements form the building blocks of all websites. HTML allows images and objects to be embedded and can be used to create interactive forms. It provides a means to create structured documents by denoting structural semantics for text such as headings, paragraphs, lists, links, quotes and other items. It can embed scripts written in languages such as JavaScript which affect the behavior of HTML web pages.

Web browsers can also refer to Cascading Style Sheets (CSS) to define the look and layout of text and other material. The World Wide Web Consortium (W3C), maintainer of both the HTML and the CSS standards, encourages the use of CSS over explicit presentational HTML.

2.11. Cascading Style Sheets (CSS)

Cascading Style Sheets (CSS) is a style sheet language used for describing the look and formatting of a document written in a markup language (like adding fonts, colors, spacing, etc). Although most often used to change the style of web pages and user interfaces written in HTML and XHTML, the language can be applied to any kind of XML document, including plain XML, SVG and XUL. Along with HTML and JavaScript, CSS is a cornerstone technology used by most websites to create visually engaging webpages, user interfaces for web applications, and user interfaces for many mobile applications.

2.12. Database

According to Vangie Beal (Webopedia), "Often abbreviated *DB*, a database is basically a collection of information organized in such a way that a computer program can quickly select desired pieces of data. You can think of a database as an electronic filing system."

Traditional databases are organized by fields, records, and files. A field is a single piece of information; a record is one complete set of fields; and a file is a collection of records. An alternative concept in database design is known as Hypertext. In a Hypertext database, any object, whether it be a piece of text, a picture, or a film, can be linked to any other object. Hypertext databases are

particularly useful for organizing large amounts of disparate information, but they are not designed for numerical analysis.

2.13. Database Management System (DBMS)

To access information from a database, you need a database management system *(DBMS)*. This is a collection of programs that enables you to enter, organize, and select data in a database.

Increasingly, the term database is used as shorthand for database management system. There are many different types of DBMSs, ranging from small systems that run on personal computers to huge systems that run on mainframes.

2.14. MySQL

MySQL is (as of July 2013) the world's second most widely used relational database management system (RDBMS) and most widely used open-source RDBMS. The SQL acronym stands for Structured Query Language.

MySQL is a popular choice of database for use in web applications, and is a central component of the widely used LAMP open source web application software stack (and other 'AMP' stacks). LAMP is an acronym for "Linux, Apache, MySQL, Perl/PHP/Python." Free-software-open source projects that require a full-featured database management system often use MySQL. Applications that use the MySQL

database include: TYPO3, MODx, Joomla, WordPress, phpBB, MyBB, Drupal and other software.

2.15. UML (Unified Modeling Language)

UML is a standard language for specifying, visualizing, constructing, and documenting the artifacts of software systems. UML was created by Object Management Group (OMG) and UML 1.0 specification draft was proposed to the OMG in January 1997.

OMG is continuously putting effort to make a truly industry standard.

1. UML stands for **U**nified **M**odeling **L**anguage.
2. UML is different from the other common programming languages like C++, Java, COBOL, etc.
3. UML is a pictorial language used to make software blue prints.

2.15.1 UML Architecture

UML plays an important role in defining different perspectives of a system. These perspectives are: Design; Implementation; Process; and Deployment .And the centre is the **Use Case** view which connects all these four. A **Use case** represents the functionality of the system. So the other perspectives are connected with use case.

1. **Design** of a system consists of classes, interfaces and collaboration. UML provides class diagram, object diagram to support this.
2. **Implementation** defines the components assembled together to make a complete physical system. UML component diagram is used to support implementation perspective.
3. **Process** defines the flow of the system. So the same elements as used in *Design* are also used to support this perspective.
4. **Deployment** represents the physical nodes of the system that forms the hardware. UML deployment diagram is used to support this perspective.

2.15.2. Structural Diagrams

The structural diagrams represent the static aspect of the system. These static aspects represent those parts of a diagram which forms the main structure and therefore stable.

These static parts are represents by classes, interfaces, objects, components and nodes. The four structural diagrams are:

1. Class diagram
2. Object diagram
3. Component diagram
4. Deployment diagram

1. Class Diagram

Class diagrams are the most common diagrams used in UML. Class diagram consists of classes, interfaces, associations and collaboration. Class diagrams basically represent the object oriented view of a system which is static in nature. Active class is used in a class diagram to represent the concurrency of the system. Class diagram represents the object orientation of a system. So it is generally used for development purpose. This is the most widely used diagram at the time of system construction.

2. Object Diagram

Object diagrams can be described as an instance of class diagram. So these diagrams are more close to real life scenarios where we implement a system. Object diagrams are a set of objects and their relationships just like class diagrams and also represent the static view of the system. The usage of object diagrams is similar to class diagrams but they are used to build prototype of a system from practical perspective.

3. Component Diagram

Component diagrams represent a set of components and their relationships. These components consist of classes, interfaces or collaborations. So Component diagrams represent the implementation view of a system. During design phase software artifacts (classes, interfaces etc) of a system are arranged in different groups

depending upon their relationship. Now these groups are known as components. Finally, component diagrams are used to visualize the implementation.

4. Deployment Diagram

Deployment diagrams are a set of nodes and their relationships. These nodes are physical entities where the components are deployed. Deployment diagrams are used for visualizing deployment view of a system. This is generally used by the deployment team.

2.15.3. Behavioral Diagrams

Any system can have two aspects, static and dynamic. So a model is considered as complete when both the aspects are covered fully. Behavioral diagrams basically capture the dynamic aspect of a system. Dynamic aspect can be further described as the changing/moving parts of a system.

UML has the following five types of behavioral diagrams:

1. Use case diagram
2. Sequence diagram
3. Collaboration diagram
4. Statechart diagram
5. Activity diagram

1. Use case Diagram

Use case diagrams are a set of use cases, actors and their relationships. They represent the use case view of a system. A use case represents a particular functionality of a system. So use case diagram is used to describe the relationships among the functionalities and their internal/external controllers. These controllers are known as actors.

2. Sequence Diagram

A sequence diagram is an interaction diagram. From the name it is clear that the diagram deals with some sequences, which are the sequence of messages flowing from one object to another. Interaction among the components of a system is very important from implementation and execution perspective. So Sequence diagram is used to visualize the sequence of calls in a system to perform a specific functionality.

3. Collaboration Diagram

Collaboration diagram is another form of interaction diagram. It represents the structural organization of a system and the messages sent/received. Structural organization consists of objects and links. The purpose of collaboration diagram is similar to sequence diagram. But the specific purpose of collaboration diagram is to visualize the organization of objects and their interaction.

4. Statechart Diagram

Any real time system is expected to be reacted by some kind of internal/external events. These events are responsible for state change of the system. Statechart diagram is used to represent the event driven state change of a system. It basically describes the state change of a class, interface etc. State chart diagram is used to visualize the reaction of a system by internal/external factors.

5. Activity Diagram

Activity diagram describes the flow of control in a system. So it consists of activities and links. The flow can be sequential, concurrent or branched. Activities are nothing but the functions of a system. Numbers of activity diagrams are prepared to capture the entire flow in a system. Activity diagrams are used to visualize the flow of controls in a system. This is prepared to have an idea of how the system will work when executed.

2.16. Object-Oriented Analysis and Design (OOAD)

Object-Oriented Analysis and Design (OOAD) is a popular technical approach to analyzing, designing an application, system, or business by applying the object-

oriented paradigm and visual modeling throughout the development life cycles to foster better stakeholder communication and product quality.

According to the popular guide Unified Process; OOAD in modern software engineering is best conducted in an iterative and incremental way. Iteration by iteration, the outputs of OOAD activities, analysis models for OOA and design models for OOD respectively, will be refined and evolve continuously driven by key factors like risks and business value.