KARNATAKA STATE OPEN UNIVERSITY
MUKTHAGANGOTRI, MYSORE –570 006

Master of Library and Information Science

M.Lib.I.Sc - 1

Foundations of Information Science

BLOCK - 1

M.Lib.I.Sc – 1
Foundations of Information Science

BLOCK

1

DATA, INFORMATION AND KNOWLEDGE

Unit-1
Definition of Data, Information and Knowledge

Unit-2
Notion of Information: Definition, Nature, Properties and Scope

Unit -3
Knowledge: Definition, Types: Tacit and explicit

Unit -4
Information Science: Origin relationship with other disciplines

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Mukthagangotri, Mysuru-570006

Developed by Academic Section KSOU, Mysore

M.Lib.I.Sc -1 : Foundations of Information Resources
Block – 1: Data, Information & Knowledge

Block Introduction

Information science (also known as information studies) is an interdisciplinary science primarily concerned with the collection, classification, manipulation, storage, retrieval and dissemination of information. Information science studies the application and usage of knowledge in organizations, and the interaction between people, organizations and information systems. It is often, though not exclusively, studied as a branch of computer science or informatics and is closely related to the cognitive and social sciences.

Information Science focuses on understanding problems from the perspective of the stakeholders involved and then applying information (and other) technology as needed. In other words, it tackles the problem first rather than technology first. Within information science, attention has been given in recent years to human–computer interaction, groupware, the semantic web, value sensitive design, iterative design processes and to the ways people generate, use and find information.

Information Science should not be confused with information theory, the study of a particular mathematical concept of information, or with library science, a field related to a library which uses some of the principles of information science.

The unit-2 examines the various definitions of information science. And also provides a model describes the communication system of information science and other discipline in the unit gives solid foundation for understanding the concept of information science.

Unit-3 provides an idea on to the epistemological roots of information science. Various theories of information science have been discussed in this particular unit.

Unit-4 discusses the various paradigms of information science. The physical and cognitive paradigms of information science have been dealt in this particular unit.

Dr. N S Harinarayana

MLISc – 1
Foundations of Information Science

Block-1
Data, Information & Knowledge

Unit – 1
Definition of Data, Information and knowledge: their interrelationships

1.0 OBJECTIVES

This unit will help to you understand:

- The meaning of Data;
- The nature, scope and properties including types of data;
- The Interrelationships of data, Information and Knowledge; and
- The Interrelationship of data, Information and knowledge in the context of Library and Information Centre.

2.0 INTRODUCTION

Since the growth of civilization, the human beings are able to communicate and record knowledge. Information is being the major source of growth and development. Today, Information is seen as an important component of growth and improvements in

living standards in the developed world. Information is related to many interlinked concepts such as data, facts, observation, intelligence, skill, knowledge, experience, and wisdom. The data, information and knowledge are the intellectual assets, which have been perceived by its value, its role and importance in nation's development. The combinations concepts and their applications have in fact contributed to the growth and prosperity of the society. We all know that human mind is the super brain, which has contributed in inventions and innovations of newer concepts and its applications to the development of the human beings and growth of the society at large. Particularly development is seen in the society due to development of technology and its applications for creating newer knowledge and information.

Information based Societies and Information industries are emerging and changed the scenario of the nation development socially, politically, economically and scientifically. Libraries and information centers are no exception. The Role of L& IC's is also changing in accordance with the advances in Information technology for diffusing, developing and utilizing Information effectively. In this unit we are going to study the concepts of data, its meaning and its nature, types of data, properties of data and the scope of data in the context in which it is used. Data, information and knowledge are interrelated, in the sense that one is the building block of the other. Data is building block of Information and Information is building block of Knowledge. They are used interchangeably, very often, Information standing for knowledge or data.

3.0. Meaning and Definition of Data

3.1 Meaning of Data:

The data is a Latin word refers to "*anything that is given*". Hence "*something given*". Data is plural of "*datum*". In practice, it is used as both singular and plural form of the word. Data can exist in variety of forms-such as numbers or text on pieces of paper, as bit and bytes stored in electronic memory, or facts stored in a persons mind. Data is raw. It may be in any form, which can be used. The data cannot be defined unless we know the value assigned to it. Data is used in discussions of problems in Geometry,

Engineering and so on. Such usage is the origin of data as a concept in computer science: data are numbers, words, images, etc., accepted as they stand.

The word *datum* in English is still used in the general sense of "something given", and more specifically in Cartography geography geology and drafting to mean a reference point, reference line, or reference surface. The Latin plural data is also used as a plural in English, but it is also commonly treated as a mass noun and used in the singular. For example, "This is all the data from the experiment". This usage is inconsistent with the rules of Latin grammar, which would suggest, "These are the data", each measurement or result is raw data are numbers, characters, images or other outputs from devices to convert physical quantities into symbols, in a very broad sense. Such data are typically further processed by a human or input into a computer, stored and processed there, or transmitted (output) to another human or computer. Raw data is a relative term; data processing commonly occurs by stages, and the "processed data" from one stage may be considered the "raw data" of the next.

Data is usually an observed fact, obtained on basis of systematic survey or study using different devices related to certain activity. For example, mechanical computing devices are classified according to the means by which they represent data. Similarly, an analog computer represents a datum as a voltage, distance, position, or other physical quantity. A digital computer represents a datum as a sequence of symbols drawn from a fixed alphabet. The most common digital computers use a binary alphabet, that is, an alphabet of two characters, typically denoted "0" and "1". More familiar representations, such as numbers or letters, are then constructed from the binary alphabet.

Some special forms of data are distinguished. A computer program is a collection of data, which can be interpreted as instructions. Most computer languages make a distinction between programs and the other data on which programs operate, but in some languages, notably Lisp and similar languages, programs are essentially indistinguishable from other data. It is also useful to distinguish metadata, that is, a description of other data. Metadata is "data about data." The prototypical example of metadata is the library catalogue, which is a description of the contents of books, a single datum.

3.2 Definition:

"Data is a set of discrete, objective facts about events…Data describes only a part of what happened; it provides no judgment or interpretation and no sustainable basis of action…Data says nothing about its own importance or relevance." (Davenport and Prusak, 1998:2-3)

The CODAT (Committee on Data for Science and Technology) defines data as a "*crystallized presentation of the essence of scientific knowledge in most accurate form*". Random House Webster Computer and Internet Dictionary defines data as "*distinct pieces of information, usually formatted in a special way*"

Thus, a text is a piece of data. In fact, letters and characters are quantified symbols because there are a finite number of them; any alphabet (including digits and special characters) may be considered as a numbering system. Pictures, figures, recorded sounds and animation are also examples of (quantifiable) data, because they may be quantified (using digital scanners, cameras, recording devices, etc.) to the point that it is eventually difficult to distinguish, from their originals, their reproduction made from the quantified representation. It is very important to note that, even if incomprehensible for a reader, any text constitutes a piece of data. In computer parlance, a spreadsheet generally starts out by holding data. Examples: What do the numbers 123424331911, 211192 or perhaps the letters 'aab' mean to you? Probably nothing - this is because they have no specific meaning or application. They are examples of DATA.

Data consist of raw facts and figures - it does not have any meaning until it is processed and turned into something useful. The Binary Digits 0 and 1 represents some data.

Fig

```
010101010101010101
010101010101010101
010101010101010101
010101010010101010
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Data comes in many forms, the main ones being letters, numbers and symbols. However, it is essential that data is available because it is the first step in creating meaningful Information. *For example* the three data items above could represent some very important information:

DATA	INFORMATION
5739579385	Your winning Lottery ticket number
1208063	Your Birthday
AB	The grades you want at A level

Self Check Exercise-1

1. Explain the meaning and definition of data.
2. Write your answer in the space given below.

4. Data: Types, Nature, Properties & Scope

Types of Data:

We have come to know by the definition of data, which is a representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automated means. Data is raw material of

information. Refers mostly to the information entered into, and stored within a computer or file. Data can be used directly, without too much of misinterpretation, does not require mediation or consensus for understanding. In electronic versions of scientific data sets are often called as 'hard databases' compared to 'soft databases' which refer to bibliographic and textual databases. Many bibliographic and full text databases also support data searching (e.g. INSPEC database). Often data is derived from full text articles - so searching for data in such sources becomes very important. Hence, data can be viewed in different contexts: for example data used in computers sciences, data represented in sciences and social sciences. There may be types of data emerging from the above disciplines. The data types may differ in case of sciences, technology and management science. Census data is good example of population studies. Let us know how data is represented in the computers in fig-1.

The data types have been discussed giving the explanations along with examples.

4.1.1 Data types in Computers:

Data Type	Explanation	Example
Boolean	Can hold one of two values - yes/no; true/false	Are you employed - yes/no
Integer	Holds whole numbers only (positive and negative)	Shoe size: 4,5,6,7,8 School years: 7,8,9,10,11,12,13
Real	Holds decimal numbers and fractions	For storing currency e.g. 12.25 (it cannot store the currency symbol)
Character	Anything you see on the keyboard	'b' '7' '@' '%'
Text/String	Holds any alphanumeric character, can include numbers and symbols	For storing any text e.g. Name, address, telephone number, postcode

Fig-2. *Data represented in computers*

4.1.2 Data in Sciences

Most science is based on observations that include direct observations of the natural world and observations of experimental output and results. Increasingly, data are being generated from computer models. Sometimes "data" are equated with "observations". In other situations, the word "data" is used as a descriptive term for the starting point of the analysis or research of interest. For example, to a seismologist interested in seismic waves, seismometer outputs are data. CODATA has recognized scientific data which are repented as follows:

Data with reference to time factor: Based on the time the data can be classified into two categories:

Time Independent data: The term refers to the data, which can be measured repeatedly, e.g., data in Geosciences and Astronomy such as geological structures, rocks, fixed stars etc.

Time dependent data: These can be measured only once, e.g., certain geophysical or cosmological phenomena like volcanic eruptions and solar flares. Likewise, data pertaining to rare fossils are time-dependent data.

Data with reference to location factor: Data with reference to location factor can be categorized as follows:

Location independent data: These are independent of the location of objects measured e.g., data on pure Physics and Chemistry.

Data with reference to mode of generation: There are three types of data under this category. These are:

Primary data: Data re primary when obtained by experiment or observation designed for the measurement, e.g., values of velocity derived by measuring length and time.

Derived data: Combining several primary data with the aid of a theoretical model derives these data.

Theoretical data: These are derived by theoretical calculations. Basic data such as fundamental constants are used in theoretical calculations, e.g., data concerning solar eclipses are predicted with the use of celestial mechanics.

Data with reference to nature of quantitative values: These are categorized into the following two classes:

- **Determinable data**: Data on a quantity, which can be assumed to take a definite value under a given condition, are known as determinable data. Time-dependent data are usually determinable data, if the given condition is understood to include the specification of time.
- **Stochastic data**: Data relating to a quantity, which take fluctuating values from one sample to another, from one measurement to another, under a given condition, are referred to as stochastic. In Geosciences, most data are stochastic.

Data with reference to terms of expression: The categorization in this case yields three classes of data:

Quantitative data: These are measures of quantities expressed in terms of well-defined units, changing the magnitude of a quality to a numerical value. Most data in Physical Sciences are quantitative data.

- **Semi-quantitative data**: These data consist of affirmative or negative answers to posed questions concerning different characteristics of the objects involved, e.g., in Biology, classification of organisms is based upon a set of 'Yes' and 'No' responses to questions concerning morphological, biochemical and other characteristics of species. Such data are regarded as semi quantitative. 'Yes' and 'No' can be coded as '1' and '0' (zero) for obtaining numerical data.

- **Qualitative data**: The data expressed in terms of definitive statements concerning scientific objects are qualitative in nature. Qualitative data in this sense are almost equivalent to established knowledge.

Data with reference to mode of presentation: These are categorized as numerical graphic and symbolic data.

- **Numerical data**: These data are presented in numerical values, e.g., most quantitative data fall in this category.
- **Graphic data**: Here data are presented in graphic form or as models. In some cases, graphs are constructed for the sake of helping users grasp a mass of data by visual perception. Charts and maps also belong to the category.
- **Symbolic data**: These are presented in symbolic form, e.g., symbolic presentation of weather data.

4.1.3 Types of data in social sciences:

As in sciences, data in social sciences are also organized into different types so that their nature can be easily understood. The following categorization is normally observed in social sciences.

Data with reference to scale of measurement: Based on the scale of measurement data can be categorized as follows:

- **Nominal data**: The nominal scale is used for assigning numbers as the identification of individual unit. For example, the classification of journals according to the discipline they belong to, may be considered as nominal data. If numbers are assigned to describe the categories the numbers represent only the name of the category.
- **Ordinal data:** Interval data are ordered categories of data and the difference between various categories are of equal measurement. For example, we can measure the IQ (Intelligence Quotient) of a group of children. After assigning

numerical value to the IQ of each child, the data can be grouped with interval of 10, like 0 to 10, 10 to 20, 20 to 30 and so on. In this case, '0' does not mean the absence of intelligence and children with IQ '20' are not doubly intelligent than children with IQ '10'.

- **Ratio data:** Ratio data are the quantitative measurement of a variable in terms of magnitude. In ratio data, we can say that one thing is twice of thrice of another as for example, measurements involving weight, distance, price, etc.

Data with reference to continuity: Data with reference to continuity can be categorized as follows:

- **Continues data:** Continuous data are infinite set of possible values. Between ranges there are infinite possible values. For example, height of an individual is not restricted to values like 155 cm and after that to 156 cm it can be 155.59 cm or 155.99 cm continuous value.
- **Discrete data**: The discrete data are finite or potentially countable set of values. For example, the number of members in a library it can be 3575 or 2599 but certainly not 2599 ½. Similarly the number of citizens in a country, the number of vehicles registered is the examples of discrete data.

Data with reference to number of characteristics: Data can also be categorized on the basis of number of variables considered. These are:

- **Univariate data**: Univariate data are obtained when one characteristic is used for observation, e.g., the performance of the student in a given class.
- **Bivariate data:** Bivariate data result when instead of one two characteristics are measured simultaneously, e.g., height and weight of tenth class students.
- **Multivariate data**: Multivariate data consist of observations on there or more characteristics e.g., family size, income and savings in a metropolitan city in India.

Data with reference to time: There are two types of data under this category. These are

- **Time series data**: Data recorded in a chronological order across time are referred to as time series data. It takes different values at different times e.g., the number of books added to a library in different years, monthly production of steel in a plant, yearly intake of students in a university.
- **Cross-sectional data**: This refers to data for the same unit or for different units at a point of time, e.g., data across sections of people, region or segments of the society.

Data with reference to origin: Data under this category can be put as follows:

- **-Primary data**: The data obtained first hand from individuals by direct observation, counting and measurement or by interviews or mailing a questionnaire are called primary data. It may be complete enumeration of sampling e.g., data collected from a market survey.
- **-Secondary data:** The data collected initially for the purpose and already published in books or respects but are used later on for some other purpose are referred to as secondary data. For example, data collected from census reports, books, data monographs, etc.

- **Data with reference to characteristics**: Data can be categorized on the basis of its characteristics as follows:
  - **Quantitative data**: When the characteristic of observation is quantified we get quantitative data. Quantitative data result from the measurement of the magnitude of the characteristic used. For example, age of a person price of a commodity, income of a family etc.

- **Qualitative data:** When the characteristic of observation is a quality of attribute, we get qualitative data. For example sex or color of a person or intelligence of a student.

Self Check Exercise-2

1. How are data categorized in Sciences?
2. Write you answer in the space given below?

_____
_____
_____
_____
_____
_____
_____

4.2 Nature of Data

We have understood the meaning of data. Data has been seen in different context in different disciplines. The value attained by the data with the specific items then transformed into meaningful form to perform a function is the nature of data. Nature of data can be determined to the class it belongs. We have seen the values assigned to data in context of Computer parlance, Sciences and Social sciences. The nature of data in computers may be numeric, alphanumeric, text; graphics etc., in sciences and social science the data to a large extent a quantitative data are numerical data. The nature of data in science with reference to types of data is as follows:

Numerical Data: The data measured in the science is derived and stated in numerical values.

Descriptive data: The nature of data is descriptive expressed in terms of definitive statements concerning the objects.

Graphic and symbolic data: The nature of data is modes of presentation, which enables users to grasp data by visual perception. The nature is graphics. While referring to the

types of data in social sciences the nature of data can either be enumerative or descriptive.

Enumerative data: Most data in social sciences are enumerative in nature. However, they are refined with the help of statistical techniques to make them more meaningful. They are known as statistical data. This explains the use of different scales of measurement whereby they are grabbed.

Descriptive data: All qualitative data in social sciences can be descriptive in nature. These can be in the form of definitive statements. However, if necessary, numerical values can be assigned to descriptive statements, which may then be reduced to numerical data.

Properties of data: for examining the properties of data, reference to the various definitions of data discussed in section 2.2 is necessary. Reference to these definitions reveals that following are the properties of data: (1) amenability to use, (2) clarity, (3) accuracy and (4) the quality of being the essence of the matter. Each of these may be discussed further.

Amenability to use: From the dictionary meaning of data it is learnt that data are facts used in deciding something. In short, data are meant to be used as a basis for arriving at definitive conclusions. They are not required, if they are not amenable to use. The use may differ with the context. Amenability to use nevertheless remains a characteristic of data.

Clarity: According to the CODATA definition, data are a crystallized presentation. This means data should necessarily display clarity so essential for communicating the essence of the matter. Without clarity, the meaning desired to be communicated will remain hidden.

Accuracy: Data should be real, complete and accurate. Accuracy is thus an essential property of data. Since data offer a basis for deciding something, they must necessarily be accurate if valid conclusions are to be drawn.

Essence: In social sciences, large quantities of data are collected which cannot be presented, nor is it necessary to present them in that form. They have to be compressed and refined. Data so refined can present the essence or derived qualitative value, of the matter. Data in sciences consist of observations made from scientific experiments; these are all measured quantities. Data, thus are always the essence of the matter.

Besides the above four properties three more properties are evident, more particularly in social sciences. They are the properties of being aggregated, compressed and refined.

Aggregation: Aggregation is cumulation or adding up. For example, monthly data are added up to form a consolidated annual cumulation. Cumulative percentages are always worked out in data presented on a variable in tabular form. In social sciences aggregation is of great importance. For instance, production figures, crop yield, export and import statistics and census data are cases of aggregation.

Compression: Large amounts of data are always compressed to make them more meaningful. To present the essence of the matter, it is necessary to compress data. Compressed data are manageable and can be grasped quickly. There exist a number of techniques to compress data to a manageable size. Graphs and charts are some examples of compressed data.

Refinement: Data require processing or refinement. When refined, they are capable of leading to conclusions or even generalizations. This refinement can then discover new facts. Bradford's bibiliograph denoting the scatter of a subject or Garfield's historiography denoting the development of a discipline are two examples of data refinement. Conclusions can be drawn only when data are processed or refined.

4.3 SCOPE OF DATA

Scope of the data can be studied from following points of view:

Utility of Data: Data have great utility s their use in the growth of knowledge. No research, investigation, experiments, etc. is possible without reference to data already

existing. Nor does any research end without generating new data. No decision-making system can work, nor can a problem be solved, without adequate use of data. No planning is conceivable without enough data. For want of sufficient data research results or conclusions drawn from an enquiry are automatically rendered untenable. Data also alter concepts and remove uncertainty. Data then are indispensable in research and in planning and decision-making. The importance of data is no less in managing libraries and library service.

Size of Data: Size of data involves the coverage of the subject under study, data elements and data population covering documents, data banks and field survey methods (questionnaire, interview, observations, etc). In science what already exists is in the form of data. According to an Aslib statement, scientific data include: the properties and attributes of an individual entity; the values of one property over many entities; variations of one property of one entity under different conditions; classification of entities based on properties; and quantitative relations between two or more entities

Period of data: Data collection for any research problem must indicate the time span. It should be clearly stated whether data period is current or cumulative. In sciences the interpretations and conclusions are mainly drawn keeping in view the whole text of the subject. In social sciences and humanities, however, the cumulative period is not taken into account for data collection. The importance of data in library service is manifold. Librarians are users of data in more than one way. They collect bibliographic data for providing services and generate and use non-bibliographic data for managing these services. Apart from these they are required to make available data to researchers and planners according to their subject interests. it is thus necessary to ensure that relevant data sources are available in the library in order that the users may be assisted with appropriate and adequate data in their decision process. It is seen that there exists no field of knowledge, no human activity where data can be dispensable. All investigations begin and end with data. In intellectual pursuits data are all pervasive, only their nature varies with the event.

5. Interrelationship of Data, Information and Knowledge

The definitions of data, information and knowledge, as well as their interrelations are discussed here. Data has commonly been seen as simple facts that can be structured to become information. Information, in turn, becomes knowledge when it is interpreted, put into context, or when meaning is added to it. There are several variations of this widely adopted theme. The common idea is that data is something less than information, and information is less than knowledge. Moreover, it is assumed that we first need to have data before information can be created, and only when we have information, knowledge can emerge. There quickly found to be a wealth of sources that seemed to make sense in terms of defining what knowledge actually was, and how was it differentiated from data, information, and wisdom. They are not of equal value in terms of utility and applications. They are evaluated in ascending scale of values, data having the least value and the wisdom the greatest. In totality these concepts form valuable human intellectual assets and service as a precious human capital in all development process. The interrelations of the concept of data, Information and knowledge will be understood from the following example:

1. Data -Raw material - Cotton
2. Information -Intermediary -Yarn
3. Cloth - Finished product -Cloth

According to Russell Ackoff, a systems theorist and professor of organizational change, the content of the human mind can be classified into five categories. The following diagram represents the transitions from data, to information, to knowledge, and finally to wisdom, and it is understanding that support the transition from each stage to the next. Understanding is not a separate level of its own.

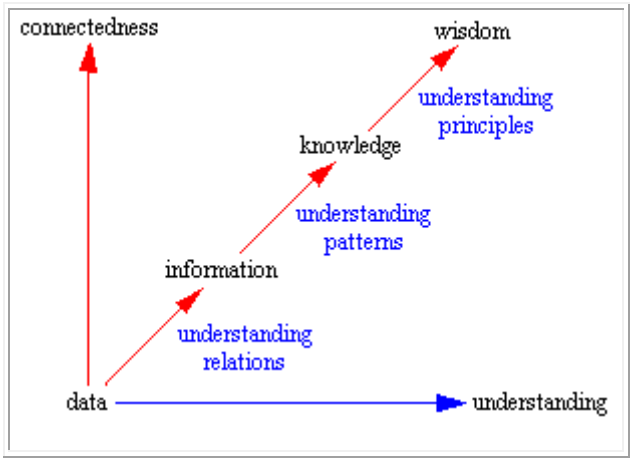

Fig 3: Data represents a fact or statement of event without relation to other things

Data: symbols

Information: data that are processed to be useful; provides answers to "who", "what", "where", and "when" questions Knowledge: application of data and information; answers "how" questions Understanding: appreciation of "why" Wisdom: evaluated understanding.

Ackoff indicates that the first four categories relate to the past; they deal with what has been or what is known. Only the fifth category, wisdom, deals with the future because it incorporates vision and design. With wisdom, people can create the future rather than just grasp the present and past. But achieving wisdom isn't easy; people must move successively through the other categories.

A further elaboration of Ackoff's definitions follows:

Data... data is raw. It simply exists and has no significance beyond its existence (in and of itself). It can exist in any form, usable or not. It does not have meaning of itself. In computer parlance, a spreadsheet generally starts out by holding data.

Information... information is data that has been given meaning by way of relational connection. This "meaning" can be useful, but does not have to be. In computer parlance, a relational database makes information from the data stored within it.

Knowledge... knowledge is the appropriate collection of information; such that it's intent is to be useful. Knowledge is a deterministic process. When someone "memorizes" information, then they have amassed knowledge. This knowledge has useful meaning to them, but it does not provide for, in and of itself, integration such as would infer further knowledge.

Understanding... understanding is an interpolative and probabilistic process. It is cognitive and analytical. It is the process by which knowledge is synthesized with new knowledge from the previously held knowledge. The difference between understanding and knowledge is the difference between "learning" and "memorizing". Understanding can build upon currently held information, knowledge and understanding itself. In computer parlance, AI systems possess understanding in the sense that they are able to synthesize new knowledge from previously stored information and knowledge.

Wisdom... wisdom is an extrapolative and non-deterministic, non-probabilistic process. It calls upon all the previous levels of consciousness, and specifically upon special types of human programming (moral, ethical codes, etc.).Wisdom is therefore, the process by which one can discern, or judge, between right and wrong, good and bad. Wisdom is a uniquely human state, wisdom requires one to have a soul, for it resides as much in the heart as in the mind. And a soul is something machines will never possess (or perhaps I should reword that to say, a soul is something that, in general, will never possess a machine). Fig: Data represents a fact or statement of event without relation to other things. Ex: It is raining. Information embodies the understanding of a relationship of some sort, possibly cause and effect. Ex: The temperature dropped 15 degrees and then it started raining.

Knowledge represents a pattern that connects and generally provides a high level of predictability as to what is described or what will happen next. Ex: If the humidity is very high and the temperature drops substantially the atmospheres is often unlikely to be able to hold the moisture so it rains.

Wisdom embodies more of an understanding of fundamental principles embodied within the knowledge that are essentially the basis for the knowledge being what it is. Wisdom is essentially systemic. Ex: It rains because it rains. And this encompasses an understanding of all the interactions that happen between raining, evaporation, air currents, temperature gradients, changes, and raining.

Self-Check Exercise-3

1. Summarise the interrelationship of data, Information and Knowledge.
2. Write you answer in the following Space

Libraries and Data, Information and Knowledge

With reference to Library and Information Centre, the relations of data, information and knowledge are useful and necessary to determine the types of services area planned to help the Library users. For librarians and documentlists, information science is primarily concerned with finding the most suitable rules for the design of systems and procedures for collecting, organizing, classifying, indexing, storing, retrieving and mediating those materials which support data, knowledge, meaning and experience. Librarians, documentalists and archivists have done this for thousands of years.

Data Information and Knowledge in context of Library & Information Science discipline.

Data	**Information**	**Knowledge**	**Wisdom**
Each unique record of the Membership Register.	The collection of the above records and organized into a User Profile.	Understanding a pattern from the above User profile by the Librarian. i.e. What kind of users are frequenting the library e.g. Children, Senior Citizens, Research Scholars etc.	Planning of new services/ Improvement of existing services based on the knowledge gained.

Self Check Exercise-3

1. Summaries the interrelationships of Data, Information Knowledge.

Write your answer in the space given below:

Summary:

By definitions of data essentially means something that is given. Data may be anything that is given a fact, figures, texts, charts or graphs. "Data is a set of discrete, objective facts about events…Data describes only a part of what happened; it provides no judgment or interpretation and no sustainable basis of action…Data says nothing about its own importance or relevance." (Davenport and Prusak, 1998:2-3)

Data can be viewed in different contexts: for example data used in computers sciences, data represented in sciences and social sciences. There may be types of data emerging from the above disciplines. The data types may differ in case of sciences, technology and management science. Census data is good example of population studies. Data representation in computers, Sciences and Social sciences has been discussed in details.

The interrelations of the concept of data, Information and knowledge will be understood from the following example:

1. Data -Raw material - Cotton
2. Information -Intermediary -Yarn

3. Cloth - Finished product -Cloth

A further elaboration of Ackoff's through diagram represents the transitions from data, to information, to knowledge, and finally to wisdom, and it is understanding that support the transition from each stage to the next is discussed with examples of **data** represents a fact or statement of event without relation to other things. Ex: It is raining.

Information embodies the understanding of a relationship of some sort, possibly cause and effect. Ex: The temperature dropped 15 degrees and then it started raining. Knowledge represents a pattern that connects and generally provides a high level of predictability as to what is described or what will happen next. Ex: If the humidity is very high and the temperature drops substantially the atmospheres is often unlikely to be able to hold the moisture so it rains.

Wisdom embodies more of an understanding of fundamental principles embodied within the knowledge that are essentially the basis for the knowledge being what it is. Wisdom is essentially systemic. Ex: It rains because it rains. And this encompasses an understanding of all the interactions that happen between raining, evaporation, air currents, temperature gradients, changes, and raining. With reference to Library and Information Centre, the relations of data, information and knowledge are useful and necessary to determine the types of services area planned to help the Library users.

Answer to Self Check Exercise-1

Information is seen as an important component of growth and improvements in living standards in the developed world. Information is related to many interlinked concepts such as data, facts, observation, intelligence, skill, knowledge, experience, and wisdom. The data, information and knowledge are the intellectual assets, which have been perceived by its value, its role and importance in nation's development. The combinations concepts and their applications have in fact contributed to the growth and prosperity of the society. We all know that human mind is the super brain, which has contributed in inventions and innovations of newer concepts and its applications to the development of the human beings and growth of the society at large. Particularly development is seen in the society due to development of technology and its applications for creating newer knowledge and information.

Data is a set of discrete, objective facts about events…Data describes only a part of what happened; it provides no judgment or interpretation and no sustainable basis of action…Data says nothing about its own importance or relevance." (Davenport and Prusak, 1998:2-3) Thus, a text is a piece of data. In fact, letters and characters are quantified symbols because there are a finite number of them; any alphabet (including digits and special characters) may be considered as a numbering system. Pictures, figures, recorded sounds and animation are also examples of (quantifiable) data, because they may be quantified (using digital scanners, cameras, recording devices, etc.) to the point that it is eventually difficult to distinguish, from their originals, their reproduction made from the quantified representation. It is very important to note that, even if incomprehensible for a reader, any text constitutes a piece of data. In computer parlance, a spreadsheet generally starts out by holding data.

The CODAT (Committee on Data for Science and Technology) defines data as a "crystallized presentation of the essence of scientific knowledge in most accurate form". Random House Webster Computer and Internet Dictionary defines data as "distinct pieces of information, usually formatted in a special way

2. Most science is based on observations that include direct observations of the natural world and observations of experimental output and results. Increasingly, data are being generated from computer models. Sometimes "data" are equated with "observations". In other situations, the word "data" is used as a descriptive term for the starting point of the analysis or research of interest. For example, to a seismologist interested in seismic waves, seismometer outputs are data. CODATA has recognized scientific data which are repented as follows:

Data with reference to time factor: Based on the time the data can be classified into two categories:

Time Independent data: The term refers to the data, which can be measured repeatedly, e.g., data in Geosciences and Astronomy such as geological structures, rocks, fixed stars etc.

Time dependent data: These can be measured only once, e.g., certain geophysical or cosmological phenomena like volcanic eruptions and solar flares. Likewise, data pertaining to rare fossils are time-dependent data.

Data with reference to location factor: Data with reference to location factor can be categorized as follows:

Location independent data: These are independent of the location of objects measured e.g., data on pure Physics and Chemistry.

Data with reference to mode of generation: There are three types of data under this category. These are:

-Primary data: Data re primary when obtained by experiment or observation designed for the measurement, e.g., values of velocity derived by measuring length and time.

- Derived data: Combining several primary data with the aid of a theoretical model derives these data.

- Theoretical data: These are derived by theoretical calculations. Basic data such as fundamental constants are used in theoretical calculations, e.g., data concerning solar eclipses are predicted with the use of celestial mechanics.

Data with reference to nature of quantitative values: These are categorized into the following two classes:

Determinable data: Data on a quantity, which can be assumed to take a definite value under a given condition, are known as determinable data. Time-dependent data are usually determinable data, if the given condition is understood to include the specification of time.

Stochastic data: Data relating to a quantity, which take fluctuating values from one sample to another, from one measurement to another, under a given condition, are referred to as stochastic. In Geosciences, most data are stochastic.

Data with reference to terms of expression: The categorization in this case yields three classes of data:

-Quantitative data: These are measures of quantities expressed in terms of well-defined units, changing the magnitude of a quality to a numerical value. Most data in Physical Sciences are quantitative data.

-Semi-quantitative data: These data consist of affirmative or negative answers to posed questions concerning different characteristics of the objects involved, e.g., in Biology, classification of organisms is based upon a set of 'Yes' and 'No' responses to questions concerning morphological, biochemical and other characteristics of species. Such data are regarded as semi quantitative. 'Yes' and 'No' can be coded as '1' and '0' (zero) for obtaining numerical data.

- Qualitative data: The data expressed in terms of definitive statements concerning scientific objects are qualitative in nature. Qualitative data in this sense are almost equivalent to established knowledge.

Data with reference to mode of presentation: These are categorized as numerical graphic and symbolic data.

-Numerical data: These data are presented in numerical values, e.g., most quantitative data fall in this category.

-Graphic data: Here data are presented in graphic form or as models. In some cases, graphs are constructed for the sake of helping users grasp a mass of data by visual perception. Charts and maps also belong to the category.

Symbolic data: These are presented in symbolic form, e.g., symbolic presentation of weather data.

3. The definitions of data, information and knowledge, as well as their interrelations according to Russell Ackoff, a systems theorist and professor of organizational change, the content of the human mind can be classified into five categories. Data, Information, Knowledge and wisdom.

Data: symbols

Information: data that are processed to be useful; provides answers to "who", "what", "where", and "when" questions

Knowledge: application of data and information; answers "how" questions

Understanding: appreciation of "why"

Data has commonly been seen as simple facts that can be structured to become information. Information, in turn, becomes knowledge when it is interpreted, put into context, or when meaning is added to it. There are several variations of this widely adopted theme. The common idea is that data is something less than information, and information is less than knowledge. Moreover, it is assumed that we first need to have data before information can be created, and only when we have information, knowledge can emerge. There quickly found to be a wealth of sources that seemed to make sense in terms of defining what knowledge actually was, and how was it differentiated from data, information, and wisdom. They are not of equal value in terms of utility and applications. They are evaluated in ascending scale of values, data having the least value and the wisdom the greatest. In totality these concepts form valuable human intellectual assets and service as a precious human capital in all development process.

The interrelations of the concept of data, Information and knowledge will be understood from the following example:

1. Data -Raw material - Cotton
2. Information -Intermediary -Yarn
3. Cloth - Finished product -Cloth

References:

- Davenport, T.H. and L. Prusak (1998). Working Knowledge: How Organizations Manage What They Know. Harvard Business School Press, Boston, MA

- Ackoff, R. L., "From Data to Wisdom", Journal of Applies Systems Analysis, Volume 16, 1989 p 3-9.

- Bellinger (G):Date, Information, Knowledge, and Wisdom. Accessed http://www.outsights.com/systems/dikw/dikw.htm.

- Anderson (W. L): Some challenges and issues in managing and Preserving access to, Long-lived Collections of Digital Scientific and Technical Data, Data Science Journal, Volume 3, 30 December 2004 191.

Unit – 2
Notion of Information: Definition, Nature, Properties and Scope

1.0 Notion of Information

The word "Information" is presently well known to everybody. Meanwhile, it has come into common use since not very long ago, i.e. in the middle of twenth century by the initiative of Claude Shannon. He has introduced this term in a limited technical sense as applied to the theory of communication or code transmission (called Information Theory). Simultaneously with him, Norbert Wiener substantiated a necessity of approaching to information as a common phenomenon significant for the existence of nature, human being and society.

Meanwhile, the notion of information as such still remains to a high extent intuitive and gets a variety of meanings in different areas of human activities.

Information can be conceived as a signal that has a usable meaning. The latter contributes to a re-organisation of the system utilising the information - which wouldn't be possible without the signal. One can differentiate between a "traditional" and a "modern" notion of information.

1.1 The Traditional notion of Information:

"Information is a message which is mediating a meaning to a perceiving living being. It is not necessarily emanating from a living being and could originate from the inanimate nature or technology. The perceiving living being is using its sense-organs for the reception and its nervous system for the processing of the message."

In this sense, a map contains information. A human being who is reading it is organising his or her behaviour according to the guidelines of the DNA map. DNA contains in the "modern" sense information that present the "structure" of a human being. In each cell, the whole quantity of information is stored and part of it is picked out and applied in an organising way within the various cells

1.2 The Modern notion of Information:

"Information is a signal that enables a certain organisation of a system. The generation, the transmission and the processing of the signal is not tied to the participation of perceiving living beings." The notion of information is generalised to all systems, which can receive, and process organising signals. To get back to the two historic events from the first section: The two transformations of information described above happen without that a human being needs to learn about the information. The "meaning" of it is thus unknown (since neither the cell nor the computer knows about meanings). The modern notion of information, as opposed to the traditional, therefore differentiates between Information (as the organising factor) and their meaning (in the perception of thinking living beings). The information within the context of human sensory organs and the machine (microcomputers) are mapped here to understand the information flow.

1.3 The value and importance of information:

The general conception of information transfer that takes place in the human and machine environment is quite obvious with the above example. The inventions, innovations for creation of new knowledge are the consistent efforts of the individual who have dedicated to the growth of the knowledge from the days of evolution of the civilization from ancient to modern. The importance of the information in various stages of human development is reckoning as driving force. Some of the factors attributed to the current value of information and knowledge, which have contributed to the Socio-economic development, are in the fields of Research and Development (R & D), Science and technology, Information technology and Societal Information.

1.4 Information Life Flow:

The Information Life cycle Model (Clayton and Gorman) shown in the fig 1 is one of the model, which depicts information flow in the society. The model represents flow of information from the top- author the researcher will usually communicate with his/her colleagues, the so called "invisible college". Eventually however, if the information is scientific or academic in nature it is likely to be published as report or a journal article, copies will go to the libraries as well as the potential readers. The cycle is repeated up to three times, with the different publishers (a frequently different authors, as each draws upon earlier works), but with the library at the centre of the cycle. Eventually new authors draw upon known information as part of the new cycle. By "Information" in the context we mean a full range of library resources, including educational and recreational materials. Apparently at each stage of the cycle the readers will be different and have different needs.

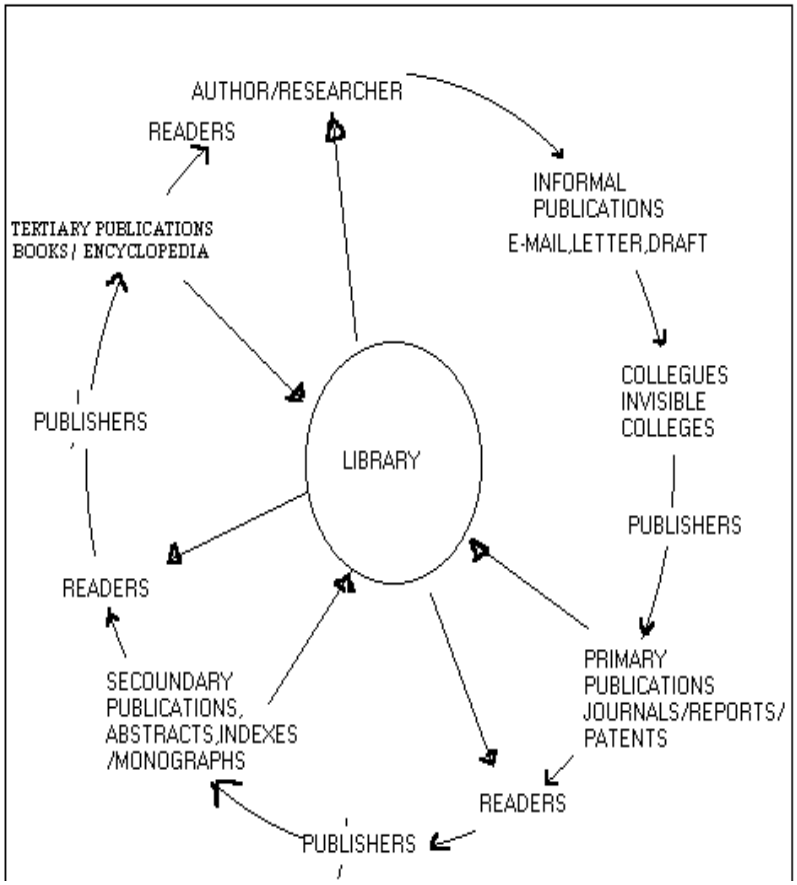

Fig -1 Information Life cycle Model (Clayton and Gorman)

1.5 Value of the Information Professional

In today's fast-paced world of business, the need for information is an international commodity. Information, both internally and externally produced, is the lifeblood of an organization and essential for innovation and continuous learning. Information sharing is also essential for any organization that is attempting to understand and manage its intellectual capital, often in a global context.

Information professionals play a unique role in gathering, organizing, and coordinating access to the best available information sources for the organization, understanding the critical need of turning that information into usable knowledge.

This is accomplished through the development, deployment, and management of information resources and services. Information professionals, working in non-traditional settings such as market research, business development, and strategic planning, use the Internet and other technology to present information in a way that maximizes its usefulness, saving time and money in order to attain the goals of their organization. Organizations that are integrating information professionals into strategic planning initiatives recognize their necessity in gaining a competitive advantage in the information and knowledge age.

Exercise-1

1. Explain Notion of information.
2. Write your answer in the space below:

2.0 Definition of Information

In this section, we are presenting a quick resume of the literature on the discussions on the definition of information as there are too many formal definitions and none is accepted universally. Therefore, it would be more useful to give a brief review of discussions on the definition rather than giving the different formal definitions of information. The term "information" has been widely and increasingly used, but not always with a clear idea about its meaning. As Dretske (1981) and Lewis (1991) pointed out, few books concerning information actually define it clearly. And Mingers (1997) adds, "Information systems could not exist without information and yet there is no secure agreement over what information actually is" (p. 73). The word "information" is one of the most used, and very abused, words. Different scientific disciplines and engineering fields provide diverse meanings to the word, which is becoming the umbrella of divergent, and sometimes dissimilar and incoherent homonyms. Information has been frequently defined as "interpreted data" and, as such, the same data might cause different interpretations. Different persons might associate different meanings to the same data. This kind of definition is frequently found in Information Systems textbooks, especially those oriented to Information Systems Development and Managerial Information Systems (MIS). Data in a MIS should provide some meaning to some manager in order to fulfill its reason or justification of existence.

An interpretation is, by its own nature, subjective, i.e. related to a subject, a "mind, ego, or agent of whatever sort that sustains or assumes the form of thought or consciousness." (Merriam-Webster, 1999).

A similar conclusion might be derived from the etymology of the word "information." "Inform" originated from the Middle English term "enforme", derived from the Middle French term "enformer", which evolved from the Latin term "informare" (Merriam-Webster, 1999). This Latin term means "shape, form an idea of" (Hoad, 1993). To form an idea is always in the mind of a person, of a subject. On the

other hand, “informare” is a composite of “in” and “form.” The last term means “shape, mold” The term “in-” is used in combination mainly with verbs and their derivatives, with the senses of ‘in, into, within’.” (Hoad, 1993) Accordingly, “to inform” would mean “to form in”, “to form into”, “to form within” a person, a subject, or as Boland (1987, referenced by Cohen, 2000) concluded “…information is the inward-forming of a person that result from the engagement with data.” The conclusion we made, from the etymological analysis of the term converge with the conclusions made by several authors by means of other kind of analysis. Dervin (1983), for example, points out that, “Since it is assumed that all information producing is internally guided and since it is generally accepted that all human observing is constrained, sense-making further assumes that all information is subjective” (p. 4, Dervin emphasis).

Most writers take the position that the word 'information' is used with many different connotations and a single precise definition encompassing all its aspects cannot in principle be formulated. Whatever the definitions of the basic concepts of information, a science of information could be useful for studying the structure of Information Science.

2.1 Belkin

In an elaborate study on the information concepts for Information Science Belkin makes the distinction between definition and concept. The distinction is while a definition presumably defines the phenomenon; the concept is looking at or interpreting the phenomenon. By accepting the idea of a concept, it becomes easier to look for a useful concept rather than attempting a universal definition of information.

Belkin postulates three approaches to the determination of the requirement of an information concept:

- Methodological -- having to do with the utility of the concept;
- Behavioral --having to do with the phenomena which the concept must account for;
- Definitional - having to do with the context of the concept.

With these postulates, the following eight requirements are enumerated which would be relevant and operational to developing a structure of Information Science:

1 It must refer to information within the context of purposeful, meaningful, communication;

2 It should account for information as a process of social communication among human beings;

3 It should account for information being requested or desired;

4 It must account for the relationship between information and state of knowledge of generator and of recipient;

5 It should account for the effect of information on the recipient;

6 It should account for the varying effects of messages presented in different ways;

7 It must be generalisable beyond the individual case; and

8 It should offer a means of prediction of the effect of information. Requirements 1 to 6 pertain to relevance of information to user communities; the rest two are operational requirements to design and develop useful models of information systems.

2.2 Wersig and Neveling

Wersig and Neveling consider information much more comprehensively, adopting six different approaches:

1 The Structural approach (matter oriented) in which information is seen as structures of the world or static relations between physical objects which may be perceived or not;

2 The Knowledge approach which records knowledge that is built upon the basis of perception of the structure of the world. This approach is not recommended because knowledge and information are used as synonyms;

3 The Message approach in which information is recorded as symbols oriented in a physical carrier. This approach is used only by those concerned with the mathematical theory of communication;

4 The Meaning approach where the semantic content of a message is accepted as information;

5 The Effect approach or the Recipient-oriented approach which states that information occurs only as a specific effect of a process;

6 The Process approach where information is seen as a process, which, for example, occurs in the human mind when a problem and useful data are brought together.

The substance of these approaches is that information is a social process and can be understood only if it is defined in relation to needs either as reduction of uncertainty caused by a communication of data or as data used for reducing uncertainty.

He, however, believes that the fundamental problem of Information Science is to interpret this equation and thereby to explain information process.

Exercise-2

1. Elaborate Wersig and Neveling approach to information.
2. Write your answer in space provided in the space.

2.3 Information science (s):

Prof. Maculap (Eminent American Economist) says "The bond among the information Sciences is their focus on information as object of study, through word information is interpreted very differently by various groups of researchers. McCain (1995) in her study on information science, enumerated Information Sciences Map Fig-2

with specific subjects is included in it, as well as the closely related fields, to yield a selection guide for ISA. It was helpful to express the results as a "map" of the field, in which the basic subjects comprising information science are shown as a "core" at the center, with related fields surrounding the core. The fields most closely related to information science are: computing technology, behavioral science, librarianship, statistics, communications, law and government, communication, and other subject disciplines. Each of these related disciplines, of course, has its own subject map, a portion of which would overlap information science. It is important to distinguish the sub disciplines that fall within the scope of information science and those that fall outside of it.

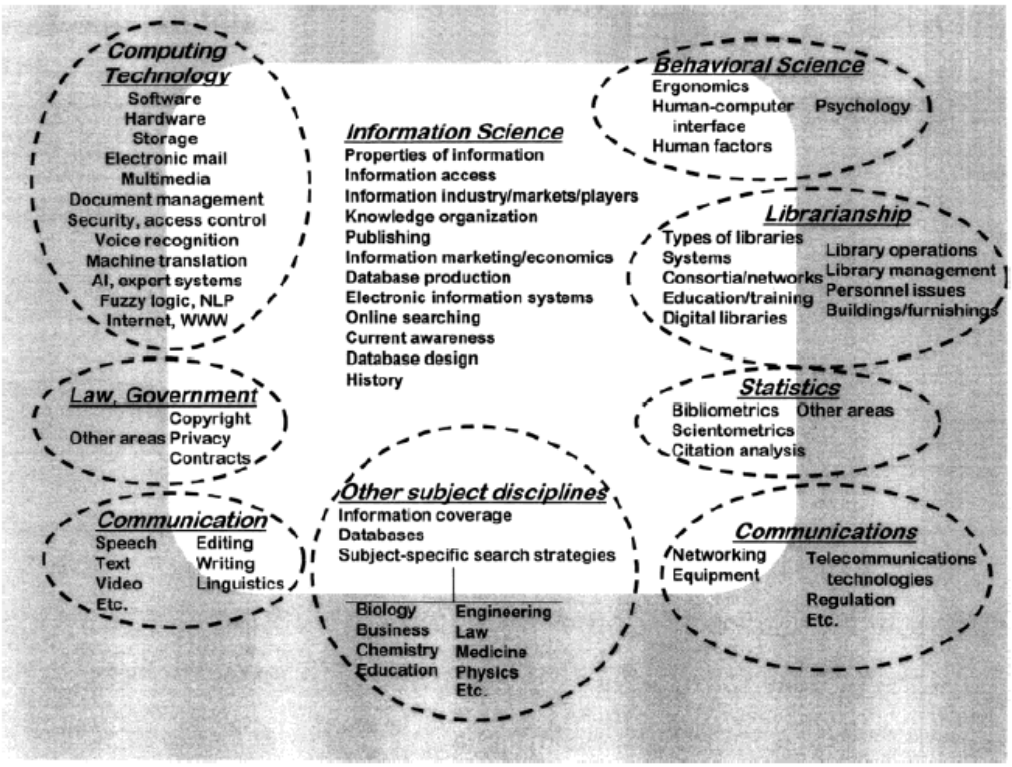

Fig-2: Information Science Map

Information science, several investigators have used bolometric and other techniques to develop maps showing the relationship of information science to other fields. The following studies are relevant and provide helpful background in this area.

(1) McCain (1995) used a co- descriptor analysis of the 1993 issues of ISA (Information Science Abstracts) and derived a mapping of the topics it covered. She concluded that ISA's subject coverage centers on three major areas: databases and information retrieval, information management, and implementation of information technologies in libraries. (Several significant changes have occurred in the information field even in the few years since McCain published her results in 1993. The Internet has become pervasive, database and searching technologies have advanced, and electronic publishing has become widespread.) Mc-Cain (1998) also noted that the 1993 issues of ISA contain an unusual preponderance of patents. (Patent coverage in ISA was suspended in 1996 and has not yet been resumed.)(2) In an outstanding and extremely thorough study, White and McCain (1998) used author co citation analysis to derive the sub disciplines of information science. They divided the field into two major specialties: experimental and practical information retrieval, and scientific communication as exemplified in bibliometrics, citation studies, and the like. Of special interest here are White and McCain's 12 sub disciplines, or specialties, in information science: (a) experimental retrieval; (b) citation analysis; (c) on-line retrieval; (d) bibliometrics; (e) general library systems; (f) science communication; (g) user theory; (h) OPACs; (i) imported ideas; (j) indexing theory; (k) citation theory; (l) communication theory.

3.0 Nature of information:

The nature of information is understood in context of data, information, knowledge and wisdom that are viewed as part of a continuum. The term ``information'' is used differently by individuals in different walks of life, from specialists working in information based professions, such as communication media and information management, to those in the computing and cognitive sciences, as well as by people involved in less scholarly pursuits. An interest in understanding information as well as the ability to measure it allows these specialists and others to work on their chosen problems, make reasonable decisions, and to communicate effectively among themselves. For example,

- Communication scholars express concern about information overload due to the plethora of mass media sources;
- Electrical engineers strive to improve modem technology to increase the amount and speed of information transmitted, i.e., the number of bits per second transmitted over coaxial or fiber optic circuits;
- Biological Sciences are concerned with Living beings;
- Philosophical Studies are concerned with modern and conventional studies of epistemology;
- Computer Sciences concerned with processing, storage and retrieval of information;
- Library and Information Sciences is concerned with knowledge organization and information dissemination;

A more general definition allows frameworks, theories, and results to be transferred across disciplinary boundaries, and provides for dialogue across these boundaries, while at the same time allowing individual disciplines to focus on the specific information phenomena of their discipline. Unfortunately, people in different fields and professions differ on what information is or how to evaluate the different definitions that are assumed explicitly or implicitly by different fields or social groups.

3.1 TYPES OF INFORMATION

The word " information' has no single universally accepted definition there is no one single way we can group or classify information. In fact, the "types" of information could be grouped using different characteristics depending upon the purpose of such a classification. According to Shera there are six types of information:

1. **Conceptual Information:** The conceptual information relates to ideas, theories and hypothesis about the relationship, which exists among the variables in an area.

2. **Empirical Information:** Information relating to data and experience of research, which may be drawn from oneself or communication through others.

3. **Procedural Information:** This is the data obtained, manipulated and tested through investigations;

4. **Stimulatory Information:** is motivated by oneself or the environment;

5. **Policy Information:** is focused on the decision making process

6. **Directive Information:** is used for coordinating and enabling effective group activity

3.1 Sources of Information:

When we think of information it is not just floated in air. Information needs a medium (Print, Audio visuals, Electronic formats & online) and gets it way into following types of sources:

3.1.1 Primary Sources:

The primary sources are new original or new interpretations of known facts and ideas. Usually unorganized and unrelated, each unit being separate and widely scattered, such as periodicals, research reports, conference proceedings, patents, standards, trade literature these etc.,

3.1.2 Secondary Sources:

Information derived from primary sources. Organized and arranged according to a definite plan. Indexing and abstracting periodicals, review of progress, reference books (Handbook, Dictionaries, tables, encyclopedias etc.,)

3.1.3 Tertiary Sources:

Compilations of primary and secondary sources organized and arranged according to some definite plan. Such as year books and directories, bibliographies, guides to the literatures, list of research in progress, guides to libraries and sources of information and guides to organizations etc.,

3.2 Information Transfer Chain:

Information is understood rather differently from the way. The emphasis here is very much on the transmission and reception of information. The model shown in Fig-3 is often referred to as 'Information model' of communication. Although it is principally concerned with communication technology, it is frequently used in the study of human communication. Information theory or statistical communication theory was initially developed to separate noise from information-carrying signals. The breaking down of information system into sub-systems was to evaluate the efficiency of various communication channels and codes. You might ask yourself how viable the transfer of Shannon's insights from information theory to human communication is likely to be. The concepts of information theory and cybernetics are essentially mathematical and are intended to be applied to technical problems under clearly defined conditions.

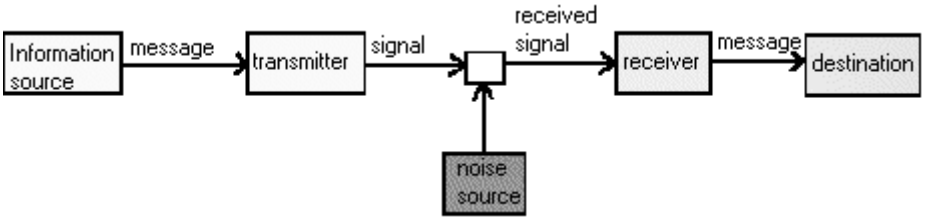

Fig-3 Shannon-Weaver " Information Model of Communication

We have been discussing the nature concept and definition of information and information transfer phenomenon with reference to its different manifestation.

When we think of information it is not just floated in air. Information needs a medium (Print, Audio visuals, Electronic formats & online) and gets it way into following types of sources:

Source: It refers to the established carriers that disseminate information or knowledge or any type of their surrogates.

Channel: Channel refers to the established carriers that disseminate information or knowledge or any type of their surrogates.

Media: is the physical media that carry messages or contents of information (May be oral i.e. person to person or recorded print and non print).

Recipient: is the ultimate receiver of information who may also generate or create information, (receiver may be individual, groups, organization or institution).

Information needs: indicate the types of information that are normally communicated to those who seek the different types of information relevant to there need.

3.3 Scope of Information:

The scope of information and other associated concepts have been discussed at length in this block with reference to their value and importance in all human activities. We have also learnt that information has value and utility only if it is communicated, which makes information and communication inseparable, sometimes even indistinguishable.

It is necessary, therefore, to discuss the scope of information in relation to the communication process of information transfer, which has been studied in some details in the earlier sections of this unit. Sources, Channel, Media, Recipient constitute the elements that form information Transfer chain.

Our primary focus being Library and information Science, it is also appropriate to examine the scope of the information in relation to the expanding dimensions of information Sciences.

Vickery (1983) succinctly summarizes the scope of Information Science, which includes among others:

- the behaviour of people as generators, sources, recipients and users of information, all of whom are partners in the information transfer process;
- the quantitative study of messages: its size, growth rate, distribution, patterns of production and use;

Ranganathan's Five Laws of Library Science examined in the light of the canvas of Information Science, give the widest implications of information as it is evolving today which also fits in with the contours of Vickery.

Restated with emphasis on information, the Five Laws are:

- Information is for use.
- Every user his/her information.
- Every information its user.
- Save the time of the user; its corollary- Save the time of the library staff.
- Information system is a growing organism.

The First Law stresses the value of information, a vital component in every human activity. In an Information Society, as has evolved, information is viewed as a resource, a commodity and a basic input to all human growth and development.

This concept of an Information Society is very much in conformity with Ranganathan's own perceptions. In fact, the old adage "Knowledge is Wealth' "Knowledge is Power' is captured in these ideas to reinforce the power of knowledge that transforms a non-resource into a resource.

In essence, the First Law comprehends a whole range of aspects of Information Science that includes:

- Development of document and non-document resources;
- Organisation and management of these information resources;
- Techniques and tools for processing the collection;
- Use of different kinds of literature in various contexts;
- Bibliometric studies for measuring the volume, growth and development;
- National and international Information Policies.

The Second Law suggests that information services should be entirely oriented towards users needs. User studies, therefore, are crucial to objectivity in service. Such a service includes among others:

- Behaviour patterns of information gathering by different categories of users in different contexts;
- Use and users of different types of information; and
- Study of interest profiles of users that includes individuals, groups, institutions and projects, programmes and such others.

The Third Law conveys that the entire information transfer process should be in consonance with the ultimate use. The familiar principle "Right information to the right user at the right time' is communicated here. Primary, secondary and tertiary communication channels should gel focused on use. In other words, marketing of information, keeping the users needs in view is stressed, providing scope for innovative products and services, irrespective of their physical media.

The Fourth Law emphasizes the value of "Time. Timeliness and speed are the very essence of service. Use of Information Technology enables a total metamorphosis in improving means and mechanisms to provide high quality service. Information professionals should be geared to this transformation process that hinges on education and training and more importantly building up a proper perspective, developing an attitude to service and a fresh approach to information. Use promotion, education in information use skills and user friendliness make the use and operation of a system not only simple but also saves a great amount of valuable time. Continuous research on all aspects of information handling is an absolute necessity keeping all these factors in view.

The Fifth Law refers to the dynamics of change, which is seen in the ever growing, sometimes turbulent advancement of knowledge, which is a dynamic continuum and never ending phenomenon. The institutional mechanisms with a self adapting capacity to changing environments are to be constantly evolved and the need for it is to be appreciated and

These Laws are not scientific generalizations but norms, precepts, guides to good practice .in the wider field of do**cum**entation and information studies and their new expand in dimensions.

Exercise-3:

Enumerate scope of Information Sciences.

Write your answer in the space given below:

_____
_____
_____
_____
_____
_____
_____
_____
_____
_____

3.4 Barrier of Information

A variety of obstacles are hindering the free flow and use of information and knowledge. Some of these barriers are deliberate and hence do not appear within easy means. The barriers to communication and information flow are of the following kinds.

Language.	**Jargon**	**Presentation**
Man-man	**Neologism**	**Level**
Man-machine	**Synonym**	**Style**
	Acronym	**Form**

While language is a powerful means of communication, the barriers caused by jargons and levels of presentation fail to convey the message intended to be communicated.

Communication Problem	Media Problem	Socio-economic Problem
Multiplicity of Sources	Comprehension	Culture
Seepage and Scatter	Perception	Level of Development of Countries
	Alien of Reality	
	Misunderstanding	

Cultural and Social differentiation may cause serious problems of communication. These problems may be overcome by appropriate presentation of information.

Over Population	Pollution (Noise)	Delays in Handling
Primary Papers	Propaganda	Publication
Rehash	Redundant Data	Postal Transit
Abstracts, Digests, etc.	Error	Translation
		Processing Searching
		Accessing Document
		Delivery Feedback

In this group, the problems posed are volume, mis-information and delays in publication due to various reasons.

Economic	**Political**	**Regulatory**
Direct Cost	Instability	Foreign Exchange
Overheads	War	Customs

This group of barriers indicates the problem of costs, political situation in a country and other regulatory measures of a country. Some of these barriers can possibly be overcome with the instrument of information policies at national levels and the establishment of the International Information and Communication Order.

Self Check Exercise 4:

1. Elaborate barriers of information.

2. Write your answer in given space below

Summary:

The word "Information" is presently well known to everybody. The Notion of Information in traditional and modern sense is exhibited to understand the information flow. Again with Information life cycle model and Shannon weaver model we have understood information flow in an academic environment and transmission of information through signals.

The definition " Information" by most writers take the position that the word 'information' is used with many different connotations and a single precise definition encompassing all its aspects cannot in principle be formulated. Whatever the definitions of the basic concepts of information, a science of information could be useful for studying the structure of Information Science.

Prof. Maculap (Eminent American Economist) says " The bond among the information Sciences is their focus on information as object of study, through word information is interpreted very differently by various groups of researchers. McCain (1995) in her study on information science, enumerated Information Sciences Map Fig-2 with specific subjects is included in it, as well as the closely related fields, to yield a

selection guide for ISA. It was helpful to express the results as a “map” of the field, in which the basic subjects comprising information science are shown as a “core” at the center, with related fields surrounding the core. The nature of information is understood in context of data, information, knowledge and wisdom that are viewed as part of a continuum. According to Shera there are six types of information:

1 **Conceptual Information:** The conceptual information relates to ideas, theories and hypothesis about the relationship, which exists among the variables in an area.

7. **Empirical Information:** Information relating to data and experience of research, which may be drawn from oneself or communication through others.

8. **Procedural Information:** This is the data obtained, manipulated and tested through investigations;

9. **Stimulatory Information:** is motivated by oneself or the environment;

10. **Policy Information:** is focused on the decision making process

11. **Directive Information:** is used for coordinating and enabling effective group activity

Information needs a medium (Print, Audio visuals, Electronic formats & online) Hence it has been categorized as primary, secondary and tertiary sources. Vickery (1983) succinctly summarizes the scope of Information Science, which includes among others:

- the behaviour of people as generators, sources, recipients and users of information, all of whom are partners in the information transfer process;
- the quantitative study of messages: its size, growth rate, distribution, patterns of production and use;

Ranganathan's Five Laws of Library Science examined in the light of the canvas of Information Science, give the widest implications of information as it is evolving today which also fits in with the contours of Vickery. A variety of obstacles are hindering the free flow and use of information and knowledge. Some of these barriers are deliberate and

hence do not appear within easy means. The barriers to communication and information flow.

Answer to Self check Excersie

1. Notion of Information

The word "Information" is presently well known to everybody. Meanwhile, it has come into common use since not very long ago, i.e. in the middle of twenth century by the initiative of Claude Shannon. He has introduced this term in a limited technical sense as applied to the theory of communication or code transmission (called Information Theory). Simultaneously with him, Norbert Wiener substantiated a necessity of approaching to information as a common phenomenon significant for the existence of nature, human being and society.

Meanwhile, the notion of information as such still remains to a high extent intuitive and gets a variety of meanings in different areas of human activities.

Information can be conceived as a signal that has a usable meaning. The latter contributes to a re-organisation of the system utilising the information - which wouldn't be possible without the signal. One can differentiate between a "traditional" and a "modern" notion of information.

1.1 The Traditional notion of Information:

"Information is a message which is mediating a meaning to a perceiving living being. It is not necessarily emanating from a living being and could originate from the inanimate nature or technology. The perceiving living being is using its sense-organs for the reception and its nervous system for the processing of the message."
In this sense, a map contains information. A human being who is reading it is organising his or her behaviour according to the guidelines of the map.

1.2The Modern notion of Information:

"Information is a signal that enables a certain organisation of a system. The generation, the transmission and the processing of the signal is not tied to the participation of perceiving living beings." The notion of information is generalised to all systems, which can receive, and process organising signals. To get back to the two historic events from the first section: The two transformations of information described above happen without that a human being needs to learn about the information. The "meaning" of it is thus unknown (since neither the cell nor the computer know about meanings). The modern notion of information, as opposed to the traditional, therefore differentiates between Information (as the organising factor) and their meaning (in the perception of thinking living beings). The information within the context of human sensory organs and the machine (microcomputers) are mapped here to understand the information flow.

2. Wersig and Neveling consider information much more comprehensively, adopting six different approaches:

7 The Structural approach (matter oriented) in which information is seen as structures of the world or static relations between physical objects which may be perceived or not;

8 The Knowledge approach which records knowledge that is built upon the basis of perception of the structure of the world. This approach is not recommended because knowledge and information are used as synonyms;

9 The Message approach in which information is recorded as symbols oriented in a physical carrier. This approach is used only by those concerned with the mathematical theory of communication;

10 The Meaning approach where the semantic content of a message is accepted as information;

11 The Effect approach or the Recipient-oriented approach which states that information occurs only as a specific effect of a process;

12 The Process approach where information is seen as a process, which, for example, occurs in the human mind when a problem and useful data are brought together.

The substance of these approaches is that information is a social process and can be understood only if it is defined in relation to needs either as reduction of uncertainty caused by a communication of data or as data used for reducing uncertainty.

He, however, believes that the fundamental problem of Information Science is to interpret this equation and thereby to explain information process.

3. The scope of Information sciences in words of Prof. Maculap (Eminent American Economist) says " The bond among the information Sciences is their focus on information as object of study, through word information is interpreted very differently by various groups of researchers. McCain (1995) in her study on information science, enumerated Information Sciences Map Fig-2 with specific subjects is included in it, as well as the closely related fields, to yield a selection guide for ISA. It was helpful to express the results as a "map" of the field, in which the basic subjects comprising information science are shown as a "core" at the center, with related fields surrounding the core. The fields most closely related to information science are: computing technology, behavioral science, librarianship, statistics, communications, law and government, communication, and other subject disciplines. (1) McCain (1995) used a co-descriptor analysis of the 1993 issues of ISA (Information Science Abstracts) and derived a mapping of the topics it covered. She concluded that ISA's subject coverage centers on three major areas: databases and information retrieval, information management, and implementation of information technologies in libraries

A variety of obstacles are hindering the free flow and use of information and knowledge. Some of these barriers are deliberate and hence do not appear within easy means. The barriers to communication and information flow are of the following kinds.

Language.	Jargon	Presentation
Man-man	Neologism	Level
Man-machine	Synonym	Style
	Acronym	Form

While language is a powerful means of communication, the barriers caused by jargons and levels of presentation fail to convey the message intended to be communicated.

Communication Problem	Media Problem	Socio-economic Problem
Multiplicity of Sources	Comprehension	Culture
Seepage and Scatter	Perception	Level of Development of
	Alien of Reality	Countries
	Misunderstanding	

Cultural and Social differentiation may cause serious problems of communication. These problems may be overcome by appropriate presentation of information.

Over Population	Pollution (Noise)	Delays in Handling
Primary Papers	Propaganda	Publication
Rehash	Redundant Data	Postal Transit
Abstracts, Digests, etc.	Error	Translation
		Processing Searching
		Accessing Document
		Delivery Feedback

In this group, the problems posed are volume, mis-information and delays in publication due to various reasons.

Economic	Political	Regulatory
Direct Cost	Instability	Foreign Exchange
Overheads	War	Customs

This group of barriers indicates the problem of costs, political situation in a country and other regulatory measures of a country. Some of these barriers can possibly be overcome with the instrument of information policies at national levels and the establishment of the International Information and Communication Order

References:

1. Merriam-Webster, 1999.
2. Callaos (Nagib) and Callous (Belkis).(2002). Towards a systemic Notion of Information: Practical Consequences. *Informing Science 5(*1).
3. Belkin (N J) (1975). Information Concepts for information science. *Journal of documentation*.34, 55-85
4. Clayton (Peter) and Gorman. (G E) (2001) *Managing information resources in libraries: collection management in theory and practice.* London : *Library Association* Pub.4-5.
5. Shera (J H). The foundations of education for Librarianship. New York. *Becker and Hayes.*
6. Shannon (c) and Weaver W (1949). The mathematical Theory of Communication. Univ.Of Illinois Press, Urbana.
7. Vickery (B C) and Vickery (A) (1987) Information Science In theory and practice. London. Butterworths.
8. Hawkins (D T) (2001) Information Science Abstracts: Tracking the Literature of Information Science. Journal of American society for Information Science and Technology.1 (1), 50.

Unit – 3
Knowledge: Definition, Types: Tacit and Explicit.

1.0 Objectives

This unit will help to you understand:

- The meaning knowledge
- Knowledge and its definition
- The Characteristics Of Knowledge
- Types of knowledge that exists-tacit and explicit

2.0 Introduction

From the Unit 1 and Unit-2 we were able to understand and differentiate the concepts of data, Information and Knowledge. The Knowledge is "information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions." Clearly, the distinction between “Knowledge” and “Information” has to be understood. In the hierarchy of knowledge the data has commonly be seen as simple facts that can be structured to become information. Information, in turn, becomes knowledge when it is interpreted, put into context, or when meaning is added to it. There are several variations of this widely adopted theme. The common idea is that data is something less than information, and information is less than knowledge. Moreover, it is assumed that we first need to have data before information can be created, and only when we have information then, knowledge can emerge.

Knowledge is information in action. It is a dynamic blend of experience, values, information and insights, against which new experiences and information can be evaluated and consolidated.

In the corporate environment, knowledge comprises information, forecasts and trends, analyses and research findings on products and processes, customers, suppliers and markets, experiences of failures and successes, among various other business details. Unlike material assets, which decrease with consumption, the value of knowledge as an asset increases in direct proportion to its application; shared knowledge remains intact with the giver even as it enriches the receiver.

In context of today's economy, knowledge is power. Knowledge and its applications are regarded as the primary source of competitive advantage. The Third wave (Tofflers, 1980) distinguishes Information age from agricultural and industrial age. The importances of Information and Knowledge in economic systems are identified. The future world where knowledge shared becomes more power and the entire organization behaves as an intelligent, self-selecting, self-adapting systems continually integrating and processing incoming data and information to determine actions.

Human knowledge is represented in software can prompt a major change in business practices. For example, the invention of Hypertext Markup Language (HTML) has triggered the development of the Web, and of successful Web-based businesses Many efforts in Knowledge Management aim to take implicit knowledge held by a few people, to make it explicit in suitable contexts, and to make it a basis for informed actions by the whole enterprise. Several things are needed to bring isolated pockets of valuable knowledge into a useful common context.

First, the people who have the knowledge must be persuaded that it is in their interest to share it, and to help to make it explicit.

Second, we need an understandable way of representing the knowledge.

Thirdly, we will often need a system that organises knowledge.

You can obtain and leverage knowledge in several ways. To name a few trade associations, for example, are valuable pools of industry and sector knowledge, where you will find people who have dedicated their careers to understanding an industry's complexities and its "DNA." Peer networks, like Young President's Organization, TiE (The Indus Entrepreneurs), chambers of commerce, or alumni associations provide collective resources to give and get knowledge and information. Research librarians and staff at public, university, or corporate libraries are human databases of valuable information and knowledge, usually accessible by simple request.

Finally, with the use of the web and interactivity, we literally have the world at our fingertips, and the access to opportunity. With knowledge you get power and the pathway to productivity and success.

3.0 Definition of Knowledge

According to ancient Indian thoughts, knowledge, Jnaana, has no isolated existence. First, there has to be a person who wants to know, Jnaathr; then something, that is worth being known, Jneeya, has to capture his mind. Next, jnaathr has to research, arjana it or someone has to teach, prajnaana it to him. The resulting representation of jneeya that is worth being known, within jnaathr, one who wishes to know, is jnaana, the knowledge. Representation of a problem-solution in a human-mind is knowledge.

Ever since the ancient Greek period, philosophers have discussed what knowledge is. Early thinkers such as Plato and Aristotle were followed by Hobbes and Locke, Kant and Hegel, and into the 20th century by the likes of Wittgenstein, Popper, and Kuhn, to name but a few of the more prominent western philosophers. In recent years, we have witnessed a booming interest in knowledge also from other disciplines; organization theorists, information system developers, and economists have all been swept away by the knowledge management avalanche. It seems, though, that the interest is particularly strong within the Information Sciences/Information Technology community. A possible question to ask then is how knowledge relates to information technology (IT) Can IT at all be used to handle knowledge, and if so, what sort of knowledge? What sorts of knowledge are there? What is knowledge?

The term 'knowledge' is often used to refer to a body of facts and principles accumulated by mankind in the course of time. Knowledge is a multifaceted concept with multi-layered meaning. The history of philosophy since the classical Greek period can be regarded as never ending search for the meaning of knowledge.. The traditional epistemology adopts a definition of knowledge as "Justified True Belief". In theory of knowledge creation, knowledge is seen as a dynamic human process of justifying personal beliefs as part of an aspiration for the "truth". Machlup (1983) see information is a flow of mess Dretske(1981) offers more useful definitions. He says, “Information is that commodity capable of yielding knowledge, and what information a signal carries is what we can learn from it. Knowledge is identified with information-produced (or sustained) belief, but the information a person receives is relative to what he or she already knows about the possibilities at the source. “The definition of knowledge is still a live debate for philosophers. In order for there to be knowledge, according to most thinkers, at least three criteria must be fulfilled. A thought must be justified, true, and believed. Some claim that these conditions are not sufficient, as Gettier case: that is a fundamental problem in modern epistemology (the philosophy of knowledge), issuing from counter examples to the definition of knowledge as justified true belief. There are a number of alternatives proposed, including Robert Nozick's arguments for requirement that knowledge 'tracks the truth' and Simon Blackburn's additional requirement that we do not want to say that those who meet any of these conditions 'through a defect, flaw, or failure' have knowledge. Richard Kirkham suggests that our definition of knowledge needs to require that the believer's evidence such that it logically necessitates the truth of the belief.

Other Definitions

Knowledge is

- "Information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions." T. Davenport et al., 1998

- "Explicit or codified knowledge refers to knowledge that is transmittable in formal, systematic language. On the other hand, tacit knowledge has a personal quality, which makes it hard to formalize and communicate." I. Nonaka, 1994.
- "Knowledge as the human expertise stored in a person's mind, gained through experience, and interaction with the person's environment." Sunasee and Sewery, 2002.
- "Knowledge is a physical, mental or electronic record of relationships believed to exist between real or imaginary entities, forces and phenomena." Worthington, 2005.
- "The insights, understandings, and practical know-how that we all possess – is a fundamental resource that allows us to function intelligently." Wiig, 1996.
- "Knowledge is information evaluated and organized by the human mind so that it can be used purposefully, e.g., conclusions or explanations." Rousa, 2002.
- "Knowledge is... a mental grasp of a fact(s) of reality, reached either by perceptual observation or by a process of reason based on perceptual observation." Rand, 1967.
- "a fluid mix of framed experience, contextual information, values and expert insight that provides a framework for evaluating and incorporating new experiences and information". Davenport and Prusak (1998, p. 5).
- Knowledge is information that changes something or somebody -- either by becoming grounds for actions, or by making an individual (or an institution) capable of different or more effective action." -- Peter F. Drucker in The New Realities

3.1 Characteristics of Knowledge

There are several sources of knowledge about knowledge, including new thinking within the theory of knowledge.

A number of different attempts to rethink the theory of science; significant new insights arising from so-called 'second generation' cognitive science;

Some outstanding attempts to understand knowledge process in companies, particularly those tightly linked to practical experience from knowledge intensive companies.

The sum of these insights is that knowledge is contextual, selective, and concept dependent.

Let us briefly discuss each of these key characteristics.

3.1.1 Knowledge is contextual:

No knowledge can be true and no knowledge can be linked to reality independent of context. A statement that appears universal is necessarily an abstraction and can only be true if interpreted into a context. The links between a statement and its context – both in terms of what defined its origin and in terms of its potential application – are multiple and complex but definitely include the fact that knowledge is embodied, that it is personal, social, and historical.

3.1.2 Knowledge is selective:

Reality is infinitely rich and any context can be perceived in multiple ways. Any perception and any form of knowledge represent a selection of what is relevant and pertinent, and of what is not. Because of this fundamental relation all knowledge will be abstractive and reductive and in need of interpretation. Selection determines what is in focus, and what is subsidiary, and what just passive background is. Selection determines the level of segmentation – are we looking at a physical system of mass and energy, at atomic configurations, at a set of biochemical processes, at biological creatures, or at a social situation? What constitutes the relation between part and whole, not to mention the relation between selected subset and all other possible selections; between that which has been selected and whoever made the selection.

3.1.3 Knowledge is concept dependent:

Whenever knowledge is expressed it is dependent on the language in which it is expressed. Content and meaning of a statement varies with language. At one level this fact is a matter of a degree of incommensurability between natural languages. At another

and more fundamental level this dependency follows from the metaphorical nature of a very large proportion of the concepts we use to talk about our reality. The metaphorical concepts are not only not literal in meaning; they also have several non-identical meanings and uses, most of which cannot be eliminated even informal use. This is true also of many of the basic concepts which we utilize to formulate and express scientific knowledge such as space, time, cause and effect.

Exercise No-1

1. Define Knowledge and explain the characteristics of Knowledge.
2. Write your answer in the space given below:

4.0 TYPES OF KNOWLEDGE

Knowledge is essential to people. It resides in the mind. Knowledge is what a person 'knows' - mix of information, analysis, integration, experience, culture, etc. Much of knowledge is tacit -we cannot communicate our knowledge completely in words or symbols (e.g. the expertise of a craftsman). When we articulate our knowledge, it becomes (or called as) explicit knowledge - what we can express/ articulate to others. Direct knowledge transfer takes place through socialization and interaction ('intellectual socialization'). Indirect knowledge transfer takes place via information - when the receiver internalizes this and converts it into his/her knowledge. Since knowledge is intrinsic, experiential, and individualistic, it is much harder to capture and organize knowledge, compared to data and information.

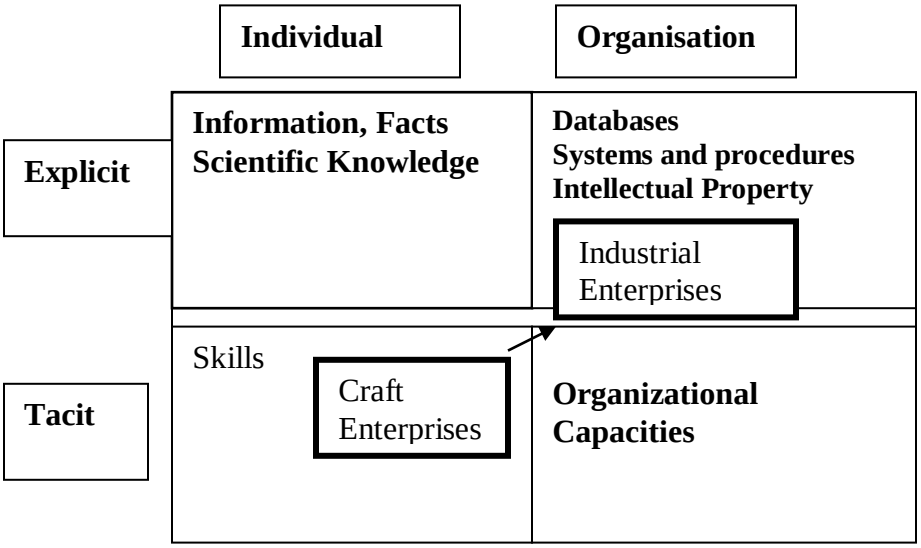

Fig-1 The systematization of Knowledge from Craft Enterprises to Industrial Enterprises

Form the example, the systematization of Knowledge from Craft Enterprises to Industrial Enterprises we see knowledge exists in two principle forms, explicit and tacit, and at two major levels, the individual and the firm, and then there are major benefits to the firm shifting its primary knowledge base from individually held tacit knowledge, to firm-held explicit knowledge. First, explicit knowledge offers greater potential for value creation because of its replicability potential. Second the firm's potential for appropriating this value is greater if ownership lies with the firm rather than with the individual. The systematization of tacit individually held Knowledge into explicit, firm-held knowledge is the primary force behind the evolution of craft trades into industrialized trades. The process of industrializing craft business has been the basis of many of the most outstanding business success of the century.

From the above example we understand that there are two types of knowledge. Let us study the types of knowledge in details.

4.1. Explicit Knowledge:

Explicit Knowledge can be formally articulated or encoded; can be more easily transferred or shared; is abstract and removed from direct experience. Explicit knowledge is recorded and available in various media like books, periodicals, letters, reports,

memos, literature, etc; audio-visual material, CDs, films, videos, etc; or electronic formats like data, software, websites, etc. to be more precise the explicit knowledge can be articulated into formal language, including grammatical statements (words and numbers), mathematical expressions, specifications, manuals, etc. Explicit knowledge can be readily transmitted others. Also, it can easily be processed by a computer, transmitted electronically, or stored in databases.

The Knowledge Center's already provides a vast database of explicit, cutting-edge knowledge from all over the world. Users of the Knowledge Centre can access value added services through the online databases, digitized brochures, pre-programme and post-programme material, additional readings related to the training and development programmes. Other resources offered include a vast array of articles from relevant journals, case studies and documentation on best practices.

4. 2.Tacit Knowledge:

By definition, tacit knowledge is not easily shared. Tacit knowledge consists often of habits and culture that we do not recognize in ourselves. In the field of Knowledge Management the concept of tacit knowledge refers to a knowledge, which is only known to you, and hard to share with someone else, which is the opposite from the concept of explicit knowledge.

Tacit Knowledge is invisible and, often, confined to the mind of a person. It is hard to codify and, therefore, difficult to communicate to others. Transformation of knowledge from the tacit to the explicit increases its usability and visibility. But capturing the tacit (often intuitive) knowledge that resides within an expert in the form of know-how and insights is very difficult and challenging. Implicit and explicit knowledge are not discrete or separate categories. They are so heavily linked as to be practically bipolar and nearly impossible to map. For example, to completely understand a written document (explicit knowledge) it requires a significant amount of insight and experience (implicit knowledge) — like a machine drawing, which is impossible to make out to a person without an engineering background. What are the implications of this for industry and trade? The three traditional factors of production — land, labour and capital — are

relatively easier to handle in the 21st century. The new fourth factor, knowledge, which is at the heart of much of today's global economy, is rapidly emerging a bottleneck to growth in new areas. Therefore, managing knowledge, the driver for the growth of economies, is vital for a company's success in today's knowledge economy. Knowledge management Knowledge management is deliberate and systematic building, renewal, and application of knowledge. It is a process, which continuously and systematically gathers information from individuals and teams that generate learning, and systemizes it in the 'collective brain' of the organisation for the benefit of the entire structure. It involves leveraging and reusing knowledge resources that already exist within the organisation to maximise the returns from its knowledge assets. Knowledge management also means gathering, organising and sharing intangible knowledge like professional know how and expertise, creative solutions, technology and even individual insights and experiences.

	To tacit Knowledge	To Explicit Knowledge
From tacit knowledge	Socialization	Externalization
From explicit knowledge	Externalization	Combination

Fig: 2 Knowledge process

It involves the systematic creation of an interactive, learning corporate environment, where people readily transfer and share what they know, internalise it and apply it to create new experiences through existing knowledge. Personal knowledge embedded in individual experience and involves intangible factors, such as personal beliefs, perspective, and the value system. Tacit knowledge is hard to articulate with formal language (hard, but not impossible). It contains subjective insights, intuitions, and hunches.

Before tacit knowledge can be communicated, it must be converted into words, models, or numbers that can be understand. In addition, there are two dimensions to tacit knowledge:

4.2.1Technical Dimension (procedural):

This encompasses the kind of informal and skills often captured in the term know-how. For example, a craftsperson develops a wealth of expertise after years of experience. But a craftsperson often has difficulty articulating the technical or scientific principles of his or her craft. Highly subjective and personal insights, intuitions, hunches and inspirations derived from bodily experience fall into this dimension.

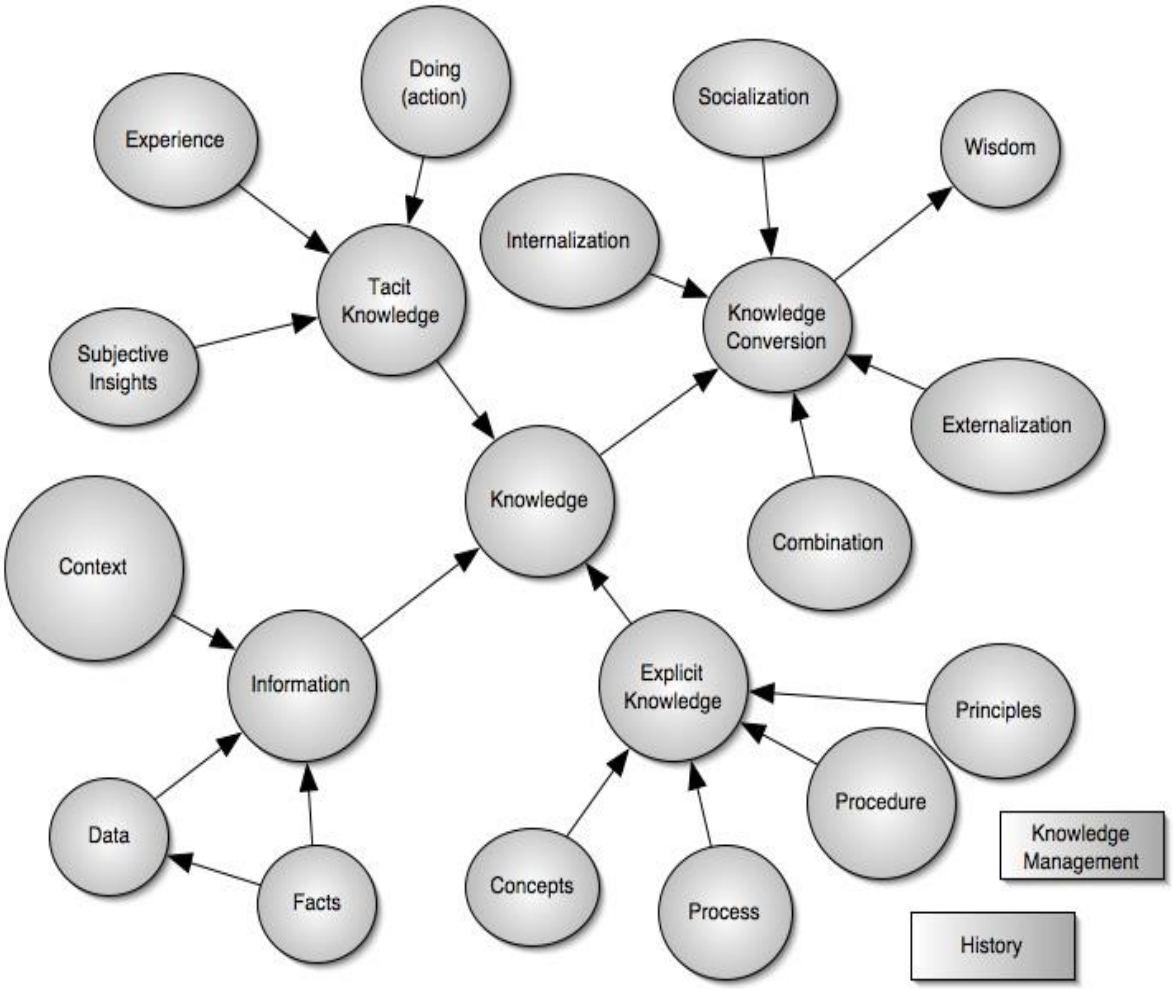

Fig –3 Knowledge Typology Map

4.2.2 Cognitive Dimension:

This consists of beliefs, perceptions, ideals, values, emotions and mental models so ingrained in us that we take them for granted. Though they cannot be articulated very easily, this dimension of tacit knowledge shapes the way we perceive the world around us. Nonaka & Takeuchi (pp. 63-69) further discuss the four modes of knowledge creation or conversion that are derived from the two kinds of knowledge:

- Socialization: from tacit to tacit -- Sharing experiences to create tacit knowledge, such as shared mental models and technical skills. This also includes observation, imitation, and practice. However, "experience" is the key, which his why the mere "transfer of information" often makes little sense to the receiver.
- Internalization: from explicit to tacit -- Embodying explicit knowledge into tacit knowledge. Closely related to "learning by doing." Normally, knowledge is verbalized or diagrammed into documents or oral stories.
- Externalization: from tacit to explicit -- The quintessential process of articulating tacit knowledge into explicit concepts through metaphors, analogies, concepts, hypothesis, or models. Note that when we conceptualize an image, we express its essence mostly in language.
- Combination,: from explicit to explicit -- A process of systemizing concepts into a knowledge system. Individuals exchange and combine knowledge through media, such as documents, meetings, and conversations. Information is reconfigured by such means as sorting, combining, and categorizing. Formal education and many training programs work this way.
- Artifacts derived from knowledge creation are facts, concepts, processes, procedures, and principles. These, in turn, are used to help create knowledge in others.

Exercise-2

1. How many types of knowledge are there? Elaborate.

2. Write your answer in the space given below:

5. Libraries and Knowledge Management

It is evident that, because definitions of knowledge management are largely context dependent, there is likely to be flexibility of interpretation about what it is. An organization's interpretation has a profound effect on how the organization operationalizes knowledge management. An absolute requirement is that the organisation has a conceptual framework to organize and integrate the information that the organisation feels is important, so that it becomes part of an organizational knowledge base and provides a strategy for transforming distinct and possibly random pieces of information into something that can be systematically applied and that expands collective knowledge. (Frand & Hixon, 1999).

One can take the position that knowledge management is about knowledge sharing and re-use. On the surface this is the library view – but it also lies at the heart of the technology approach, which focuses on capturing explicit knowledge by use of enabling technology in the belief that it is the technology that makes the difference. Alternatively, one can take the view that knowledge management is a people-problem and focus on leveraging corporate intellectual assets (Murray,nd). But that view assumes that knowledge can be separated from the knowing individual. While knowledge management can be addressed at either a technological level or at a philosophical level (Davenport, 1998), in practical terms, however, the question we should be asking is: what are we managing? Is it the object of knowledge, the process of knowing, or a combination of the two? (Godbout, 1996). A third view is that of a growing number of writers, such as Larry Prusak who acknowledges that it isn't really possible to manage

knowledge. Prusak notes that what an organization can do is “manage the environment that optimizes knowledge.” (Cited in Frand &Hixon, 1999,). It is perfectly reasonable, when trying to manage the environment, to use knowledge management principles, as these ensure that issues are addressed at a high level. Despite the impediments to realizing the promise of knowledge management, knowledge management is an extremely important part of the wider Information Environment within which every library operates. A wider Information Environment has eight major characteristics:

1. A visible shift in the management view of the nature of organizational activities which is moving away from emphasis on function to emphasis on activities that are occurring as cross -functional processes
2. Team-based work
3. Customer focus
4. Knowledge based organisation
5. Learning organisation
6. Knowledge management (which brings together the key aspects of 1-5, as demonstrated in Figure-4).
7. The networked organization
8. The extended enterprise.

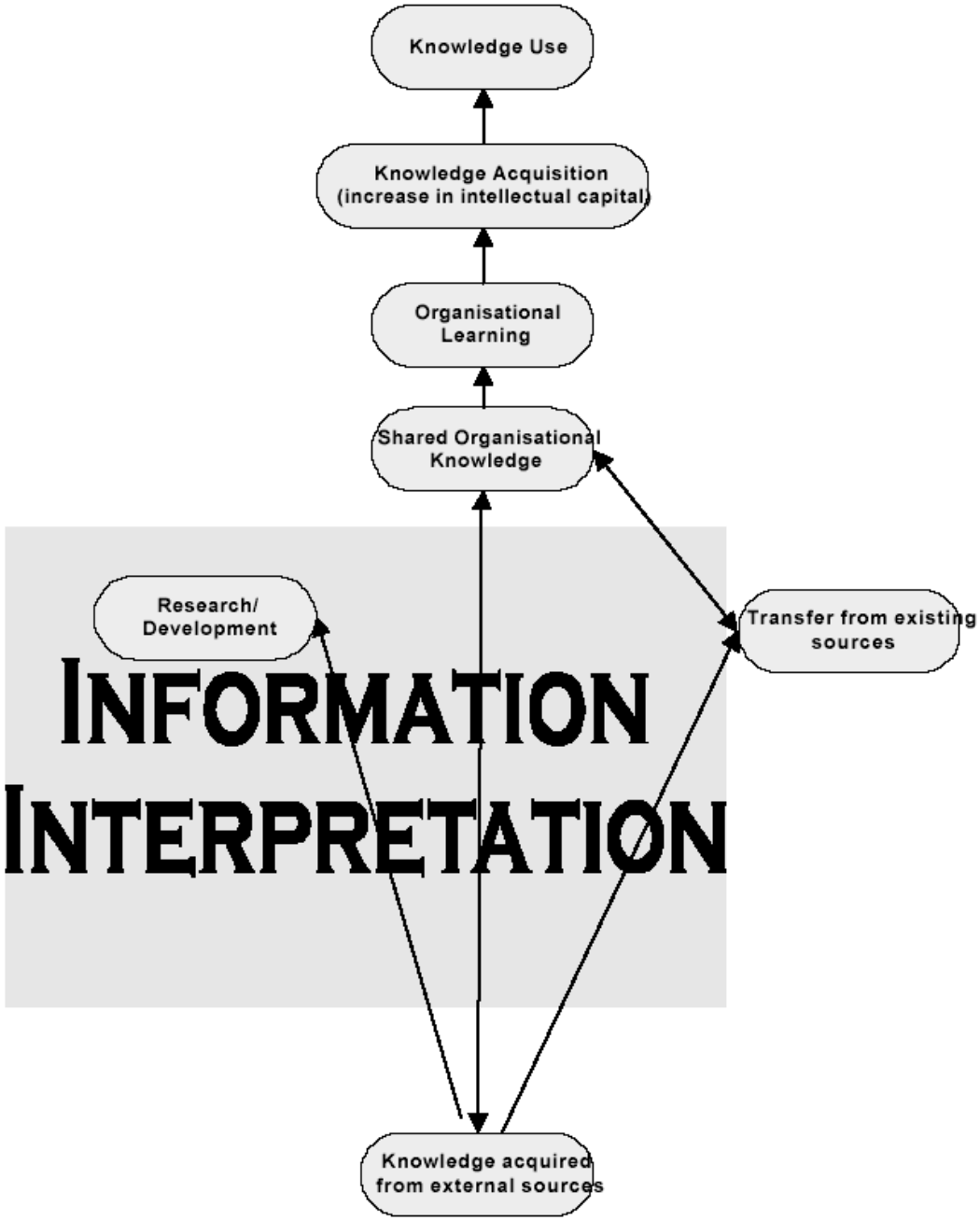

Fig –4: Knowledge Management Processes

Librarians are traditionally very good at negotiating the reference question. In other words, by instinct, good librarians take into account the specific needs of the

individual user. To achieve this requires working with the user to ensure that his or her information need is contextualized. The process requires that librarians take an active and constructivist role in the negotiation, using knowledge about the context and the library user to ensure that the information provided, when interpreted by the library user, will have the desired effect. These skills must be consciously translated into the virtual environment. To accomplish this task, libraries need to construct hybrid knowledge management environments in which we use both humans and computers in complementary ways. “Technology and librarians” writes journalist Leigh Buchanan, “are the yin and yang of information management”.

Summary

There are several variations of this widely adopted theme of knowledge. The common idea is that data is something less than information, and information is less than knowledge. Moreover, it is assumed that we first need to have data before information can be created, and only when we have information, knowledge can emerge. The Knowledge is "information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions." Meaning of Knowledge as assumed in ancient Indian thought of Jnana, which represents a problem-solution in a human-mind, is knowledge. Then knowledge discussed about knowledge. The 20th century of Wittgenstein, Popper, and Kuhn western philosophers has witnessed booming interest in knowledge.

The definition of Knowledge defined by the authors has made us understand the concept and meaning. The sum of these insights is that knowledge is contextual, selective, and concept dependent. Which have attributed as key characteristics of knowledge? Tacit and explicit knowledge are two types of knowledge. Explicit knowledge is recorded and available in various media like books, periodicals, letters, reports, memos, literature, etc; audio-visual material, CDs, films, videos, etc; or electronic formats like data, software, websites, etc. Tacit Knowledge is invisible and, often, confined to the mind of a person. It is hard to codify and, therefore, difficult to communicate to others. Many efforts in Knowledge Management aim to take implicit

knowledge held by a few people, to make it explicit in suitable contexts, and to make it a basis for informed actions is visualized.

In Library Environment, the Librarians working with the user to ensure that his or her information need is contextualized. The process requires that librarians take an active and constructivist role in the negotiation, using knowledge about the context and the library user to ensure that the information provided, when interpreted by the library user, will have the desired effect. These skills must be consciously translated into the virtual environment. To accomplish this task, libraries need to construct hybrid knowledge management environments in which we use both humans and computers in complementary ways. “Technology and librarians” writes journalist Leigh Buchanan (1999), “are the yin and yang of information management”.

Self-Check Answers:

1. In context of today’s economy, knowledge is power. Knowledge and its applications are regarded as the primary source of competitive advantage. The Third wave (Tofflers, 1980) distinguishes Information age from agricultural and industrial age. The importances of Information and Knowledge in economic systems are identified. The future world where knowledge shared becomes more power and the entire organization behaves as an intelligent, self-selecting, self-adapting systems continually integrating and processing incoming data and information to determine actions. Different writers have defined knowledge some of the definitions are elaborated below:

> "Knowledge is... a mental grasp of a fact(s) of reality, reached either by perceptual observation or by a process of reason based on perceptual observation." Rand, 1967.
>
> "a fluid mix of framed experience, contextual information, values and expert insight that provides a framework for evaluating and incorporating new experiences and information”. Davenport and Prusak (1998, p. 5).
>
> “Knowledge is information that changes something or somebody -- either by becoming grounds for actions, or by making an individual.

There are several sources of knowledge about knowledge, including new thinking within the theory of knowledge; a number of different attempts to rethink the theory of science; significant new insights arising from so-called 'second generation' cognitive science, and some outstanding attempts to understand knowledge processes in companies, particularly those tightly linked to practical experience from knowledge intensive companies. The sum of these insights is that knowledge is

1. Contextual.
2. Selective, and
3. Concept dependent.

2. There are two types of knowledge. Let us study the types of knowledge in details.

1. Explicit Knowledge: 2.Tacit Knowledge

1. Explicit knowledge

Can be articulated into formal language, including grammatical statements (words and numbers), mathematical expressions, specifications, manuals, etc. Explicit knowledge can be readily transmitted others. Also, it can easily be processed by a computer, transmitted electronically, or stored in databases.

2. Tacit knowledge

Personal knowledge embedded in individual experience and involves intangible factors, such as personal beliefs, perspective, and the value system. Tacit knowledge is hard to articulate with formal language (hard, but not impossible). It contains subjective insights, intuitions, and hunches. Before tacit knowledge can be communicated, it must be converted into words, models, or numbers that can be understand. In addition, there are two dimensions to tacit knowledge:

Technical Dimension (procedural): This encompasses the kind of informal and skills often captured in the term *know-how.*

Cognitive Dimension: This consists of beliefs, perceptions, ideals, values, emotions and mental models so ingrained in us that we take them for granted. Nonaka &

Takeuchi (pp. 63-69) further discuss the four modes of knowledge *creation* or *conversion* that are derived from the two kinds of knowledge.

Socialization: from tacit to tacit -- Sharing experiences to create tacit knowledge, such as shared mental models and technical skills.

Internalization: from explicit to tacit -- Embodying explicit knowledge into tacit knowledge. Closely related to "learning by doing."

Externalization: from tacit to explicit. The typical process of articulating tacit knowledge into explicit concepts through metaphors, analogies, concepts, hypothesis, or models.

Combination,: from explicit to explicit -- A process of systemizing concepts into a knowledge system. Individuals exchange and combine knowledge through media, such as documents, meetings, and conversations.

References:

1 Holsapple (C W) Handbook of Knowledge Management, Springer.

2 Despres (C) and Chauvel (D)(2000), Knowledge Horizon, Butterworth-Heinmann, New Delhi.

2 Davenport, T. H. (1997), Information Ecology, Oxford University Press, New York, NY

3 Davenport, Thomas H. (1998). Some principles of knowledge management Retrieved. http://www.bus.utexas.edu/kman/kmprin.htm

4 Achterbergh, Jan & Vriens, Dirk (May-June 2002). "Managing viable knowledge." Systems Research and Behavioral Science. V19 i3 p223 (19).

5 Cram (Jennifer) Whose Knowledge? Whose Management?: Cognitive Considerations for the Provision of Virtual Library Services to School Communities.

6 Nonaka, Ikujiro & Takeuchi, Hirotaka (1995). The Knowledge Creating Company. New York: Oxford University Press.

MLISc -1
FOUNDATIONS OF INFORMATION SCIENCE

Block - 1
DATA, INFORMATION & KNOWLEDGE

Unit - 4:
INFORMATION SCIENCE: ORIGIN, RELATIONSHIP WITH OTHER DISCIPLINES

STRUCTURE

4.0 OBJECTIVES

This unit aims to

1. Examine briefly the emergences and the evolutions of the discipline of Information science.
2. Examines the scope of Information Science
3. Examines the Scientific dimensions of Information science, its basic assumptions and concepts and domains, and
4. Discusses the present state of the discipline.
5. Point out the major areas of concern for information science and related disciplines.

4.1 INTRODUCTION

Information is a basic phenomenon. for all basic phenomena-energy or gravity in physics, life in biology, justice in jurisprudence- the same "we don't know" any way the investigation in the basic phenomenon is preceding- that is the basic point in all the fields. May be over the years we have learnt a lot about their manifestations, behaviors, and effects and we are continuing to learn about them through scientific investigations.

Information is directly involving cognitive processes and understanding. This results from interaction of two cognitive structures. A "Mind" and broadly a "Text". Therefore information is that which affects or changes the state of a mind. In Information services it is conveyed through the medium of a text, document or record. Information is a context –situation. It involves motivation of intentionality and therefore it is connected to the expansive social context of the horizon, such as culture work or problem at hand.

Information is the pattern of organization of matter and energy. All information is natural information, in that it exists in the material world of matter and energy. Represented information is encoded or embodied. Encoded information is information that has symbolic, linguistic or signal based patterns of organization.

4.2 INFORMATION SCIENCE

Information Science is the study of the gathering, organizing, storing, retrieving, and dissemination of Information. Information Science facilitates effective communication of desired information between the human generators and human users, and that Information Science is specifically concerned with information in the context of human communication between human

minds. And the relation between the generators and information and between information and recipients should be considered in this regard. In this context the information can be recorded and stored to be transferred to those who are in a different place or at a later time. This is included because library and information science treats not only information individuals deal with, but also information and knowledge shared and stored among society.

Information Science is a academic discipline that deals with the generation, collection, organization, storage, retrieval, and dissemination of recorded knowledge. It is sometimes mistakenly used as a synonym for library science, but though related, it is a separate discipline.

New Forms of Information technology have become the focus of tremendous amounts of attention and energy in society. But also academia ,where computer scientists ,cognitive scientists, and social scientists, are thinking about information and the social impact of IT in new ways. This poses a challenge to Information Science. Today in Information Science many new comers without a background in the field are coming in. At this historical juncture ,information scientists should become more conscious of the thought world we are operating, out of which we can communicate more rapidly and collectively to a large population. It enables to continue influencing the future of information in the 21st century.

Information Science has 3 general characteristics that are the leitmotif of its evolution and its existence.

1. Information Science is interdisciplinary in nature; however, the relations with various disciplines are changing. The interdisciplinary evolution is far from ever
2. Information Science is inevitably connected to IT. A technological need is compelling and constraining the evolution of Information Science, as is the evolution of the information society as a whole
3. Information Science is, with many other fields, an active participant in the evolution of the information society. Information Science.has a strong social and human dimension, above and beyond technology**.**

4.3 DEFINITION:

Information is an intangible that depends on the conceptualization and the understanding of a human being. Records contain words or pictures (tangibles).absolutely. But they contain information relative only to a user…information is associated with a transaction between text and reader, between a record and a user.(Tague-sutcliff, 1995, pp.11-12)

Information Science is that discipline that investigates the properties and behavior of information, the forces governing the flow of information and the means of processing information for optimum accessibility and usability. It is concerned with that body of knowledge relating to the origination, collection, organization, storage, retrieval, interpretation, transmission, transformation and utilization of information. It has both pure science component which inquires into the subject without regard to its application, and an applied science component, which develops services and products (Borko, 1968, p.31)

The proper study of Information Science is the interface between the people and Literature…[Information Science addresses]modeling the world of publication with a practical goal of being able to deliver their content to enquires [users] on demand…while many scientists seek to understand communication between persons, information Scientists seek to understand communication between persons and certain valued surrogates for persons that Literature comprises (White and Mccain ,1997, 1998)

Thus Information Science as a Science, as a profession, is defined by the problems it has addressed and the methods it has used for their solutions overtime. Any advances in information Science depend on whether the field is indeed progressing in relation to problems, addressed and methods used. Any “fixing” If in order, will have to be approached by redefining or refocusing either the problems addressed, or the methods for their solutions, or both.

4.4 SCOPE:

Information science as many other fields involves a professional component. focusing information science on the content –bearing properties of literature and on associated techniques and systems dealing with providing effective access to and use of literature, provides restrictions

for information science. It just deals with specific manifestation or type of information that defines its scope and its systems. The profession of information science grew from research and applications in information retrieval, to become a powerful component in the field and also a leading one in respect to innovation.

The profession is responding in its won way to needs of its users and organizations, and chartering its own technological applications, Many times independently of research advances and even on different direction.

Information science deals with experimental IR, citation analysis, practical retrieval, Bibliometrics, General library systems theory, Science communications, user studies and theory, OPACs, general imported ideas-other disciplines, indexing theory citation theory and communication theory. New areas include interaction studies: searching of the Internet:multimedia IR: multi language IR: and Digital Libraries.

Self check exercise:

Define what is Information and Information Science? its Scope and characteristics?

I. Write your answer in the space given below.
II. Check your answer with the answers given at the end of this unit

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4.5 ORIGIN AND HISTORY AND SOCIAL CONTEXT

The emergence of information is probably too recent to permit its definitive historical reconstruction or even more than its transient definition. It might be tempting to equate the

emergence of documentation or information storage and retrieval with that of information science. But a history of information science vis-à-vis one or two of its important tributaries would not be qualified as complete history. It would appear that the history of information science is in part the history of all its contributory disciplines as well as an account of other factors involved in its emergence.

The roots of information science are in documentation, a field that emerged when digital computers were developed during the 1940s and early 1950s. During World War II the need arose to increase the precision and depth of bibliographic searches, resulting in efforts to change traditional kinds of classification into computer-compatible systems. Automated searching of files, coordinate indexing, and controlled vocabularies were introduced in response to the urgent need to create easy access to the contents of scientific journals. Automated abstracts, or summaries, of documents were then developed to further simplify access to research findings.

Information Science is a field that emerged along with a number of new fields, with computer Science being one example. The rapid pace of scientific and technological developments is increasing tremendously since the beginning of the 20th century. Owing to the scientific and technological revolution.. In the 1960s massive collections of documents were transferred to databases or converted to non-print forms; various searches could then be done by computer .The manifestation of this phenomenon was “Information explosion” due to the tremendous increase in scientific and technological publications and information records of all kinds. (“Literature”) synthesized by de Solla Price, (1963).

The origin of Information Science could be traced to 1945 by a article by MIT scientist and even more prominently, the head of the US scientific effort during WWII Bush, 1945. Here Bush did two things a) he briefly defined a critical and strategic problem that was on the minds of many b) proposed a solution that was a” technological fix” and thus in tune with Science hold a monopoly in that niche. Since the magnitude of information is increasing in society, more funds are poured for projects, researches and initiatives are devoted in information and also various fields. There is increasing in the number of researchers, professionals, businessmen, are whirling to information.

During the past few years information science has become a thoroughly interdisciplinary field, and in recent times areas such as artificial intelligence and information technology in education have become especially important. IS is challenged by the socially determined change and knowledge. Analyzing the **metatheory** of IS. Vickery starts with a characterization of contemporary knowledge. The incessant growth in volume of the world's knowledge, the depersonalization and fragmentation of knowledge, **fragmentation** is a consequence of the increasing specialization of knowledge and of its distribution in a great number of printed and electronic channels. The sum of knowledge on a topic is thus scattered among many messages of varying origin, in many channels, perhaps in many information stores. Another important change is conceptual change. Wilson states as follows 'the world of research and development is the place where conceptual change is most rapid. Modern scholarship and science are centered on the creation of conceptual change. Hence the information is the central concept in IS. Knowledge is also one of the core concepts like relevance. It is well known that the central concept of IS are defined or understood in different ways, depending on distinct theoretical frameworks or points of view. Some of the core concepts are arranged where some information processes within the cycle of production, communication and the use of documents are displayed. In the professional and theoretical literature concepts such as knowledge, document representation,

Knowledge organization, information retrieval , needs and relevance are used at different levels and within different theoretical frameworks. Vickery uses the concept of knowledge at a social level, while Belkin concentrates on individual knowledge structure. The understanding of knowledge organization and document representation differs as well. In document representation it does not find expression in terms like domain aboutness, user –related aboutness and author aboutness. Like knowledge the users and their needs are studied and understood from individual or collective view points. IR is like wise understood in several ways as a semiotic process, as problem solving process, as heuristic process or as a matching process. In contrast to the latter the three first mentioned are interactive processes, but with different theoretical interaction. In general IR interaction is understood as a structural relationship between users and IR system which includes a smaller of a greater number of elements and different emphases according to distinct theoretical frameworks.

FIGURE.1 THE COMMUNICATION SYSTEM OF INFORMATION SCIENCE

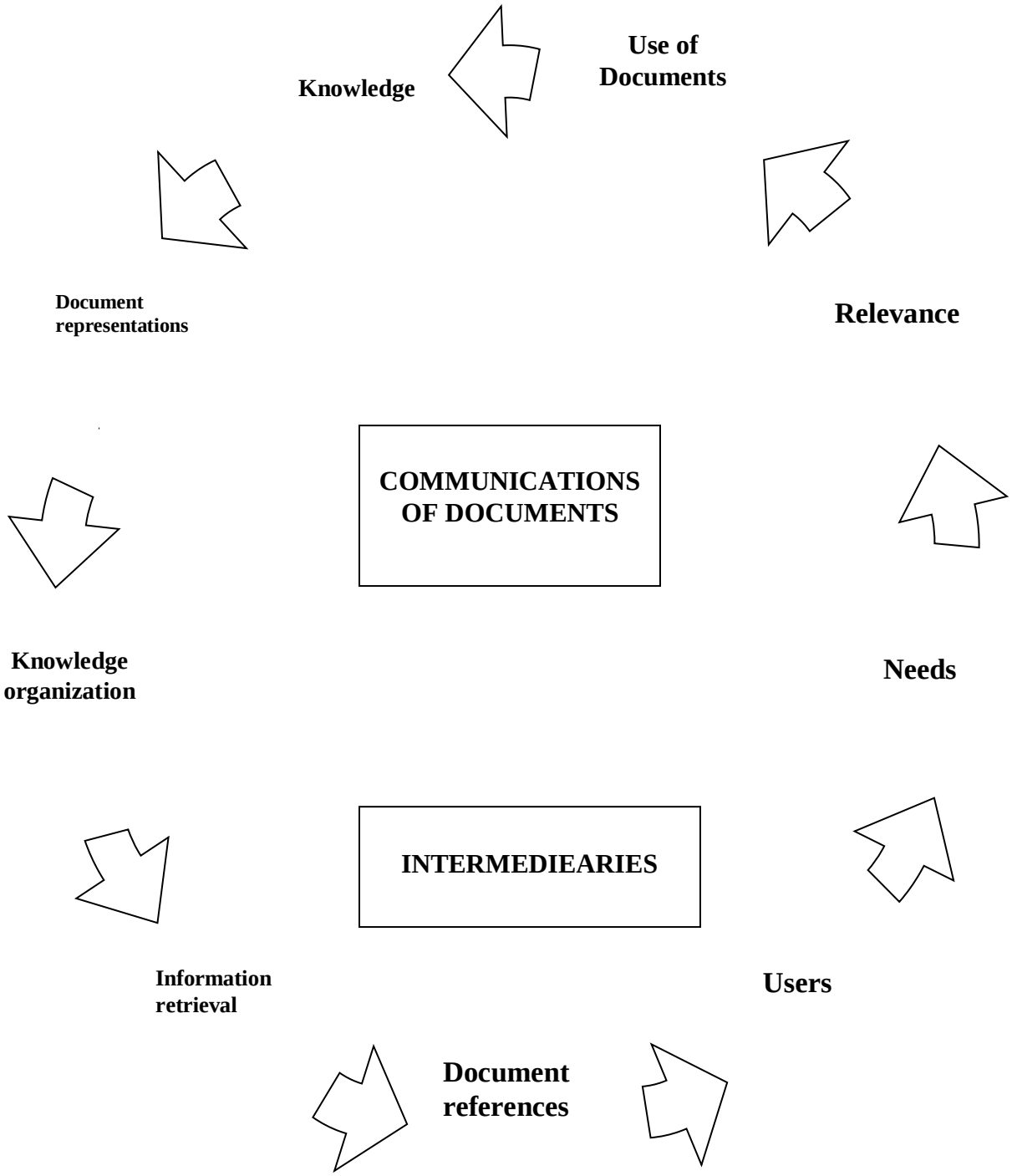

Figure.2 Displays a Scale Covering Different Understandings of the concept .the top represents relevance seen in a social context (a scientific domain): the bottom represents an objective, context-free understanding of the concept the domain analytic view understands the communication system of information science as the social level, and relevance is related to the knowledge of a domain. Higrland expresses some of the basic characteristics of the domain analytic view as follows:

'Priority is given to the understanding of the user needs from a social perspective and the function of information systems in trades and disciplines. Focus is either one knowledge domain of the comparative study of different knowledge domains.

FIGURE 2: CONCEPTUAL LEVELS OF RELEVANCE

LEVELS	RELEVANCE
Social level	a)Conceptual relevance :Relevance judgments are based on domain knowledge b)Contextual relevance: Contextual factors determine the relevance judgment which is an act of interpretation.
Individual level	a)pragmatic relevance of the individual level: The relevance judgment is determined by the individual user's problem space and state of knowledge b)intermediary relevance : a relevance judgment based on an intermediary's subjective evaluation of the relation between a query and a document representation
System level	Topical relevance: relevance is an objective and can be measured.

A knowledge domain is a scientific, scholarly or professional domain with unique structure of communication and publication, unique types of documents, specific terminology and informational structures. Scientific and professional communications and information dissemination should be seen as a part of a cooperative process of solving existing. Common goals in more or less well defined groups. The model of scientific communication perceives the producers of knowledge, the intermediaries and the users as organized in thought and discourse communities, which form parts of the division of labor in society. The same or almost the same A Knowledge domain and a thought or discourse analytic view point view can be discussed in relation to the discourse analytic view point.

Self check exercise:

Trace the origin and development of IS in social and historical context?

Explain communication system and information science?

III. Write your answer in the space given below.
IV. Check your answer with the answers given at the end of this unit

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4.6 RELATIONSHIP WITH OTHER DISCIPLINES

There are two factors introduced in interdisciplinarity in Information Science

1. The problems addressed cannot be determined with approaches and constructs from any discipline-thus interdisciplinarity is encoded as it is in many modern fields.
2. Interdisciplinarity in Information Science was introduced and is being perpetuated to the present by the very differences in backgrounds of people addressing the described problems. Differences in background are many: They make the richness of the field and difficulties in communication and education.

4.7 PHYSICAL PARADIGM AND INFORMATION SCIENCE

At the beginning of the fifties the cranfield tests marked a new stage in the development of IS. From then information retrieval was developed as a well-defined scientific discipline. Ellis writes that rather than referring to it as the cranfield paradigm it is perhaps more informative to

conceive of it as the physical paradigm for IR research. The paradigm viewing the library as a social institution continued to develop in the conceptual context of library science. the physical paradigm became central concept of IS. The physical paradigm represents a nomothetic type of research and it is based on a realistic view of science. According to the realistic model scientific knowledge is absolute true knowledge. The means that scientific knowledge is considered to have a privileged position, it is universal and neutral, and it is not influenced by social and cognitive processes. The aim of research carried out within the physical paradigm is to enhance retrieval performance. The object of research is IR.this means that though the scope is widened from the library context to scientific information in general it is still a rather narrow scope. The focus is on the Information system. Ingwersen calls the information concept of the physical paradigm traditional or classic. In the traditional or classic sense information was scientific-domain-specific information-or better-knowledge. This view made text representation more controllable, less problematic. At a general level the sciences were monoparadigmatic,and it was period of conceptual stability in the sciences.

4.8 LIBRARY SCIENCE AND INFORMATION SCIENCE

Library science, more accurately labeled “librarianship”, is a professional area of study; it is not a science, even though most library schools incorporate information science in the curriculum. Graduates of library schools are primarily concerned with such tasks as evaluating, processing, storing, and retrieving information, and with collection development and bibliographic processes and products. In the mid-1980s they still dealt mainly with written records such as books, journals, and musical scores, and with such separate non-print items as phonograph records and videotapes. Increasingly, though, librarians are being called upon to learn audio-visual and computer technologies and applications, such as CD-ROM and the Internet. They also assist library users with the materials and equipment available. The librarian is more concerned with the management of systems, the information scientist with their creation. The area as a whole brings together ideas and technologies from many other areas, including the social sciences, computer science, cybernetics, linguistics, management, neuroscience, and systems theory. Information scientists evaluate the many and various phenomena that affect any aspect of information. They are interested in determining such things as: the life cycle and utility

of literature on a given subject (Bibliometrics); patterns of authorship (co-citation analysis); and the impact of reading on groups and societies (social epistemology).

For the information scientist, therefore, the library is only one of several alternative sites for information storage and service; systems may be based in, for example, information banks, archives, or organizations such as schools and businesses, medical centers, computing companies, university research centers, and abstracting and indexing companies.

Librarianship has a long and proud history devoted to organization, preservation and use of graphic records and records of other media. This is done through Libraries not only as a particular organization or type of information system. And also as an indispensable social, cultural, and educational institution whose value has been confirmed manifold throughout human history and across all geographic and cultural boundaries. It is the Library which is contributing to the total communications system in society. It maximizes the maximum utility of graphic records for the benefits of the society.. The common ground between library science and information science is in sharing in their social role and in their general concern with effective utilization of graphic and other records, particularly by individuals. But there are significant differences in critical aspects

1. Selection of problems addressed and the way they are defined
2. Theoretical questions asked and frameworks established-the theories and conceptual frameworks in librarianship is based on philosophy and communication
3. The nature and the degree of experimentation and pragmatic development and the resulting practical knowledge and competencies derived
4. Tools and approaches used
5. The nature and strength of interdisciplinary relations established and the dependence of progress on interdisciplinary approaches

It could be concluded that librarianship and information science are two different fields in strong interdisciplinary relations, rather than one and the same field though these two disciplines are related are different fields. The differences are in the research agenda and directions.

Interestingly research on OPACs, now that they are incorporating more and more Information Retrieval features is bringing the two fields closer.

The development of IS from LIS at the beginning of the century to the IS of the present day is characterized by changing conceptions of the object, the structure, the foci and the content of the discipline. With a broad use of the concept, these changes are conceived as a series of paradigms: a paradigm viewing libraries in the context of the history of civilization, a paradigm viewing the library as a social institution . The physical paradigm, the cognitive view and most recently a tendency towards viewing information institutions and informative processes in a social and historical context. The changing conceptions are partially determined by historical changes of the universe of knowledge and needs for information. A central turning point is the transition from ptolemic picture of the information universe to the Copernicus.

4.9 COMPUTER SCIENCE AND INFORMATION SCIENCE

The relationship between these two disciplines lies in application of computers and computing in IR, and the associated products, services, networks. The relation involves research on the evolving of digital libraries with their technological base. As per Denning (1989) the discipline of computing is the systematic study of algorithmic processes that describe and transfer information: their theory, analysis, design, efficiency, implementation and application. The fundamental question underlying all of the computing is “what can be (efficiently) automated

Computer science is about algorithms related to information interpreted in the narrower sense, whereas IS is about the very nature of Information and its use by humans. Interpreted in the third or broadest sense. CS is about symbol manipulation wheras IS is about content manipulation. Symbol manipulation is the indispensable infrastructure. The two aspects are complementary and lead to different basic and applied agendas. CS is larger compared to IS .many computer scientists are involved in research and development on Information and its branches. There are several streams in research and development in CS that does not have connection with the early evolution of IS. But they have addressed information problems similar to those of IS. Among others includes expert systems, knowledge bases, hypertext, and human,

and human computer interaction more recently. This involves research and development in digital libraries. This has a significant informational component that is associated with information representation, its intellectual organization and linkages: meta-information, information seeking, searching retrieving and filtering: use, quality, value and impact of information., evaluation of Information systems from use and user perspective and the like all conventionally addressed in information science. Computer science research and development provide a different outlook. Framework, and approach and even a different paradigm not only for information science research and development, but also for its academic and continuing education again as with librarianship the issue is not about lawn But it is about paradigms theoretical foundations and pragmatic solutions and ultimately it is about their suitability to human and education paradigms.

4.10 BEHAVIORAL PSYCHOLOGY AND INFORMATION SCIENCE

During the last 3 decades the cognitive school or approach has developed and increasingly dominated the study of information behavior even though it is not generally accepted, it has most impact. The development of the cognitive perspective has meant a broadening of both the scope and spectrum of foci of IS. It is a broadening of the scope in the sense that all kinds of information are included in the concept ,and it is a broadening of the focus in the way that it includes human information retrieval behavior in general, and in relation to IR and IR systems. The approach concentrates on the qualitative aspects of IR interaction. The cognitive viewpoint is based on a relativistic model of knowledge, which means that knowledge is relative in that it is altered by cognitive and social processes. Another difference between the physical paradigm and the cognitive approach is that the latter is interdisciplinary, drawing on psychology, maths, communication and other disciplines, while the physical paradigm is developed from a well-defined scientific discipline (physics). It is easier to analyze the physical paradigm is a post-normal science in the sense that it treats comprehensive and complex phenomena demanding interdisciplinary research or an integrated theoretical framework. The cognitive view can be seen as theoretical answer to problems of the new Copernican information universe, characterized by, among other things, the fragmentation of knowledge and the diversification of information needs to cope with this the cognitive view developed and still is developing a holistic, conceptual framework which seems still basically to be limited by the

horizon of cognitive science, a horizon excluding the social dimension, or viewing the social dimension as complementary. This complementary social dimension is recognized mainly within disciplines such as informetics and information management.

The relationship between Behavioral Psychology and Information Science certainly the dominant psychological theory with respect to information science Matson traces the development of thought in the behavioral sciences from the enlightenment to the present. He shows that the dominant force in psychology during the first half of the 20th century, behaviorism is a direct descendent of Newtonian Physics. Then he critically evaluates what this world view has done to its object of study man. The integration of the gestalt of the computer with Behavioral Psychology and the Newtonian world view rounds out our notion of the basic components of paradigm underlying Information Science.

4.11 EDUCATION AND INFORMATION SCIENCE:

Education is critical for any field is a accurate statement that hardly needs to be stated. In particular research lives by education. It cannot be better than the education that researchers receive and then extend and plow back into education .unfortunately the education in information has not received attention that it deserves. Jesse H Shera a legendary library school dean from 1950's to 1970's was instrumental in starting the center for documentation and communication research .In 1955.thereafter the library school curriculum started to include courses like 'Machine Literature searching ' later known as Information Retrieval .The basic approach was to append those courses mostly as electives in the existing library school curriculum. Thus IS became one of the special areas of library science discipline .The strength of the Shera's model is that it posits education within practiced and to a broader and user-oriented frame of a number of other information services, and relates it to a great diversity of information resources. The majority of the limitation is that lack of a broader theoretical framework and a total lack of teaching of any formalism related to systems.,such as development and understanding of algorithms. Researchers are in the human-centered side. Later Gerard Salton (1927-1995) developed a model wherein laboratory and research approach to education was given importance. Shera's model resulted in IS education being an appendage to library science

education. .Salton's model IR education resulted in it being a specialty of and an appendage to computer science education.

While library education receives formal attention from the ALA and education for computer science from ACM. No such formal attention is paid by any professionals/scientific society to education for information science, or for IR in particular . Neither ASIS nor SIGIR as primary homes for information science, have been involved to any great extent in educational matters. Such as setting up of standards. Or devising model curricla. clearly, there is a need and an opportunity for more substantive involvement by both organizations in educational issues.

4.12 SUMMARY

IS appears to have emerged not only as an expansion and metamorphosis of documentation and information retrieval; it directly or indirectly incorporated or parallel in several prevailing objectives and concepts of the communication and behavioral sciences and other contributory disciplines. The communication and behavioral science emerged with documentation and from the outset apparently shared many of its problems. The formative pattern of documentation and information science resembles that of other disciplinary systems.

We live in a society where knowledge and information are a dominating characteristic. No wonder many fields, many projects, many scientific, technical; social cultural, political, commercial and related activities try to deal with some or other dimensions of knowledge and information. Information science is one of them. Information is also an invaluable commodity. Information Science has many strong and diverse competitors.

The success or failure of any interactive system and technology is contingent on the extent to which user issues, the human factors ,are addressed right from the beginning to the very end, right from theory, conceptualization, and design process on to development, evaluation, and to provision of services. conversely, the human-centered IS has lost its presence in the systems side .The question arises whether we are evolving into two 2 information sciences one that computer science-based focusing on IR, digital libraries, search engines and the like, and the other that is information science based, more attributed to interaction, users, and use, with little direct connection with development of systems, but still completely dependent on systems, thus

chasing them relentlessly.. IS becomes popular discipline if it successfully integrates systems, users research and application. Society needs such a science and such a profession.

Self check exercises:
Trace the relationship of IS with other disciplines?

I. Write your answer in the space given below.
II. Check your answer with the answers given at the end of this unit

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4.13 ANSWERS TO SELF CHECK EXERCISES:

1. Definition of Information Science and its characteristics

Information Science is a academic discipline that deals with the generation, collection, organization, storage, retrieval, and dissemination of recorded knowledge. It is sometimes mistakenly used as a synonym for library science, but though related, it is a separate discipline. New Forms of Information technology have become the focus of tremendous amounts of attention and energy in society. But also academia ,where computer scientists ,cognitive scientists, and social scientists, are thinking about information and the social impact of IT in new ways. This poses a challenge to Information Science. Today in Information Science many new comers without a background in the field are coming in. At this historical juncture ,information scientists should become more conscious of the thought world we are operating, out of which we can communicate more rapidly and collectively to a large population. It enables to continue influencing the future of information in the 21st century.

Information Science has 3 general characteristics that are the leitmotif of its evolution and its existence.

1. Information Science is interdisciplinary in nature; however, the relations with various disciplines are changing. The interdisciplinary evolution is far from ever
2. Information Science is inevitably connected to IT. A technological need is compelling and constraining the evolution of Information Science, as is the evolution of the information society as a whole
3. Information Science is, with many other fields, an active participant in the evolution of the information society. Information Science. has a strong social and human dimension, above and beyond technology**.**

2 Emergence of Information and its origin and development

The emergence of information is probably too recent to permit its definitive historical reconstruction or even more than its transient definition. It might be tempting to equate the emergence of documentation or information storage and retrieval with that of information science. But a history of information science vis-à-vis one or two of its important tributaries would not be qualified as complete history. It would appear that the history of information science is in part the history of all its contributory disciplines as well as an account of other factors involved in its emergence.

The roots of information science are in documentation, a field that emerged when digital computers were developed during the 1940s and early 1950s. During World War II the need arose to increase the precision and depth of bibliographic searches, resulting in efforts to change traditional kinds of classification into computer-compatible systems. Automated searching of files, coordinate indexing, and controlled vocabularies were introduced in response to the urgent need to create easy access to the contents of scientific journals. Automated abstracts, or summaries, of documents were then developed to further simplify access to research findings.

3. RELATIONSHIP WITH OTHER DISCIPLINES

There are two factors introduced in interdisciplinarity in Information Science

3. The problems addressed cannot be determined with approaches and constructs from any discipline-thus interdisciplinarity is encoded as it is in many modern fields.
4. Interdisciplinarity in Information Science was introduced and is being perpetuated to the present by the very differences in backgrounds of people addressing the described problems. Differences in background are many: They make the richness of the field and difficulties in communication and education**.**

The development of IS from LIS at the beginning of the century to the IS of the present day is characterized by changing conceptions of the object, the structure, the foci and the content of the discipline. With a broad use of the concept, these changes are conceived as a series of paradigms: a paradigm viewing libraries in the context of the history of civilization , a paradigm viewing the library as a social institution . the physical paradigm ,the cognitive view and most recently a tendency towards viewing information institutions and informative processes in a social and historical context. The changing conceptions are partially determined by historical changes of the universe of knowledge and needs for information. A central turning point is the transition from ptolemic picture of the information universe to the Copernicus.

4.14 KEYWORDS

Conceptuality : Conceptualism maintains that although universals (abstractions or abstract ideas) have no real existence in the external world, they do exist as ideas or concepts in the mind and are thus something more than mere words.

Interdiscplinarity : involving different areas of knowledge or study

Relevance : having idea that are useful and valuable to people

Domain :an area of knowledge or activity

Knowledge : understanding and skills that you gain through education or experience

Emergence : to know about facts and ideas etc.

4.15 REFERENCES AND FURTHER READING

1. Bates M J. (2006). Fundamental forms of Information. Journal of the American Society for Information Science an Technology.57(12) 1033-1045,
2. Bates M J (1999). The invisible substrate of Information Science, Journal of the American Society for Information Science 50(12):1043-1050.
3. Harmon Glynn.(1971). On the Evolution of Information Science. Journal of the American Society for Information Science. 235-241.
4. Microsoft Encarta Encyclopedia (2002.) . Microsoft Corporation.
5. Saracevic Tefko. (1999).Information Science. Journal of the American Society for Information Science.50(12) 1051-1063.
6. Orom Andrews.(2000).Information Science Historical changes and social aspects: A nordic outlook ,Journal of Documentation , 56(1).12-26.

MLISc – 1
Foundations of Information Science

Block-1
Data, Information & Knowledge

Unit – 1
Definition of Data, Information and knowledge: their interrelationships

1.0 OBJECTIVES

This unit will help to you understand:

- The meaning of Data;
- The nature, scope and properties including types of data;
- The Interrelationships of data, Information and Knowledge; and
- The Interrelationship of data, Information and knowledge in the context of Library and Information Centre.

2.0 INTRODUCTION

Since the growth of civilization, the human beings are able to communicate and record knowledge. Information is being the major source of growth and development. Today, Information is seen as an important component of growth and improvements in

living standards in the developed world. Information is related to many interlinked concepts such as data, facts, observation, intelligence, skill, knowledge, experience, and wisdom. The data, information and knowledge are the intellectual assets, which have been perceived by its value, its role and importance in nation's development. The combinations concepts and their applications have in fact contributed to the growth and prosperity of the society. We all know that human mind is the super brain, which has contributed in inventions and innovations of newer concepts and its applications to the development of the human beings and growth of the society at large. Particularly development is seen in the society due to development of technology and its applications for creating newer knowledge and information.

Information based Societies and Information industries are emerging and changed the scenario of the nation development socially, politically, economically and scientifically. Libraries and information centers are no exception. The Role of L& IC's is also changing in accordance with the advances in Information technology for diffusing, developing and utilizing Information effectively. In this unit we are going to study the concepts of data, its meaning and its nature, types of data, properties of data and the scope of data in the context in which it is used. Data, information and knowledge are interrelated, in the sense that one is the building block of the other. Data is building block of Information and Information is building block of Knowledge. They are used interchangeably, very often, Information standing for knowledge or data.

3.0. Meaning and Definition of Data

3.1 Meaning of Data:

The data is a Latin word refers to "*anything that is given*". Hence "*something given*". Data is plural of "*datum*". In practice, it is used as both singular and plural form of the word. Data can exist in variety of forms-such as numbers or text on pieces of paper, as bit and bytes stored in electronic memory, or facts stored in a persons mind. Data is raw. It may be in any form, which can be used. The data cannot be defined unless we know the value assigned to it. Data is used in discussions of problems in Geometry,

Engineering and so on. Such usage is the origin of data as a concept in computer science: data are numbers, words, images, etc., accepted as they stand.

The word *datum* in English is still used in the general sense of "something given", and more specifically in Cartography geography geology and drafting to mean a reference point, reference line, or reference surface. The Latin plural data is also used as a plural in English, but it is also commonly treated as a mass noun and used in the singular. For example, "This is all the data from the experiment". This usage is inconsistent with the rules of Latin grammar, which would suggest, "These are the data", each measurement or result is raw data are numbers, characters, images or other outputs from devices to convert physical quantities into symbols, in a very broad sense. Such data are typically further processed by a human or input into a computer, stored and processed there, or transmitted (output) to another human or computer. Raw data is a relative term; data processing commonly occurs by stages, and the "processed data" from one stage may be considered the "raw data" of the next.

Data is usually an observed fact, obtained on basis of systematic survey or study using different devices related to certain activity. For example, mechanical computing devices are classified according to the means by which they represent data. Similarly, an analog computer represents a datum as a voltage, distance, position, or other physical quantity. A digital computer represents a datum as a sequence of symbols drawn from a fixed alphabet. The most common digital computers use a binary alphabet, that is, an alphabet of two characters, typically denoted "0" and "1". More familiar representations, such as numbers or letters, are then constructed from the binary alphabet.

Some special forms of data are distinguished. A computer program is a collection of data, which can be interpreted as instructions. Most computer languages make a distinction between programs and the other data on which programs operate, but in some languages, notably Lisp and similar languages, programs are essentially indistinguishable from other data. It is also useful to distinguish metadata, that is, a description of other data. Metadata is "data about data." The prototypical example of metadata is the library catalogue, which is a description of the contents of books, a single datum.

3.2 Definition:

"Data is a set of discrete, objective facts about events…Data describes only a part of what happened; it provides no judgment or interpretation and no sustainable basis of action…Data says nothing about its own importance or relevance." (Davenport and Prusak, 1998:2-3)

The CODAT (Committee on Data for Science and Technology) defines data as a "*crystallized presentation of the essence of scientific knowledge in most accurate form*". Random House Webster Computer and Internet Dictionary defines data as "*distinct pieces of information, usually formatted in a special way*"

Thus, a text is a piece of data. In fact, letters and characters are quantified symbols because there are a finite number of them; any alphabet (including digits and special characters) may be considered as a numbering system. Pictures, figures, recorded sounds and animation are also examples of (quantifiable) data, because they may be quantified (using digital scanners, cameras, recording devices, etc.) to the point that it is eventually difficult to distinguish, from their originals, their reproduction made from the quantified representation. It is very important to note that, even if incomprehensible for a reader, any text constitutes a piece of data. In computer parlance, a spreadsheet generally starts out by holding data. Examples: What do the numbers 123424331911, 211192 or perhaps the letters 'aab' mean to you? Probably nothing - this is because they have no specific meaning or application. They are examples of DATA.

Data consist of raw facts and figures - it does not have any meaning until it is processed and turned into something useful. The Binary Digits 0 and 1 represents some data.

Fig

```
010101010101010101
010101010101010101
010101010101010101
010101010010101010
```

Data comes in many forms, the main ones being letters, numbers and symbols. However, it is essential that data is available because it is the first step in creating meaningful Information. *For example* the three data items above could represent some very important information:

DATA	INFORMATION
5739579385	Your winning Lottery ticket number
1208063	Your Birthday
AB	The grades you want at A level

Self Check Exercise-1

1. Explain the meaning and definition of data.
2. Write your answer in the space given below.

4. Data: Types, Nature, Properties & Scope

Types of Data:

We have come to know by the definition of data, which is a representation of facts, concepts, or instructions in a formalized manner suitable for communication, interpretation, or processing by humans or by automated means. Data is raw material of

information. Refers mostly to the information entered into, and stored within a computer or file. Data can be used directly, without too much of misinterpretation, does not require mediation or consensus for understanding. In electronic versions of scientific data sets are often called as 'hard databases' compared to 'soft databases' which refer to bibliographic and textual databases. Many bibliographic and full text databases also support data searching (e.g. INSPEC database). Often data is derived from full text articles - so searching for data in such sources becomes very important. Hence, data can be viewed in different contexts: for example data used in computers sciences, data represented in sciences and social sciences. There may be types of data emerging from the above disciplines. The data types may differ in case of sciences, technology and management science. Census data is good example of population studies. Let us know how data is represented in the computers in fig-1.

The data types have been discussed giving the explanations along with examples.

4.1.1 Data types in Computers:

Data Type	Explanation	Example
Boolean	Can hold one of two values - yes/no; true/false	Are you employed - yes/no
Integer	Holds whole numbers only (positive and negative)	Shoe size: 4,5,6,7,8 School years: 7,8,9,10,11,12,13
Real	Holds decimal numbers and fractions	For storing currency e.g. 12.25 (it cannot store the currency symbol)
Character	Anything you see on the keyboard	'b' '7' '@' '%'
Text/String	Holds any alphanumeric character, can include numbers and symbols	For storing any text e.g. Name, address, telephone number, postcode

Fig-2. *Data represented in computers*

4.1.2 Data in Sciences

Most science is based on observations that include direct observations of the natural world and observations of experimental output and results. Increasingly, data are being generated from computer models. Sometimes "data" are equated with "observations". In other situations, the word "data" is used as a descriptive term for the starting point of the analysis or research of interest. For example, to a seismologist interested in seismic waves, seismometer outputs are data. CODATA has recognized scientific data which are repented as follows:

Data with reference to time factor: Based on the time the data can be classified into two categories:

Time Independent data: The term refers to the data, which can be measured repeatedly, e.g., data in Geosciences and Astronomy such as geological structures, rocks, fixed stars etc.

Time dependent data: These can be measured only once, e.g., certain geophysical or cosmological phenomena like volcanic eruptions and solar flares. Likewise, data pertaining to rare fossils are time-dependent data.

Data with reference to location factor: Data with reference to location factor can be categorized as follows:

Location independent data: These are independent of the location of objects measured e.g., data on pure Physics and Chemistry.

Data with reference to mode of generation: There are three types of data under this category. These are:

Primary data: Data re primary when obtained by experiment or observation designed for the measurement, e.g., values of velocity derived by measuring length and time.

Derived data: Combining several primary data with the aid of a theoretical model derives these data.

Theoretical data: These are derived by theoretical calculations. Basic data such as fundamental constants are used in theoretical calculations, e.g., data concerning solar eclipses are predicted with the use of celestial mechanics.

Data with reference to nature of quantitative values: These are categorized into the following two classes:

- **Determinable data**: Data on a quantity, which can be assumed to take a definite value under a given condition, are known as determinable data. Time-dependent data are usually determinable data, if the given condition is understood to include the specification of time.
- **Stochastic data**: Data relating to a quantity, which take fluctuating values from one sample to another, from one measurement to another, under a given condition, are referred to as stochastic. In Geosciences, most data are stochastic.

Data with reference to terms of expression: The categorization in this case yields three classes of data:

Quantitative data: These are measures of quantities expressed in terms of well-defined units, changing the magnitude of a quality to a numerical value. Most data in Physical Sciences are quantitative data.

- **Semi-quantitative data**: These data consist of affirmative or negative answers to posed questions concerning different characteristics of the objects involved, e.g., in Biology, classification of organisms is based upon a set of 'Yes' and 'No' responses to questions concerning morphological, biochemical and other characteristics of species. Such data are regarded as semi quantitative. 'Yes' and 'No' can be coded as '1' and '0' (zero) for obtaining numerical data.

- **Qualitative data**: The data expressed in terms of definitive statements concerning scientific objects are qualitative in nature. Qualitative data in this sense are almost equivalent to established knowledge.

Data with reference to mode of presentation: These are categorized as numerical graphic and symbolic data.

- **Numerical data**: These data are presented in numerical values, e.g., most quantitative data fall in this category.
- **Graphic data**: Here data are presented in graphic form or as models. In some cases, graphs are constructed for the sake of helping users grasp a mass of data by visual perception. Charts and maps also belong to the category.
- **Symbolic data**: These are presented in symbolic form, e.g., symbolic presentation of weather data.

4.1.3 Types of data in social sciences:

As in sciences, data in social sciences are also organized into different types so that their nature can be easily understood. The following categorization is normally observed in social sciences.

Data with reference to scale of measurement: Based on the scale of measurement data can be categorized as follows:

- **Nominal data**: The nominal scale is used for assigning numbers as the identification of individual unit. For example, the classification of journals according to the discipline they belong to, may be considered as nominal data. If numbers are assigned to describe the categories the numbers represent only the name of the category.
- **Ordinal data:** Interval data are ordered categories of data and the difference between various categories are of equal measurement. For example, we can measure the IQ (Intelligence Quotient) of a group of children. After assigning

numerical value to the IQ of each child, the data can be grouped with interval of 10, like 0 to 10, 10 to 20, 20 to 30 and so on. In this case, '0' does not mean the absence of intelligence and children with IQ '20' are not doubly intelligent than children with IQ '10'.

- **Ratio data:** Ratio data are the quantitative measurement of a variable in terms of magnitude. In ratio data, we can say that one thing is twice of thrice of another as for example, measurements involving weight, distance, price, etc.

Data with reference to continuity: Data with reference to continuity can be categorized as follows:

- **Continues data:** Continuous data are infinite set of possible values. Between ranges there are infinite possible values. For example, height of an individual is not restricted to values like 155 cm and after that to 156 cm it can be 155.59 cm or 155.99 cm continuous value.
- **Discrete data**: The discrete data are finite or potentially countable set of values. For example, the number of members in a library it can be 3575 or 2599 but certainly not 2599 ½. Similarly the number of citizens in a country, the number of vehicles registered is the examples of discrete data.

Data with reference to number of characteristics: Data can also be categorized on the basis of number of variables considered. These are:

- **Univariate data**: Univariate data are obtained when one characteristic is used for observation, e.g., the performance of the student in a given class.
- **Bivariate data:** Bivariate data result when instead of one two characteristics are measured simultaneously, e.g., height and weight of tenth class students.
- **Multivariate data**: Multivariate data consist of observations on there or more characteristics e.g., family size, income and savings in a metropolitan city in India.

Data with reference to time: There are two types of data under this category. These are

- **Time series data**: Data recorded in a chronological order across time are referred to as time series data. It takes different values at different times e.g., the number of books added to a library in different years, monthly production of steel in a plant, yearly intake of students in a university.
- **Cross-sectional data**: This refers to data for the same unit or for different units at a point of time, e.g., data across sections of people, region or segments of the society.

Data with reference to origin: Data under this category can be put as follows:

- **-Primary data**: The data obtained first hand from individuals by direct observation, counting and measurement or by interviews or mailing a questionnaire are called primary data. It may be complete enumeration of sampling e.g., data collected from a market survey.
- **-Secondary data:** The data collected initially for the purpose and already published in books or respects but are used later on for some other purpose are referred to as secondary data. For example, data collected from census reports, books, data monographs, etc.

- **Data with reference to characteristics**: Data can be categorized on the basis of its characteristics as follows:
  - **Quantitative data**: When the characteristic of observation is quantified we get quantitative data. Quantitative data result from the measurement of the magnitude of the characteristic used. For example, age of a person price of a commodity, income of a family etc.

- **Qualitative data:** When the characteristic of observation is a quality of attribute, we get qualitative data. For example sex or color of a person or intelligence of a student.

Self Check Exercise-2

1. How are data categorized in Sciences?
2. Write you answer in the space given below?

_____
_____
_____
_____
_____
_____
_____

4.2 Nature of Data

We have understood the meaning of data. Data has been seen in different context in different disciplines. The value attained by the data with the specific items then transformed into meaningful form to perform a function is the nature of data. Nature of data can be determined to the class it belongs. We have seen the values assigned to data in context of Computer parlance, Sciences and Social sciences. The nature of data in computers may be numeric, alphanumeric, text; graphics etc., in sciences and social science the data to a large extent a quantitative data are numerical data. The nature of data in science with reference to types of data is as follows:

Numerical Data: The data measured in the science is derived and stated in numerical values.

Descriptive data: The nature of data is descriptive expressed in terms of definitive statements concerning the objects.

Graphic and symbolic data: The nature of data is modes of presentation, which enables users to grasp data by visual perception. The nature is graphics. While referring to the

types of data in social sciences the nature of data can either be enumerative or descriptive.

Enumerative data: Most data in social sciences are enumerative in nature. However, they are refined with the help of statistical techniques to make them more meaningful. They are known as statistical data. This explains the use of different scales of measurement whereby they are grabbed.

Descriptive data: All qualitative data in social sciences can be descriptive in nature. These can be in the form of definitive statements. However, if necessary, numerical values can be assigned to descriptive statements, which may then be reduced to numerical data.

Properties of data: for examining the properties of data, reference to the various definitions of data discussed in section 2.2 is necessary. Reference to these definitions reveals that following are the properties of data: (1) amenability to use, (2) clarity, (3) accuracy and (4) the quality of being the essence of the matter. Each of these may be discussed further.

Amenability to use: From the dictionary meaning of data it is learnt that data are facts used in deciding something. In short, data are meant to be used as a basis for arriving at definitive conclusions. They are not required, if they are not amenable to use. The use may differ with the context. Amenability to use nevertheless remains a characteristic of data.

Clarity: According to the CODATA definition, data are a crystallized presentation. This means data should necessarily display clarity so essential for communicating the essence of the matter. Without clarity, the meaning desired to be communicated will remain hidden.

Accuracy: Data should be real, complete and accurate. Accuracy is thus an essential property of data. Since data offer a basis for deciding something, they must necessarily be accurate if valid conclusions are to be drawn.

Essence: In social sciences, large quantities of data are collected which cannot be presented, nor is it necessary to present them in that form. They have to be compressed and refined. Data so refined can present the essence or derived qualitative value, of the matter. Data in sciences consist of observations made from scientific experiments; these are all measured quantities. Data, thus are always the essence of the matter.

Besides the above four properties three more properties are evident, more particularly in social sciences. They are the properties of being aggregated, compressed and refined.

Aggregation: Aggregation is cumulation or adding up. For example, monthly data are added up to form a consolidated annual cumulation. Cumulative percentages are always worked out in data presented on a variable in tabular form. In social sciences aggregation is of great importance. For instance, production figures, crop yield, export and import statistics and census data are cases of aggregation.

Compression: Large amounts of data are always compressed to make them more meaningful. To present the essence of the matter, it is necessary to compress data. Compressed data are manageable and can be grasped quickly. There exist a number of techniques to compress data to a manageable size. Graphs and charts are some examples of compressed data.

Refinement: Data require processing or refinement. When refined, they are capable of leading to conclusions or even generalizations. This refinement can then discover new facts. Bradford's bibiliograph denoting the scatter of a subject or Garfield's historiography denoting the development of a discipline are two examples of data refinement. Conclusions can be drawn only when data are processed or refined.

4.3 SCOPE OF DATA

Scope of the data can be studied from following points of view:

Utility of Data: Data have great utility s their use in the growth of knowledge. No research, investigation, experiments, etc. is possible without reference to data already

existing. Nor does any research end without generating new data. No decision-making system can work, nor can a problem be solved, without adequate use of data. No planning is conceivable without enough data. For want of sufficient data research results or conclusions drawn from an enquiry are automatically rendered untenable. Data also alter concepts and remove uncertainty. Data then are indispensable in research and in planning and decision-making. The importance of data is no less in managing libraries and library service.

Size of Data: Size of data involves the coverage of the subject under study, data elements and data population covering documents, data banks and field survey methods (questionnaire, interview, observations, etc). In science what already exists is in the form of data. According to an Aslib statement, scientific data include: the properties and attributes of an individual entity; the values of one property over many entities; variations of one property of one entity under different conditions; classification of entities based on properties; and quantitative relations between two or more entities

Period of data: Data collection for any research problem must indicate the time span. It should be clearly stated whether data period is current or cumulative. In sciences the interpretations and conclusions are mainly drawn keeping in view the whole text of the subject. In social sciences and humanities, however, the cumulative period is not taken into account for data collection. The importance of data in library service is manifold. Librarians are users of data in more than one way. They collect bibliographic data for providing services and generate and use non-bibliographic data for managing these services. Apart from these they are required to make available data to researchers and planners according to their subject interests. it is thus necessary to ensure that relevant data sources are available in the library in order that the users may be assisted with appropriate and adequate data in their decision process. It is seen that there exists no field of knowledge, no human activity where data can be dispensable. All investigations begin and end with data. In intellectual pursuits data are all pervasive, only their nature varies with the event.

5. Interrelationship of Data, Information and Knowledge

The definitions of data, information and knowledge, as well as their interrelations are discussed here. Data has commonly been seen as simple facts that can be structured to become information. Information, in turn, becomes knowledge when it is interpreted, put into context, or when meaning is added to it. There are several variations of this widely adopted theme. The common idea is that data is something less than information, and information is less than knowledge. Moreover, it is assumed that we first need to have data before information can be created, and only when we have information, knowledge can emerge. There quickly found to be a wealth of sources that seemed to make sense in terms of defining what knowledge actually was, and how was it differentiated from data, information, and wisdom. They are not of equal value in terms of utility and applications. They are evaluated in ascending scale of values, data having the least value and the wisdom the greatest. In totality these concepts form valuable human intellectual assets and service as a precious human capital in all development process. The interrelations of the concept of data, Information and knowledge will be understood from the following example:

1. Data -Raw material - Cotton
2. Information -Intermediary -Yarn
3. Cloth - Finished product -Cloth

According to Russell Ackoff, a systems theorist and professor of organizational change, the content of the human mind can be classified into five categories. The following diagram represents the transitions from data, to information, to knowledge, and finally to wisdom, and it is understanding that support the transition from each stage to the next. Understanding is not a separate level of its own.

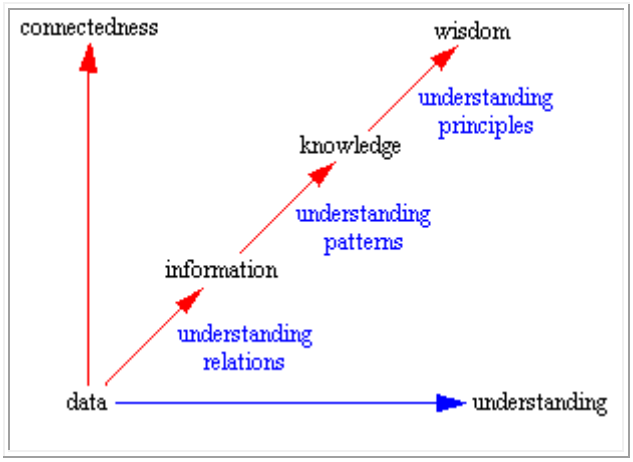

Fig 3: Data represents a fact or statement of event without relation to other things

Data: symbols

Information: data that are processed to be useful; provides answers to "who", "what", "where", and "when" questions Knowledge: application of data and information; answers "how" questions Understanding: appreciation of "why" Wisdom: evaluated understanding.

Ackoff indicates that the first four categories relate to the past; they deal with what has been or what is known. Only the fifth category, wisdom, deals with the future because it incorporates vision and design. With wisdom, people can create the future rather than just grasp the present and past. But achieving wisdom isn't easy; people must move successively through the other categories.

A further elaboration of Ackoff's definitions follows:

Data... data is raw. It simply exists and has no significance beyond its existence (in and of itself). It can exist in any form, usable or not. It does not have meaning of itself. In computer parlance, a spreadsheet generally starts out by holding data.

Information... information is data that has been given meaning by way of relational connection. This "meaning" can be useful, but does not have to be. In computer parlance, a relational database makes information from the data stored within it.

Knowledge... knowledge is the appropriate collection of information; such that it's intent is to be useful. Knowledge is a deterministic process. When someone "memorizes" information, then they have amassed knowledge. This knowledge has useful meaning to them, but it does not provide for, in and of itself, integration such as would infer further knowledge.

Understanding... understanding is an interpolative and probabilistic process. It is cognitive and analytical. It is the process by which knowledge is synthesized with new knowledge from the previously held knowledge. The difference between understanding and knowledge is the difference between "learning" and "memorizing". Understanding can build upon currently held information, knowledge and understanding itself. In computer parlance, AI systems possess understanding in the sense that they are able to synthesize new knowledge from previously stored information and knowledge.

Wisdom... wisdom is an extrapolative and non-deterministic, non-probabilistic process. It calls upon all the previous levels of consciousness, and specifically upon special types of human programming (moral, ethical codes, etc.).Wisdom is therefore, the process by which one can discern, or judge, between right and wrong, good and bad. Wisdom is a uniquely human state, wisdom requires one to have a soul, for it resides as much in the heart as in the mind. And a soul is something machines will never possess (or perhaps I should reword that to say, a soul is something that, in general, will never possess a machine). Fig: Data represents a fact or statement of event without relation to other things. Ex: It is raining. Information embodies the understanding of a relationship of some sort, possibly cause and effect. Ex: The temperature dropped 15 degrees and then it started raining.

Knowledge represents a pattern that connects and generally provides a high level of predictability as to what is described or what will happen next. Ex: If the humidity is very high and the temperature drops substantially the atmospheres is often unlikely to be able to hold the moisture so it rains.

Wisdom embodies more of an understanding of fundamental principles embodied within the knowledge that are essentially the basis for the knowledge being what it is. Wisdom is essentially systemic. Ex: It rains because it rains. And this encompasses an understanding of all the interactions that happen between raining, evaporation, air currents, temperature gradients, changes, and raining.

Self-Check Exercise-3

1. Summarise the interrelationship of data, Information and Knowledge.
2. Write you answer in the following Space

Libraries and Data, Information and Knowledge

With reference to Library and Information Centre, the relations of data, information and knowledge are useful and necessary to determine the types of services area planned to help the Library users. For librarians and documentlists, information science is primarily concerned with finding the most suitable rules for the design of systems and procedures for collecting, organizing, classifying, indexing, storing, retrieving and mediating those materials which support data, knowledge, meaning and experience. Librarians, documentalists and archivists have done this for thousands of years.

Data Information and Knowledge in context of Library & Information Science discipline.

Data	**Information**	**Knowledge**	**Wisdom**
Each unique record of the Membership Register.	The collection of the above records and organized into a User Profile.	Understanding a pattern from the above User profile by the Librarian. i.e. What kind of users are frequenting the library e.g. Children, Senior Citizens, Research Scholars etc.	Planning of new services/ Improvement of existing services based on the knowledge gained.

Self Check Exercise-3

1. Summaries the interrelationships of Data, Information Knowledge.

Write your answer in the space given below:

Summary:

By definitions of data essentially means something that is given. Data may be anything that is given a fact, figures, texts, charts or graphs. "Data is a set of discrete, objective facts about events…Data describes only a part of what happened; it provides no judgment or interpretation and no sustainable basis of action…Data says nothing about its own importance or relevance." (Davenport and Prusak, 1998:2-3)

Data can be viewed in different contexts: for example data used in computers sciences, data represented in sciences and social sciences. There may be types of data emerging from the above disciplines. The data types may differ in case of sciences, technology and management science. Census data is good example of population studies. Data representation in computers, Sciences and Social sciences has been discussed in details.

The interrelations of the concept of data, Information and knowledge will be understood from the following example:

1. Data -Raw material - Cotton
2. Information -Intermediary -Yarn

3. Cloth - Finished product -Cloth

A further elaboration of Ackoff's through diagram represents the transitions from data, to information, to knowledge, and finally to wisdom, and it is understanding that support the transition from each stage to the next is discussed with examples of **data** represents a fact or statement of event without relation to other things. Ex: It is raining.

Information embodies the understanding of a relationship of some sort, possibly cause and effect. Ex: The temperature dropped 15 degrees and then it started raining. Knowledge represents a pattern that connects and generally provides a high level of predictability as to what is described or what will happen next. Ex: If the humidity is very high and the temperature drops substantially the atmospheres is often unlikely to be able to hold the moisture so it rains.

Wisdom embodies more of an understanding of fundamental principles embodied within the knowledge that are essentially the basis for the knowledge being what it is. Wisdom is essentially systemic. Ex: It rains because it rains. And this encompasses an understanding of all the interactions that happen between raining, evaporation, air currents, temperature gradients, changes, and raining. With reference to Library and Information Centre, the relations of data, information and knowledge are useful and necessary to determine the types of services area planned to help the Library users.

Answer to Self Check Exercise-1

Information is seen as an important component of growth and improvements in living standards in the developed world. Information is related to many interlinked concepts such as data, facts, observation, intelligence, skill, knowledge, experience, and wisdom. The data, information and knowledge are the intellectual assets, which have been perceived by its value, its role and importance in nation's development. The combinations concepts and their applications have in fact contributed to the growth and prosperity of the society. We all know that human mind is the super brain, which has contributed in inventions and innovations of newer concepts and its applications to the development of the human beings and growth of the society at large. Particularly development is seen in the society due to development of technology and its applications for creating newer knowledge and information.

Data is a set of discrete, objective facts about events…Data describes only a part of what happened; it provides no judgment or interpretation and no sustainable basis of action…Data says nothing about its own importance or relevance." (Davenport and Prusak, 1998:2-3) Thus, a text is a piece of data. In fact, letters and characters are quantified symbols because there are a finite number of them; any alphabet (including digits and special characters) may be considered as a numbering system. Pictures, figures, recorded sounds and animation are also examples of (quantifiable) data, because they may be quantified (using digital scanners, cameras, recording devices, etc.) to the point that it is eventually difficult to distinguish, from their originals, their reproduction made from the quantified representation. It is very important to note that, even if incomprehensible for a reader, any text constitutes a piece of data. In computer parlance, a spreadsheet generally starts out by holding data.

The CODAT (Committee on Data for Science and Technology) defines data as a "crystallized presentation of the essence of scientific knowledge in most accurate form". Random House Webster Computer and Internet Dictionary defines data as "distinct pieces of information, usually formatted in a special way

2. Most science is based on observations that include direct observations of the natural world and observations of experimental output and results. Increasingly, data are being generated from computer models. Sometimes "data" are equated with "observations". In other situations, the word "data" is used as a descriptive term for the starting point of the analysis or research of interest. For example, to a seismologist interested in seismic waves, seismometer outputs are data. CODATA has recognized scientific data which are repented as follows:

Data with reference to time factor: Based on the time the data can be classified into two categories:

Time Independent data: The term refers to the data, which can be measured repeatedly, e.g., data in Geosciences and Astronomy such as geological structures, rocks, fixed stars etc.

Time dependent data: These can be measured only once, e.g., certain geophysical or cosmological phenomena like volcanic eruptions and solar flares. Likewise, data pertaining to rare fossils are time-dependent data.

Data with reference to location factor: Data with reference to location factor can be categorized as follows:

Location independent data: These are independent of the location of objects measured e.g., data on pure Physics and Chemistry.

Data with reference to mode of generation: There are three types of data under this category. These are:

-Primary data: Data re primary when obtained by experiment or observation designed for the measurement, e.g., values of velocity derived by measuring length and time.

- Derived data: Combining several primary data with the aid of a theoretical model derives these data.

- Theoretical data: These are derived by theoretical calculations. Basic data such as fundamental constants are used in theoretical calculations, e.g., data concerning solar eclipses are predicted with the use of celestial mechanics.

Data with reference to nature of quantitative values: These are categorized into the following two classes:

Determinable data: Data on a quantity, which can be assumed to take a definite value under a given condition, are known as determinable data. Time-dependent data are usually determinable data, if the given condition is understood to include the specification of time.

Stochastic data: Data relating to a quantity, which take fluctuating values from one sample to another, from one measurement to another, under a given condition, are referred to as stochastic. In Geosciences, most data are stochastic.

Data with reference to terms of expression: The categorization in this case yields three classes of data:

-Quantitative data: These are measures of quantities expressed in terms of well-defined units, changing the magnitude of a quality to a numerical value. Most data in Physical Sciences are quantitative data.

-Semi-quantitative data: These data consist of affirmative or negative answers to posed questions concerning different characteristics of the objects involved, e.g., in Biology, classification of organisms is based upon a set of 'Yes' and 'No' responses to questions concerning morphological, biochemical and other characteristics of species. Such data are regarded as semi quantitative. 'Yes' and 'No' can be coded as '1' and '0' (zero) for obtaining numerical data.

- Qualitative data: The data expressed in terms of definitive statements concerning scientific objects are qualitative in nature. Qualitative data in this sense are almost equivalent to established knowledge.

Data with reference to mode of presentation: These are categorized as numerical graphic and symbolic data.

-Numerical data: These data are presented in numerical values, e.g., most quantitative data fall in this category.

-Graphic data: Here data are presented in graphic form or as models. In some cases, graphs are constructed for the sake of helping users grasp a mass of data by visual perception. Charts and maps also belong to the category.

Symbolic data: These are presented in symbolic form, e.g., symbolic presentation of weather data.

3. The definitions of data, information and knowledge, as well as their interrelations according to Russell Ackoff, a systems theorist and professor of organizational change, the content of the human mind can be classified into five categories. Data, Information, Knowledge and wisdom.

Data: symbols

Information: data that are processed to be useful; provides answers to "who", "what", "where", and "when" questions

Knowledge: application of data and information; answers "how" questions

Understanding: appreciation of "why"

Data has commonly been seen as simple facts that can be structured to become information. Information, in turn, becomes knowledge when it is interpreted, put into context, or when meaning is added to it. There are several variations of this widely adopted theme. The common idea is that data is something less than information, and information is less than knowledge. Moreover, it is assumed that we first need to have data before information can be created, and only when we have information, knowledge can emerge. There quickly found to be a wealth of sources that seemed to make sense in terms of defining what knowledge actually was, and how was it differentiated from data, information, and wisdom. They are not of equal value in terms of utility and applications. They are evaluated in ascending scale of values, data having the least value and the wisdom the greatest. In totality these concepts form valuable human intellectual assets and service as a precious human capital in all development process.

The interrelations of the concept of data, Information and knowledge will be understood from the following example:

1. Data -Raw material - Cotton
2. Information -Intermediary -Yarn
3. Cloth - Finished product -Cloth

References:

- Davenport, T.H. and L. Prusak (1998). Working Knowledge: How Organizations Manage What They Know. Harvard Business School Press, Boston, MA

- Ackoff, R. L., "From Data to Wisdom", Journal of Applies Systems Analysis, Volume 16, 1989 p 3-9.

- Bellinger (G):Date, Information, Knowledge, and Wisdom. Accessed http://www.outsights.com/systems/dikw/dikw.htm.

- Anderson (W. L): Some challenges and issues in managing and Preserving access to, Long-lived Collections of Digital Scientific and Technical Data, Data Science Journal, Volume 3, 30 December 2004 191.

Unit – 2
Notion of Information: Definition, Nature, Properties and Scope

1.0 Notion of Information

The word "Information" is presently well known to everybody. Meanwhile, it has come into common use since not very long ago, i.e. in the middle of twenth century by the initiative of Claude Shannon. He has introduced this term in a limited technical sense as applied to the theory of communication or code transmission (called Information Theory). Simultaneously with him, Norbert Wiener substantiated a necessity of approaching to information as a common phenomenon significant for the existence of nature, human being and society.

Meanwhile, the notion of information as such still remains to a high extent intuitive and gets a variety of meanings in different areas of human activities.

Information can be conceived as a signal that has a usable meaning. The latter contributes to a re-organisation of the system utilising the information - which wouldn't be possible without the signal. One can differentiate between a "traditional" and a "modern" notion of information.

1.1 The Traditional notion of Information:

"Information is a message which is mediating a meaning to a perceiving living being. It is not necessarily emanating from a living being and could originate from the inanimate nature or technology. The perceiving living being is using its sense-organs for the reception and its nervous system for the processing of the message."

In this sense, a map contains information. A human being who is reading it is organising his or her behaviour according to the guidelines of the DNA map. DNA contains in the "modern" sense information that present the "structure" of a human being. In each cell, the whole quantity of information is stored and part of it is picked out and applied in an organising way within the various cells

1.2 The Modern notion of Information:

"Information is a signal that enables a certain organisation of a system. The generation, the transmission and the processing of the signal is not tied to the participation of perceiving living beings." The notion of information is generalised to all systems, which can receive, and process organising signals. To get back to the two historic events from the first section: The two transformations of information described above happen without that a human being needs to learn about the information. The "meaning" of it is thus unknown (since neither the cell nor the computer knows about meanings). The modern notion of information, as opposed to the traditional, therefore differentiates between Information (as the organising factor) and their meaning (in the perception of thinking living beings). The information within the context of human sensory organs and the machine (microcomputers) are mapped here to understand the information flow.

1.3 The value and importance of information:

The general conception of information transfer that takes place in the human and machine environment is quite obvious with the above example. The inventions, innovations for creation of new knowledge are the consistent efforts of the individual who have dedicated to the growth of the knowledge from the days of evolution of the civilization from ancient to modern. The importance of the information in various stages of human development is reckoning as driving force. Some of the factors attributed to the current value of information and knowledge, which have contributed to the Socio-economic development, are in the fields of Research and Development (R & D), Science and technology, Information technology and Societal Information.

1.4 Information Life Flow:

The Information Life cycle Model (Clayton and Gorman) shown in the fig 1 is one of the model, which depicts information flow in the society. The model represents flow of information from the top- author the researcher will usually communicate with his/her colleagues, the so called "invisible college". Eventually however, if the information is scientific or academic in nature it is likely to be published as report or a journal article, copies will go to the libraries as well as the potential readers. The cycle is repeated up to three times, with the different publishers (a frequently different authors, as each draws upon earlier works), but with the library at the centre of the cycle. Eventually new authors draw upon known information as part of the new cycle. By "Information" in the context we mean a full range of library resources, including educational and recreational materials. Apparently at each stage of the cycle the readers will be different and have different needs.

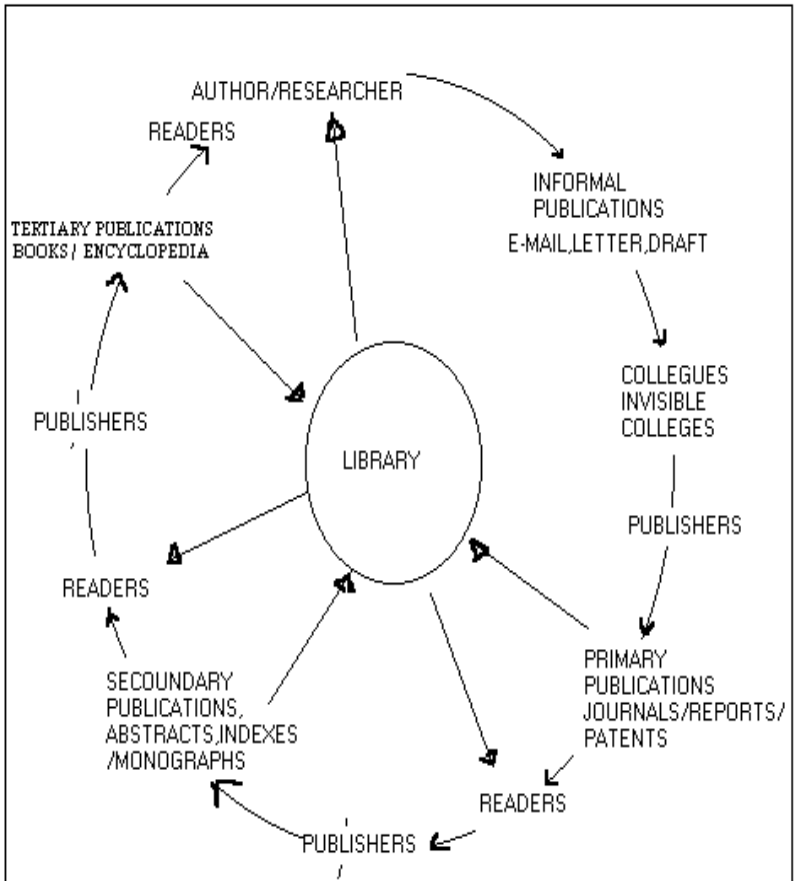

Fig -1 Information Life cycle Model (Clayton and Gorman)

1.5 Value of the Information Professional

In today's fast-paced world of business, the need for information is an international commodity. Information, both internally and externally produced, is the lifeblood of an organization and essential for innovation and continuous learning. Information sharing is also essential for any organization that is attempting to understand and manage its intellectual capital, often in a global context.

Information professionals play a unique role in gathering, organizing, and coordinating access to the best available information sources for the organization, understanding the critical need of turning that information into usable knowledge.

This is accomplished through the development, deployment, and management of information resources and services. Information professionals, working in non-traditional settings such as market research, business development, and strategic planning, use the Internet and other technology to present information in a way that maximizes its usefulness, saving time and money in order to attain the goals of their organization. Organizations that are integrating information professionals into strategic planning initiatives recognize their necessity in gaining a competitive advantage in the information and knowledge age.

Exercise-1

1. Explain Notion of information.
2. Write your answer in the space below:

2.0 Definition of Information

In this section, we are presenting a quick resume of the literature on the discussions on the definition of information as there are too many formal definitions and none is accepted universally. Therefore, it would be more useful to give a brief review of discussions on the definition rather than giving the different formal definitions of information. The term "information" has been widely and increasingly used, but not always with a clear idea about its meaning. As Dretske (1981) and Lewis (1991) pointed out, few books concerning information actually define it clearly. And Mingers (1997) adds, "Information systems could not exist without information and yet there is no secure agreement over what information actually is" (p. 73). The word "information" is one of the most used, and very abused, words. Different scientific disciplines and engineering fields provide diverse meanings to the word, which is becoming the umbrella of divergent, and sometimes dissimilar and incoherent homonyms. Information has been frequently defined as "interpreted data" and, as such, the same data might cause different interpretations. Different persons might associate different meanings to the same data. This kind of definition is frequently found in Information Systems textbooks, especially those oriented to Information Systems Development and Managerial Information Systems (MIS). Data in a MIS should provide some meaning to some manager in order to fulfill its reason or justification of existence.

An interpretation is, by its own nature, subjective, i.e. related to a subject, a "mind, ego, or agent of whatever sort that sustains or assumes the form of thought or consciousness." (Merriam-Webster, 1999).

A similar conclusion might be derived from the etymology of the word "information." "Inform" originated from the Middle English term "enforme", derived from the Middle French term "enformer", which evolved from the Latin term "informare" (Merriam-Webster, 1999). This Latin term means "shape, form an idea of" (Hoad, 1993). To form an idea is always in the mind of a person, of a subject. On the

other hand, “informare” is a composite of “in” and “form.” The last term means “shape, mold” The term “in-” is used in combination mainly with verbs and their derivatives, with the senses of ‘in, into, within’.” (Hoad, 1993) Accordingly, “to inform” would mean “to form in”, “to form into”, “to form within” a person, a subject, or as Boland (1987, referenced by Cohen, 2000) concluded “…information is the inward-forming of a person that result from the engagement with data.” The conclusion we made, from the etymological analysis of the term converge with the conclusions made by several authors by means of other kind of analysis. Dervin (1983), for example, points out that, “Since it is assumed that all information producing is internally guided and since it is generally accepted that all human observing is constrained, sense-making further assumes that all information is subjective” (p. 4, Dervin emphasis).

Most writers take the position that the word 'information' is used with many different connotations and a single precise definition encompassing all its aspects cannot in principle be formulated. Whatever the definitions of the basic concepts of information, a science of information could be useful for studying the structure of Information Science.

2.1 Belkin

In an elaborate study on the information concepts for Information Science Belkin makes the distinction between definition and concept. The distinction is while a definition presumably defines the phenomenon; the concept is looking at or interpreting the phenomenon. By accepting the idea of a concept, it becomes easier to look for a useful concept rather than attempting a universal definition of information.

Belkin postulates three approaches to the determination of the requirement of an information concept:

- Methodological -- having to do with the utility of the concept;
- Behavioral --having to do with the phenomena which the concept must account for;
- Definitional - having to do with the context of the concept.

With these postulates, the following eight requirements are enumerated which would be relevant and operational to developing a structure of Information Science:

1 It must refer to information within the context of purposeful, meaningful, communication;

2 It should account for information as a process of social communication among human beings;

3 It should account for information being requested or desired;

4 It must account for the relationship between information and state of knowledge of generator and of recipient;

5 It should account for the effect of information on the recipient;

6 It should account for the varying effects of messages presented in different ways;

7 It must be generalisable beyond the individual case; and

8 It should offer a means of prediction of the effect of information. Requirements 1 to 6 pertain to relevance of information to user communities; the rest two are operational requirements to design and develop useful models of information systems.

2.2 Wersig and Neveling

Wersig and Neveling consider information much more comprehensively, adopting six different approaches:

1 The Structural approach (matter oriented) in which information is seen as structures of the world or static relations between physical objects which may be perceived or not;

2 The Knowledge approach which records knowledge that is built upon the basis of perception of the structure of the world. This approach is not recommended because knowledge and information are used as synonyms;

3 The Message approach in which information is recorded as symbols oriented in a physical carrier. This approach is used only by those concerned with the mathematical theory of communication;

4 The Meaning approach where the semantic content of a message is accepted as information;

5 The Effect approach or the Recipient-oriented approach which states that information occurs only as a specific effect of a process;

6 The Process approach where information is seen as a process, which, for example, occurs in the human mind when a problem and useful data are brought together.

The substance of these approaches is that information is a social process and can be understood only if it is defined in relation to needs either as reduction of uncertainty caused by a communication of data or as data used for reducing uncertainty.

He, however, believes that the fundamental problem of Information Science is to interpret this equation and thereby to explain information process.

Exercise-2

1. Elaborate Wersig and Neveling approach to information.
2. Write your answer in space provided in the space.

2.3 Information science (s):

Prof. Maculap (Eminent American Economist) says "The bond among the information Sciences is their focus on information as object of study, through word information is interpreted very differently by various groups of researchers. McCain (1995) in her study on information science, enumerated Information Sciences Map Fig-2

with specific subjects is included in it, as well as the closely related fields, to yield a selection guide for ISA. It was helpful to express the results as a "map" of the field, in which the basic subjects comprising information science are shown as a "core" at the center, with related fields surrounding the core. The fields most closely related to information science are: computing technology, behavioral science, librarianship, statistics, communications, law and government, communication, and other subject disciplines. Each of these related disciplines, of course, has its own subject map, a portion of which would overlap information science. It is important to distinguish the sub disciplines that fall within the scope of information science and those that fall outside of it.

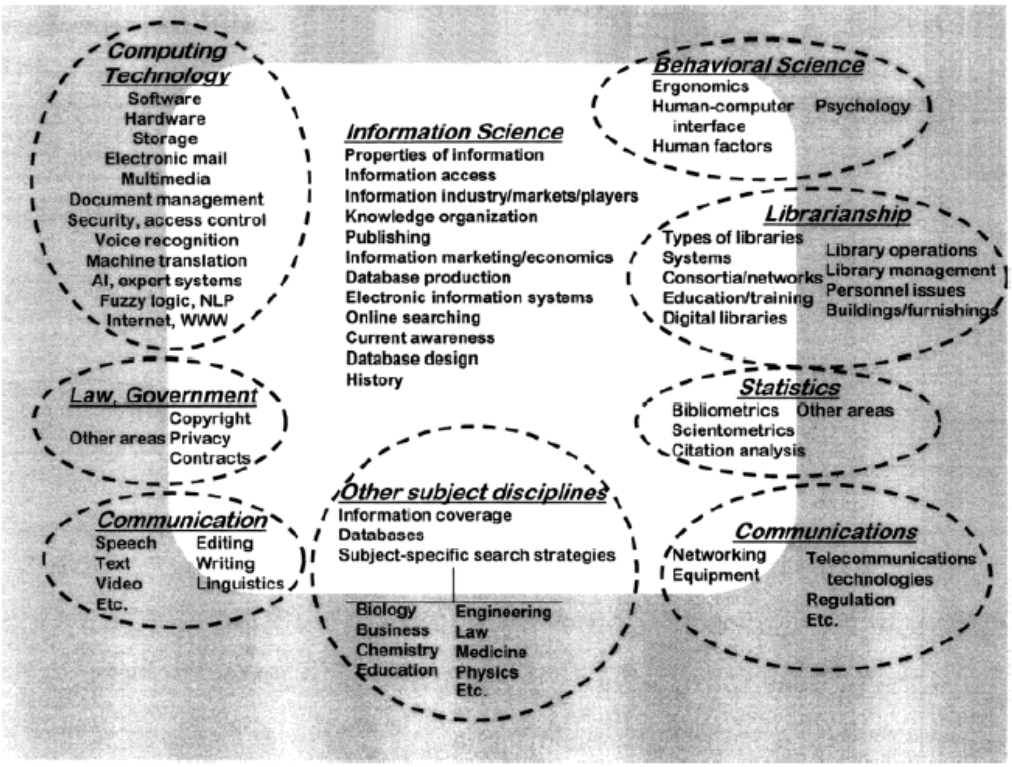

Fig-2: Information Science Map

Information science, several investigators have used bolometric and other techniques to develop maps showing the relationship of information science to other fields. The following studies are relevant and provide helpful background in this area.

(1) McCain (1995) used a co- descriptor analysis of the 1993 issues of ISA (Information Science Abstracts) and derived a mapping of the topics it covered. She concluded that ISA's subject coverage centers on three major areas: databases and information retrieval, information management, and implementation of information technologies in libraries. (Several significant changes have occurred in the information field even in the few years since McCain published her results in 1993. The Internet has become pervasive, database and searching technologies have advanced, and electronic publishing has become widespread.) Mc-Cain (1998) also noted that the 1993 issues of ISA contain an unusual preponderance of patents. (Patent coverage in ISA was suspended in 1996 and has not yet been resumed.)(2) In an outstanding and extremely thorough study, White and McCain (1998) used author co citation analysis to derive the sub disciplines of information science. They divided the field into two major specialties: experimental and practical information retrieval, and scientific communication as exemplified in bibliometrics, citation studies, and the like. Of special interest here are White and McCain's 12 sub disciplines, or specialties, in information science: (a) experimental retrieval; (b) citation analysis; (c) on-line retrieval; (d) bibliometrics; (e) general library systems; (f) science communication; (g) user theory; (h) OPACs; (i) imported ideas; (j) indexing theory; (k) citation theory; (l) communication theory.

3.0 Nature of information:

The nature of information is understood in context of data, information, knowledge and wisdom that are viewed as part of a continuum. The term ``information'' is used differently by individuals in different walks of life, from specialists working in information based professions, such as communication media and information management, to those in the computing and cognitive sciences, as well as by people involved in less scholarly pursuits. An interest in understanding information as well as the ability to measure it allows these specialists and others to work on their chosen problems, make reasonable decisions, and to communicate effectively among themselves. For example,

- Communication scholars express concern about information overload due to the plethora of mass media sources;
- Electrical engineers strive to improve modem technology to increase the amount and speed of information transmitted, i.e., the number of bits per second transmitted over coaxial or fiber optic circuits;
- Biological Sciences are concerned with Living beings;
- Philosophical Studies are concerned with modern and conventional studies of epistemology;
- Computer Sciences concerned with processing, storage and retrieval of information;
- Library and Information Sciences is concerned with knowledge organization and information dissemination;

A more general definition allows frameworks, theories, and results to be transferred across disciplinary boundaries, and provides for dialogue across these boundaries, while at the same time allowing individual disciplines to focus on the specific information phenomena of their discipline. Unfortunately, people in different fields and professions differ on what information is or how to evaluate the different definitions that are assumed explicitly or implicitly by different fields or social groups.

3.1 TYPES OF INFORMATION

The word " information' has no single universally accepted definition there is no one single way we can group or classify information. In fact, the "types" of information could be grouped using different characteristics depending upon the purpose of such a classification. According to Shera there are six types of information:

1. **Conceptual Information:** The conceptual information relates to ideas, theories and hypothesis about the relationship, which exists among the variables in an area.

2. **Empirical Information:** Information relating to data and experience of research, which may be drawn from oneself or communication through others.

3. **Procedural Information:** This is the data obtained, manipulated and tested through investigations;

4. **Stimulatory Information:** is motivated by oneself or the environment;

5. **Policy Information:** is focused on the decision making process

6. **Directive Information:** is used for coordinating and enabling effective group activity

3.1 Sources of Information:

When we think of information it is not just floated in air. Information needs a medium (Print, Audio visuals, Electronic formats & online) and gets it way into following types of sources:

3.1.1 Primary Sources:

The primary sources are new original or new interpretations of known facts and ideas. Usually unorganized and unrelated, each unit being separate and widely scattered, such as periodicals, research reports, conference proceedings, patents, standards, trade literature these etc.,

3.1.2 Secondary Sources:

Information derived from primary sources. Organized and arranged according to a definite plan. Indexing and abstracting periodicals, review of progress, reference books (Handbook, Dictionaries, tables, encyclopedias etc.,)

3.1.3 Tertiary Sources:

Compilations of primary and secondary sources organized and arranged according to some definite plan. Such as year books and directories, bibliographies, guides to the literatures, list of research in progress, guides to libraries and sources of information and guides to organizations etc.,

3.2 Information Transfer Chain:

Information is understood rather differently from the way. The emphasis here is very much on the transmission and reception of information. The model shown in Fig-3 is often referred to as 'Information model' of communication. Although it is principally concerned with communication technology, it is frequently used in the study of human communication. Information theory or statistical communication theory was initially developed to separate noise from information-carrying signals. The breaking down of information system into sub-systems was to evaluate the efficiency of various communication channels and codes. You might ask yourself how viable the transfer of Shannon's insights from information theory to human communication is likely to be. The concepts of information theory and cybernetics are essentially mathematical and are intended to be applied to technical problems under clearly defined conditions.

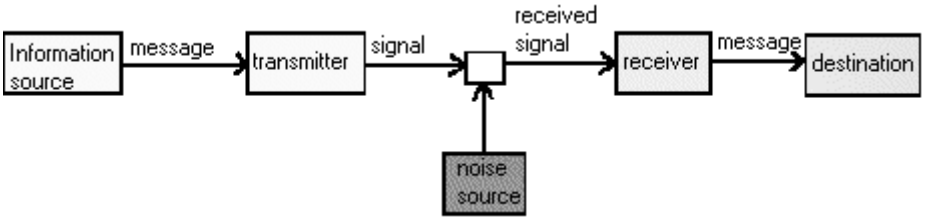

Fig-3 Shannon-Weaver " Information Model of Communication

We have been discussing the nature concept and definition of information and information transfer phenomenon with reference to its different manifestation.

When we think of information it is not just floated in air. Information needs a medium (Print, Audio visuals, Electronic formats & online) and gets it way into following types of sources:

Source: It refers to the established carriers that disseminate information or knowledge or any type of their surrogates.

Channel: Channel refers to the established carriers that disseminate information or knowledge or any type of their surrogates.

Media: is the physical media that carry messages or contents of information (May be oral i.e. person to person or recorded print and non print).

Recipient: is the ultimate receiver of information who may also generate or create information, (receiver may be individual, groups, organization or institution).

Information needs: indicate the types of information that are normally communicated to those who seek the different types of information relevant to there need.

3.3 Scope of Information:

The scope of information and other associated concepts have been discussed at length in this block with reference to their value and importance in all human activities. We have also learnt that information has value and utility only if it is communicated, which makes information and communication inseparable, sometimes even indistinguishable.

It is necessary, therefore, to discuss the scope of information in relation to the communication process of information transfer, which has been studied in some details in the earlier sections of this unit. Sources, Channel, Media, Recipient constitute the elements that form information Transfer chain.

Our primary focus being Library and information Science, it is also appropriate to examine the scope of the information in relation to the expanding dimensions of information Sciences.

Vickery (1983) succinctly summarizes the scope of Information Science, which includes among others:

- the behaviour of people as generators, sources, recipients and users of information, all of whom are partners in the information transfer process;
- the quantitative study of messages: its size, growth rate, distribution, patterns of production and use;

Ranganathan's Five Laws of Library Science examined in the light of the canvas of Information Science, give the widest implications of information as it is evolving today which also fits in with the contours of Vickery.

Restated with emphasis on information, the Five Laws are:

- Information is for use.
- Every user his/her information.
- Every information its user.
- Save the time of the user; its corollary- Save the time of the library staff.
- Information system is a growing organism.

The First Law stresses the value of information, a vital component in every human activity. In an Information Society, as has evolved, information is viewed as a resource, a commodity and a basic input to all human growth and development.

This concept of an Information Society is very much in conformity with Ranganathan's own perceptions. In fact, the old adage "Knowledge is Wealth' "Knowledge is Power' is captured in these ideas to reinforce the power of knowledge that transforms a non-resource into a resource.

In essence, the First Law comprehends a whole range of aspects of Information Science that includes:

- Development of document and non-document resources;
- Organisation and management of these information resources;
- Techniques and tools for processing the collection;
- Use of different kinds of literature in various contexts;
- Bibliometric studies for measuring the volume, growth and development;
- National and international Information Policies.

The Second Law suggests that information services should be entirely oriented towards users needs. User studies, therefore, are crucial to objectivity in service. Such a service includes among others:

- Behaviour patterns of information gathering by different categories of users in different contexts;
- Use and users of different types of information; and
- Study of interest profiles of users that includes individuals, groups, institutions and projects, programmes and such others.

The Third Law conveys that the entire information transfer process should be in consonance with the ultimate use. The familiar principle "Right information to the right user at the right time' is communicated here. Primary, secondary and tertiary communication channels should gel focused on use. In other words, marketing of information, keeping the users needs in view is stressed, providing scope for innovative products and services, irrespective of their physical media.

The Fourth Law emphasizes the value of "Time. Timeliness and speed are the very essence of service. Use of Information Technology enables a total metamorphosis in improving means and mechanisms to provide high quality service. Information professionals should be geared to this transformation process that hinges on education and training and more importantly building up a proper perspective, developing an attitude to service and a fresh approach to information. Use promotion, education in information use skills and user friendliness make the use and operation of a system not only simple but also saves a great amount of valuable time. Continuous research on all aspects of information handling is an absolute necessity keeping all these factors in view.

The Fifth Law refers to the dynamics of change, which is seen in the ever growing, sometimes turbulent advancement of knowledge, which is a dynamic continuum and never ending phenomenon. The institutional mechanisms with a self adapting capacity to changing environments are to be constantly evolved and the need for it is to be appreciated and

These Laws are not scientific generalizations but norms, precepts, guides to good practice .in the wider field of do**cum**entation and information studies and their new expand in dimensions.

Exercise-3:

Enumerate scope of Information Sciences.

Write your answer in the space given below:

_____
_____
_____
_____
_____
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_____
_____
_____
_____

3.4 Barrier of Information

A variety of obstacles are hindering the free flow and use of information and knowledge. Some of these barriers are deliberate and hence do not appear within easy means. The barriers to communication and information flow are of the following kinds.

Language.	**Jargon**	**Presentation**
Man-man	**Neologism**	**Level**
Man-machine	**Synonym**	**Style**
	Acronym	**Form**

While language is a powerful means of communication, the barriers caused by jargons and levels of presentation fail to convey the message intended to be communicated.

Communication Problem	Media Problem	Socio-economic Problem
Multiplicity of Sources	Comprehension	Culture
Seepage and Scatter	Perception	Level of Development of Countries
	Alien of Reality	
	Misunderstanding	

Cultural and Social differentiation may cause serious problems of communication. These problems may be overcome by appropriate presentation of information.

Over Population	Pollution (Noise)	Delays in Handling
Primary Papers	Propaganda	Publication
Rehash	Redundant Data	Postal Transit
Abstracts, Digests, etc.	Error	Translation
		Processing Searching
		Accessing Document
		Delivery Feedback

In this group, the problems posed are volume, mis-information and delays in publication due to various reasons.

Economic	**Political**	**Regulatory**
Direct Cost	Instability	Foreign Exchange
Overheads	War	Customs

This group of barriers indicates the problem of costs, political situation in a country and other regulatory measures of a country. Some of these barriers can possibly be overcome with the instrument of information policies at national levels and the establishment of the International Information and Communication Order.

Self Check Exercise 4:

1. Elaborate barriers of information.

2. Write your answer in given space below

Summary:

The word "Information" is presently well known to everybody. The Notion of Information in traditional and modern sense is exhibited to understand the information flow. Again with Information life cycle model and Shannon weaver model we have understood information flow in an academic environment and transmission of information through signals.

The definition " Information" by most writers take the position that the word 'information' is used with many different connotations and a single precise definition encompassing all its aspects cannot in principle be formulated. Whatever the definitions of the basic concepts of information, a science of information could be useful for studying the structure of Information Science.

Prof. Maculap (Eminent American Economist) says " The bond among the information Sciences is their focus on information as object of study, through word information is interpreted very differently by various groups of researchers. McCain (1995) in her study on information science, enumerated Information Sciences Map Fig-2 with specific subjects is included in it, as well as the closely related fields, to yield a

selection guide for ISA. It was helpful to express the results as a “map” of the field, in which the basic subjects comprising information science are shown as a “core” at the center, with related fields surrounding the core. The nature of information is understood in context of data, information, knowledge and wisdom that are viewed as part of a continuum. According to Shera there are six types of information:

1 **Conceptual Information:** The conceptual information relates to ideas, theories and hypothesis about the relationship, which exists among the variables in an area.

7. **Empirical Information:** Information relating to data and experience of research, which may be drawn from oneself or communication through others.

8. **Procedural Information:** This is the data obtained, manipulated and tested through investigations;

9. **Stimulatory Information:** is motivated by oneself or the environment;

10. **Policy Information:** is focused on the decision making process

11. **Directive Information:** is used for coordinating and enabling effective group activity

Information needs a medium (Print, Audio visuals, Electronic formats & online) Hence it has been categorized as primary, secondary and tertiary sources. Vickery (1983) succinctly summarizes the scope of Information Science, which includes among others:

- the behaviour of people as generators, sources, recipients and users of information, all of whom are partners in the information transfer process;
- the quantitative study of messages: its size, growth rate, distribution, patterns of production and use;

Ranganathan's Five Laws of Library Science examined in the light of the canvas of Information Science, give the widest implications of information as it is evolving today which also fits in with the contours of Vickery. A variety of obstacles are hindering the free flow and use of information and knowledge. Some of these barriers are deliberate and

hence do not appear within easy means. The barriers to communication and information flow.

Answer to Self check Excersie

1. Notion of Information

The word "Information" is presently well known to everybody. Meanwhile, it has come into common use since not very long ago, i.e. in the middle of twenth century by the initiative of Claude Shannon. He has introduced this term in a limited technical sense as applied to the theory of communication or code transmission (called Information Theory). Simultaneously with him, Norbert Wiener substantiated a necessity of approaching to information as a common phenomenon significant for the existence of nature, human being and society.

Meanwhile, the notion of information as such still remains to a high extent intuitive and gets a variety of meanings in different areas of human activities.

Information can be conceived as a signal that has a usable meaning. The latter contributes to a re-organisation of the system utilising the information - which wouldn't be possible without the signal. One can differentiate between a "traditional" and a "modern" notion of information.

1.1 The Traditional notion of Information:

"Information is a message which is mediating a meaning to a perceiving living being. It is not necessarily emanating from a living being and could originate from the inanimate nature or technology. The perceiving living being is using its sense-organs for the reception and its nervous system for the processing of the message."
In this sense, a map contains information. A human being who is reading it is organising his or her behaviour according to the guidelines of the map.

1.2The Modern notion of Information:

"Information is a signal that enables a certain organisation of a system. The generation, the transmission and the processing of the signal is not tied to the participation of perceiving living beings." The notion of information is generalised to all systems, which can receive, and process organising signals. To get back to the two historic events from the first section: The two transformations of information described above happen without that a human being needs to learn about the information. The "meaning" of it is thus unknown (since neither the cell nor the computer know about meanings). The modern notion of information, as opposed to the traditional, therefore differentiates between Information (as the organising factor) and their meaning (in the perception of thinking living beings). The information within the context of human sensory organs and the machine (microcomputers) are mapped here to understand the information flow.

2. Wersig and Neveling consider information much more comprehensively, adopting six different approaches:

7 The Structural approach (matter oriented) in which information is seen as structures of the world or static relations between physical objects which may be perceived or not;

8 The Knowledge approach which records knowledge that is built upon the basis of perception of the structure of the world. This approach is not recommended because knowledge and information are used as synonyms;

9 The Message approach in which information is recorded as symbols oriented in a physical carrier. This approach is used only by those concerned with the mathematical theory of communication;

10 The Meaning approach where the semantic content of a message is accepted as information;

11 The Effect approach or the Recipient-oriented approach which states that information occurs only as a specific effect of a process;

12 The Process approach where information is seen as a process, which, for example, occurs in the human mind when a problem and useful data are brought together.

The substance of these approaches is that information is a social process and can be understood only if it is defined in relation to needs either as reduction of uncertainty caused by a communication of data or as data used for reducing uncertainty.

He, however, believes that the fundamental problem of Information Science is to interpret this equation and thereby to explain information process.

3. The scope of Information sciences in words of Prof. Maculap (Eminent American Economist) says " The bond among the information Sciences is their focus on information as object of study, through word information is interpreted very differently by various groups of researchers. McCain (1995) in her study on information science, enumerated Information Sciences Map Fig-2 with specific subjects is included in it, as well as the closely related fields, to yield a selection guide for ISA. It was helpful to express the results as a "map" of the field, in which the basic subjects comprising information science are shown as a "core" at the center, with related fields surrounding the core. The fields most closely related to information science are: computing technology, behavioral science, librarianship, statistics, communications, law and government, communication, and other subject disciplines. (1) McCain (1995) used a co-descriptor analysis of the 1993 issues of ISA (Information Science Abstracts) and derived a mapping of the topics it covered. She concluded that ISA's subject coverage centers on three major areas: databases and information retrieval, information management, and implementation of information technologies in libraries

A variety of obstacles are hindering the free flow and use of information and knowledge. Some of these barriers are deliberate and hence do not appear within easy means. The barriers to communication and information flow are of the following kinds.

Language.	Jargon	Presentation
Man-man	Neologism	Level
Man-machine	Synonym	Style
	Acronym	Form

While language is a powerful means of communication, the barriers caused by jargons and levels of presentation fail to convey the message intended to be communicated.

Communication Problem	Media Problem	Socio-economic Problem
Multiplicity of Sources	Comprehension	Culture
Seepage and Scatter	Perception	Level of Development of
	Alien of Reality	Countries
	Misunderstanding	

Cultural and Social differentiation may cause serious problems of communication. These problems may be overcome by appropriate presentation of information.

Over Population	Pollution (Noise)	Delays in Handling
Primary Papers	Propaganda	Publication
Rehash	Redundant Data	Postal Transit
Abstracts, Digests, etc.	Error	Translation
		Processing Searching
		Accessing Document
		Delivery Feedback

In this group, the problems posed are volume, mis-information and delays in publication due to various reasons.

Economic	Political	Regulatory
Direct Cost	Instability	Foreign Exchange
Overheads	War	Customs

This group of barriers indicates the problem of costs, political situation in a country and other regulatory measures of a country. Some of these barriers can possibly be overcome with the instrument of information policies at national levels and the establishment of the International Information and Communication Order

References:

1. Merriam-Webster, 1999.
2. Callaos (Nagib) and Callous (Belkis).(2002). Towards a systemic Notion of Information: Practical Consequences. *Informing Science 5(*1).
3. Belkin (N J) (1975). Information Concepts for information science. *Journal of documentation*.34, 55-85
4. Clayton (Peter) and Gorman. (G E) (2001) *Managing information resources in libraries: collection management in theory and practice.* London : *Library Association* Pub.4-5.
5. Shera (J H). The foundations of education for Librarianship. New York. *Becker and Hayes.*
6. Shannon (c) and Weaver W (1949). The mathematical Theory of Communication. Univ.Of Illinois Press, Urbana.
7. Vickery (B C) and Vickery (A) (1987) Information Science In theory and practice. London. Butterworths.
8. Hawkins (D T) (2001) Information Science Abstracts: Tracking the Literature of Information Science. Journal of American society for Information Science and Technology.1 (1), 50.

Unit – 3
Knowledge: Definition, Types: Tacit and Explicit.

1.0 Objectives

This unit will help to you understand:

- The meaning knowledge
- Knowledge and its definition
- The Characteristics Of Knowledge
- Types of knowledge that exists-tacit and explicit

2.0 Introduction

From the Unit 1 and Unit-2 we were able to understand and differentiate the concepts of data, Information and Knowledge. The Knowledge is "information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions." Clearly, the distinction between “Knowledge” and “Information” has to be understood. In the hierarchy of knowledge the data has commonly be seen as simple facts that can be structured to become information. Information, in turn, becomes knowledge when it is interpreted, put into context, or when meaning is added to it. There are several variations of this widely adopted theme. The common idea is that data is something less than information, and information is less than knowledge. Moreover, it is assumed that we first need to have data before information can be created, and only when we have information then, knowledge can emerge.

Knowledge is information in action. It is a dynamic blend of experience, values, information and insights, against which new experiences and information can be evaluated and consolidated.

In the corporate environment, knowledge comprises information, forecasts and trends, analyses and research findings on products and processes, customers, suppliers and markets, experiences of failures and successes, among various other business details. Unlike material assets, which decrease with consumption, the value of knowledge as an asset increases in direct proportion to its application; shared knowledge remains intact with the giver even as it enriches the receiver.

In context of today's economy, knowledge is power. Knowledge and its applications are regarded as the primary source of competitive advantage. The Third wave (Tofflers, 1980) distinguishes Information age from agricultural and industrial age. The importances of Information and Knowledge in economic systems are identified. The future world where knowledge shared becomes more power and the entire organization behaves as an intelligent, self-selecting, self-adapting systems continually integrating and processing incoming data and information to determine actions.

Human knowledge is represented in software can prompt a major change in business practices. For example, the invention of Hypertext Markup Language (HTML) has triggered the development of the Web, and of successful Web-based businesses Many efforts in Knowledge Management aim to take implicit knowledge held by a few people, to make it explicit in suitable contexts, and to make it a basis for informed actions by the whole enterprise. Several things are needed to bring isolated pockets of valuable knowledge into a useful common context.

First, the people who have the knowledge must be persuaded that it is in their interest to share it, and to help to make it explicit.

Second, we need an understandable way of representing the knowledge.

Thirdly, we will often need a system that organises knowledge.

You can obtain and leverage knowledge in several ways. To name a few trade associations, for example, are valuable pools of industry and sector knowledge, where you will find people who have dedicated their careers to understanding an industry's complexities and its "DNA." Peer networks, like Young President's Organization, TiE (The Indus Entrepreneurs), chambers of commerce, or alumni associations provide collective resources to give and get knowledge and information. Research librarians and staff at public, university, or corporate libraries are human databases of valuable information and knowledge, usually accessible by simple request.

Finally, with the use of the web and interactivity, we literally have the world at our fingertips, and the access to opportunity. With knowledge you get power and the pathway to productivity and success.

3.0 Definition of Knowledge

According to ancient Indian thoughts, knowledge, Jnaana, has no isolated existence. First, there has to be a person who wants to know, Jnaathr; then something, that is worth being known, Jneeya, has to capture his mind. Next, jnaathr has to research, arjana it or someone has to teach, prajnaana it to him. The resulting representation of jneeya that is worth being known, within jnaathr, one who wishes to know, is jnaana, the knowledge. Representation of a problem-solution in a human-mind is knowledge.

Ever since the ancient Greek period, philosophers have discussed what knowledge is. Early thinkers such as Plato and Aristotle were followed by Hobbes and Locke, Kant and Hegel, and into the 20th century by the likes of Wittgenstein, Popper, and Kuhn, to name but a few of the more prominent western philosophers. In recent years, we have witnessed a booming interest in knowledge also from other disciplines; organization theorists, information system developers, and economists have all been swept away by the knowledge management avalanche. It seems, though, that the interest is particularly strong within the Information Sciences/Information Technology community. A possible question to ask then is how knowledge relates to information technology (IT) Can IT at all be used to handle knowledge, and if so, what sort of knowledge? What sorts of knowledge are there? What is knowledge?

The term 'knowledge' is often used to refer to a body of facts and principles accumulated by mankind in the course of time. Knowledge is a multifaceted concept with multi-layered meaning. The history of philosophy since the classical Greek period can be regarded as never ending search for the meaning of knowledge.. The traditional epistemology adopts a definition of knowledge as "Justified True Belief". In theory of knowledge creation, knowledge is seen as a dynamic human process of justifying personal beliefs as part of an aspiration for the "truth". Machlup (1983) see information is a flow of mess Dretske(1981) offers more useful definitions. He says, “Information is that commodity capable of yielding knowledge, and what information a signal carries is what we can learn from it. Knowledge is identified with information-produced (or sustained) belief, but the information a person receives is relative to what he or she already knows about the possibilities at the source. “The definition of knowledge is still a live debate for philosophers. In order for there to be knowledge, according to most thinkers, at least three criteria must be fulfilled. A thought must be justified, true, and believed. Some claim that these conditions are not sufficient, as Gettier case: that is a fundamental problem in modern epistemology (the philosophy of knowledge), issuing from counter examples to the definition of knowledge as justified true belief. There are a number of alternatives proposed, including Robert Nozick's arguments for requirement that knowledge 'tracks the truth' and Simon Blackburn's additional requirement that we do not want to say that those who meet any of these conditions 'through a defect, flaw, or failure' have knowledge. Richard Kirkham suggests that our definition of knowledge needs to require that the believer's evidence such that it logically necessitates the truth of the belief.

Other Definitions

Knowledge is

- "Information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions." T. Davenport et al., 1998

- "Explicit or codified knowledge refers to knowledge that is transmittable in formal, systematic language. On the other hand, tacit knowledge has a personal quality, which makes it hard to formalize and communicate." I. Nonaka, 1994.
- "Knowledge as the human expertise stored in a person's mind, gained through experience, and interaction with the person's environment." Sunasee and Sewery, 2002.
- "Knowledge is a physical, mental or electronic record of relationships believed to exist between real or imaginary entities, forces and phenomena." Worthington, 2005.
- "The insights, understandings, and practical know-how that we all possess – is a fundamental resource that allows us to function intelligently." Wiig, 1996.
- "Knowledge is information evaluated and organized by the human mind so that it can be used purposefully, e.g., conclusions or explanations." Rousa, 2002.
- "Knowledge is... a mental grasp of a fact(s) of reality, reached either by perceptual observation or by a process of reason based on perceptual observation." Rand, 1967.
- "a fluid mix of framed experience, contextual information, values and expert insight that provides a framework for evaluating and incorporating new experiences and information". Davenport and Prusak (1998, p. 5).
- Knowledge is information that changes something or somebody -- either by becoming grounds for actions, or by making an individual (or an institution) capable of different or more effective action." -- Peter F. Drucker in The New Realities

3.1 Characteristics of Knowledge

There are several sources of knowledge about knowledge, including new thinking within the theory of knowledge.

A number of different attempts to rethink the theory of science; significant new insights arising from so-called 'second generation' cognitive science;

Some outstanding attempts to understand knowledge process in companies, particularly those tightly linked to practical experience from knowledge intensive companies.

The sum of these insights is that knowledge is contextual, selective, and concept dependent.

Let us briefly discuss each of these key characteristics.

3.1.1 Knowledge is contextual:

No knowledge can be true and no knowledge can be linked to reality independent of context. A statement that appears universal is necessarily an abstraction and can only be true if interpreted into a context. The links between a statement and its context – both in terms of what defined its origin and in terms of its potential application – are multiple and complex but definitely include the fact that knowledge is embodied, that it is personal, social, and historical.

3.1.2 Knowledge is selective:

Reality is infinitely rich and any context can be perceived in multiple ways. Any perception and any form of knowledge represent a selection of what is relevant and pertinent, and of what is not. Because of this fundamental relation all knowledge will be abstractive and reductive and in need of interpretation. Selection determines what is in focus, and what is subsidiary, and what just passive background is. Selection determines the level of segmentation – are we looking at a physical system of mass and energy, at atomic configurations, at a set of biochemical processes, at biological creatures, or at a social situation? What constitutes the relation between part and whole, not to mention the relation between selected subset and all other possible selections; between that which has been selected and whoever made the selection.

3.1.3 Knowledge is concept dependent:

Whenever knowledge is expressed it is dependent on the language in which it is expressed. Content and meaning of a statement varies with language. At one level this fact is a matter of a degree of incommensurability between natural languages. At another

and more fundamental level this dependency follows from the metaphorical nature of a very large proportion of the concepts we use to talk about our reality. The metaphorical concepts are not only not literal in meaning; they also have several non-identical meanings and uses, most of which cannot be eliminated even informal use. This is true also of many of the basic concepts which we utilize to formulate and express scientific knowledge such as space, time, cause and effect.

Exercise No-1

1. Define Knowledge and explain the characteristics of Knowledge.
2. Write your answer in the space given below:

4.0 TYPES OF KNOWLEDGE

Knowledge is essential to people. It resides in the mind. Knowledge is what a person 'knows' - mix of information, analysis, integration, experience, culture, etc. Much of knowledge is tacit -we cannot communicate our knowledge completely in words or symbols (e.g. the expertise of a craftsman). When we articulate our knowledge, it becomes (or called as) explicit knowledge - what we can express/ articulate to others. Direct knowledge transfer takes place through socialization and interaction ('intellectual socialization'). Indirect knowledge transfer takes place via information - when the receiver internalizes this and converts it into his/her knowledge. Since knowledge is intrinsic, experiential, and individualistic, it is much harder to capture and organize knowledge, compared to data and information.

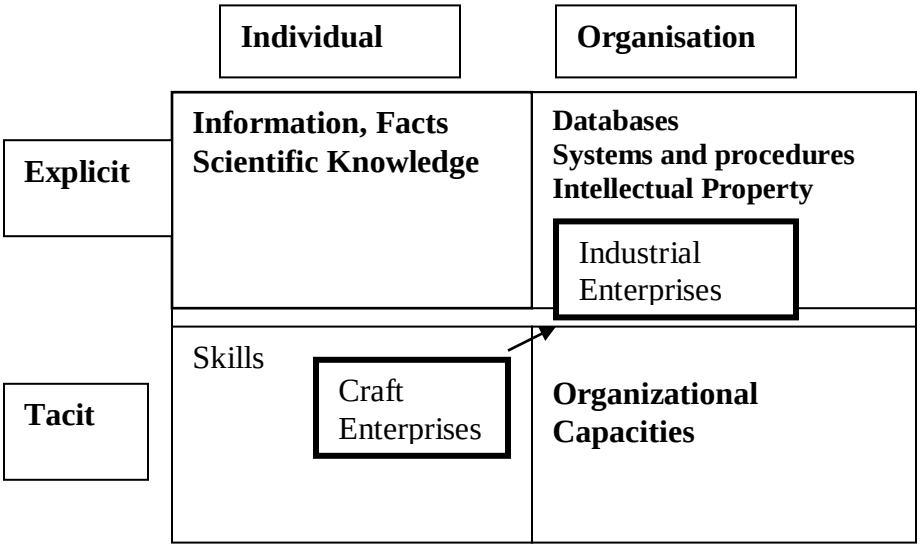

Fig-1 The systematization of Knowledge from Craft Enterprises to Industrial Enterprises

Form the example, the systematization of Knowledge from Craft Enterprises to Industrial Enterprises we see knowledge exists in two principle forms, explicit and tacit, and at two major levels, the individual and the firm, and then there are major benefits to the firm shifting its primary knowledge base from individually held tacit knowledge, to firm-held explicit knowledge. First, explicit knowledge offers greater potential for value creation because of its replicability potential. Second the firm's potential for appropriating this value is greater if ownership lies with the firm rather than with the individual. The systematization of tacit individually held Knowledge into explicit, firm-held knowledge is the primary force behind the evolution of craft trades into industrialized trades. The process of industrializing craft business has been the basis of many of the most outstanding business success of the century.

From the above example we understand that there are two types of knowledge. Let us study the types of knowledge in details.

4.1. Explicit Knowledge:

Explicit Knowledge can be formally articulated or encoded; can be more easily transferred or shared; is abstract and removed from direct experience. Explicit knowledge is recorded and available in various media like books, periodicals, letters, reports,

memos, literature, etc; audio-visual material, CDs, films, videos, etc; or electronic formats like data, software, websites, etc. to be more precise the explicit knowledge can be articulated into formal language, including grammatical statements (words and numbers), mathematical expressions, specifications, manuals, etc. Explicit knowledge can be readily transmitted others. Also, it can easily be processed by a computer, transmitted electronically, or stored in databases.

The Knowledge Center's already provides a vast database of explicit, cutting-edge knowledge from all over the world. Users of the Knowledge Centre can access value added services through the online databases, digitized brochures, pre-programme and post-programme material, additional readings related to the training and development programmes. Other resources offered include a vast array of articles from relevant journals, case studies and documentation on best practices.

4. 2.Tacit Knowledge:

By definition, tacit knowledge is not easily shared. Tacit knowledge consists often of habits and culture that we do not recognize in ourselves. In the field of Knowledge Management the concept of tacit knowledge refers to a knowledge, which is only known to you, and hard to share with someone else, which is the opposite from the concept of explicit knowledge.

Tacit Knowledge is invisible and, often, confined to the mind of a person. It is hard to codify and, therefore, difficult to communicate to others. Transformation of knowledge from the tacit to the explicit increases its usability and visibility. But capturing the tacit (often intuitive) knowledge that resides within an expert in the form of know-how and insights is very difficult and challenging. Implicit and explicit knowledge are not discrete or separate categories. They are so heavily linked as to be practically bipolar and nearly impossible to map. For example, to completely understand a written document (explicit knowledge) it requires a significant amount of insight and experience (implicit knowledge) — like a machine drawing, which is impossible to make out to a person without an engineering background. What are the implications of this for industry and trade? The three traditional factors of production — land, labour and capital — are

relatively easier to handle in the 21st century. The new fourth factor, knowledge, which is at the heart of much of today's global economy, is rapidly emerging a bottleneck to growth in new areas. Therefore, managing knowledge, the driver for the growth of economies, is vital for a company's success in today's knowledge economy. Knowledge management Knowledge management is deliberate and systematic building, renewal, and application of knowledge. It is a process, which continuously and systematically gathers information from individuals and teams that generate learning, and systemizes it in the 'collective brain' of the organisation for the benefit of the entire structure. It involves leveraging and reusing knowledge resources that already exist within the organisation to maximise the returns from its knowledge assets. Knowledge management also means gathering, organising and sharing intangible knowledge like professional know how and expertise, creative solutions, technology and even individual insights and experiences.

	To tacit Knowledge	To Explicit Knowledge
From tacit knowledge	Socialization	Externalization
From explicit knowledge	Externalization	Combination

Fig: 2 Knowledge process

It involves the systematic creation of an interactive, learning corporate environment, where people readily transfer and share what they know, internalise it and apply it to create new experiences through existing knowledge. Personal knowledge embedded in individual experience and involves intangible factors, such as personal beliefs, perspective, and the value system. Tacit knowledge is hard to articulate with formal language (hard, but not impossible). It contains subjective insights, intuitions, and hunches.

Before tacit knowledge can be communicated, it must be converted into words, models, or numbers that can be understand. In addition, there are two dimensions to tacit knowledge:

4.2.1Technical Dimension (procedural):

This encompasses the kind of informal and skills often captured in the term know-how. For example, a craftsperson develops a wealth of expertise after years of experience. But a craftsperson often has difficulty articulating the technical or scientific principles of his or her craft. Highly subjective and personal insights, intuitions, hunches and inspirations derived from bodily experience fall into this dimension.

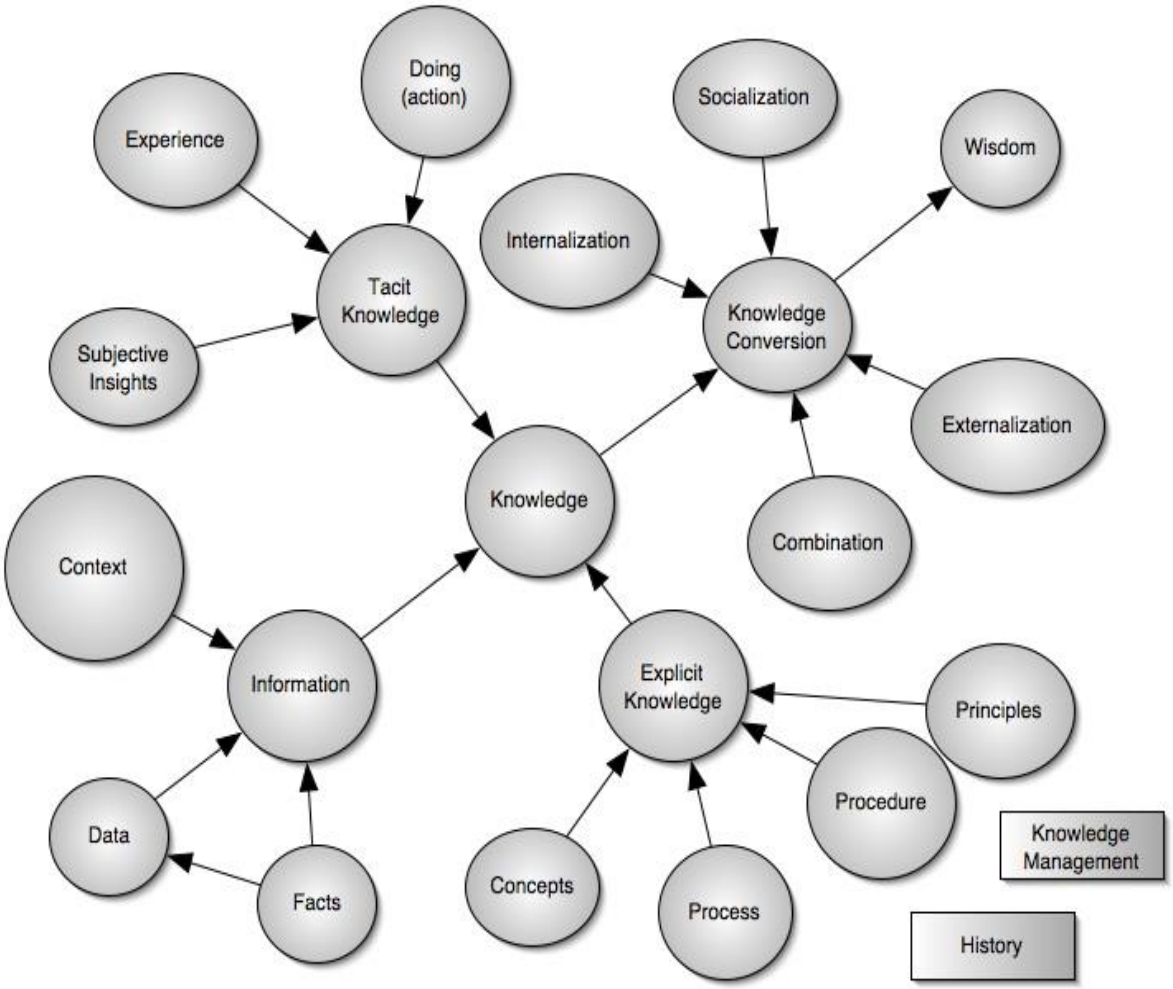

Fig –3 Knowledge Typology Map

4.2.2 Cognitive Dimension:

This consists of beliefs, perceptions, ideals, values, emotions and mental models so ingrained in us that we take them for granted. Though they cannot be articulated very easily, this dimension of tacit knowledge shapes the way we perceive the world around us. Nonaka & Takeuchi (pp. 63-69) further discuss the four modes of knowledge creation or conversion that are derived from the two kinds of knowledge:

- Socialization: from tacit to tacit -- Sharing experiences to create tacit knowledge, such as shared mental models and technical skills. This also includes observation, imitation, and practice. However, "experience" is the key, which his why the mere "transfer of information" often makes little sense to the receiver.
- Internalization: from explicit to tacit -- Embodying explicit knowledge into tacit knowledge. Closely related to "learning by doing." Normally, knowledge is verbalized or diagrammed into documents or oral stories.
- Externalization: from tacit to explicit -- The quintessential process of articulating tacit knowledge into explicit concepts through metaphors, analogies, concepts, hypothesis, or models. Note that when we conceptualize an image, we express its essence mostly in language.
- Combination,: from explicit to explicit -- A process of systemizing concepts into a knowledge system. Individuals exchange and combine knowledge through media, such as documents, meetings, and conversations. Information is reconfigured by such means as sorting, combining, and categorizing. Formal education and many training programs work this way.
- Artifacts derived from knowledge creation are facts, concepts, processes, procedures, and principles. These, in turn, are used to help create knowledge in others.

Exercise-2

1. How many types of knowledge are there? Elaborate.

2. Write your answer in the space given below:

5. Libraries and Knowledge Management

It is evident that, because definitions of knowledge management are largely context dependent, there is likely to be flexibility of interpretation about what it is. An organization's interpretation has a profound effect on how the organization operationalizes knowledge management. An absolute requirement is that the organisation has a conceptual framework to organize and integrate the information that the organisation feels is important, so that it becomes part of an organizational knowledge base and provides a strategy for transforming distinct and possibly random pieces of information into something that can be systematically applied and that expands collective knowledge. (Frand & Hixon, 1999).

One can take the position that knowledge management is about knowledge sharing and re-use. On the surface this is the library view – but it also lies at the heart of the technology approach, which focuses on capturing explicit knowledge by use of enabling technology in the belief that it is the technology that makes the difference. Alternatively, one can take the view that knowledge management is a people-problem and focus on leveraging corporate intellectual assets (Murray,nd). But that view assumes that knowledge can be separated from the knowing individual. While knowledge management can be addressed at either a technological level or at a philosophical level (Davenport, 1998), in practical terms, however, the question we should be asking is: what are we managing? Is it the object of knowledge, the process of knowing, or a combination of the two? (Godbout, 1996). A third view is that of a growing number of writers, such as Larry Prusak who acknowledges that it isn't really possible to manage

knowledge. Prusak notes that what an organization can do is “manage the environment that optimizes knowledge.” (Cited in Frand &Hixon, 1999,). It is perfectly reasonable, when trying to manage the environment, to use knowledge management principles, as these ensure that issues are addressed at a high level. Despite the impediments to realizing the promise of knowledge management, knowledge management is an extremely important part of the wider Information Environment within which every library operates. A wider Information Environment has eight major characteristics:

1. A visible shift in the management view of the nature of organizational activities which is moving away from emphasis on function to emphasis on activities that are occurring as cross -functional processes
2. Team-based work
3. Customer focus
4. Knowledge based organisation
5. Learning organisation
6. Knowledge management (which brings together the key aspects of 1-5, as demonstrated in Figure-4).
7. The networked organization
8. The extended enterprise.

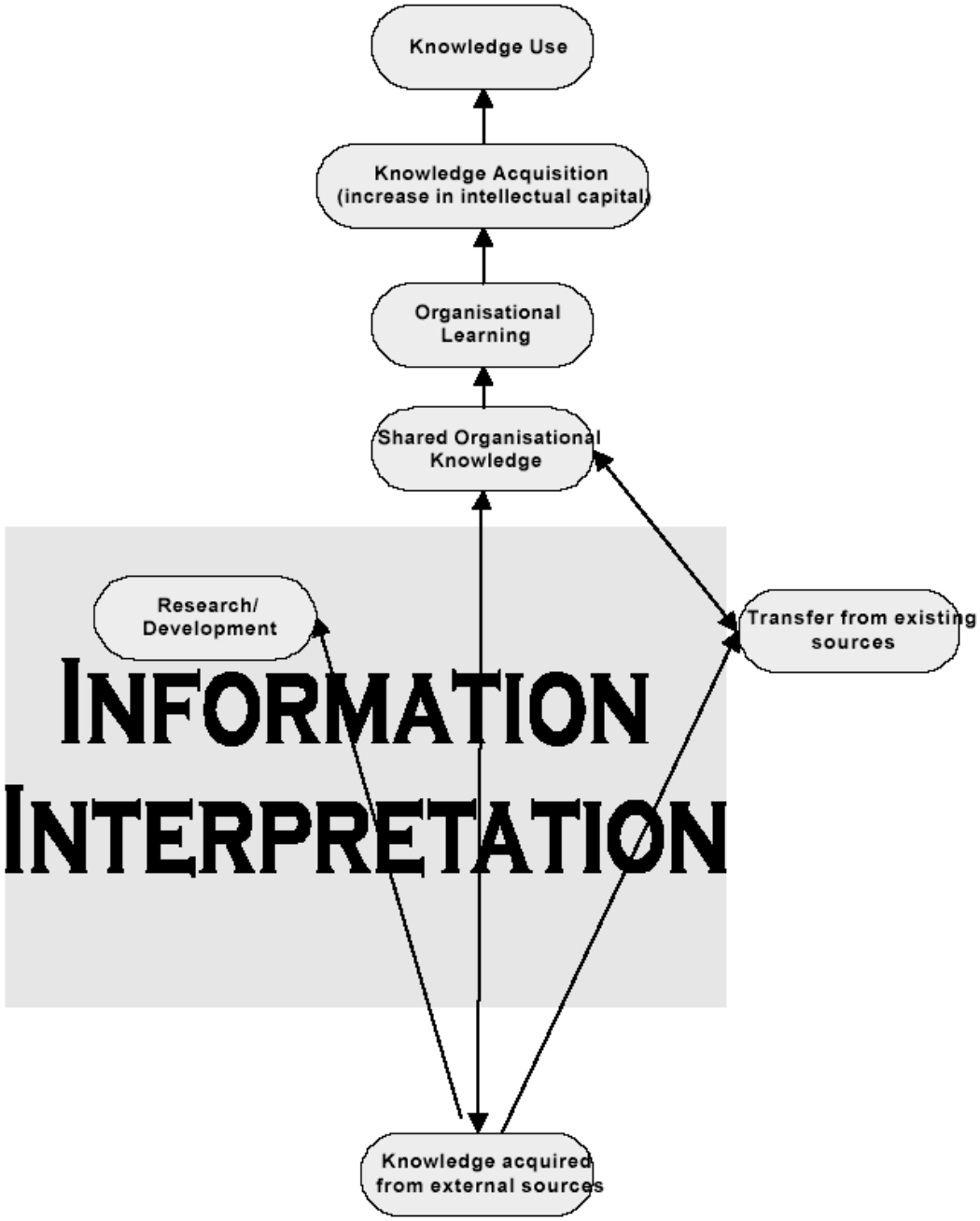

Fig –4: Knowledge Management Processes

Librarians are traditionally very good at negotiating the reference question. In other words, by instinct, good librarians take into account the specific needs of the

individual user. To achieve this requires working with the user to ensure that his or her information need is contextualized. The process requires that librarians take an active and constructivist role in the negotiation, using knowledge about the context and the library user to ensure that the information provided, when interpreted by the library user, will have the desired effect. These skills must be consciously translated into the virtual environment. To accomplish this task, libraries need to construct hybrid knowledge management environments in which we use both humans and computers in complementary ways. “Technology and librarians” writes journalist Leigh Buchanan, “are the yin and yang of information management”.

Summary

There are several variations of this widely adopted theme of knowledge. The common idea is that data is something less than information, and information is less than knowledge. Moreover, it is assumed that we first need to have data before information can be created, and only when we have information, knowledge can emerge. The Knowledge is "information combined with experience, context, interpretation, and reflection. It is a high-value form of information that is ready to apply to decisions and actions." Meaning of Knowledge as assumed in ancient Indian thought of Jnana, which represents a problem-solution in a human-mind, is knowledge. Then knowledge discussed about knowledge. The 20th century of Wittgenstein, Popper, and Kuhn western philosophers has witnessed booming interest in knowledge.

The definition of Knowledge defined by the authors has made us understand the concept and meaning. The sum of these insights is that knowledge is contextual, selective, and concept dependent. Which have attributed as key characteristics of knowledge? Tacit and explicit knowledge are two types of knowledge. Explicit knowledge is recorded and available in various media like books, periodicals, letters, reports, memos, literature, etc; audio-visual material, CDs, films, videos, etc; or electronic formats like data, software, websites, etc. Tacit Knowledge is invisible and, often, confined to the mind of a person. It is hard to codify and, therefore, difficult to communicate to others. Many efforts in Knowledge Management aim to take implicit

knowledge held by a few people, to make it explicit in suitable contexts, and to make it a basis for informed actions is visualized.

In Library Environment, the Librarians working with the user to ensure that his or her information need is contextualized. The process requires that librarians take an active and constructivist role in the negotiation, using knowledge about the context and the library user to ensure that the information provided, when interpreted by the library user, will have the desired effect. These skills must be consciously translated into the virtual environment. To accomplish this task, libraries need to construct hybrid knowledge management environments in which we use both humans and computers in complementary ways. “Technology and librarians” writes journalist Leigh Buchanan (1999), “are the yin and yang of information management”.

Self-Check Answers:

1. In context of today’s economy, knowledge is power. Knowledge and its applications are regarded as the primary source of competitive advantage. The Third wave (Tofflers, 1980) distinguishes Information age from agricultural and industrial age. The importances of Information and Knowledge in economic systems are identified. The future world where knowledge shared becomes more power and the entire organization behaves as an intelligent, self-selecting, self-adapting systems continually integrating and processing incoming data and information to determine actions. Different writers have defined knowledge some of the definitions are elaborated below:

> "Knowledge is... a mental grasp of a fact(s) of reality, reached either by perceptual observation or by a process of reason based on perceptual observation." Rand, 1967.
>
> "a fluid mix of framed experience, contextual information, values and expert insight that provides a framework for evaluating and incorporating new experiences and information”. Davenport and Prusak (1998, p. 5).
>
> “Knowledge is information that changes something or somebody -- either by becoming grounds for actions, or by making an individual.

There are several sources of knowledge about knowledge, including new thinking within the theory of knowledge; a number of different attempts to rethink the theory of science; significant new insights arising from so-called 'second generation' cognitive science, and some outstanding attempts to understand knowledge processes in companies, particularly those tightly linked to practical experience from knowledge intensive companies. The sum of these insights is that knowledge is

1. Contextual.
2. Selective, and
3. Concept dependent.

2. There are two types of knowledge. Let us study the types of knowledge in details.

1. Explicit Knowledge: 2.Tacit Knowledge

1. Explicit knowledge

Can be articulated into formal language, including grammatical statements (words and numbers), mathematical expressions, specifications, manuals, etc. Explicit knowledge can be readily transmitted others. Also, it can easily be processed by a computer, transmitted electronically, or stored in databases.

2. Tacit knowledge

Personal knowledge embedded in individual experience and involves intangible factors, such as personal beliefs, perspective, and the value system. Tacit knowledge is hard to articulate with formal language (hard, but not impossible). It contains subjective insights, intuitions, and hunches. Before tacit knowledge can be communicated, it must be converted into words, models, or numbers that can be understand. In addition, there are two dimensions to tacit knowledge:

Technical Dimension (procedural): This encompasses the kind of informal and skills often captured in the term *know-how.*

Cognitive Dimension: This consists of beliefs, perceptions, ideals, values, emotions and mental models so ingrained in us that we take them for granted. Nonaka &

Takeuchi (pp. 63-69) further discuss the four modes of knowledge *creation* or *conversion* that are derived from the two kinds of knowledge.

Socialization: from tacit to tacit -- Sharing experiences to create tacit knowledge, such as shared mental models and technical skills.

Internalization: from explicit to tacit -- Embodying explicit knowledge into tacit knowledge. Closely related to "learning by doing."

Externalization: from tacit to explicit. The typical process of articulating tacit knowledge into explicit concepts through metaphors, analogies, concepts, hypothesis, or models.

Combination,: from explicit to explicit -- A process of systemizing concepts into a knowledge system. Individuals exchange and combine knowledge through media, such as documents, meetings, and conversations.

References:

1 Holsapple (C W) Handbook of Knowledge Management, Springer.

2 Despres (C) and Chauvel (D)(2000), Knowledge Horizon, Butterworth-Heinmann, New Delhi.

2 Davenport, T. H. (1997), Information Ecology, Oxford University Press, New York, NY

3 Davenport, Thomas H. (1998). Some principles of knowledge management Retrieved. http://www.bus.utexas.edu/kman/kmprin.htm

4 Achterbergh, Jan & Vriens, Dirk (May-June 2002). "Managing viable knowledge." Systems Research and Behavioral Science. V19 i3 p223 (19).

5 Cram (Jennifer) Whose Knowledge? Whose Management?: Cognitive Considerations for the Provision of Virtual Library Services to School Communities.

6 Nonaka, Ikujiro & Takeuchi, Hirotaka (1995). The Knowledge Creating Company. New York: Oxford University Press.

MLISc -1
FOUNDATIONS OF INFORMATION SCIENCE

Block - 1
DATA, INFORMATION & KNOWLEDGE

Unit - 4:
INFORMATION SCIENCE: ORIGIN, RELATIONSHIP WITH OTHER DISCIPLINES

STRUCTURE

4.0 OBJECTIVES

This unit aims to

1. Examine briefly the emergences and the evolutions of the discipline of Information science.
2. Examines the scope of Information Science
3. Examines the Scientific dimensions of Information science, its basic assumptions and concepts and domains, and
4. Discusses the present state of the discipline.
5. Point out the major areas of concern for information science and related disciplines.

4.1 INTRODUCTION

Information is a basic phenomenon. for all basic phenomena-energy or gravity in physics, life in biology, justice in jurisprudence- the same "we don't know" any way the investigation in the basic phenomenon is preceding- that is the basic point in all the fields. May be over the years we have learnt a lot about their manifestations, behaviors, and effects and we are continuing to learn about them through scientific investigations.

Information is directly involving cognitive processes and understanding. This results from interaction of two cognitive structures. A "Mind" and broadly a "Text". Therefore information is that which affects or changes the state of a mind. In Information services it is conveyed through the medium of a text, document or record. Information is a context –situation. It involves motivation of intentionality and therefore it is connected to the expansive social context of the horizon, such as culture work or problem at hand.

Information is the pattern of organization of matter and energy. All information is natural information, in that it exists in the material world of matter and energy. Represented information is encoded or embodied. Encoded information is information that has symbolic, linguistic or signal based patterns of organization.

4.2 INFORMATION SCIENCE

Information Science is the study of the gathering, organizing, storing, retrieving, and dissemination of Information. Information Science facilitates effective communication of desired information between the human generators and human users, and that Information Science is specifically concerned with information in the context of human communication between human

minds. And the relation between the generators and information and between information and recipients should be considered in this regard. In this context the information can be recorded and stored to be transferred to those who are in a different place or at a later time. This is included because library and information science treats not only information individuals deal with, but also information and knowledge shared and stored among society.

Information Science is a academic discipline that deals with the generation, collection, organization, storage, retrieval, and dissemination of recorded knowledge. It is sometimes mistakenly used as a synonym for library science, but though related, it is a separate discipline.

New Forms of Information technology have become the focus of tremendous amounts of attention and energy in society. But also academia ,where computer scientists ,cognitive scientists, and social scientists, are thinking about information and the social impact of IT in new ways. This poses a challenge to Information Science. Today in Information Science many new comers without a background in the field are coming in. At this historical juncture ,information scientists should become more conscious of the thought world we are operating, out of which we can communicate more rapidly and collectively to a large population. It enables to continue influencing the future of information in the 21st century.

Information Science has 3 general characteristics that are the leitmotif of its evolution and its existence.

1. Information Science is interdisciplinary in nature; however, the relations with various disciplines are changing. The interdisciplinary evolution is far from ever
2. Information Science is inevitably connected to IT. A technological need is compelling and constraining the evolution of Information Science, as is the evolution of the information society as a whole
3. Information Science is, with many other fields, an active participant in the evolution of the information society. Information Science.has a strong social and human dimension, above and beyond technology**.**

4.3 DEFINITION:

Information is an intangible that depends on the conceptualization and the understanding of a human being. Records contain words or pictures (tangibles).absolutely. But they contain information relative only to a user…information is associated with a transaction between text and reader, between a record and a user.(Tague-sutcliff, 1995, pp.11-12)

Information Science is that discipline that investigates the properties and behavior of information, the forces governing the flow of information and the means of processing information for optimum accessibility and usability. It is concerned with that body of knowledge relating to the origination, collection, organization, storage, retrieval, interpretation, transmission, transformation and utilization of information. It has both pure science component which inquires into the subject without regard to its application, and an applied science component, which develops services and products (Borko, 1968, p.31)

The proper study of Information Science is the interface between the people and Literature…[Information Science addresses]modeling the world of publication with a practical goal of being able to deliver their content to enquires [users] on demand…while many scientists seek to understand communication between persons, information Scientists seek to understand communication between persons and certain valued surrogates for persons that Literature comprises (White and Mccain ,1997, 1998)

Thus Information Science as a Science, as a profession, is defined by the problems it has addressed and the methods it has used for their solutions overtime. Any advances in information Science depend on whether the field is indeed progressing in relation to problems, addressed and methods used. Any “fixing” If in order, will have to be approached by redefining or refocusing either the problems addressed, or the methods for their solutions, or both.

4.4 SCOPE:

Information science as many other fields involves a professional component. focusing information science on the content –bearing properties of literature and on associated techniques and systems dealing with providing effective access to and use of literature, provides restrictions

for information science. It just deals with specific manifestation or type of information that defines its scope and its systems. The profession of information science grew from research and applications in information retrieval, to become a powerful component in the field and also a leading one in respect to innovation.

The profession is responding in its won way to needs of its users and organizations, and chartering its own technological applications, Many times independently of research advances and even on different direction.

Information science deals with experimental IR, citation analysis, practical retrieval, Bibliometrics, General library systems theory, Science communications, user studies and theory, OPACs, general imported ideas-other disciplines, indexing theory citation theory and communication theory. New areas include interaction studies: searching of the Internet:multimedia IR: multi language IR: and Digital Libraries.

Self check exercise:

Define what is Information and Information Science? its Scope and characteristics?

I. Write your answer in the space given below.
II. Check your answer with the answers given at the end of this unit

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4.5 ORIGIN AND HISTORY AND SOCIAL CONTEXT

The emergence of information is probably too recent to permit its definitive historical reconstruction or even more than its transient definition. It might be tempting to equate the

emergence of documentation or information storage and retrieval with that of information science. But a history of information science vis-à-vis one or two of its important tributaries would not be qualified as complete history. It would appear that the history of information science is in part the history of all its contributory disciplines as well as an account of other factors involved in its emergence.

The roots of information science are in documentation, a field that emerged when digital computers were developed during the 1940s and early 1950s. During World War II the need arose to increase the precision and depth of bibliographic searches, resulting in efforts to change traditional kinds of classification into computer-compatible systems. Automated searching of files, coordinate indexing, and controlled vocabularies were introduced in response to the urgent need to create easy access to the contents of scientific journals. Automated abstracts, or summaries, of documents were then developed to further simplify access to research findings.

Information Science is a field that emerged along with a number of new fields, with computer Science being one example. The rapid pace of scientific and technological developments is increasing tremendously since the beginning of the 20th century. Owing to the scientific and technological revolution.. In the 1960s massive collections of documents were transferred to databases or converted to non-print forms; various searches could then be done by computer .The manifestation of this phenomenon was “Information explosion” due to the tremendous increase in scientific and technological publications and information records of all kinds. (“Literature”) synthesized by de Solla Price, (1963).

The origin of Information Science could be traced to 1945 by a article by MIT scientist and even more prominently, the head of the US scientific effort during WWII Bush, 1945. Here Bush did two things a) he briefly defined a critical and strategic problem that was on the minds of many b) proposed a solution that was a” technological fix” and thus in tune with Science hold a monopoly in that niche. Since the magnitude of information is increasing in society, more funds are poured for projects, researches and initiatives are devoted in information and also various fields. There is increasing in the number of researchers, professionals, businessmen, are whirling to information.

During the past few years information science has become a thoroughly interdisciplinary field, and in recent times areas such as artificial intelligence and information technology in education have become especially important. IS is challenged by the socially determined change and knowledge. Analyzing the **metatheory** of IS. Vickery starts with a characterization of contemporary knowledge. The incessant growth in volume of the world's knowledge, the depersonalization and fragmentation of knowledge, **fragmentation** is a consequence of the increasing specialization of knowledge and of its distribution in a great number of printed and electronic channels. The sum of knowledge on a topic is thus scattered among many messages of varying origin, in many channels, perhaps in many information stores. Another important change is conceptual change. Wilson states as follows 'the world of research and development is the place where conceptual change is most rapid. Modern scholarship and science are centered on the creation of conceptual change. Hence the information is the central concept in IS. Knowledge is also one of the core concepts like relevance. It is well known that the central concept of IS are defined or understood in different ways, depending on distinct theoretical frameworks or points of view. Some of the core concepts are arranged where some information processes within the cycle of production, communication and the use of documents are displayed. In the professional and theoretical literature concepts such as knowledge, document representation,

Knowledge organization, information retrieval , needs and relevance are used at different levels and within different theoretical frameworks. Vickery uses the concept of knowledge at a social level, while Belkin concentrates on individual knowledge structure. The understanding of knowledge organization and document representation differs as well. In document representation it does not find expression in terms like domain aboutness, user –related aboutness and author aboutness. Like knowledge the users and their needs are studied and understood from individual or collective view points. IR is like wise understood in several ways as a semiotic process, as problem solving process, as heuristic process or as a matching process. In contrast to the latter the three first mentioned are interactive processes, but with different theoretical interaction. In general IR interaction is understood as a structural relationship between users and IR system which includes a smaller of a greater number of elements and different emphases according to distinct theoretical frameworks.

FIGURE.1 THE COMMUNICATION SYSTEM OF INFORMATION SCIENCE

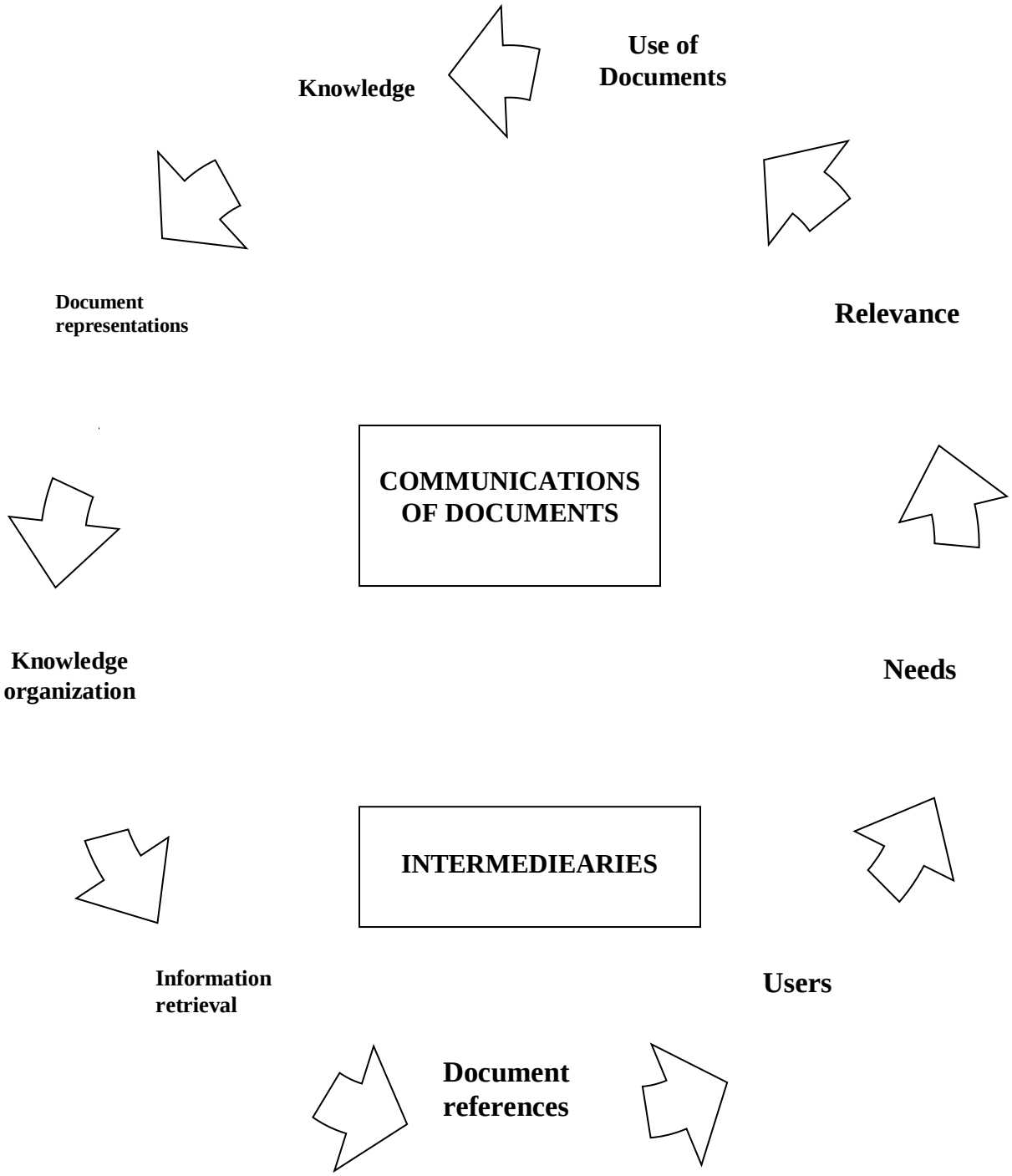

Figure.2 Displays a Scale Covering Different Understandings of the concept .the top represents relevance seen in a social context (a scientific domain): the bottom represents an objective, context-free understanding of the concept the domain analytic view understands the communication system of information science as the social level, and relevance is related to the knowledge of a domain. Higrland expresses some of the basic characteristics of the domain analytic view as follows:

'Priority is given to the understanding of the user needs from a social perspective and the function of information systems in trades and disciplines. Focus is either one knowledge domain of the comparative study of different knowledge domains.

FIGURE 2: CONCEPTUAL LEVELS OF RELEVANCE

LEVELS	RELEVANCE
Social level	a)Conceptual relevance :Relevance judgments are based on domain knowledge b)Contextual relevance: Contextual factors determine the relevance judgment which is an act of interpretation.
Individual level	a)pragmatic relevance of the individual level: The relevance judgment is determined by the individual user's problem space and state of knowledge b)intermediary relevance : a relevance judgment based on an intermediary's subjective evaluation of the relation between a query and a document representation
System level	Topical relevance: relevance is an objective and can be measured.

A knowledge domain is a scientific, scholarly or professional domain with unique structure of communication and publication, unique types of documents, specific terminology and informational structures. Scientific and professional communications and information dissemination should be seen as a part of a cooperative process of solving existing. Common goals in more or less well defined groups. The model of scientific communication perceives the producers of knowledge, the intermediaries and the users as organized in thought and discourse communities, which form parts of the division of labor in society. The same or almost the same A Knowledge domain and a thought or discourse analytic view point view can be discussed in relation to the discourse analytic view point.

Self check exercise:

Trace the origin and development of IS in social and historical context?

Explain communication system and information science?

III. Write your answer in the space given below.
IV. Check your answer with the answers given at the end of this unit

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4.6 RELATIONSHIP WITH OTHER DISCIPLINES

There are two factors introduced in interdisciplinarity in Information Science

1. The problems addressed cannot be determined with approaches and constructs from any discipline-thus interdisciplinarity is encoded as it is in many modern fields.
2. Interdisciplinarity in Information Science was introduced and is being perpetuated to the present by the very differences in backgrounds of people addressing the described problems. Differences in background are many: They make the richness of the field and difficulties in communication and education.

4.7 PHYSICAL PARADIGM AND INFORMATION SCIENCE

At the beginning of the fifties the cranfield tests marked a new stage in the development of IS. From then information retrieval was developed as a well-defined scientific discipline. Ellis writes that rather than referring to it as the cranfield paradigm it is perhaps more informative to

conceive of it as the physical paradigm for IR research. The paradigm viewing the library as a social institution continued to develop in the conceptual context of library science. the physical paradigm became central concept of IS. The physical paradigm represents a nomothetic type of research and it is based on a realistic view of science. According to the realistic model scientific knowledge is absolute true knowledge. The means that scientific knowledge is considered to have a privileged position, it is universal and neutral, and it is not influenced by social and cognitive processes. The aim of research carried out within the physical paradigm is to enhance retrieval performance. The object of research is IR.this means that though the scope is widened from the library context to scientific information in general it is still a rather narrow scope. The focus is on the Information system. Ingwersen calls the information concept of the physical paradigm traditional or classic. In the traditional or classic sense information was scientific-domain-specific information-or better-knowledge. This view made text representation more controllable, less problematic. At a general level the sciences were monoparadigmatic,and it was period of conceptual stability in the sciences.

4.8 LIBRARY SCIENCE AND INFORMATION SCIENCE

Library science, more accurately labeled “librarianship”, is a professional area of study; it is not a science, even though most library schools incorporate information science in the curriculum. Graduates of library schools are primarily concerned with such tasks as evaluating, processing, storing, and retrieving information, and with collection development and bibliographic processes and products. In the mid-1980s they still dealt mainly with written records such as books, journals, and musical scores, and with such separate non-print items as phonograph records and videotapes. Increasingly, though, librarians are being called upon to learn audio-visual and computer technologies and applications, such as CD-ROM and the Internet. They also assist library users with the materials and equipment available. The librarian is more concerned with the management of systems, the information scientist with their creation. The area as a whole brings together ideas and technologies from many other areas, including the social sciences, computer science, cybernetics, linguistics, management, neuroscience, and systems theory. Information scientists evaluate the many and various phenomena that affect any aspect of information. They are interested in determining such things as: the life cycle and utility

of literature on a given subject (Bibliometrics); patterns of authorship (co-citation analysis); and the impact of reading on groups and societies (social epistemology).

For the information scientist, therefore, the library is only one of several alternative sites for information storage and service; systems may be based in, for example, information banks, archives, or organizations such as schools and businesses, medical centers, computing companies, university research centers, and abstracting and indexing companies.

Librarianship has a long and proud history devoted to organization, preservation and use of graphic records and records of other media. This is done through Libraries not only as a particular organization or type of information system. And also as an indispensable social, cultural, and educational institution whose value has been confirmed manifold throughout human history and across all geographic and cultural boundaries. It is the Library which is contributing to the total communications system in society. It maximizes the maximum utility of graphic records for the benefits of the society.. The common ground between library science and information science is in sharing in their social role and in their general concern with effective utilization of graphic and other records, particularly by individuals. But there are significant differences in critical aspects

1. Selection of problems addressed and the way they are defined
2. Theoretical questions asked and frameworks established-the theories and conceptual frameworks in librarianship is based on philosophy and communication
3. The nature and the degree of experimentation and pragmatic development and the resulting practical knowledge and competencies derived
4. Tools and approaches used
5. The nature and strength of interdisciplinary relations established and the dependence of progress on interdisciplinary approaches

It could be concluded that librarianship and information science are two different fields in strong interdisciplinary relations, rather than one and the same field though these two disciplines are related are different fields. The differences are in the research agenda and directions.

Interestingly research on OPACs, now that they are incorporating more and more Information Retrieval features is bringing the two fields closer.

The development of IS from LIS at the beginning of the century to the IS of the present day is characterized by changing conceptions of the object, the structure, the foci and the content of the discipline. With a broad use of the concept, these changes are conceived as a series of paradigms: a paradigm viewing libraries in the context of the history of civilization, a paradigm viewing the library as a social institution . The physical paradigm, the cognitive view and most recently a tendency towards viewing information institutions and informative processes in a social and historical context. The changing conceptions are partially determined by historical changes of the universe of knowledge and needs for information. A central turning point is the transition from ptolemic picture of the information universe to the Copernicus.

4.9 COMPUTER SCIENCE AND INFORMATION SCIENCE

The relationship between these two disciplines lies in application of computers and computing in IR, and the associated products, services, networks. The relation involves research on the evolving of digital libraries with their technological base. As per Denning (1989) the discipline of computing is the systematic study of algorithmic processes that describe and transfer information: their theory, analysis, design, efficiency, implementation and application. The fundamental question underlying all of the computing is “what can be (efficiently) automated

Computer science is about algorithms related to information interpreted in the narrower sense, whereas IS is about the very nature of Information and its use by humans. Interpreted in the third or broadest sense. CS is about symbol manipulation wheras IS is about content manipulation. Symbol manipulation is the indispensable infrastructure. The two aspects are complementary and lead to different basic and applied agendas. CS is larger compared to IS .many computer scientists are involved in research and development on Information and its branches. There are several streams in research and development in CS that does not have connection with the early evolution of IS. But they have addressed information problems similar to those of IS. Among others includes expert systems, knowledge bases, hypertext, and human,

and human computer interaction more recently. This involves research and development in digital libraries. This has a significant informational component that is associated with information representation, its intellectual organization and linkages: meta-information, information seeking, searching retrieving and filtering: use, quality, value and impact of information., evaluation of Information systems from use and user perspective and the like all conventionally addressed in information science. Computer science research and development provide a different outlook. Framework, and approach and even a different paradigm not only for information science research and development, but also for its academic and continuing education again as with librarianship the issue is not about lawn But it is about paradigms theoretical foundations and pragmatic solutions and ultimately it is about their suitability to human and education paradigms.

4.10 BEHAVIORAL PSYCHOLOGY AND INFORMATION SCIENCE

During the last 3 decades the cognitive school or approach has developed and increasingly dominated the study of information behavior even though it is not generally accepted, it has most impact. The development of the cognitive perspective has meant a broadening of both the scope and spectrum of foci of IS. It is a broadening of the scope in the sense that all kinds of information are included in the concept ,and it is a broadening of the focus in the way that it includes human information retrieval behavior in general, and in relation to IR and IR systems. The approach concentrates on the qualitative aspects of IR interaction. The cognitive viewpoint is based on a relativistic model of knowledge, which means that knowledge is relative in that it is altered by cognitive and social processes. Another difference between the physical paradigm and the cognitive approach is that the latter is interdisciplinary, drawing on psychology, maths, communication and other disciplines, while the physical paradigm is developed from a well-defined scientific discipline (physics). It is easier to analyze the physical paradigm is a post-normal science in the sense that it treats comprehensive and complex phenomena demanding interdisciplinary research or an integrated theoretical framework. The cognitive view can be seen as theoretical answer to problems of the new Copernican information universe, characterized by, among other things, the fragmentation of knowledge and the diversification of information needs to cope with this the cognitive view developed and still is developing a holistic, conceptual framework which seems still basically to be limited by the

horizon of cognitive science, a horizon excluding the social dimension, or viewing the social dimension as complementary. This complementary social dimension is recognized mainly within disciplines such as informetics and information management.

The relationship between Behavioral Psychology and Information Science certainly the dominant psychological theory with respect to information science Matson traces the development of thought in the behavioral sciences from the enlightenment to the present. He shows that the dominant force in psychology during the first half of the 20th century, behaviorism is a direct descendent of Newtonian Physics. Then he critically evaluates what this world view has done to its object of study man. The integration of the gestalt of the computer with Behavioral Psychology and the Newtonian world view rounds out our notion of the basic components of paradigm underlying Information Science.

4.11 EDUCATION AND INFORMATION SCIENCE:

Education is critical for any field is a accurate statement that hardly needs to be stated. In particular research lives by education. It cannot be better than the education that researchers receive and then extend and plow back into education .unfortunately the education in information has not received attention that it deserves. Jesse H Shera a legendary library school dean from 1950's to 1970's was instrumental in starting the center for documentation and communication research .In 1955.thereafter the library school curriculum started to include courses like 'Machine Literature searching ' later known as Information Retrieval .The basic approach was to append those courses mostly as electives in the existing library school curriculum. Thus IS became one of the special areas of library science discipline .The strength of the Shera's model is that it posits education within practiced and to a broader and user-oriented frame of a number of other information services, and relates it to a great diversity of information resources. The majority of the limitation is that lack of a broader theoretical framework and a total lack of teaching of any formalism related to systems.,such as development and understanding of algorithms. Researchers are in the human-centered side. Later Gerard Salton (1927-1995) developed a model wherein laboratory and research approach to education was given importance. Shera's model resulted in IS education being an appendage to library science

education. .Salton's model IR education resulted in it being a specialty of and an appendage to computer science education.

While library education receives formal attention from the ALA and education for computer science from ACM. No such formal attention is paid by any professionals/scientific society to education for information science, or for IR in particular . Neither ASIS nor SIGIR as primary homes for information science, have been involved to any great extent in educational matters. Such as setting up of standards. Or devising model curricla. clearly, there is a need and an opportunity for more substantive involvement by both organizations in educational issues.

4.12 SUMMARY

IS appears to have emerged not only as an expansion and metamorphosis of documentation and information retrieval; it directly or indirectly incorporated or parallel in several prevailing objectives and concepts of the communication and behavioral sciences and other contributory disciplines. The communication and behavioral science emerged with documentation and from the outset apparently shared many of its problems. The formative pattern of documentation and information science resembles that of other disciplinary systems.

We live in a society where knowledge and information are a dominating characteristic. No wonder many fields, many projects, many scientific, technical; social cultural, political, commercial and related activities try to deal with some or other dimensions of knowledge and information. Information science is one of them. Information is also an invaluable commodity. Information Science has many strong and diverse competitors.

The success or failure of any interactive system and technology is contingent on the extent to which user issues, the human factors ,are addressed right from the beginning to the very end, right from theory, conceptualization, and design process on to development, evaluation, and to provision of services. conversely, the human-centered IS has lost its presence in the systems side .The question arises whether we are evolving into two 2 information sciences one that computer science-based focusing on IR, digital libraries, search engines and the like, and the other that is information science based, more attributed to interaction, users, and use, with little direct connection with development of systems, but still completely dependent on systems, thus

chasing them relentlessly.. IS becomes popular discipline if it successfully integrates systems, users research and application. Society needs such a science and such a profession.

Self check exercises:
Trace the relationship of IS with other disciplines?

I. Write your answer in the space given below.
II. Check your answer with the answers given at the end of this unit

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4.13 ANSWERS TO SELF CHECK EXERCISES:

1. Definition of Information Science and its characteristics

Information Science is a academic discipline that deals with the generation, collection, organization, storage, retrieval, and dissemination of recorded knowledge. It is sometimes mistakenly used as a synonym for library science, but though related, it is a separate discipline. New Forms of Information technology have become the focus of tremendous amounts of attention and energy in society. But also academia ,where computer scientists ,cognitive scientists, and social scientists, are thinking about information and the social impact of IT in new ways. This poses a challenge to Information Science. Today in Information Science many new comers without a background in the field are coming in. At this historical juncture ,information scientists should become more conscious of the thought world we are operating, out of which we can communicate more rapidly and collectively to a large population. It enables to continue influencing the future of information in the 21st century.

Information Science has 3 general characteristics that are the leitmotif of its evolution and its existence.

1. Information Science is interdisciplinary in nature; however, the relations with various disciplines are changing. The interdisciplinary evolution is far from ever
2. Information Science is inevitably connected to IT. A technological need is compelling and constraining the evolution of Information Science, as is the evolution of the information society as a whole
3. Information Science is, with many other fields, an active participant in the evolution of the information society. Information Science. has a strong social and human dimension, above and beyond technology**.**

2 Emergence of Information and its origin and development

The emergence of information is probably too recent to permit its definitive historical reconstruction or even more than its transient definition. It might be tempting to equate the emergence of documentation or information storage and retrieval with that of information science. But a history of information science vis-à-vis one or two of its important tributaries would not be qualified as complete history. It would appear that the history of information science is in part the history of all its contributory disciplines as well as an account of other factors involved in its emergence.

The roots of information science are in documentation, a field that emerged when digital computers were developed during the 1940s and early 1950s. During World War II the need arose to increase the precision and depth of bibliographic searches, resulting in efforts to change traditional kinds of classification into computer-compatible systems. Automated searching of files, coordinate indexing, and controlled vocabularies were introduced in response to the urgent need to create easy access to the contents of scientific journals. Automated abstracts, or summaries, of documents were then developed to further simplify access to research findings.

3. RELATIONSHIP WITH OTHER DISCIPLINES

There are two factors introduced in interdisciplinarity in Information Science

3. The problems addressed cannot be determined with approaches and constructs from any discipline-thus interdisciplinarity is encoded as it is in many modern fields.
4. Interdisciplinarity in Information Science was introduced and is being perpetuated to the present by the very differences in backgrounds of people addressing the described problems. Differences in background are many: They make the richness of the field and difficulties in communication and education**.**

The development of IS from LIS at the beginning of the century to the IS of the present day is characterized by changing conceptions of the object, the structure, the foci and the content of the discipline. With a broad use of the concept, these changes are conceived as a series of paradigms: a paradigm viewing libraries in the context of the history of civilization , a paradigm viewing the library as a social institution . the physical paradigm ,the cognitive view and most recently a tendency towards viewing information institutions and informative processes in a social and historical context. The changing conceptions are partially determined by historical changes of the universe of knowledge and needs for information. A central turning point is the transition from ptolemic picture of the information universe to the Copernicus.

4.14 KEYWORDS

Conceptuality : Conceptualism maintains that although universals (abstractions or abstract ideas) have no real existence in the external world, they do exist as ideas or concepts in the mind and are thus something more than mere words.

Interdiscplinarity : involving different areas of knowledge or study

Relevance : having idea that are useful and valuable to people

Domain :an area of knowledge or activity

Knowledge : understanding and skills that you gain through education or experience

Emergence : to know about facts and ideas etc.

4.15 REFERENCES AND FURTHER READING

1. Bates M J. (2006). Fundamental forms of Information. Journal of the American Society for Information Science an Technology.57(12) 1033-1045,
2. Bates M J (1999). The invisible substrate of Information Science, Journal of the American Society for Information Science 50(12):1043-1050.
3. Harmon Glynn.(1971). On the Evolution of Information Science. Journal of the American Society for Information Science. 235-241.
4. Microsoft Encarta Encyclopedia (2002.) . Microsoft Corporation.
5. Saracevic Tefko. (1999).Information Science. Journal of the American Society for Information Science.50(12) 1051-1063.
6. Orom Andrews.(2000).Information Science Historical changes and social aspects: A nordic outlook ,Journal of Documentation , 56(1).12-26.

KARNATAKA STATE OPEN UNIVERSITY

MUKTHAGANGOTRI, MYSORE –570 006

Master of Library and Information Science

M.Lib.I.Sc - 1

Foundations of Information Science

BLOCK - 2

M.Lib.I.Sc – 1
Foundations of Information Science

BLOCK

2

INFORMATION SCIENCE

Unit-5
Theoretical Foundations of Information Science.

Unit-6
Physical and Cognitive Paradigms of Information Science.

Unit -7
Evolution of Information Society: Economics of Information and Information Economics

Unit -8
Issues in Information Society: Intellectual Property Rights; Information Policies

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Karnataka State Open University
Mukthagangotri, Mysuru-570006

Developed by Academic Section KSOU, Mysore

M.Lib.I.Sc -1 : Foundations of Information Resources
Block – 2 : Information Science

Block Introduction

Information is a resource, which affects all human activities and is an indispensable, irreplaceable link between intellectual and material activities. Present society is called 'Information Society', in which the creation, distribution and manipulation of information is a significant economic and cultural activity. Globalization and developments in Information and Communication Technologies have further influenced the evolution of Information Society.

The concepts of 'Information Society' and 'Economics of Information', characteristics of Information Society, Barriers to the use of information and changing role of Libraries and Information Centers. Economic features of information, utility value of information products, Cost-Benefit Evaluation of Information Products and Services, while treating information as a Commodity are discussed in detail.

Major issues to be considered in the present day Information Society are protection of Intellectual Property Rights (IPR) and Information Policies. Major objectives of Intellectual Property Rights, different forms covered under IPR and related issues are discussed in Unit 8. While providing desired information to their users, there are chances of Information Professionals getting caught in the web of legal problems. To overcome these problems, there is need for National Information Policy that ensures that the rights of both the users of information and creators of information are protected. Issues to be covered while framing National Information Policy are discussed in length.

The concept of Information Professional and Professional Ethics. Responsibilities of an Information Professional and the characteristics and skills to be possessed by a new Information Professional in the present context have been explained.
There is need for a code of ethics to provide a framework to Library and Information Professionals to manage the responsibilities and sensitivities, which figure prominently in their work. Ethical Practices and Responsibilities of Information Professional in the present day context are explained in the simplest terms.

Information science (also known as information studies) is an interdisciplinary science primarily concerned with the collection, classification, manipulation, storage, retrieval and dissemination of information. Information science studies the application and usage of knowledge in organizations, and the interaction between people, organizations and information systems. It is often, though not exclusively, studied as a branch of computer science or informatics and is closely related to the cognitive and social sciences.

Information Science focuses on understanding problems from the perspective of the stakeholders involved and then applying information (and other) technology as needed. In other words, it tackles the problem first rather than technology first. Within information science, attention has been given in recent years to human–computer interaction, groupware, the semantic web, value sensitive design, iterative design processes and to the ways people generate, use and find information.

Information Science should not be confused with information theory, the study of a particular mathematical concept of information, or with library science, a field related to a library which uses some of the principles of information science.

Unit-5 &6 of this block attempts to introduce you to the concept and scope of information science. The unit examines the various definitions of information science. And also provides a model describes the communication system of information science and other discipline in the unit gives solid foundation for understanding the concept of information science.

Unit-7 provides an idea on to the epistemological roots of information science. Various theories of information science have been discussed in this particular unit.

Unit-8 discusses the various paradigms of information science. The physical and cognitive paradigms of information science have been dealt in this particular unit.

Dr. N S Harinarayana

Unit - 5
THEORICATICAL FOUNDATION OF INFORMATION SCIENCE

STRUCTURE

5.0 OBJECTIVES

This unit aims to

1. To know the meaning of IS, Definitions and origin.
2. To identify IS and Epistemological questions and model
3. To examine Epistemological roots of the information concept
4. To identify the major distinction with regard to epistemological and the ontological concepts
5. to identify the theoretical foundation of IS
6. to identify information values , methodological substrates

5.1 INTRODUCTION:

Information Science, academic discipline that deals with the generation, collection, organization, storage, retrieval, and dissemination of recorded knowledge. It is sometimes mistakenly used as a synonym for library science, but though related, it is a separate discipline. From 1958 t o 1977 information scientists, as well as researchers from other fields, attempted to establish the core areas of research in IS and define its boundaries to other disciplines. The main problem was the lack of underlying scientific or philosophical approaches to information processes. except for implicit rationalistic views adhering to the physical sciences. The pioneers have insisted that IS had to or should be seen as a 'real' science- a natural science. this is the reason why the field reached out for and named some fundamental 'laws' of information which, because of the human dimension of using information for purpose of cognition, could be regarded only as indicators. However, it is important to stress these attempts of forced scientific evolution –founded in a wish for perfection-because without them the field would have been without a soul, and would have been digested by related cognitive disciplines as early as the 1960's.

As IS has become increasingly acquainted with advanced problems of knowledge representation, processing and retrieval. Some implicit epistemological questions and model within this field has been the subject of discussion particularly over the past few years. However, this dialogue between epistemology and IS which began fairly recently has a long tradition with regard to the concept of information. The term information itself has a very rich epistemological background. It was used in classical Latin, for instance by Cicero, to denote the pictorial representation of objects in the human mind as well as the process of teaching, that is of forming the mind through knowledge communication.

The Latin term informatio became a terminus technicus in medieval epistemology and Ontology and played an important role in the rationalist and empiricist theories of knowledge and played an important role in the rationalist and empiricist theories of knowledge of modern philosophy. Today the concept of information is, on the one hand, very difficult to define as it is used in many different areas, not only in philosophy but

also in the natural and Social Sciences .the is confusing situation can be considered, on the other hand, as a symptom of its theoretical relevance.

The etymogical roots of the term information reveal that key theories of Greek Ontology and epistemology based on the concepts of typos, idea and morphe were at the origin of the Latin term information. These connotations were maintained throughout the Middle Ages but disappeared as scholastic ontology was superseded by modern Science. since approximately the 16th century we find the term information in ordinary French, English, Spanish and Italian in the sense it is used today : to instruct, to furnish with knowledge, whereas the ontological meaning of giving form to something became more and more obsolete . Paradoxically the epistemological meaning was the basis of the formalization by Shanon and Weaver, who explicitly disregarded the semantic and pragmatic connotations. Information seemed to lose its connection to the human world, and came to be applied, as a more or less adequate metaphor, to every kind of process through which something is being changed or informed. Through the meditation of cybernetics and Computer Science as inflationary of this term into many Sciences (Physics, biology, psychology, and sociology) took place. The result has been a chaotic discussion between two extremes: anthropomorphism and reductionism.

The rise of IS led to a further explosion of this chaos. Schrader (1986, p.179) counted some 134 notions of information in our field. On the one hand, the content of our domain was taken to be defined by the specification of the term information, but that, on the other, there was almost no reference to the negative form misinformation and its derivatives: “lies, propaganda, misrepresentation, gossip, delusion, hallucination, illusion, mistake, concealment, distortion, embellishment, innuendo deception” this leads to a “naïve model of ‘information man which sometimes takes the form of decision making man or uncertainty man nevertheless, one thing seems to be clear: the notion of information in our field is explicitly referred and restricted to the human sphere. This means a implicit rejection of IS in the sense of a super science whose object is information at all levels of reality. Such a science without a material of its own, would be similar to a general techne a science of sciences, as attributed to the sophists by Plato in his Charmides (Capurro, 1991). In IS the concept is man and not information. When we

look at some leading paradigms in our field, we observe certain ontological presuppositions having their roots in Greek and modern philosophy. With the rise of philosophical Hermeneutics and analytical philosophy we have gained in new paths of thinking which are relevant to the foundations of IS.

Self check exercises:
1. What is IS ? Describe its etymological roots?

i. Write your answer in the space given below
ii. Check your answer with the answers given at the end of this unit

Note:

5.2 EPISTEMOLOGICAL ROOTS OF THE INFORMATION CONCEPT:

ENGLISH ROOTS

According to English dictionary Dr. Johnson mentions 3 uses of the word Information namely

a. Intelligence given; instruction
b. Charge or accusation exhibited
c. The act of informing or actuation

The second meaning is a special application in the field of law of the first epistemological sense. The third use refers to ontology which has not changed since ancient times. Both meanings have their roots in Greek philosophy. According to Dr. Johnson information means Intelligence given, that is it indicates the act of telling something to somebody who ignores the content of the message. The use of the term in

everyday English goes back toe the end of the century. the term instruction any way information related to concepts such as reason with somebody has to say to a messenger and to his message. There is a context of ignorance and expectation but also of common knowledge to which the information is supposed to be significant. Information is a concept situated in the field of human language and intersubjectivity. It refers to the process of telling something to somebody and to the content being transmitted.. In short it indicates a a major human characteristic.

5.3 Distinction between epistemological and the ontological concepts:

According the oxford English dictionary. We find a major distinction with regard to the epistemological and the ontological meaning and the differences the following factors are

1. The action of informing, formation or moulding of the mind or character, training instruction, teaching.

2. The act of informing; communication of the knowledge or news of some fact or occurrence, the act of telling or the fact of being told of something.

3. Knowledge communicated concerning some particular fact, subject, or event: that of which one is appraised or told ; intelligence ,news

4. The act of informing against , charging , or accusing

5. Special in English law

6. In other legal system.

The three last meanings are related to the special application in the legal field. Key senses are again the process of communicating something to some body as well as the content of the message. When Claude Shannon and Warren Weaver develop their mathematical theory of communication they explicitly refer to this epistemological meaning they write " As commonly used, information is a very elastic term , and it will first be necessary to set up for it a more specific meaning as applied to the present discussion they intend to eliminate, as they say, the psychological factors involved in this concept in order to establish a measure of information in terms of purely physical quantities"

Just as communication may fall into the error of imagining that because we learn about the world and about other people through communicative processes, communication is more fundamental than the world that is communicated about so also Library and IS may fall into the error of imagining that the theory of organizing information about the world is more fundamental that the world thus described. The epistemology is noble endeavors hence let us tries and formulate theory at the level that Dyson proposes. 'The germ theory of disease' that is a theory. It specifies the role of the immune system, or of public health. Are more at the level he would call models. The y address parts of a complex whole in a sway that permits practical advance.

There are two abstractions for the theory of LIS.: "text" and "meaning". These are rather like "germ "and "disease". The former is more concrete, but still varies a lot. That latter is more abstract, and may be very hard to pin down. However, we need not pinpoint to make a fundamental statement about theory.. there is one more concept that is the' index'. The fundamental idea is that one may work with a text and produce from that work an index entry. The index entry is supposed to represent the text. So now the fundamental theory; texts and their meanings are not unrelated .this is shanon's view.that is if we know the text we also know the meaning of it. There is one more concept that is of the "reader" of the text. Reader is the constructor or decontstructor or whatever. The point is that the "meaning" does not reside in the text, but resides in the mind of the reader, as a result of interaction with the text. This is the reader and the text. This means that a particular instance of meaning is a function the meaning function of both the reader and the text. This means that it depends, in an essential way, on both. Meaning theory really does depend on the text, an example would be to say that f(x,y)=xy. If either variable or y changes, not only does the function change, but even its dependence on the other variable changes. and what about the index? An index can be thought of also as a kind of "meaning". We can emphasize that by writing Index =Index (Agent, Text).Now why didn't I write Reader instead of Agent. This is a cute question. Librarians (who are such agents) are trained, in a sense, to act in predictable ways. This is different from the nation of the reader. In truth, is the very fact that librarian-agents follow "rules" that gives any hope of developing non-human indexing agents (currently, computer programs;

perhaps one day we can train pigeons or dolphins to index texts). So what does this framework give us? It gives us a basis from which to describe the various models that are represented in the packet of readings. We will find models often present themselves as focused on (or gaining their strength from) one of those perspectives. Work based on a theory of knowledge could be said to concentrate on the Meaning function. So-called system oriented work is focused on the Index function. Rule-based methods seek to foreground the Agent.

5.4 COGNITIVE METHODS FOREGROUND THE READER:

Simon H. on the "Sciences of the Artificial has discussed the fact that Sciences studying human constructions are not the same as Sciences studying the naturally occurring world. In particular, construction can be changed, as needed, to make them perform better, and they are generally understood in a context where there are defined "goals" in current scientific thinking, planets, for example, and do not have goals. There will be at least 3 layers of goals.

1. Goals of individual participants
2. Goals of the institution itself, which may be more or less explicit.
3. Goals of the surround in which it has been brought into existence.

These have some common elements, which makes it possible for the individuals to participate effectively in the institutions on behalf of the surround. It is worth mentioning here that the norms of scientific discourse differ in one very important regard form the norms of social discourse. In social discourse it is generally desired to avoid error better to keep still and be thought a fool, than to open your mouth and remove all doubt". This is desired by speakers, and also by co-participants. The term "ethno-methodology" means, the norms of social discourse may keep us from correcting him. This imposes two other changes in behavior. Second is the person who is in error violates the science norms if he takes the correction" personally", rather than taking it as a correction of his" understanding". The speaker acquires some obligation to speak in such a way that he might actually be seen to be wrong. Thus socially "conversations between two people are enormously complicated things" but the scientist contributes more by saying conversations between two people simply do not convey information .while

conversing tiny discussion becomes very important. Conversations between two people do not simply convey information has exactly the same words. One word has been moved two positions. Yet they say different things. The example given would not refute the second statement, if fact, it would be irrelevant to it. We have to try to formulate those insights so clearly that others might find them not correct. This is the practical meaning of Popper's concept of "falsifiability" and it is a spectacularly powerful tool for limiting the range of discourse on scientifically definable topics.

When we talk about function such as Meaning (Reader, Text) it is sometimes useful to talk about the 'Range 'of the function.. In mathematics, this will be the "set of values that the function may assume". We may find it useful to resort to this" Range" concept when we read papers that talk about the "Organization of knowledge"(a particular hobby of L-theorists).while we cannot be quite sure what this "knowledge" stuff is we may suppose that it has some close relation to the set of meanings. It is probably a subset, and it probably tends to contain meanings that are shared by more than a handful of people. The other is the kind of simplification that occurs in much experimental of observational research, in these settings, the abstractions (Reader, Text, Agent, Meaning) are replaced by such simpler concrete notions. For example, "relevance theory" says something like :there is one aspect of meaning that could be called the value of the meaning , and that value in turn depends on or perhaps is synonymous with)something that we will call the "Relevance of the text for the reader" or a researcher may replace the entire reader by a few specific characteristic of the reader: age, area of study, native language, etc. These results in a model equation which has the same form as the fundamental equation but might read: value=value (age, education, question; length, reading level, keywords)

Self check exercises:

2. Explain the epistemological roots of information concept?
   i. Write your answer in the space given below
   ii. Check your answer with the answers given at the end of this unit

Note:

5.5 INFORMATION SCIENCE THEORY:

The distinctive perspective in Information work carries over into and is integral to the theory of the IS field as well. In 1970 this journal changed its name from American documentation to the current one. That year is as good as any to mark the formal recognition of the then new field. The roots of IS lay in the theory and thinking in several related field. Particularly in the years 1930-1970 what those disparite theories and elements had in common, what enabled them to be a reasonably coherent intellectual discipline when brought together in IS, was their interest in forma and structure, in particular in Information form and structure.

General system theory (Bertalantffy) 1968, also see historical discussion in Checklane. (1981) which developed in the 1930's and later drew attention to the underlying structure of pattern in social and technical institutions and devices. One of the concepts of the system was developed and elaborated systems could be recognized as underlying countless disparate social, technical and physical phenomenon. Operations research and systems analysis during and after world war developed these ideas further into a variety applied realms.

John von Neumann and Oskar Morgenstern (1967) developed game theory-which is a way of seeing and underlying common structure of trade-offs, benefits, and

disadvantages within a variety of a social and economic situations .this recognition of underlying structures arose throughout the social and engineering sciences in the decades after the war. If we define information as “the pattern of organization of matter and energy” (Parker. 1974.p.10 then structure of all kinds itself constitutes a kind of information.

Within the context, Norbert Wiener (1061) identified the role of information in natural and human systems in a way that had never been recognized before. He developed the field of cybernetics, which deals with the guiding or governing of systems. Wiener demonstrated that many systems are driven not primarily or only by mechanical forces, but rather are determined by the feedback of information to a governing element of the system. We are so used to hearing the word “feedback’ in its common everyday overuse, that nowadays . wiener demonstrated, for example, that when a person reaches for an object , it is done with continual visual and kinesthetic feedback of information, which is then used to guide the hand further. The hand does not just respond to a single impulse from the brain to “grab”.

The early work that had perhaps the single most electrifying impact of all was Claude and Shannon’s information theory (Shannon & Weaver, 1949). Shannon measured the amount of information going through a telephone wire. Such a development does not on the face of it sound revolutionary, but it was because his theory was abstract, and seemingly applicable to many environments, including not only technical but also human language and psychology. The limits of Shannon’s theory for the human sciences ultimately became evident, but the legacy of a new, abstract sense of information as reducing uncertainty by measurable amounts, remained.

Similarly, Noam Chomsky’s theory of syntactic structures in language (1971) – common patterns underlying all different languages- had an explosive impact on several fields, and was the engine that drove the field of psycholinguistics. Miller ,Galanter, and Pribram, three well-known psychologists, wrote plans and the structure of Behavior (1960). This posited a common underlying structure to all.or virtually all, human behaviors.

Gregory Bateson identified common underlying structures in learning. As well as metastructures in communication that references other communications. He dealt, thus, in many different ways with representations of representations. It is no accident that the cover of the 1972 paperback of his steps to an ecology of mind states:" the new information sciences can lead to a new understanding of man' (Bateson 1972). He is best known for his "double-bind" theory of schizophrenia. But his theories referred to all communication and learning among humans, not just schizophrenia. When biochemical explanations of Schizophernia. Largely displaced psychological ones, Bateson's work fell into disrepute- a most unfortunate failure of our intellectual world to recognize that he was a theorist of all communication. Not just the unhealthy communications that are sometimes associated with dysfunctional families.

Finally, the recognition of form and structure found purest expression of all in G..Spencer-Brown started with the irreducibly smallest distinction. A single difference, which is the first step in creating form out of the formless void.

All of these thinkers had in common the recognition of underlying structure beneath the surface variety of life. They contributed theories and ideas of great power, and were the theoretical driving force behind information science are described in the way they have been so far , the close relationship between theory and practice-through their common attention to form and structure becomes evident.

5.6 INFORMATION SCIENCE'S UNIVERSE:

Both from a theoretical and a practical standpoint Information scientists are interested in the structure of their object of study- information. But as the examples above indicate, many social and behavioral scientists are interested in underlying structures also many engineers, based on Shannon's and Weiner's work, among others, are interested in information. What is distinctive about information's theory is about information as a social and psychological phenomenon. The information we study generally originates from human agency in some way, whether it is the data beamed down from a satellite or

the text of a book on Immanuel Kant's philosophy. Our primary but not sole focus , is on recorded information and people's relationship to it.

All the academic disciplines can be seen as studying different universes of phenomena. The natural sciences study the natural world, the social sciences study the social worlds produced by humans. And the arts and humanities study the content and context of the creative works of human beings, from philosophy to literature to the arts.

IS has a distinct universe that it studies also the world of recorded information produced by human agency. All human activities in studying above natural, social and artistic universes themselves producing information entities –books, articles, databases, data files, etc-thus creating a fourth universe, that of recorded information. The recorded information contains many kinds of information besides others popular literature, business records, personal archives, music, film etc and of course all of these in electronic form in short the documentary products of human activity themselves from a universe deserving of study, and study of that universe –and how human beings produce it , seek it retrieve it and use it-is the intellectual domain of information science. the study of the information universe finds its purest expression in bibliometrics, or the study of the statistical properties of recorded information and therefore how human beings relate to this information .,seek it , ignore it retrieve it –is of central research importance.

This study of the information universe finds its purest expression in bibliometrics, or the study of the statistical properties of recorded information. However, the field's interest is in human-produced information and therefore, how human beings relate to this information-how they seek it, use it, ignore it, retrieve it-is of central research importance also.

In comparison to other social and behavioral science field's we are always looking for the red thread of information in the social texture of people's lives. when we study about people, we do so with the purpose of understanding information creation seeking , and use. We don not just study people in general. The rest of the social sciences do various forms of that. In communication research the emphasis is on the

communication process and its effects on people: in information science we study that process in service of information transfer. The sociologist or the social psychologist identifies and describes the network of relationships and the social hierarchy that develops under these circumstances. They may examine the impact of technology on those social relationships and the work of the individuals involved.

The information scientist, on the other hand, follows the information the way Woodward and Berinstein "followed the money" in their Watergate investigations. That is the red thread in the social tapestry. Usually we ask what kinds of information people prefer to communicate through this of that new channel of information technology. We always follow the information.

Self check exercises:
3. Briefly explain IS theoretical foundation and its universe?

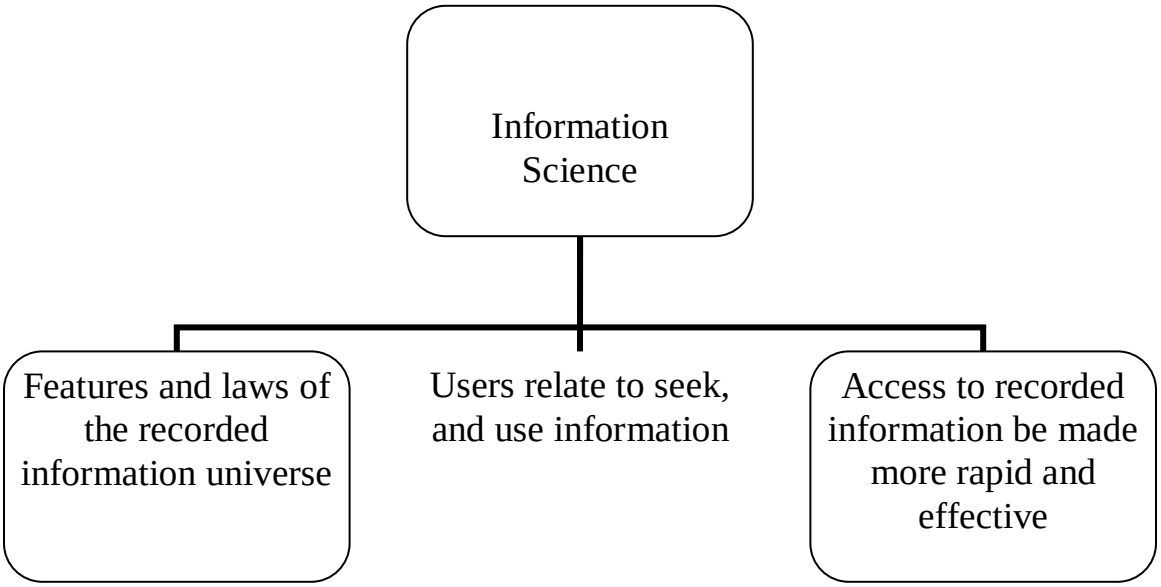
i. Write your answer in the space given below
ii. Check your answer with the answers given at the end of this unit

Note:

5.7 INFORMATION SCIENCE'S BIG QUESTIONS:

3 big questions can be identified within the above framework.

1. The Physical question
2. The social question
3. The design question



The second question deals with all kinds of information. But the other two have "recorded information" at their heart. It has to be understood that how people relate to and use all kinds, and in their social contexts – the second question –to contribute to our understanding of the first question and to do the best job possible answering the third question. But one of the defining characteristics of our field-and another feature that unites us with librarianship-is that we deal principally with recorded information. A fundamental difference between recorded information and more evanescent or ephemeral forms is that recorded information generally lasts a long time. It can hang around for months, years, or centuries. And that, in turn means that it can pile up. One of the fundamental challenges for both librarianship and IS is to find a way to contend with ever-larger piles or stacks or sets of information.

Because of the linguistic, psychological, cognitive, social, and technical complexities of IR. Each increase in size of the information source or database requires different solutions. The development of each new medium or technological device also requires a sophisticated blend of our technological and socio psychological understanding to produce the best IR system result. Although these 3 questions are posed as distinct questions, it can be seen that the research in response to each of them is also to each of the m is also mutually supportive and valuable for answering the other questions.

5.8 METHODIOGICAL SUBSTRATE:

The fundamental methodological stance of IS can be described as socio technical. The two most important methodological traditions we draw on are the social sciences and the engineering sciences. Thus only those computer scientists endure in the field who donot dismiss the linguistic or psychological complexities of IR as squishy nonsense, and only those social scientists survive who are interested in the technology and do not hand it an unreflective Luddite rejections. Methodologically we may use bibliometric techniques ,other statistical techniques, and philosophico analytic approaches for studying the first question. Much qualitative research remains to be done analyzing the social significance of the design characteristics of various documentary forms (Hjorland.1997.p127) the second question draws on the full range of social science techniques. From the quantitative to qualitative. . The third design question draws on the above two approaches as well, but most distinctively uses engineering techniques. A fundamental approach in IR system design is formative evaluation. First a system is developed that embodies solutions to IR for a designated context. Then it is tested for performance .then it is applied to a new design and performance proceeds to improve. It can also be seen that to solve the IS field's problems a mix of methodology are needed.

The third comment on methodology : regarding the great methodological shift sweeping through the social sciences, the shift to the qualitative, multiple –perspective, post modernist approaches-this field requires multiple methodological approaches to conduct its research. By observing various in mid 20th century social science we have had a series of waves of methodological fashion. It is to understood that it is finally recognized that all of methodological approaches could be powerful and useful-especially in IS.

5.9 INFORMATION VALUES:

The values of IS have tended to follow the "value neutral" science or engineering module emphasis at the applied level is on without political or explicitly value-laden objective. At the pure science level, the effort is to find out the truth or multiple truths of

the matter studied , regardless of personal agenda . The advantage of removing political issues from scientific endeavors has been that communication in IS as with other sciences has been able to proceed across political boundaries and among people with very different political philosophies.

Librarianship, in contrast, follows a more service-oriented and empowerment-oriented value system. The library is there to produce a certain desirable social result, and, as a consequence, many of the activities of the library field are organized and directed to meet that values-laden goal. The mix of values driving library work varies from country to country, and, appropriately, is situated to the particular circumstances of each nation.

There is one more characteristic-we might even call it a value-of the field of information science that merits recognition: a sense of humor. As another article in these anniversary issues documents, the American Society for Information Science has long had a Special Interest Group devoted to presenting spoofs of papers (SIG-CON), and idolizing its founding member and "information racketeer", the never-seen Llewellyn C. Puppy- breath III. this element of our field was taken for granted until I visited one year a social science academic association (which shall remain nameless), and came upon a most deadly serious group of people whose sense of humor was well hidden and whose anxiety at each article presentation was palpable. I was happy to return to a group of people able to laugh at themselves, yet still deeply value their own work

Self check exercises:

4. Briefly explain IS's big questions and its methodological substrate and IS values?
   i. Write your answer in the space given below
   ii. Check your answer with the answers given at the end of this unit

Note:

5.10 SUMMARY

Information science does not consist only of the explicit paradigm of the study of the selecting, gathering, organizing, accessing, and retrieving of information that is the usual description of the field. As with most intellectual domains, the field of information science has many unarticulated, but important, elements "below the water line." It has been the purpose of this unit to bring some of those elements to the surface, so that we may better understand our own work and communicate it to the many people from the broader society who are now excited by information questions and problems.

We live in a society where knowledge and information are a dominating characteristic. No wonder then that many fields, many projects, many scientific, technical, social, cultural, political , commercial, and related activities try to deal with some or other dimension of knowledge and information. Many fields are in the race. IS is one of them. Information is also a prized commodity, thus increasingly information is also becoming big business. IS has many strong and diverse competitors. Conversely, the human –centered IS as exemplified by ASIS, has lost its presence in the systems side. Are we evolving into two information sciences -plural? One that is computer science-based focusing on IR, digital libraries, search engines, and the like, and the other that is IS based, more attuned to interaction, users, and use, with little direct connection with development of systems, but still completely dependent on systems, thus chasing them relentlessly. Greater payoff for IS will come if and when if successfully integrates systems and user research and applications. Society needs such a science and such a profession.

5.11 Answers to self check exercises:

1. As IS has become increasingly acquainted with advanced problems of knowledge representation, processing and retrieval. Some implicit epistemological questions and model within this field has been the subject of discussion particularly over the past few years. However, this dialogue between epistemology and IS which began fairly recently has a long tradition with regard to the concept of information. The term

information itself has a very rich epistemological background. It was used in classical Latin, for instance by Cicero, to denote the pictorial representation of objects in the human mind as well as the process of teaching, that is of forming the mind through knowledge communication.

The Latin term informatio became a terminus technicus in medieval epistemology and Ontology and played an important role in the rationalist and empiricist theories of knowledge and played an important role in the rationalist and empiricist theories of knowledge of modern philosophy. Today the concept of information is, on the one hand, very difficult to define as it is used in many different areas, not only in philosophy but also in the natural and Social Sciences .the is confusing situation can be considered, on the other hand, as a symptom of its theoretical relevance.

The etymogical roots of the term information reveal that key theories of Greek Ontology and epistemology based on the concepts of typos, idea and morphe were at the origin of the Latin term information. These connotations were maintained throughout the Middle Ages but disappeared as scholastic ontology was superseded by modern Science. since approximately the 16th century we find the term information in ordinary French, English, Spanish and Italian in the sense it is used today : to instruct, to furnish with knowledge, whereas the ontological meaning of giving form to something became more and more obsolete . Paradoxically the epistemological meaning was the basis of the formalization by Shanon and Weaver, who explicitly disregarded the semantic and pragmatic connotations. Information seemed to lose its connection to the human world, and came to be applied, as a more or less adequate metaphor, to every kind of process through which something is being changed or informed. Through the meditation of cybernetics and Computer Science as inflationary of this term into many Sciences (Physics, biology, psychology, and sociology) took place. The result has been a chaotic discussion between two extremes: anthropomorphism and reductionism.

2. EPISTEMOLOGICAL ROOTS OF THE INFORMATION CONCEPT:

ENGLISH ROOTS

According to English dictionary Dr. Johnson mentions 3 uses of the word Information namely

a. Intelligence given; instruction
b. Charge or accusation exhibited
c. The act of informing or actuation

The second meaning is a special application in the field of law of the first epistemological sense. The third use refers to ontology which has not changed since ancient times. Both meanings have their roots in Greek philosophy. According to Dr. Johnson information means Intelligence given, that is it indicates the act of telling something to somebody who ignores the content of the message. The use of the term in everyday English goes back toe the end of the century. the term instruction any way information related to concepts such as reason with somebody has to say to a messenger and to his message. There is a context of ignorance and expectation but also of common knowledge to which the information is supposed to be significant. Information is a concept situated in the field of human language and intersubjectivity. It refers to the process of telling something to somebody and to the content being transmitted.. In short it indicates a a major human characteristic.

According the oxford English dictionary We find a major distinction between the epistemological, and the Ontological meaning with regard the epistemological and the ontological meaning and the differences the following factors are

1. The action of informing, formation or moulding of the mind or character, training instruction, teaching.

2. The act of informing; communication of the knowledge or news of some fact or occurrence, the act of telling or the fact of being told of something.

3. Knowledge communicated concerning some particular fact, subject, or event: that of which one is appraised or told ; intelligence ,news

4. The act of informing against , charging , or accusing

5. Special in English law
6. In other legal system.

The three last meanings are related to the special application in the legal field. Key senses are again the process of communicating something to some body as well as the content of the message. When Claude Shannon and Warren Weaver develop their mathematical theory of communication they explicitly refer to this epistemological meaning they write " As commonly used, information is a very elastic term , and it will first be necessary to set up for it a more specific meaning as applied to the present discussion they intend to eliminate, as they say, the psychological factors involved in this concept in order to establish a measure of information in terms of purely physical quantities"

Just as communication may fall into the error of imagining that because we learn about the world and about other people through communicative processes, communication is more fundamental than the world that is communicated about so also Library and IS may fall into the error of imagining that the theory of organizing information about the world is more fundamental that the world thus described. The epistemology is a noble endeavor hence let us try and formulate theory at the level that Dyson proposes. 'The germ theory of disease' that is a theory. It specifies the role of the immune system, or of public health. Are more at the level he would call models. The y address parts of a complex whole in a sway that permits practical advance.

There are two abstractions for the theory of LIS.: "text" and "meaning". These are rather like "germ "and "disease". The former is more concrete, but still varies a lot. That latter is more abstract, and may be very hard to pin down. However, we need not pinpoint to make a fundamental statement about theory.. there is one more concept that is the' index'. The fundamental idea is that one may work with a text and produce from that work an index entry. The index entry is supposed to represent the text. So now the fundamental theory; texts and their meanings are not unrelated .this is shanon's view.that is if we know the text we also know the meaning of it. There is one more concept that is

of the “reader” of the text. Reader is the constructor or decontstructor or whatever. The point is that the “meaning” does not reside in the text, but resides in the mind of the reader, as a result of interaction with the text. This is the reader and the text. This means that a particular instance of meaning is a function the meaning function of both the reader and the text. This means that it depends, in an essential way, on both. Meaning theory really does depend on the text, an example would be to say that f(x,y)=xy. If either variable or y changes, not only does the function change, but even its dependence on the other variable changes. and what about the index? An index can be thought of also as a kind of “meaning”. We can emphasize that by writing Index =Index (Agent, Text).Now why didn’t I write Reader instead of Agent. This is a cute question. Librarians (who are such agents) are trained, in a sense, to act in predictable ways. This is different from the nation of the reader. In truth, is the very fact that librarian-agents follow “rules” that gives any hope of developing non-human indexing agents (currently, computer programs; perhaps one day we can train pigeons or dolphins to index texts). So what does this framework give us? It gives us a basis from which to describe the various models that are represented in the packet of readings. We will find models often present themselves as focused on (or gaining their strength from) one of those perspectives. Work based on a theory of knowledge could be said to concentrate on the Meaning function. So-called system oriented work is focused on the Index function. Rule-based methods seek to foreground the Agent.

3. **INFORMATION SCIENCE THEORY:**

The distinctive perspective in Information work carries over into and is integral to the theory of the IS field as well. In 1970 this journal changed its name from American documentation to the current one. That year is as good as any to mark the formal recognition of the then new field. The roots of IS lay in the theory and thinking in several related field. Particularly in the years 1930-1970 what those disparite theories and elements had in common, what enabled them to be a reasonably coherent intellectual discipline when brought together in IS, was their interest in forma and structure, in particular in Information form and structure.

General system theory (Bertalantffy) 1968, also see historical discussion in Check lane. (1981) which developed in the 1930's and later drew attention to the underlying structure of pattern in social and technical institutions and devices. One of the concepts of the system was developed and elaborated systems could be recognized as underlying countless disparate social, technical and physical phenomenon. Operations research and systems analysis during and after world war developed these ideas further into a variety applied realms.

John von Neumann and Oskar Morgenstern (1967) developed game theory-which is a way of seeing and underlying common structure of trade-offs, benefits, and disadvantages within a variety of a social and economic situations .this recognition of underlying structures arose throughout the social and engineering sciences in the decades after the war. If we define information as "the pattern of organization of matter and energy" (Parker. 1974. P.10 then structure of all kinds itself constitutes a kind of information.

Within the context, Norbert Wiener (1061) identified the role of information in natural and human systems in a way that had never been recognized before. He developed the field of cybernetics, which deals with the guiding or governing of systems. Wiener demonstrated that many systems are driven not primarily or only by mechanical forces, but rather are determined by the feedback of information to a governing element of the system. We are so used to hearing the word "feedback' in its common everyday overuse, that nowadays. Wiener demonstrated, for example, that when a person reaches for an object, it is done with continual visual and kinesthetic feedback of information, which is then used to guide the hand further. The hand does not just respond to a single impulse from the brain to "grab".

The early work that had perhaps the single most electrifying impact of all was Claude and Shannon's information theory (Shannon & Weaver, 1949). Shannon measured the amount of information going through a telephone wire. Such a development does not on the face of it sound revolutionary, but it was because his theory was abstract, and seemingly applicable to many environments, including not only technical but also

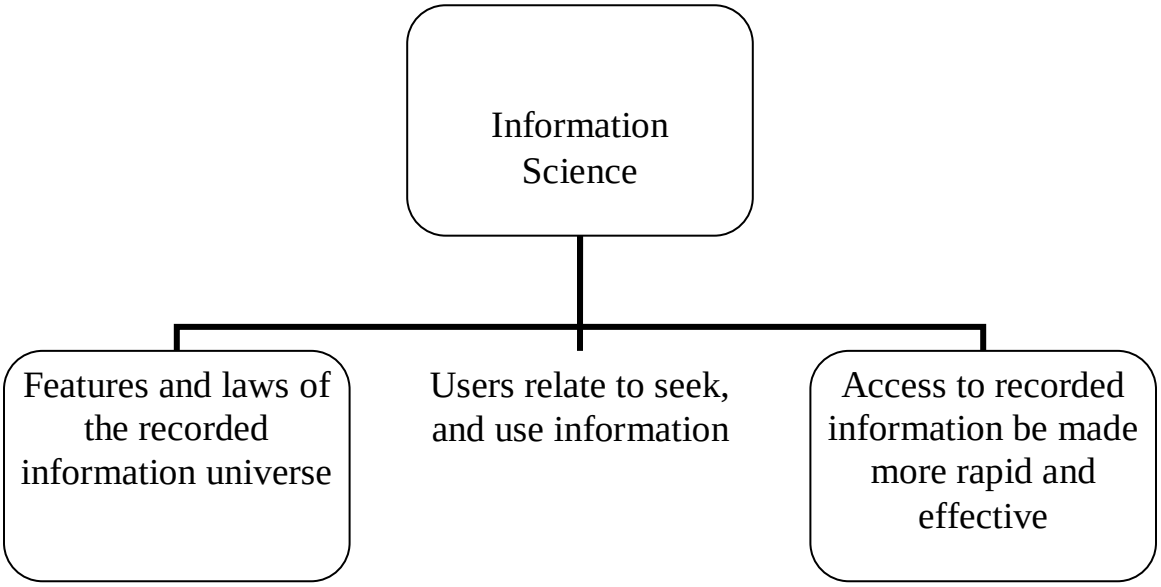
human language and psychology. The limits of Shannon's theory for the human sciences ultimately became evident, but the legacy of a new, abstract sense of information as reducing uncertainty by measurable amounts, remained.

Similarly, Noam Chomsky's theory of syntactic structures in language (1971) – common patterns underlying all different languages- had an explosive impact on several fields, and was the engine that drove the field of psycholinguistics. Miller ,Galanter, and Pribram, three well-known psychologists, wrote plans and the structure of Behavior (1960). This posited a common underlying structure to all.or virtually all, human behaviors.

4. **INFORMATION SCIENCE'S BIG QUESTIONS:**

3 big questions can be identified within the above framework.

4. The Physical question
5. The social question
6. The design question



The second question deals with all kinds of information. But the other two have "recorded information" at their heart. It has to be understood that how people relate to

and use all kinds, and in their social contexts – the second question –to contribute to our understanding of the first question and to do the best job possible answering the third question. But one of the defining characteristics of our field-and another feature that unites us with librarianship-is that we deal principally with recorded information. A fundamental difference between recorded information and more evanescent or ephemeral forms is that recorded information generally lasts a long time. It can hang around for months, years, or centuries. And that, in turn means that it can pile up. One of the fundamental challenges for both librarianship and IS is to find a way to contend with ever-larger piles or stacks or sets of information.

Because of the linguistic, psychological, cognitive, social, and technical complexities of IR. Each increase in size of the information source or database requires different solutions. The development of each new medium or technological device also requires a sophisticated blend of our technological and socio psychological understanding to produce the best IR system result. Although these 3 questions are posed as distinct questions, it can be seen that the research in response to each of them is also to each of the m is also mutually supportive and valuable for answering the other questions.

5.12 KEYWORDS:

Etymology: Etymology, branch of linguistics that deals with the origin and development of words and with the comparison of similar words, or cognates, in different languages of the same language group**.**

Epistemology : Epistemology is concerned with the definition of knowledge and related concepts, the sources and criteria of knowledge, the kinds of knowledge possible and the degree to which each is certain, the limits of knowledge, and the exact relation between the one who knows and the object known.

Ontology : ontology, which deals with the question of how many fundamentally distinct sorts of entities compose the universe, and metaphysics proper, which is concerned with describing the most general traits of reality

Substrate : methodological standpoint of IS described as socio technical

Cognitive methods: Scientific method of data analysis

5.13 References and further reading:

1. Bates Marcia j (2006) fundamental form of information. Journal of the American Society For Information Science And Technology,57(8):1033-1045
2. Belkin N.J and Robertson S.E (1976) Information Science and the phenomena for Information, journal of the American Society for Information Science.27(4),197-204
3. Belkin N.J: Information concepts for Information science, (1978) journal of Documentation, 34(1).55-85
4. Borko H (1969), Information Science: what is it? American Documentation, 19(1), 3-5.
5. Buckland M.K, and Liu.Z.(1995).History of Information Science Annual Review of Information Science and technology,30,385-416.
6. Herner S (1984). A brief History of Information Science and technology. 35(3), 157-163.
7. Microsoft® Encarta® Encyclopedia. © 1993-2001 Microsoft Corporation.
8. Saracevic Tefko (1999) Information Science, journal of the American Society for Information Science, 50(12):1051-1063.
9. Shera J.H. and Cleveland.D (1977). The History and foundation of Information Science.Annual Review of Information Science and technology, 12, 250-275.
10. Wersig. G. and Nevelling U. (1975). The phenomena of interest to Information science. Information Scientist, 9,127-140.

Unit - 6
PHYSICAL AND COGNITIVE PARADIGMS OF INFORMATION SCIENCE

STRUCTURE

6.0 OBJECTIVES

This unit aims to

1. To identify 3 leading paradigms of IS.
2. To examine the Cognitive Turn To The Pragmatic Turn
3. To identify the Factors Of Is As Hermeneutic –Rhetorical Discipline
4. To identify the Hermeneutic Paradigm Of Human Understanding
5. To identify the Existential And Contextual Critcal Discourse

6. To know the Recent Studies Involved In Hermeneutics and IS and Hermeneutic Foundation of Information Science, professional communites, and professional communication
7. To identify special fields of research or action
8. To identify the relevance of hermeneutics and IR.

6.1 INTRODUCTION:

IS appears to have emerged not only as an expansion and metamorphosis of documentation and IR; it directly or indirectly incorporated or paralleled several prevailing objectives and concepts of the communication and behavioral sciences and other contributory disciplines. The communication and behavioral sciences emerged with documentation and from the outset apparently shared many of its problems. The formative pattern of documents and IS resembles that of other disciplinary systems.

IS was initially defined as a discipline in 1962 and has since been characterized as a fundamental science. its unified growth appears to be ending and fundamental branches are emerging IS as well as documentation and IR have been identified as communication disciplines. A recent attempt to define IS suggest links with the modern generation of communication and behavioral sciences. in the early 1970's IS will possibly achieve completeness as a disciplinary system. It has achieved the status of maturity: specialization within its ranks could become intense. But new fusions and fissions, with attendant name changes, could occur within the next two decades.

The programmed development of IS might embrace more the science of research which has possibly existed as a latent component of IS a potential long range role for IS involves active participation in formatting a complete suprasystem of knowledge which would unify the arts, sciences and professions. Last IS could strive to overcome the limitations of human short-term memory and thereby increase the scope of human comprehension.

6.2 IS and its concept:

As IS has become increasingly acquainted with advanced problems of knowledge representation, processing and retrieval. Some implicit epistemological questions and model

within this field has been the subject of discussion particularly over the past few years. However, this dialogue between epistemology and IS which began fairly recently has a long tradition with regard to the concept of information. The term information itself has a very rich epistemological background. It was used in classical Latin, for instance by Cicero, to denote the pictorial representation of objects in the human mind as well as the process of teaching, that is of forming the mind through knowledge communication.

The Latin term informatio became a terminus technicus in medieval epistemology and Ontology and played an important role in the rationalist and empiricist theories of knowledge and played an important role in the rationalist and empiricist theories of knowledge of modern philosophy. Today the concept of information is, on the one hand, very difficult to define as it is used in many different areas, not only in philosophy but also in the natural and Social Sciences .the is confusing situation can be considered, on the other hand, as a symptom of its theoretical relevance.

The rise of IS led to a further explosion of this chaos. Schrader (1986, p.179) counted some 134 notions of information in our field. On the one hand, the content of our domain was taken to be defined by the specification of the term information, but that, on the other, there was almost no reference to the negative form misinformation and its derivatives: "lies, propaganda, misrepresentation, gossip, delusion, hallucination, illusion, mistake , concealment, distortion, embellishment, innuendo deception" this leads to a "naïve model of 'information man which sometimes takes the form of decision making man or uncertainty man nevertheless, one thing seems to be clear: the notion of information in our field is explicitly referred and restricted to the human sphere. This means a implicit rejection of IS in the sense of a super science whose object is information at all levels of reality. Such a science without a material of its own would be similar to a general techne a science of sciences, as attributed to the sophists by Plato in his Charmides (Capurro, 1991). In IS the concept is man and not information. When we look at some leading paradigms in our field, we observe certain ontological presuppositions having their roots in Greek and modern philosophy. With the rise of philosophical Hermeneutics and analytical philosophy we have gained in new paths of thinking which are relevant to the foundations of IS.

Self check exercises:

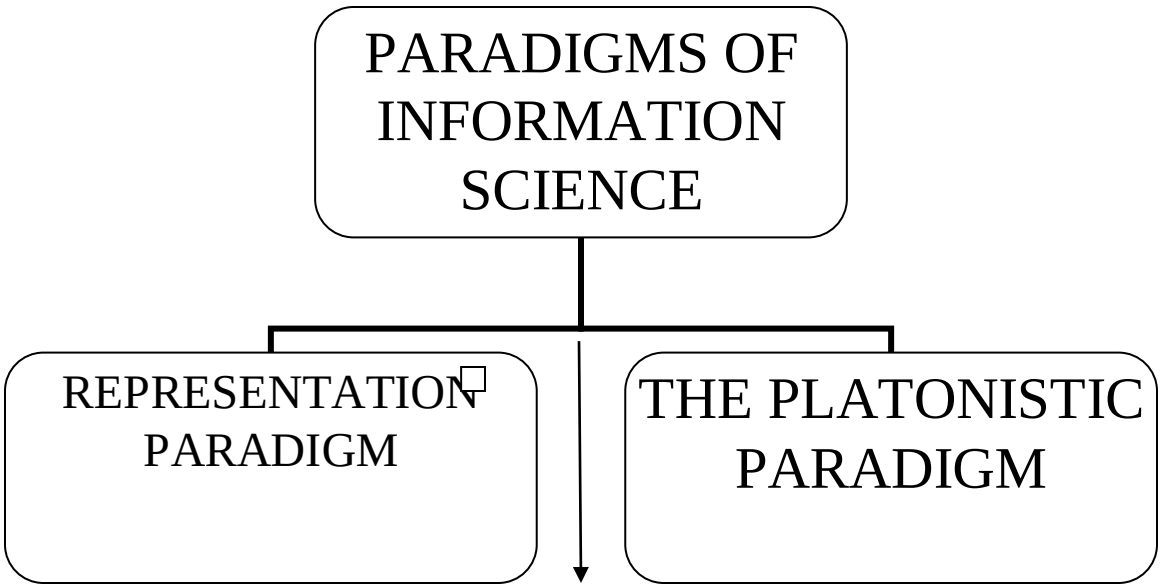
1. Briefly describe IS and its concept ?

I. Write your answer in the space given below.
II. Check your answer with the answers given at the end of this unit

Note:

6.3 PARADIGMS OF INFROMATION SCIENCE

There are 3 main epistemological paradigms, which are based on a substantiality view of something called information as well as on the modern distinction between subject and object (capurro, 1986). This is the cognitive turn. This view abandons the idea of information as a kind of substance outside of the mind and looks for the phenomenon of human cognition as a necessary condition for the determinations of what can be called information, but fails to consider the pragmatic dimension of human existence. The information is a fundamental dimension of human existence, information science mean a change of perspective which takes as a starting point the cognitive turn but goes beyond it in search of a pragmatic and rhetorical perspective.



Flowing the positivist or , as Wino grad and Flores call it , rationalistic tradition, not only informatics but also IS looks for its subject by considering information to be something objective in the external reality. This viewpoint remains basic with regard to 3 main paradigms in the above diagram.3 paradigms consider the knowing subject in interaction with something called information. This typifications leaves aside many nuances and combinations.

According to representation paradigm human beings are knowers or observers of an outside reality. The process of knowledge consists of an assimilation of things through their representations in the mind/brain of the knowing subject. These representations once processed or codified in our brain, can then be communicated to other minds and or stored and processed in machines (computers) Human beings are biological information processors, information is the codified double of reality. Humans can use information for specific rational purposes. But nothing speaks against the hypotheses that also machines can achieve this level of information processing and use.

On this basis IS is concerned with the study of representation, codification and rational use of Information.

The source channel receiver paradigm takes the phenomenon of human communication as a metaphor to be applied to different levels of reality. When they communicate, human beings,

or other kinds of sources and receivers are said to exchange information. In order for the receiver to understand the meaning of the message sent by the source, a common stock of signs has ti exist. But the exchange of information can be considered only in relationship to the structure of the message. In this case we speak of syntactic information .cybernetics couples source and receiver dynamically constructivism describes the auto generation of organisms coupled with their own world in a similar way. There is no world outside to be represented; only the world as the organism sees or forms it for its own purposes of survival. These aspects of IS is primarily concerned with the impact of information on the receivers are seekers or users of information in order to solve their problems.

Finally, the platonistic paradigm takes an opposite view to the forgoing, instead of starting with a knowing subject; it looks for something to be considered as information in itself. This is the sphere of human knowledge not as a biological, psychological or sociological process but as objectifies in non-human carriers. Paradoxically it can be called as materialistic Platonism. The idealistic version of this paradigm considers knowledge as something objective in itself, independently of any material carrier.

IS is supposed to study primarily the world of information in itself, that is to contribute to the analysis and construction of it. Information has the same ontological status as the laws of logic with regard to the psychological or biological description of the process of thinking. There remains the problem of the relationship between this world and the world of the knowing subject. This is a problem similar to the one posed by the representation paradigm. In its materialistic materialized in carriers outside the brain, in the form of documents or of their electronic surrogates. The idealistic version considers information as an objective but non material entity.

All 3 paradigms have a long tradition in the history of ideas, but they were the object of further developments in modern philosophy particularly with regard to the difference between the knowing subject as a kind of substance or thing separated from the objects of knowledge which led to the subjectivist and objectivist representation of human communication. That is to the idea, that objects of the outside world are represented in the mind or brain of a subject.

Communication means, on this basis, the exchange of information between subjects concerning their representations of the outside world objects. The main characteristics of this philosophical paradigm are to be found, in one way or another in the 3 leading paradigms. of our field. Maturana and Varels's constructivism, philosophical hermeneutics and Wittgenstein's later philosophy criticize this kind of dichotomist thinking. In the constructivist theories the outside world becomes formally determined by the structure of the living. Within information science similar attempts were made, for instance, with the development of the cognitive viewpoint. From a hermeneutic point of view cognitive dislocates knowledge from social praxis.

2. Briefly explain the paradigms of Information science

III. Write your answer in the space given below.
IV. Check your answer with the answers given at the end of this unit

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6.4 SUBJECTIVIST **AND OBJECTIVIST REPRESETATION OF HUMAN COMMUNICATION**

Figure 1 represented below reveals the subjectivist-objectivist representation of human communication. (Boss 1975)

1a /1b represents the body of a and b,

2a/2b represents the brain of a and b

3a/3b represents psyche of a and b

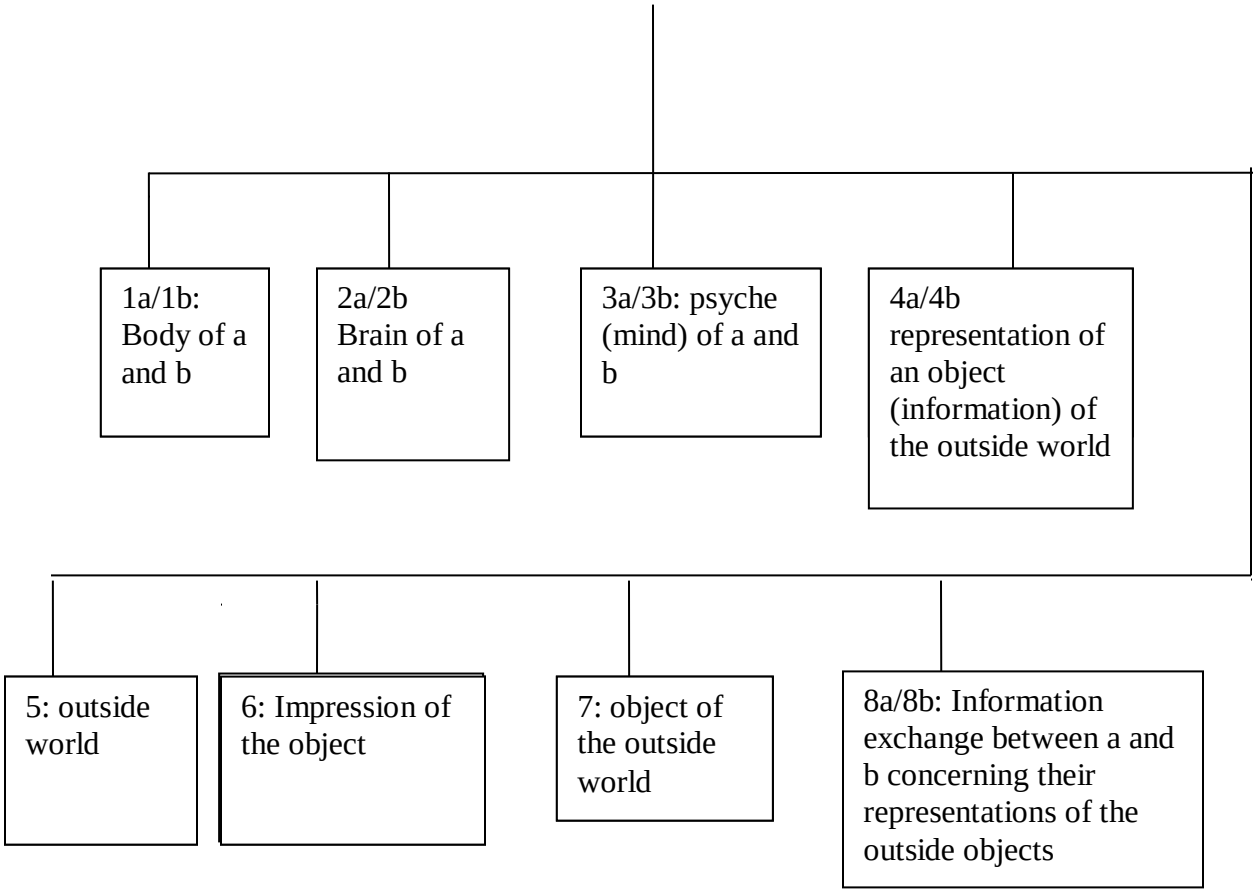
4a/4b represents the object of the outside world

5 represent outside world

6 represent impression of the object

7 represent the object of the outside world

SUBJECTIVIST AND OBJECTIVIST REPRESETATION OF HUMAN COMMUNICATION



6.5 FROM THE COGNITIVE TURN TO THE PRAGMATIC TURN:

The shift from the "physical or mechanical" paradigm of the Cranefield tests to the cognitive turn took place at the beginning of the seventies only and particularly with the ASK theory developed by Belkin et al as well as with Ingwersen's "cognitive viewpoint"(1984) Belkin's theory refers to an "anomalous state of knowledge" as the basis of the information

retrieval process. The knower is originally a non-knower. This is a Socratic insight as well as a hermeneutic one. The non-knower is a partial –knower that is an inquirer, whose questions are based on a' conceptual state of knowledge' that is part of the 'user's image of the world '. The affinity of these terms to some basic ideas of hermeneutics, for example pre-understanding, is evident, and it was very soon identified as such (Hollnage.1980. instead of starting from an objectivist consideration of something called information and its interaction with a sender or receiver, common to all kinds of living and non-living systems, the cognitive turn asks for the intrinsic relationship between the human knower and her/his potential knowledge. The cognitive turn led also to a specification of the traditional of the traditional paradigms in our field. But this turn too rests upon the modern subject/object dichotomy that is it overemphasizes an epistemological view of the relationship between man and world. Knowledge becomes, even more emphatically, a world itself.

This emphasis becomes manifest for instance in Brookes foundation of information science. On the basis of popper's ontology Brookes proposed his 'fundamental equation of information science where a knowledge structure is modified by information. Information is to be found objectively as extra physical entities which exist only in cognitive spaces. This is, on the hand, an idealistic version of the platonistic paradigm. On the otherside, Brookes considers the interaction between subjective and objective knowledge as being reflected in the changes to be observed in the knowledge structure caused by new information. The question arises as to do we really need world III that is do we really need a trichotomic popperian ontology ? Hermeneutics and wittgenstein's late philosophy criticiza some presuppositions underlying ontological dichotomies and trichotomies, without taking the path of monism, that is remaining skeptical. By questioning he presuppositions of a 'Capsule-like psyche' and of a re-presented outside world, hermeneutics offers a new insight into the question of how knowledge is being pragmatically constituted and socially shared by human beings, whose being is basically a being –in-the –world-with others. The empirical study of this phenomenon is at the core information science.

These few references to the 'cognitive viewpoint in information science 'Belkin 1990 Show a tendency in recent discussion of the foundations of our discipline: information is intrinsically connected to the knowledge structure of human beings. The cognitive viewpoint

brings out a founding dimension of our field but it remains unsatisfactory as far as the user is considered primarily as a knower. Hermeneutic concepts could be used for the possible solution of the difficulties which arise when the subject/object dichotomy of modern epistemology is taken for granted in the cognitive turn.

6.6THE HERMENEUTIC PARADIGM OF HUMAN UNDERSTANDING:

Hermeneutics as a philological discipline dealing with the problems of text interpretation has a very long tradition .the paradigm developed by philosophical Hermeneutic an attempt is made to explore the complex issue of human understanding including the question of text interpretation.

The Hermeneutic paradigm was developed by the philosopher Hans-georg gadamer 1900- on the basis of Edmund Husserl (1859-1938**)** Phenomenology and Martin Heidegger's(1889-1976) existential analytic. The paradigm has been criticized by different philosophical schools. Some of these criticisms have led to a mutual fructification and, in some cases, to similar results. This was possible because in many cases the spirit of polemics has been overcome by the spirit of dialogue and argumentation. Before considering the main features of Hermeneutic paradigm it is necessary to know 3 major criticisms of Hermeneutic paradigm.

1. Critical rationalists criticized the attempts of hermeneutics to become a special methodology for the humanities or Geistewissenschaften in contraposition to the methodology of the natural sciences bases on the casual explanations. This discussion was based partly on mutual misunderstanding but it lead to some interesting insights to which it reveals later. Hermeneutics was accused of dogmatism as it seemed to be in search of some kind of definite ground or evidence. Hermeneutics is ipso conjectural and in no case is there a claim for absolute knowledge of definite solutions.
2. Analytic philosophers criticized the tendency of hermeneutics to considering the meaning of words as something objective at least in the sense of an intentional object of the mind. But meanings, they say, are dependent of their use or of the context in which they are used. The argument is to be considered with regard to the hermeneutic concept of pre understandings

3. Critical theory finally, accused hermeneutics of lacking reflection on problems concerning psychoanalysis and political ideologies.

3. Describe the cognitive process to pragmatic turn of Information Science and hermeneutic paradigm of human understanding

V. Write your answer in the space given below.
VI. Check your answer with the answers given at the end of this unit

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6.7 PHYSICAL PARADIGM AND INFORMATION SCIENCE

At the beginning of the fifties the cranfield tests marked a new stage in the development of IS. From then information retrieval was developed as a well-defined scientific discipline. Ellis writes that rather than referring to it as the cranfield paradigm it is perhaps more informative to conceive of it as the physical paradigm for IR research. The paradigm viewing the library as a social institution continued to develop in the conceptual context of library science. the physical paradigm became central concept of IS. The physical paradigm represents a nomothetic type of research and it is based on a realistic view of science. According to the realistic model scientific knowledge is absolute true knowledge. The means that scientific knowledge is considered to have a privileged position, it is universal and neutral, and it is not influenced by social and cognitive processes. The aim of research carried out within the physical paradigm is to enhance retrieval performance. The object of research is IR.this means that though the scope is widened from the library context to scientific information in general it is still a rather narrow scope. The

focus is on the Information system. Ingwersen calls the information concept of the physical paradigm traditional or classic. In the traditional or classic sense information was scientific-domain-specific information-or better-knowledge. This view made text representation more controllable, less problematic. At a general level the sciences were monoparadigmatic,and it was period of conceptual stability in the sciences.

6.8 THE EXISTENTIAL DISCOURSE:

This was developed by Husserl's phenomenology and Heidgger existing existential analytics. Its starting point can be explained as follows

Traditional epistemology, including the modern one, as we have already seen, regarded the question concerning human knowledge to be a problem of the relation between a knower and an object that are separated from each other and come to a partial fusion called by Kant a synthesis. Phenomenology states, in opposition to this dualism, the original connection or intentionality of knower and the known (object) building an original within. Or in other words the key insight of hermeneutics is the holistic approach to the relationship between man and world. This approach is a social and a pragmatic one. We are not isolated monads, having a first a private or subjective cognitive sphere, separated from the objective one, language is not something occurring in the inner sphere of a subject, whose interactions with an outside object led to inner representations, to be communicated through signs to other receiver minds. Wittgenstein's private language argument has clearly refuted this thesis. [Wittgenstein 1984]

Instead of the modern presupposition of subjectivity as a "psyche-capsule" which was established in order to describe a theoretical of objective view on things belonging to a real world, hermeneutics refers to the founding dimension of our being-in-the –world-with –others. in the sense of a historical dimension of disclosure of meaning, which conditions but does not fully determine our understanding of the world including our theories of it. Being prior to our theoretical and other practical projects, this dimension is called pre understanding. It is the open context of the possibilities within which our inter-personal life as well as our dealing with things and with nature reveals a possible horizon of meaning. Our being-in-the-world is such that we are not first within our subjectivity and look afterwards for ways of getting out of it ,but

subjectivity and look afterwards for ways of getting out of it , but we are basically open hat is able to be addressed, within specific situations, by the meaningfulness or menainglessness of things. At the same time we grasp this openness as a finite one, given our posterior knowledge of birth as well as our prior knowledge of death. Following the existential argument, we already shared the world-openness together with others. Already means that the presupposition of a worldless subjectivity made on the ground of the Lebenswell, as Husserl called it. Man's being in the world is furthermore not of the kind of a passive or mere theoretical observer. But of acting with others creating a common world through language.

In other words, an objectivist or materialist epistemology intend so divide the objective from the subjective web or in between considering the last one a less real superstructure, while subjectivist of idealist epistemology tries to do the contrary. Existential hermeneutics stresses the original unity of out being-in-the-world, allowing us to live in a pluralistic world, sharing or not what is between us .theoretical knowledge is not something separated from the vita active which implies labour, work and action. Thinking is according to Arendt "the highest and perhaps purest activity of which men are capable" in other words; human understanding is not an isolated human intersubjectivity, language and human action. This brings some traditional epistemological paradigms to their feet.

Thus, information is neither a mentalistic nor just a mind related concept but expresses a characteristic of our pragmatic way of being. It points out to the dimension of sharing with others thematically different practical and/ or theoretical possibilities of world existence. When we say: we store, retrieve, exchange etc. information we act as if information were something out there but it is, on the contrary, we who are there, sharing a common world and therefore able to share explicitly with others, in a process of partial disclosure, the conditions and limits of our understanding .this is the basic concept of information science.

6.9 THE CONTEXTUAL-CRITICAL DISCOURSE

This is with reference to the linguistic dimension of human understanding .According to medieval and modern epistemology the process of knowledge and the process of expressing the known are two separate events. Hermeneutics, on the contrary, considers our being-with –others sharing a common world disclosure builds an non-thematic pre understanding of the world upon

which all thematic interpretation is already base. Hermeneutics criticizes the tabula-rasa theory of knowledge, according to which the mind is a kind of pure observer reproducing an outside objective reality.

Popper criticizes. The attempt to create a separate methodology for the humanities as a subjectivist view. But his own theory is similar to the hermeneutic discourse. The process of testing theories through experience can be considered as a specific application in the field of scientific methodology of the dynamic relationship between situation, comprehension and interpretation, metaphorically called the hermeneutic circle. Also the scientific process of conjectures and refutations can be considered as a specific form of the process of questions and answers as analysed by hermeneutic theory. In his seminal truth and method cadamer conceived the role of prejudices as something pertaining necessarily to human understanding. In other words, human knowledge is always biased; pre-understanding can never be completely eliminated.

The ambitious paradigm of the enlightenment should be understood as a request that we should be aware of the limitations or, as hemeneutics says, horizons within which we determine the possible sense of what appears to us. Popper speaks of the horizon of expectations and Thomas S.Kuhn has made clear the importance of paradigms in the sense of a shared body of concrete expectations, which guides the work of normal science and which can be critized and radically changed in periods of "revolutionary Science"

In a general way, hermeneutics states that not only science but human life itself is constantly dependent on pre-understanding or, as Gadamer says on "prejudices' "Prejudices are not necessarily unjustified and erroneous, so that they inevitably distort the truth. In fact, the historicity of our existence entails that prejudices, in the literal sense of the word, constitute the initial directedness of our whole ability to experience. Prejudices are biases of our openness to the world. They are simply conditions whereby we experience something-whereby we encounter says something to us"

6.10 SCIENTIFIC KNOWLEDGE is the classical field where the creation of a common pre-understanding is an essential aim itself, it is not by chance that information science, since its very

beginning, considered the processes of technological manipulation of scientific or, more generally speaking, professional-oriented knowledge, as its paradigmatic model of shared knowledge, that is of information.

The pragmatic turn was proposed by Roberts [1982] and Wersig et.al [1982 and 1985] in the eighties. Roberts looks for a behaviorist approach to "information man" .Wersig considers the "actors" within "problematic situations". The "rational-cognitive treatment of problems" constitutes for wersig only one aspect of the problem of rationalization "information man "cannot be separated from the specific situations in which she/he is pragmatically and socially imbedded, more radically, "information man" cannot be separated in her/his cognitive functions from, for instance aesthetic or ethical ones. These ideas lead to a hermeneutic and rhetorical foundation of IS. The aim of information science is to thematize this con-textual dimension taking into consideration primarily all technical forms of communication as parts of other forms of life. This scientific thematization can take place in a formal methodological as well as in a cultural-historical or pragmatic perspective. The first one is known as heuristics and the second information hermeneutics. All methods of IR belong to the first one and are an essential part of our science. But a mere formalist substantiality view leaves aside the existential groundings. An information economy that seeks to reduce information to a n exchange value without taking into account the different forms of life in which it is grounded is no less dangerous than a blind exploitation of nature. Taking into consideration the unity of both aspects, the methodological and the pragmatic, information heuristics and information hermeneutics, IS can be considered a sub-discipline of rhetoric.

6.11 IS AS A HERMENEUTIC -RHETORICAL DISCIPLINE:

In his Rhetoric Aristotle (Rhet.1358 b) distinguishes 3 kinds of speech.

1. **Deliberative speech:** concerns arguments for of against some one or something, and is related to future actions.
2. **Juridical speech**: concerns praise and blame and is mainly related to present situations.
3. **Laudatory speech**: concerns praise and blame and is mainly related to present situations.

Aristotle connects rhetoric not only to other linguistics –methodological disciplines such as logic, dialectic, and topic but also with ethics and politics.

The classical division of rhetoric embraces, in other words schluter, 1978,pp.22-26, three objectives including their corresponding human capabilities:

1. To teach /to inform : concerns reasons
2. to influence/to move :concerns the will and the feelings
3. to please: concerns sensory and sensual perception.

The characteristics of good speech are:

1. Unambiguity : the use of clear expressions
2. Commonness the use of common expressions.
3. Adequation : the use of adequate expressions. :

The Crucial Point underlying the hermeneutic-rhetorical paradigm of information science is neither the analogy of information as something physical nor the representation of reality within an innde sphere, but the recognition of the interwovenness of information and misinformation are , in some way, pseudonyms. That is they are abbreviations for experiences such as "lies,propaganda, misrepresentation, gossip, delusion, hallucination , illusion, mistake, concealment, distortion, embellishment, innuendo,deception"Schrader on th one hand, and of telling the truth, communicating publicly our convictions and ideas, looking for adequate approaches to all kinds of phenomena, hearing to what others have to say, letting our phantasy create new possibilities of being developing our sense of reality, cultivating critical thinking, as well as other capacities such as righteouness, openness, frankness, clarity, helpfulness, and truthfulness, on the other by grasping information and misinformation as a dimension of human existence.this anthropologic distinction does not imply an ontological view.

The rhetorical distinctions don't intend to separate informative and deliberative speech from the other forms of speech or to isolate all of them from ethics and politics. The ideology of a pure informative speech rests upon the disregarding of its rhetorical roots. Many of our so-called information systems are remnants of a pre-pragmatic, topic view of an ideal language, although, or more precisely, because our field has been considering itself as a practical one, as one which does not need a theory.

IS as a sub-discipline of rhetoric studies the different forms of handling artificially that is technologically and probability are the key aspects. Contrary to the idea of information as a decontextualized or situation independent sphere, a hermeneutic and rhetoric view stresses the contextuallity including cultural, aesthetic ethical and political dimensions of meaning. The pragmatic turn has decisive implications for our field. Hypertext and hypermedia as well as other kinds of intelligent databases and systems, can be called intelligent as far as the y take into consideration dialectical, topical and rhetorical figures. On the background of rhetoric it is also possible to thematize the connections of these technological mediations to ethics and politics.IS conceived as a sub-discipline of rhetoric, implies a double bind methodology. it must accomplish a self-reflection in a formal interpretative as well as in a cultural –historical way. IS a study the con-textual pragmatical dimensions within which knowledge are shared positively as information and negatively as misinformation particularly through technical forms of communication.

6.12 HERMENEUTIC AND IS:

Recent studies :

Many authors, information scientists as well as philosophers, have considered the relationship between Hermeneutic and Information Science. Borje Langefors has mentioned in his Infological approach in the following words.

"If data are what is handled by computers and information is what is to be served to people, the n information is totally distinct in kind from data. Information is of the same kind as knowledge and data must form sentences in some language. Data inform if they bring about changes in the knowledge of the users. This will only happen if the data are formed in correspondence with the knowledge structure(s) of the user. Data, or sentences, don't contain information. They only represent information fragments are brought into connection with a knowledge 'whole' this was brought out in terms of the infological equation'

$$1=i(D,S,t)$$

Where I list the information (or knowledge change) established by the transfer of some data (or signs D... The equation is meant to stress that to obtain information (I) from certain data (D) ,an information process (i) is needed and the process requires a certain time(t). furthermore

the outcome of the process (I) is whole dependent on the" pre-knowledge" structure S available to the process (thus to the data user). To understand the data or receive the information will mean to conceive of a situation or event observed by some body else and recorded as D. A Deeper understanding may then result by the process (user) drawing all sorts of conclusions from the information received. All this , clearly ,will depend on (on other parts of) S. it is immediately obvious that the knowledge structure S implies all the kinds of problems recently articulated under 'buss words' such as paradigms ,world-view, language games, ideology, personal styles and hermeneutics. It should also be clear that the data D are basically, any real-life pattern that may be not only perceived but also 'understood 'or interpreted in some way"

Alwin Eiemer and Norbetrt Henrichs, founders of the philosophy documentation center at Dosseldorf university, have made significant contributions to a n IS hermeneutics. Diemer calls thought content being transmitted in the infn process are consulted by the intersubjective process of understanding and particularly the terminology are identified in different ways through the processes of indexing and abstracting . The core of Deimer's IS hermeneutics can be seen in the phenomenological relationship between the informemes and the interpretation community. He considets the whole information field from the point of view of hermeneutics.

Henrich's approach is based on hermeneutics as well as on peirce's semiotics. Object, sign and interpreter, peirce's central categories, constitute the underlying structure of the information field. If we consider the information concept from a semiotic perspective, the meaning or content of the messages, the signs used to represent it and the interpreters (producers, mediators and recipients) the approach of these two persons is the non-separability of these 3 elements.

ASK theory was developed by Belkin N.J, RN.Oddy and H.M.Brooks ASK stands for anomalous states of knowledge and means that the IR process should make possible to actively interact with the requester's knowledge structures. That is IR systems should be able to initiate a dialogue with the user's large scale intentions without asking him to specify first his information need. Belkin stresses the importance of the users 'conceptual state of knowledge' which is in interaction with his 'image of the world' which is in interaction with his "image of the world" He writes "interactions of humans with one another, with the physical world and with themselves

are always mediated by their states of knowledge about that with which or with whom they interact. The IR situation is seeing as a 'recipients -controlled communication system, aimed at resolving the expressed information needs of humans, primarily via texts produced by other human beings"

The key role played by the receipient's knowledge structure in this theory validates in some way its destination as a hermeneutic one. But the emphasis on the individual users should be expanded to the user's community with which he/she shares a similar knowledge structure and from whom he/she expects to get some help in order to solve the anomalies. Peter Ingwersen has recently related this cognitive model to B.C.Brookes fundamental equation:

$$K(S) + D1 = K(S+DS)$$

Where K(S) is an existing knowledge affected by some increment of information D1, and K(S+DS) is the modified structure Brookes relates this equation to objective knowledge in the Popperian sense of world 3.Ingwersen's adapts this model within the cognitive paradigm relating explicitly objective knowledge to a human knowledge structure Popper's world 2 which it eventually modifies. But even in this modification does not take intersubjectivity into full consideration.

6.13 HERMENEUTIC FOUNDATION OF IS :

This is the rough outline of a hermeneutic foundation of IS that takes into account the existential and contextual-critical discourses previously explained. IS is thus delimited with regard to a general theory of information and communication. The field of scientific and technical information has proved to be too restricted with regard, for instance to societal information and to all kinds of professional information that are not produced by research centers and the like. Three basic parameters are necessary for its constitution. Professional communities, special fields of research or action, a communication process based mainly on represented knowledge.

a. **Professional communities**: producers and users of specialized information are not isolated individuals but belong to professional communities. These share common

theoretical and practical interests that build up their horizon of pre-understanding .this specific "in-between" of a professional community belongs to the 'web of human relationships' as mentioned above. Here the problems and questions are interrelated in different ways within the whole of the existential structure as well as within the concrete personality system of the individual user. That is of his/her social, cultural, political, geographical, linguistic etc. system of reference. One major aim of IS is the study of the users not as isolated individuals but as members of professional communities. IS is particularly concerned with the study of how scientists obtain information. the concept of specialized information refers then to the communication of knowledge contents to one professional communities, information in IS is a social category. The term professional points to a more general target as the term scientific community. This is, necessary and extended sense as it takes into consideration the whole range of theoretical and practical issues that constitute the core of advanced technological societies. A very Socratic viewpoint indeed .The study of information processes within professional communities are at the core of IS. There is need for research on a sociological theory of professional communities, not just on sociology of science. We need to explore the ways professionals gather and interpret information in communities as a core issue of IS means to criticize.

a. An isolating view of users and their cognitive structures
b. A restrictive view on scientific communities
c. A purely objective view of represented information

b. Special fields of research or action:

A special field of research or action is the second Parameter necessary for the constitution of specialized information .the correlate of a professional community and their pre-understanding. K. Popper is right, on the one hand, when his states that we do not investigate subject matters or disciplines but problems. But problems are, on the other hand, related to specific frameworks of theories, beliefs, traditions, interests and so on. In Popper's words, we can say that as there are no brute facts- facts are always theory- impregnated- there are also no brute problems. Special fields of research and action are not necessarily identical with subject disciplines in universities. In information science the question of delimitation of a subject field plays a significant role. Databases and expert systems are basically always

related to of a scope or subject field. Some of the empirical laws in our field, for instance Bradford's law, refer to the regularities of the core literature of a subject field. The concept of subject fields has radically changed with regard, for instance to the classification schemes of the 19th century. This is known as Copernican revolution. The study of the structure and use of such vocabularies including the use of logical devices in modern expert systems is a major concern of IS.

c. **Professional communication:** Communication is a main concern of information scientists, particularly with regard to modern IT. The technological view leaves aside, as C.Shanon and W.Weaver remarked, the semantic and pragmatic levels of communication .these levels are at the core of IS research. From a comprehensive view of human existence, communication .is a specific human phenomenon. Communication means making knowledge publicly available. The concept of information points to this potential availability. , adding a new concept of knowledge: information is knowledge as seen from the point of view of its capacity of being communicated. The concept of representation of knowledge as used by modern cognitive science becomes interesting for IS. Information scientists are not interested in building knowledge structures in themselves in a pre-Copernican manner but they study the interaction of represented knowledge with a user community whose pre understanding of a specific field is supposed to be partially objectivised.

d. Hermeneutic and IR:

Databases (bibliographic numeric, factual etc) and other forms of knowledge representation such as expert systems are expert systems are objectivizations of specific preunderstandings. Their scope or horizon is supposed to be the correlate of the one shared by a professional community . this must be clearly stated before the input of the information items into the computer takes place. Information systems are basically related to outside parameters. There is no absolute system as there is no absolute information. Classification schemes,indexing methods etc. delimit the possible horizon of interpretation of the bibliographic items. The online dialogue can be considered as a special kind of hermeneutic process. On the one side we have the fixed horizon of the system, while on the other side there is the open or existential horizon of the inquirer. During the dialogue a "fusion of

horizons"(H.G,Gadamer) takes place on different levels (descriptors, descriptive categories, contents of abstracts, classification etc) the partial identity or fusion between the horizon of the inquirer and the objectivised horizon of the system is actively determined by the pre-understanding of the searcher and by his/her question and query formulation(s)

The retrieval process can thus be primarily considered as a problem oriented process and not as a purely objective or topic oriented one. The existential ASK situation considers the problem be solved as interrelated with the pre-understanding of a professional community as well as with problems, goals and interests which are finally shared in different ways by society in general. Regarding the relevance of information retrieval T.Saracevic has summarized the matter some years ago. In his excellent introduction to modern IR, G.Salton States a difference between an objective or system –oriented and subjective user oriented relevance of course it would be wrong to identify the process of IR with the conception of scientific research as a trial and error process. Stephen P. Harter has recently emphasized the limits of this analogy .The motivation and the subsequent treatment of the results differs significantly in online searching and in scientific inquiry.

F.A.Lancaster makes a terminological difference between relevance as the relationship between a document and a request statement and pertinence as the relevance to the requester himself. Boths aspects are "subjective and equivocal " though no less important in system evaluation" Finally we should be aware that the scientific process of testing hypotheses is related to truth and falsity of theories, while there is no such specific intention in online searching .the underlying purpose is to search and fine presumably relevant information . The concepts of error and truth as used in scientific methodology would prove, in this context to be misleading. Online searching is not restricted to scientific information but concerns different kinds of pragmatic interests. The concept of relevance has to embrace all possible levels of the process, which thus can only partially be explained with the analogy of scientific theory.

4. Describe the existential and the contextual critical discourse and rhetorical discipline of hermeneutics

VII. Write your answer in the space given below.

VIII. Check your answer with the answers given at the end of this unit

Note:

6.14 Summary :

Databases and expert systems are, with the framework of hermeneutics, objectivizations of specific pre-understandings of professional communities. Professional knowledge and correspondingly, information about it, is essentially tentative or non-authoritative communication is not only "the essence of Science" but a human dimension. In a recent report on Artificial intelligence some of the lessons learned so far.

1. AI is much more difficult than expected.
2. Heuristic research is required to limit combinational explosion
3. The lack of contextual knowledge severely limits capability
4. Expectation is a human characteristic of intelligence.
5. It is difficult to handle a broad domain

Marvin Minsky considers the modent theories of intelligence to be moving away from traditional attempts in psychology and Artificial intelligence trying to represent knowledge as a collection of separate fragment. A key issue in the new theories of intelligence is , according to Minsky, the concept of frame, which he defines as a "data structure for representing a stereotyped situation" Minsky sees this concept in the tradition of Kuhns paradigms:such a sata structure can be a collection of questions to be asked about a hypothetical situation ' Minsky's proposals are closely related to Husserl's phenomenology. The question is if we are able to build up intelligent information systems this does not necessarily mean that they will become human. Just because being human means more than simply being intelligent.

6.15 Answers to self check exercises:

1.. **IS and its concept;** IS appears to have emerged not only as an expansion and metamorphosis of documentation and IR; it directly or indirectly incorporated or paralleled several prevailing objectives and concepts of the communication and behavioral sciences and other contributory disciplines. The communication and behavioral sciences emerged with documentation and from the outset apparently shared many of its problems. The formative pattern of documents and IS resembles that of other disciplinary systems.

IS was initially defined as a discipline in 1962 and has since been characterized as a fundamental science. its unified growth appears to be ending and fundamental branches are emerging. IS as well as documentation and IR, have been identified as communication disciplines. A recent attempt to define IS suggest links with the modern generation of communication and behavioral sciences. In the early 1970's IS will possibly achieve completeness as a disciplinary system. It has achieved the status of maturity :specialization within its ranks could become intense. But new fusions and fissions, with attendant name changes, could occur within the next two decades.

The programmed development of IS might embrace more the science of research which has possibly existed as a latent component of IS a potential long range role for IS involves active participation in formatting a complete suprasystem of knowledge which would unify the arts, sciences and professions. Last IS could strive to overcome the limitations of human short-term memory and thereby increase the scope of human comprehension.

As IS has become increasingly acquainted with advanced problems of knowledge representation, processing and retrieval. Some implicit epistemological questions and model within this field has been the subject of discussion particularly over the past few years. However, this dialogue between epistemology and IS which began fairly recently has a long tradition with regard to the concept of information. The term information itself has a very rich epistemological background. It was used in classical Latin, for instance by Cicero, to denote the pictorial representation of objects in the human mind as well as the process of teaching, that is of forming the mind through knowledge communication.

The Latin term informatio became a terminus technicus in medieval epistemology and Ontology and played an important role in the rationalist and empiricist theories of knowledge and played an important role in the rationalist and empiricist theories of knowledge of modern philosophy. Today the concept of information is, on the one hand, very difficult to define as it is used in many different areas, not only in philosophy but also in the natural and Social Sciences .the is confusing situation can be considered, on the other hand, as a symptom of its theoretical relevance.

The rise of IS led to a further explosion of this chaos. Schrader (1986,p.179) counted some 134 notions of information in our field. On the one hand, the content of our domain was taken to be defined by the specification of the term information, but that, on the other, there was almost no reference to the negative form misinformation and its derivatives: "lies, propaganda, misrepresentation ,gossip, delusion, hallucination, illusion, mistake , concealment, distortion, embellishment ,innuendo deception" this leads to a "naïve model of 'information man which sometimes takes the form of decision making man or uncertainty man nevertheless, one thing seems to be clear: the notion of information in our field is explicitly referred and restricted to the human sphere. This means a implicit rejection of IS in the sense of a super science whose object is information at all levels of reality. Such a science without a material of its own, would be similar to a general techne a science of sciences, as attributed to the sophists by Plato in his Charmides (Capurro, 1991). In IS the concept is man and not information. When we look at some leading paradigms in our field, we observe certain ontological presuppositions having their roots in Greek and modern philosophy. With the rise of philosophical Hermeneutics and analytical philosophy we have gained in new paths of thinking which are relevant to the foundations of IS.

2. PARADIGMS OF INFROMATION SCIENCE

There are 3 main epistemological paradigms, which are based on a substantialist view of something called information as well as on the modern distinction between subject and object (capurro, 1986). This is the cognitive turn. This view abandons the idea of information as a kind of substance outside of the mind and looks for the phenomenon of human cognition as a necessary condition for the determinations of what can be called information, but fails to

consider the pragmatic dimension of human existence. The information is a fundamental dimension of human existence, information science mean a change of perspective which takes as a starting point the cognitive turn but goes beyond it in search of a pragmatic and rhetorical perspective.

3. FROM THE COGNITIVE TURN TO THE PRAGMATIC TURN:

The shift from the "physical or mechanical" paradigm of the Cranefield tests to the cognitive turn took place at the beginning of the seventies only and particularly with the ASK theory developed by Belkin et al as well as with Ingwersen's "cognitive viewpoint" (1984) Belkin's theory refers to an "anomalous state of knowledge" as the basis of the information retrieval process. The knower is originally a non-knower. This is a Socratic insight as well as a hermeneutic one. The non-knower is a partial –knower that is an inquirer, whose questions are based on a' conceptual state of knowledge' that is part of the 'user's image of the world '. The affinity of these terms to some basic ideas of hermeneutics, for example pre-understanding, is evident, and it was very soon identified as such (Hollnage.1980. instead of starting from an objectivist consideration of something called information and its interaction with a sender or receiver, common to all kinds of living and non-living systems, the cognitive turn asks for the intrinsic relationship between the human knower and her/his potential knowledge. The cognitive turn led also to a specification of the traditional of the traditional paradigms in our field. But this turn too rests upon the modern subject/object dichotomy that is it overemphasizes an epistemological view of the relationship between man and world. Knowledge becomes, even more emphatically, a world itself.

4. THE EXISTENTIAL DISCOURSE:

This was developed by Husserl's phenomenology and Heidgger existing existential analytics. Its starting point can be explained as follows

Traditional epistemology, including the modern one, as we have already seen, regarded the question concerning human knowledge to be a problem of the relation between a knower and an object that are separated from each other and come to a partial fusion called by Kant a synthesis.

Phenomenology states, in opposition to this dualism, the original connection or intentionality of knower and the known (object) building an original within. Or in other words the key insight of hermeneutics is the holistic approach to the relationship between man and world. This approach is a social and a pragmatic one. We are not isolated monads, having a first a private or subjective cognitive sphere, separated from the objective one, language is not something occurring in the inner sphere of a subject, whose interactions with an outside object led to inner representations, to be communicated through signs to other receiver minds. Wittgenstein's private language argument has clearly refuted this thesis. [Wittgenstein 1984]

THE CONTEXTUAL-CRITICAL DISCOURSE

This is with reference to the linguistic dimension of human understanding .According to medieval and modern epistemology the process of knowledge and the process of expressing the known are two separate events. Hermeneutics, on the contrary, considers our being-with –others sharing a common world disclosure builds an non-thematic pre understanding of the world upon which all thematic interpretation is already base. Hermeneutics criticizes the tabula-rasa theory of knowledge, according to which the mind is a kind of pure observer reproducing an outside objective reality.

6.16 KEYWORDS:

EPISTEMOLOGY: Epistemology is concerned with the definition of knowledge and related concepts, the sources and criteria of knowledge, the kinds of knowledge possible and the degree to which each is certain, the limits of knowledge, and the exact relation between the one who knows and the object known.

COGNITIVE PROCESS: Are the mental processes which result in a conscious understanding of our sensory world which includes our ability to perceive, to remember, to attend, to communicate, and to plan.

CONTEXTUALIZE: The linguistic dimension of human understanding

HERMENEUTICS: is a discipline dealing with the problems of text interpretation

PARADIGM: is the phenomenon of human communication as a metaphor to be applied to different levels of reality.

PHENOMENOLOGY : THE branch of philosophy that deals with what you see, hear, feel, etc, in contrast to what may actually be real or true about the world

6.17 REFERENCES:

1. Aristotle.Ars Rhetorica, ed. W.D.Rosss, Oxford 1975
2. Belkin N.J, R.N.Oddy, H.M.Brooks : ASK for Information Retrieval journal of Documentation 38(1982) 2,61-71
3. Belkin N.J: Cognitive models and information transfer.Social Science information studies (1984)4.11-129.
4. Belkin, N.J. (1990).The cognitive view point in Information Science .journal of Information science 16, 11-15
5. Capurro Rafael , foundations of information science review and perspectives, 1-22.
6. Dieme A .Information science-a new science in international federation for documentation Ed: study committee "Research on the theoretical basis of information ,Moscow.April 1974
7. Ingwersen,P.(1984). Pshchological aspects of Information Retrieval .Social Information, studies 4, 83-95
8. Microsoft® Encarta® Encyclopedia. © 1993-2001 Microsoft Corporation. All rights reserved.
9. Popper,K.R.(1973).Objective Knowledge .an evolutionary approach. Oxford.
10. Roberts,N.(1982). A search for information man.social science information studies2, 93-104.

UNIT - 7
Evolution of Information Society; Economics of Information and Information Economics

Objectives

Evolution of Information Society

7.0 OBJECTIVES

- To introduce the concept of Information Society
- To explain objectives, characteristics of Information Society and barriers to use information.

- To introduce the changing role of libraries in Information Society.
- To make familiar with economics of information.
- To introduce the students to the concept of evaluation of information products and services.

7.1.1 INTRODUCTION

Library and Information centers are now being considered as sophisticated and complex information systems, comprising interrelated and interdependent components as subsystemslike acquisition, classification, cataloguing, circulation and reference service. There is an increasing awareness on role of information in all developmental works in science and technology as well as in social, economic, political and cultural issues. Information is both an 'input' and an 'output' of research and development in all the disciplines, in Science and Technology, Social Sciences and Humanities.

Information has been viewed differently by different people. For some, it is knowledge and for others, it is a commodity, power and for some, it is a document. In a broader view, 'information and transferable knowledge are one and the same thing'. Further, any transfer of knowledge is considered equivalent to transfer of information and vice-versa. This definition reveals the close affinity that exists between information and knowledge.

George Andrela defines 'information' as a 'resource, which affects all human activities and as an indispensable, irreplaceable link between intellectual and material activities. Knowledge is sum total of what is known, or whole body of truth, facts or information acquired by the man kind. Ching-Chih Chen (1982) defined information as 'all knowledge, facts, data and imaginative works of mind which are communicated formally and / or informally in any format. But information is not equivalent to knowledge. Information is the raw material and the precursor of knowledge. Knowledge emerges from the distilling and integrating of the raw material into concepts and rules'.You must have understood from the above definitions, how variedly the concept of information has been defined by various information specialists. Now, let us try to understand the need and importance of information in the present day society.

- Information is an aid in decision making, policy making by the policy makers, decision makers and managers.
- Information will have a reinforcing / transforming effect on human beings on receiving it. A great deal of change can be perceived in the human minds and attitudes on receiving the information, as it increases the ability of knowledge of the recipient.
- Information is needed by scientists / engineers, scholars and others to update their knowledge.
- Information helps in generating new information. In fact, scientists and scholars avail or use information to produce another document like research reports, theses / dissertation, books, journal articles, seminar papers etc.
- The users from various professions like doctors, engineers, scientists, scholars etc. acquire and apply information in order to do their job more effectively and efficiently, that is, application of information for practical purposes.
- Information supports research in order to obtain effective and fruitful results and also helps in identifying the research problems to be explored or undertaken.
- Information helps in avoiding the duplication of research.
- Information stimulates thought process of the users, particularly the scholars.
- Information keeps the scholars well informed with the current advancements in their subjects.

The overall benefits of information can be as follows:

1. Improved capability of a country by availing the existing knowledge and know-how achieved elsewhere.
2. Rationalization and systematization of a country's research and development efforts, with the help of existing information / knowledge.
3. Problem-solving, based on available wider knowledge base.
4. Improved effectiveness and efficiency of technical / production oriented activities.
5. Better decision making in all sectors.

7.1.2 DEFINITION OF INFORMATION SOCIETY

At present, we are living in a knowledge-based society, a society that demands and makes use of information in almost all kinds of human pursuits. It is because of the role played by information and its importance and also because of the involvement, association and employment of large sections / proportions of people in information related industries or information industries in this modern society, that today's society is appropriately called an 'Information Society'. One of the first persons to develop the concept of Information Society was Economist, Fritz Machlup.He called it 'Knowledge Industry', a phrase covering the educational system, media, libraries, research institutions and other information intensive activities traditionally identified as part of the Service Sector.

In 1933, Machlup began studying the effect of patents on research, and his work culminated in the breakthrough study, 'The production and distribution of knowledge in United States' in 1962. This book was widely regarded and was eventually translated into Russian and Japanese. Cawkell (1987) observed that there is a three stage shift from traditional agricultural society to an advanced industrial one, and then to an Information Society, where information is the central factor and where primary economic and social activities are the production, storage and distribution of information. Alvin Toffler and Wainsbitt have widely publicized the concept of post-industrial society – the Information Society. The Information Society and its very existence has been termed in different phrase as 'Information Age' by Dizard (1989). According to him in the present times, there is availability of new technologies in support of communication networks for information exchange.

Every one on the earth is interlinked in order to exchange the information required by him / her. By whatever name the scholars calls it, specific to this kind of society is the central position Information technology has for production and economy. Closely related concepts are post-industrial society, post modern society, knowledge society, information revolution and Information Society.An Information Society is a society in which the creation, distribution and manipulation of information is a significant economic and cultural activity. The knowledge economy is its economic counterpart whereby wealth is created through the economic exploitation of information.

Antonio Negri and Newt Gingrich characterize the Information Society as one in which people do immaterial labour. Information technology plays a major role in Information Society. Computer and communication technologies, Telephones and networking technologies have contributed significantly to the evolution of Information Society.

Important changes brought out by Information Society are:
New modes and technology of communication;
New life and work styles; and
New modes of education.

Factors that have contributed to the Information Society are:
Electronic transmission media – developments in telecommunication technology, including Internet is providing easy and quick access to information through communication links.
Economic factor – As the international relations increased among developed countries, which led to better economic power, these countries realized the importance of information in the development of their economies.

Content – Creation, updation and localization of contents of documents, say, databases, contribute significantly to the development of Information Society. Differences in cultural development; Economic and industrial relations;
Education and research programmes.

Five topics of concern in relation to Information Society are:
Globalization – which refers to general process by which economic and social processes in one part of the world are replicated in other parts of the world;
Location - refers to the place of things, concepts and people in space and time;
Interaction – refers to the nature of the connections among people and things;
Individualization – refers to preservation of identity of people and concepts within the phenomenon of globalization; and
Information – refers to multitude of ideas, that are valued by people in different contexts.

However, knowledge based economy should support the following in order to reap the benefits of Information Society:

Economic-Political capital;

Industrial – Innovative capital;

Intellectual capital; and Social capital.

7.1.3 OBJECTIVES OF INFORMATION SOCIETY

Major objectives of Information Society needs to be:

1. Information poverty affects economic progress, health conditions, educational quality, efficient and transparent governance and participation by civil society in decision making. Therefore, one of the priorities of Information Society must be to diminish information poverty, drawing from all available resources.
2. To provide access to information and knowledge to all the citizens of the world using communication technologies for achieving development.
3. Meaningful access to information via Information and communication technology channels requires the capacity to use those technology tools. Therefore, there is need to help people and institutions acquire capacity to make good of these technologies.Therefore, we can say that 'access' and 'connectivity' are parts of present Information Society, which can ensure providing access to information to 'information poor'.

7.1.4 CHARACTERISTICS OF INFORMATION SOCIETY

Alvin Toffler has aptly said that the illiterates of 21st Century will not be those who cannot read and write, but those who cannot learn, unlearn and relearn. Therefore, we have to constantly acquire new sets of skills. In this context, Kochen (1987) has identified the characteristics of Information Society as the society in which,

1. Information is considered to be important than the materials that provide Information; and

2. At least, half of its members are engaged in knowledge occupations, and such occupations are not only based on knowledge but are also knowledge generating.

3. Toffler (1991) in the study of social and economic trends, has identified the following Characteristics of the Information Society: Knowledge creation and transfer leads to creation of wealth. Industrial production has become cyclic, customized and de-massified with the use of Information Technology. Knowledge is a superior substitute for the conventional factors of production, such as land, labour, raw materials and capital.
4. Electronic information has become a fine medium of exchange. Managers, researchers and information professionals are major players in the Information Society.
6. Producer and the consumer fuse into 'prosumer'.
7. Global and wired society allows local production with global technology.

7.1.5 BARRIERS TO THE USE OF INFORMATION IN AN INFORMATION SOCIETY

In general, the barriers to effective use of information involve the following aspects:

There is too much information available on a topic – the sheer amount decreases the willingness to use information taking too much time and effort. Information is presented in a language and / or terminology, which are outside the users' experience.

iii) Information is presented in a context which is outside the user's cultural framework – the divergent cultural attributes impede the ability to relate to specific circumstances.

iv) Validity and Reliability of information may not be evaluated, and hence that information is questionable.

v) Socio-economic factors, such as income and education influence the diffusion of t technology and use of information, leading to divide between 'haves' and 'have-nots', which is popularly termed as 'digital divide'.

vi) In developed countries, 2/3 of the national income is generated by the information sector, by the production, organization and dissemination of information. Even though information is a social resource, access to information in developing countries is limited due to lack of access to information or lack of training in access and use of information.

7.1.6 CHANGING ROLE OF LIBRARIES AND INFORMATION CENTERS

Electronic information has the following distinct features:

Highly compact storage; Ease of reproduction, multiplication and manipulation; Contents can be easily detached from its container / media, and put into other media without trace of the previous; Ease of transmission, communication and storage; Hypertext and non-linear format allows a text to be fragmented and organized in a new mode; Seamless integration of print and electronic media; and then of audio, video, text and animation in multimedia; Sophisticated and multi-prong searches through keywords, free text, Boolean operators, Class numbers, thesauri and their combinations; Wall less libraries are leading to a vision of multimedia global virtual library; Remote and wireless access transcends barriers of time and place; Convergence of the technologies – multiple technologies are being merged into one; and Cost of technologies is decreasing while its power is increasing.

Power and nature of new media has a visible impact on the document collection, functioning and services of libraries. Library and information use pattern has changed in the face of information networks, powerful library software, OPACs and convergence of technologies. Outcome of the new environment is Virtual Library. Virtual Library can be visualized as a networked digital library configured to interconnect a number of physical libraries scattered geographically.

SELF-CHECK EXERCISE

1. What is an 'Information Society'? Explain the characteristics of an Information Society.
2. Describe the barriers in the use of information of an Information Society

NOTE:

1. Write your answers in the space given below.
2. Check your answers with the answers given at the end of the unit.

ECONOMICS OF INFORMATION AND INFORMATION ECONOMICS

7.2.1 ECONOMIC CONCEPT OF INFORMATION

In the Information Society, information is a key resource for the economic, socio-cultural and political development of a nation. Organizations make greater use of information as an economic resource to introduce innovation and to increase their effectiveness and competitive position. People, in order to ensure better standards of living, use information more intensively in their day-to-day activities to make their choices between alternative products and services. Advancements in Information and Communication Technologies have made possible to gain access to and process large quantities of information, and information networks have broken down time and space barriers. User expectations are also rising constantly, creating a demand for more sophisticated, high-quality information products and services. In this situation, Library and Information Managers have to accept the challenge of meeting the demands for the information products and services and play a more pro-active role. Also, Information Centers are being asked to become self-sufficient, if they have to survive in cost conscious and competition-oriented social and environmental set-up. Hence, Economics of Information is gaining importance. 'Information Economics' is an interdisciplinary subject calling for efforts from information professionals as well as economists. Many economists have attempted to define 'Economics of Information'. According to Boulding, Information Economics is 'the study of the econosphere'. Lamberton (1971) defines Economics of Information as 'the analysis of process by which information is produced, diffused, stored and used'. Machlup says that 'the distinction – generation, dissemination and use are appropriate for certain purposes, but not for any estimates of flow of knowledge / information in society. It is not possible to quantify the use made of any bit or piece of information'. In the economic terms, it is possible to analyze and describe information in terms of Supply and Demand. Possessors of Information and Seekers / Users of Information are the ones who will be supplying and demanding valuable information. Possessors of Information can have the following possibilities of action:

-Private use of information to produce something valuable to be sold in the market;
-Direct sale of information to the Seekers; and
-Free dissemination of information in the hope that this would promote for buying the goods (information) the Possessors have. Information Seekers can also have the following possibilities:
-Purchase information in the market;

-Borrow information from the one who has already purchased it;
-Monitor free information in the market; and
-Evaluate the supplied information.

ECONOMIC FEATURES OF INFORMATION

Research in the field of Information Economics has proved beyond doubt that information is an economic resource. Thomson (1981), a Canadian Economist has established ground rules for treating goods such as intangible information as they are concrete economic goods. An information resource is a stock of information that has been socially institutionalized so that it can be used repeatedly. An information resource represents a complex web of institutional relationships that cut across traditional economic, social – legal boundaries. But, information products and services can be economic commodities only to a limited extent, since these possess following features, which are not shared by any other economic goods:

-Information is a collective commodity. That is, if one person in a group purchase it, then the rest get it either free or at a much lower cost. -The end users of information are not always the purchasers of information because the Information Centers buy it for them.

-The information requirements of end users are not totally reflected by the demands of the Library and hence, difficulties arise in studying the demand pattern of end users. Unlike other commodities, information has the expandable property. That is, it is not exhausted with any amount of use.

7.2.3 UTILITY VALUE OF INFORMATION PRODUCTS

Every economic resource has utility and Marketers have recognized two dimensions of utility, which are of importance to Information Scientists. The utility of all products, including, information products and services include time, place and possession. As a result, information products have little value to user segment unless such products are

(a) in the user's possession,
(b) at a desired place of use, and
(c) available when he / she wants them to use.

The format, language, style, degree of detail and means of access can also influence the economic value of information products. Utility dimension are critical in assessing the value of information products. Therefore, the value of information products and user needs seem to be interrelated concepts. 'Information need' is a difficult concept to define, to isolate and especially to measure. A good number of research studies have investigated information user need. Usually, broad categories of information seekers are first established on the basis of their subject interest, type of study or occupation. Then, different patterns of information seeking activities are searched and they are correlated to their information needs.

7.2.4 INFORMATION AS A FACTOR OF PRODUCTION

The distinction of information and information product is vital. Following common thoughts of economists, information product, here is understood as the product, service, system or channels which carry information. Human information intermediaries come into picture in information services. The idea of product is closely connected to the concept of economic exchange and information is exchanged through information products. Information in an Information product gives value to the user when the new information joins the recipient's former knowledge for the task at hand. With the advent of data processing, information production and consumption found a tangible technological base.

7.2.5 INFORMATION IN A CAPATILIST ENVIRONMENT

As business and industry direct their attention towards making information profitable, the organization traditionally involved in the dissemination of information among them are directed affected because of

(i) limited resources;

(ii) the way they are used as markets for information industry; and

(iii) repackaging of library services as information products. The most significant measure libraries have taken to increase productivity is the rapid adoption of technology. Just as libraries have always been a crucial market for publishing industry, in the past few years, they have become very important market for the more widely defined and rapidly growing information industry.

7.2.6 INFORMATION AS A COMMODITY

Information is just like any other service provided in the market place. The information is provided through books, magazines, business news, legal advice, medical advice, consulting services, formal education through schools, universities etc. So, we do have markets for information and people buy it depending on its perceived value. In this respect, information is like any other goods and services. Information does not always flow across market. Sometimes, it is produced and consumed entirely within organization. Most goods and services have the property that "more for you means less for me". But in case of information, "more for you does not means less for me". Passing on information is not losing it. Most of the goods in the market do not have the expandable property, whereas information can be expanded. This property is described as "public goods". In the economic system, we produce a product as long as there is demand. In case of information too, one may stop creating new ideas, or new information if he is not going to get profit out of it, or if he is not going to enjoy the gains from it. Just as in the case of various commodities or products, information is also protected by Copyright and Patent Laws.

7.2.7 COST EFFECTIVENESS AND COST BENEFIT

Efficiency, Effectiveness and Benefit are the three important things we have to consider in the context of economics of information. Efficiency in the context of library is really how well we do the things, in our own terms, in terms of our own evaluation, our own value system and our own measurement. The value of information is as if the value of what is being delivered. The easiest way of determining the value of information is in terms of monetary gains resulting from access to right information at the right time within the setting of scientific research, corporate decision making etc. But the value cannot be in terms of money always. Value can be the social, political and attitudinal changes the information can bring in an individual or society. Further, the value of information may vary from time to time. Some information may be of monetary value, whereas, some of long-standing value. The value of information is realized with its use.

7.2.8 COST – BENEFIT EVALUATION

Evaluation is basically a judgment of worth, an appraisal of value. The performance of an organization, in our context, the library, is evaluated in terms of the success or attainment of its objectives. Evaluation also includes accountability to parent body or funding agency; end user's satisfaction; cost effectiveness and benefits.Cost of information system can be broadly grouped as:

-Staff costs in relation to time spend on each operation;

-Material costs like equipment, consumables etc;

-Running costs like electricity, communication facilities etc.; and

-Overhead costs include premises, general servicing etc.

Benefit is the gain accured from the use of the information system. Benefit could be in the form of satisfaction derived by the user, time saved, knowledge growth, creation of wealth, addition to wealth, increase in the production and help in decision-making.

Cost-Benefit evaluation of Information systems is difficult since the direct benefits of the Information Products or Services is difficult to identify and measure. It is, however, possible to compare the cost of the service with the cost of obtaining the same information by some other means. Another method is to estimate the time gained or the increase in productivity resulting from the use of service. If such an evaluation is impossible, it is always possible to seek the opinion of the users by means of a questionnaire or interview designed to find out how satisfied they are with the service and to obtain their own assessment of the benefits they have derived.

SELF CHECK EXERCISE.

3. Explain the economic features of Information.
4. Discuss the importance of information as a factor of production.'

NOTE:

Write your answers in the space given below.

Check your answers with the answers given at the end of the unit.

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7.3 SUMMARY

In this unit, we have traced the evolution of the concept of 'Information Society'. Major objectives and characteristics of Information Society were discussed. Barriers to the use of information in Information Society and changing role of Library and Information Centers in Information Society have been explained in detail. Economic concept of information was introduced and utility value of information was discussed in detail.

7.4 ANSWERS TO SELF CHECK EXERCISES

1. An Information Society is a society in which the creation, distribution and manipulation of information is a significant economic and cultural activity. Knowledge economy is its economic counterpart whereby wealth is created through the economic exploitation of information.

Major characteristics of Information Society are:

Information is considered to be important than the materials that provide Information;

At least, half of its members are engaged in knowledge occupations, and such occupations are not only based on knowledge but are also knowledge generating;Knowledge creation and transfer leads to creation of wealth;Industrial production has become cyclic, customized and de-massified with the use of Information Technology;Knowledge is a superior substitute for the conventional factors of production, such as land, labour, raw materials and capital;Electronic information has become a fine medium of exchange;Managers, researchers and information professionals are major players in the information society; Producer and the consumer fuse into 'prosumer'; andGlobal and wired society allows local production with global technology.

2.Barriers to effective use of information are: There is too much information available on a topic – the sheer amount decreases the illingness to use information taking too much time and effort. Information is presented in a language and / or terminology, which are outside the users' experience. Information is presented in a context which is outside the user's cultural framework – the divergent cultural attributes impede the ability to relate to specific circumstances. Validity and Reliability of information may not be evaluated, and hence that information is questionable. ocio-economic factors, such as income and education influence the diffusion of technology and use of information, leading to divide between 'haves' and 'have-nots', which is popularly termed as 'digital divide'. In developed countries, 2/3 of the national income is generated by the information sector, by the production, organization and dissemination of information. Even though information is a social resource, access to information in developing countries is limited due to lack of access to information or lack of training in access and use of information.

3. Information products and services can be economic commodities only to a limited extent, since these possess following features, which are not shared by any other economic goods: Information is a collective commodity. That is, if one person in a group purchase it, then the rest get it either free or at a much lower cost. The end users of information are not always the purchasers of information because the Information Centers buy it for them. The information requirements of end users are not totally reflected by the demands of the library and hence, difficulties arise in studying the demand pattern of end users. Unlike other commodities, information has the expandable property. That is, it is not exhausted with any amount of use. However, just like any other commodity, information is also protected copyright and patent.

4. Information product, here is understood as the product, service, system or channel which carry information. The idea of product is closely connected to the concept of economic exchange and information is exchanged through information products. Information in an Information product gives value to the user when the new information joins the recipient's former knowledge for the task at hand. To define more precisely, it is impossible to do business without information. The content, volume and complexity of information may have changed over time, but information was always required for doing business, from

pre-historic age to present computer-age. With the advent of data processing, information production and consumption found a tangible technological base.

7.5 KEYWORDS

Information Society It is a Society in which the creation, distribution and manipulation of information is a significant economic and cultural activity. Information Economics Analysis of process by which information is produced, diffused, stored and used. In economic terms, information is analyzed and described in terms of supply and demand.

7.6 REFERENCES AND FURTHER READING

BOULDING (K.E.) : The economics of knowledge and knowledge of economics. American Economics Review, 56, 2; 1966; 1-13.

CAWLELL (A.F.) : Evolution of an Information Society. London, ASLIB, 1987.

CURRAS (EMILLA) : Information Society: Emergent action. INICAE. 21, 2; 2002; 167 – 193.

INDER (MOHAN R) : Economics of Information Marketing. In: H.S.Chopra (Editor), Information Marketing, New Delhi: Rawat Publ,1996; 25 – 33.

KOCHEN (MANFRED): A new concept of Information Society. In: Cawkell, A.F. Evolution of an Information Society. London, ASLIB, 1987.

KUMAR (P.S.G.) : Economics of Information. In: Fundamentals of Information Science. New Delhi, S. Chand, 1998; 170-177.

LAMBERTON (D.M.): Economics of information and knowledge. England, Middlesex, 1971.

MACHLUP (F.): Knowledge: Its creation, distribution and economic significance. In: Knowledge and knowledge production. Vol. 1, New Jersey: Princeton University Press, 1980.

PYATI (AJIT K) : Whose vision of an Information Society? First Monday, 10,5; 2005. http://firstmonday.org/issues//isue10_5/pyati/index.html.

SATIJA (M. P.): The five laws in Information Society and virtual libraries era. SRELS Journal of Information Management, 40, 2; 2003; 93-104.

THOMSON (R. MALIK) The Economic idea. Computing, 9, 21; 1981; 22-23.

TOFFLER (ALVIN) : Powershift : Knowledge, wealth and violence at the edge of the 21st Century. New York, Banatam Books, 1991.

UNIT – 8

ISSUES IN INFORMATION SOCIETY: INTELLECTUAL PROPERTY RIGHTS. INFORMATION POLICIES

OBJECTIVES

-To introduce the concept of Intellectual Property Rights (IPR) and related legislation.

-To familiarize with the details of Copyright.

-To introduce the concept of Information Policy and Issues to be covered by a National Information Policy.

INTELLECTUAL PROPERTY RIGHTS

INTRODUCTION

Property, in the legal sense, is essentially a bundle of rights flowing from the concept of ownership and possession. While property in common parlance refers to the material object, in a strict legal sense, it refers to the interests over things tangible or intangible, which is recognized, protected and enforced by law. Intellectual property is the product of intellectual activity in the industrial, scientific, artistic fields. Unlike other forms of property, intellectual property is a nonphysical property whose value is based upon some idea or ideas. Intellectual property encompasses the protection offered by the legal regimes in the form of Patents, Copyright, Trade Mark, Designs, Geographical Indications, Layout Designs of Integrated Circuits and Trade Secrets. It also includes allied and similar legal regimes like protection of Plant Varieties and Protection of Data Bases.

8.1.2 CONCEPT OF INTELLECTUAL PROPERTY

Intellectual Property (IP) is an umbrella term for various legal entitlements, which attach to certain types of information, ideas, or other intangibles in their expressed form. The holder of this legal entitlement is generally entitled to exercise various exclusive rights in relation to the subject matter of the IP. The term Intellectual Property reflects the idea that this subject matter is the product of the mind or the intellect, and that IP rights may be protected by law in the same way as any other form of property. Intellectual wealth of any country is the key for its all round development. Hence, it is essential that rights over such intellectual property have to be claimed and protected in accordance with internationally accepted norms and rules.

The term ‘Intellect’ orginates from the Latin word ‘Intellectus’ which means power of knowing. The earliest use of the term ‘Intellectual Property’ was in October 1845 Massachussett

Circuit Court ruling in Patent case, Dovoll et al. vs Brown (Woodbury and Minot, CCD Massachussetts 7, F.C. as 197, 1845). The term is being widely used since 1967, since the establishment of World International Property Organisation (WIPO). The term 'Intellectual Property' denotes the specific legal rights which authors, inventors and other intellectual property holders may hold and exercise and not the intellectual work itself.

8.1.3 OBJECTIVES OF INTELLECTUAL PROPERTY RIGHTS (IPR)

The major objectives for which IPR are created are:

-Establishing Creators / Originators ownership; and

-To combat illegal reproduction of intellectual creation.

8.1.4 FORMS OF IPR

Intellectual Property Laws are designed to protect different forms of subject matter, although there is a degree of overlap:-Copyright may subsist in creative and artistic works (eg. Books, movies, paintings, photographs, performing arts and software) and give a copyright holder the exclusive right to control reproduction or adaptation of such works for a certain period of time.-A Patent may be granted for a new, useful and non-obvious invention, and gives the patent holder an exclusive right to commercially exploit the invention for a certain period of time (typically 20 years from the filing date of a patent application).

A Trademark is a distinctive sign which is used to distinguish the products or services of different businesses.-An Industrial Design Right protects the form of appearance, style or design of an industrial object (eg. Spare parts, furniture or textiles).-A Trade Secret (which is sometimes either equated with, or a subject of, "confidential information") is secret, non-public information concerning the commercial properties or proprietary knowledge of a business, public disclosure of which may sometimes be illegal.

8.1.5 WHAT IS A TRADEMARK?

In earlier times, traders applied their marks to the goods to indicate ownership. These are called as Proprietary marks or posessory marks. As long as 3000 years ago, Indian craftsmen used to engrave their signatures on their artistic creations before sending them to Iran. In a similar way, Merchants also marked their goods before shipment so that in the event of a shipwreck, any surviving merchandise could be identified and retrieved. During the twentieth century, trademarks changed from being indicators of origin to the symbols which assured the consumers about quality of their products / services.

A trademark is any word, phrase, symbol, design, sound, smell, colour, product configuration, group of letters or numbers, or combination of these, adopted and used by a company to identify its products or services, and distinguish them from products and services made, sold, or provided by others. The primary purpose of marks is to prevent consumers from becoming confused about the source or origin of a product or service. In India, The Trade Marks Act, 1999 protects the rights of the trade mark owner against any type of infringement.

WHAT IS A PATENT?

Twenty-first century is described as an era of intellectual property rights due to the exponential growth of the regime of intellectual property rights. There is a shift from the collective rights of the society to that of individual's rights. Opening up of the national markets for worldwide competition in the wake of globalization, liberalization and privatization has added a new dimension to trade, business and commerce. The traditional GATT, which was an international body regulating tariff for international trade was replaced by WTO in 1994. WTO lays down international guidelines for the conduct of international trade in addition to regulating the tariff.

Various agreements have been entered in to by the international community setting out the international standards for trade, business and commerce in various fields. Trade Related Intellectual Property Rights Agreement (TRIPS) is one such important agreement. India is also a party to the TRIPS. This has necessitated Indian government to effect series of changes in its law and make new laws so as to conform itself to the international obligations undertaken under the TRIPS.A Patent is a monopoly right granted to a person who has invented a new and useful

article or an improvement of an existing article or a new process of making an article. The main objective of the patents is to encourage and develop new technology and industry. Patent monopoly stimulates technical progress and it encourages research and invention. The law of patents in India is governed by the Patents Act 1970 as amended by the Patents (Amendment) Act 1999, the Patents (Second Amendment) Act 2001 and the Patents (Third Amendment) Ordinance, 2004. The amendments are effected to fall in line with the requirements of the WTO regime.

WHAT IS COPYRIGHT?

Copyright is a form of intellectual property law, protecting original works of authorship including literary, dramatic, musical and artistic works, such as poetry, novels, movies, songs, computer software, and architecture. Copyright according to the Section 14 of the Indian Copyright Act 1957, means the exclusive right to do or authorize others to do certain acts in relation to (1) literary, dramatic, musical and artistic works, (2) Cinematograph film, and (2) Sound Recordings. According to Section 13 of the Act, copyright shall subsist throughout India only in the above classes of work. Thus, Copyright is the right to copy or reproduce the work in which copyright subsists, basically. A copyright provides its holder the right to restrict unauthorized copying and reproduction of an original expression (i.e. literary work, movie, music, painting, software, mask work etc.).

The terms for these works are:

-for literary, dramatic, musical or artistic works (excluding photographs) during the lifetime of the person and till 60 years after his death.

-For joint authorship till 60 years after the death of the author who dies last.

-For anonymous work till 60 years from the year from which the work was first published.

-For photograph / cinematograph film / audio record / government or public undertaking work till 60 years from the year in which it was first published.

-Broadcasting authority is the owner of the broadcast production right up to the 24 years of the first broadcast of a programme.

8.1.8 IS COPYRIGHT SAME AS TRADEMARK OR A PATENT

Copyright protects works of authorship fixed in a tangible medium. However, copyright protection does not extend to all intellectual property. Ideas and discoveries are not protected by the copyright law, although the way in which they are expressed may be. While Trademark identifies the source or origin of goods or services and protect the goodwill associated therewith, likewise, Patents protect inventions. In contrast, Copyright only provides right to prevent others from copying it.

IPR LAWS IN INDIA

Intellectual Property is protected by the appropriate legislation of the concerned country. These laws vary from jurisdiction to jurisdiction, such that the acquisition, registration or enforcement of IPR must be pursued or obtained separately in each territory of interest. However, these laws are becoming increasingly harmonized through the international treaties such as the 1994 World Trade Organization (WTO) Agreement of Trade-Related Aspects of Intellectual Property Rights

(TRIPs). In India, IPR are categorized as follows:

Intellectual Property	*Legislation*
Invention	Patents Act 1970
Designs	Designs Act 1911 (modified in 1970)
Trade Marks	Trade and Merchandise Marks Act 1958, Amendment in 1999
Copyright	Copyright Act 1957 (Ammended in 1983, 1984, 1992 and 1994).

8.1.10 IPR AND ITS IMPACT ON SOCIETY

IPR restricts the utility of information because the legal protection deals with ownership. IPR encourages the people who are capable of producing new ideas to invent new concept or product, which have enormous potentiality in society. Creator will gain some financial benefit in terms of royalty. Society will also be benefited by acquiring new knowledge.

8.1.11 IPR IN DIGITAL ENVIRONMENT

Intellectual Property Rights (IPRs) in the digital era have added a new dimension to the traditional regime of IPRs. The complexity and jurisdictional issues relating to the Internet are challenging the IPR regime drastically. TRIPS Agreement has tried to harmonize the IPRs all over the world, yet the digital issues are making it difficult to enforce IPR Laws. At the same time, certain technological measures have also been adopted to tackle the violations of IPRs in the digital environment. Today, Information technologies and multimedia products including microfische, microfilms and communication networks are extensively used by Library and Information Centers for collection, processing, storage, retrieval and dissemination of information.

Amendment to Copyright Act in 1984 provides protection to Audio-Visual materials such as TV Programmes, CDs, Video cassettes. However, copyright protection is not sufficient for Databases and other multimedia products. Attempts are being made to protect Internet documents by using Digital Rights Management Systems such as encryption, watermarking, fingerprinting, Digital signatures, Digital Object Identifier (DOI) and so on. DOI is a system for identifying and exchanging intellectual property in digital environment. International DOI Foundation, created in 1998, supports the needs of intellectual property community in the digital environment by the promotion of DOI system as a common infrastructure for content management. In India, Information Technology Act 2000 has been passed to protect digital objects against Cyber Crime.

SELF CHECK EXERCISES

1. Explain different forms of information that are protected under Intellectual Property Rights.
2. Write a note on ‘Copyright’.

NOTE:

Write your answers in the space given below.

Check your answers with the answers given at the end of the unit.

INFORMATION POLICIES

8.2.1 NEED FOR INFORMATION POLICIES

In the era of network and communications technologies, users of information infrastructure confront an unstable and uncertain environment of multiple governing laws, changing national rules and conflicting regulations. On the part of the Information Professionals, while they are trying their best to provide desired information to their users, there are chances of getting caught in the web of Legal problems. Also, priorities, strategies and activities related to information may vary from region to region depending upon the local, economic, social and cultural situation. In this context, there is need for National Information Policy that ensures the rights of both the users of information and creators of information protected. There are a number of issues such as Right to access Information, Privacy and data protection, Intellectual Property Rights, Censorship etc. to be addressed by National Information Policy.

8.2.2 WHAT IS NATIONAL INFORMATION POLICY?

A National Information Policy has been defined as 'a set of decisions taken by the government, through appropriate laws and regulations, to orient the harmonious development of

information activities, in order to satisfy the information needs of various user groups in the country'. National Information Policy serves as a tool for the policy planners of the Country to help them understand and cope in a better way with the enormous risks and opportunities being presented by developments such as

-Information Superhighway

-Cyberspace

-Information Society.

Therefore, policy needs to be in tune with the electronic environment and the current era of cyberspace.

8.2.3 NEED FOR NATIONAL INFORMATION POLICY

Information Policies at the national and international level are essential in following areas:

-Preservation and universal access to information;

-Participation of all citizens in the emerging global information society;

-Ethical, legal and societal consequences of Information and Communication Technology developments;

-Information is serving as a resource for national development, and needs to be managed on a scientific basis for optimum utilization;

-Policy should be able to exploit the positive benefits of the Information Society to the extent Possible; and

-It should be able to minimize the negative effects of the Information revolution.

8.2.4 STATUS OF INFORMATION POLICY IN DEVELOPING COUNTRIES

Most of the developing countries do not have National Information Policies. Many countries have the draft at conceptual level which is still waiting for implementation as a policy statement. In India, it has been defined as a set of decisions taken by the government, through appropriate laws and regulations, to orient the harmonious development of information activities, in order to satisfy the information needs of various user groups in the country.

8.2.5 ISSUES TO BE COVERED BY NATIONAL INFORMATION POLICY

Following issues needs to be considered while framing National Information Policy:

-Government and official information available should be accessible to all the citizens, which Reflects their culture, language and heritage

-Set a strategic approach to the development of the nation's information networks.

-As information cannot be generated in totality at one place, cooperation should be an essential element of Information Policy.

-Information Policy should consider ethical issues in the digital era and take appropriate steps to arrive at an international consensus on uniform international communication standards and norms in the context of digital age.-Ensure interoperability of different devices making up Information and Communication Technology.

-Ensure public support for the development of a perfect information society.

SELF CHECK EXERCISES

3. Discuss the need for National Information Policy.
4. Highlight the issues to be covered by National Information Policy.

NOTE:

1. Write your answers in the space given below.
2. Check your answers with the answers given at the end of the unit.

8.3 SUMMARY

Two major issues in Information Society, Intellectual Property Rights(IPR) and Information Policies are dealt with in detail in this unit. Intellectual Property Right is an umbrella term for various legal entitlements, which attach to certain types of information, ideas

or other intangibles in their expressed form. The objectives and different forms covered by IP, namely, Trade marks, Patents and Copyright, are discussed in detail. Need for Information Policy at national level and issues to be covered by National Information Policy have been explained in detail in this unit.

8.4 ANSWERS TO SELF-CHECK EXERCISE

1 Intellectual Property Laws are designed to protect following forms of documents: Copyright may subsist in creative and artistic works (eg. Books, movies, paintings, photographs, performing arts and software) and give a copyright holder the exclusive right to control reproduction or adaptation of such works for a certain period of time.

A Patent may be granted for a new, useful and non-obvious invention, and gives the patent holder an exclusive right to commercially exploit the invention for a certain period of time (typically 20 years from the filing date of a patent application).A Trademark is a distinctive sign which is used to distinguish the products or services of different businesses.

An Industrial Design Right protects the form of appearance, style or design of an industrial object (eg. Spare parts, furniture or textiles).A Trade Secret (which is sometimes either equated with, or a subject of, "confidential information")is secret, non-public information concerning the commercial properties or proprietary knowledge of a business, public disclosure of which may sometimes be illegal.

2. Copyright is a form of intellectual property law, protecting original works of authorship including literary, dramatic, musical and artistic works, such as poetry, novels, movies, songs, computer software, and architecture. Copyright according to the Section 14 of the Indian Copyright Act 1957, means the exclusive right to do or authorize others to do certain acts in relation to (1) literary, dramatic, musical and artistic works, (2) Cinematograph film, and (2) Sound Recordings. According to Section 13 of the Act, copyright shall subsist throughout India only in the above classes of work. Thus, Copyright is the right to copy or reproduce the work in which copyright subsists, basically. A copyright provides its holder the right to restrict unauthorized copying and reproduction of an original expression (i.e. literary work, movie, music, painting, software, mask work etc.).

3. Information Policies at the national and international level are necessary in following areas: Preservation and universal access to information; Participation of all citizens in the emerging global information society; Ethical, legal and societal consequences of Information and Communication Technology developments; Information is serving as a resource for national development, and needs to be managed on a scientific basis for optimum utilization;
Policy should be able to exploit the positive benefits of the Information Society to the extent possible; and It should be able to minimize the negative effects of the Information revolution.

4. Following issues needs to be considered while framing National Information Policy:
Government and official information available should be accessible to all the citizens, which reflect their culture, language and heritage. Set a strategic approach to the development of the nation's information networks. As information cannot be generated in totality at one place, cooperation should be an essential element of Information Policy. Information Policy should consider ethical issues in the digital era and take appropriate steps to arrive at an international consensus on uniform international communication standards and norms in the context of digital age. Ensure interoperability of different devices making up Information and Communication Technology. Ensure public support for the development of a perfect information society

8.5 KEYWORDS

Intellectual Property	Denotes specific legal rights which authors, investors and Other Intellectual Property holders may hold and exercise and not the intellectual work itself.
Trade Mark	is any word, phrase, symbol, design, sound, smell, colour, Product or group of letters and numbers, or a combination Of these, adopted by a company to identify its products or Services.
Patent	A Patent is a monopoly right granted to a person who has Invented a new and useful article / improvement of an Existing article / a new process or making an article.
Copyright	is a form of Intellectual Property Law, protecting

Original works of authorship including literary, Music
And artistic works.

National Information Policy is a set of decisions taken by the government, through appropriate laws and regulations, to orient the harmonious development of information activities, in order to satisfy the information needs of various user groups in the country.

8.6 REFERENCES AND FURTHER READING

CHATTERJEE (KOUSIK) : What's wrong with IPR in India: A legalistic approach. IASLIC Bulletin, 49, 3; 2004; 249 – 254.

WIKIPAEDIA : Intellectual Property. From Wikipedia, the free Enclopedia. Http: // en. Wikibooks. Org/ wiki / FOSS Licensing

REIDENBERG (JOEL R) : Lex Informatica. The formulation of Information Policy Rules through Technology. Texas Law Review, 76, 3; 1998; 553-583.

SRIVASTAVA (ROCHNA) : Managing Intellectual Property in digital Environment through Digital Object Identifier (DOI). DESIDOC Bulletin of Information Technology, 24, 2; 2004; 17 – 21.

CIPRA : Workshop on Intellectual Property Rights. Center for Intellectual Property Rights, Research & Advocacy (CIPRA) and Dept of Law, Gulbarga Univ., Gulbarga, 28th February – 1st March 2005.

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Master of Library and Information Science
M.Lib.I.Sc - 1

Foundations of Information Science

BLOCK - 3

M.Lib.I.Sc – 1
Foundations of Information Science

BLOCK

3

INFORMATION MARKETING.

Unit-9
Information Professional & professional ethics

Unit-10
Information marketing: An overview

Unit -11
Marketing research and marketing segmentation

Unit -12
Marketing mix / Supply mix

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Mukthagangotri, Mysuru-570006

Developed by Academic Section KSOU, Mysore

M.Lib.I.Sc -1 : Foundations of Information Science
Block – 3 : Information Marketing.

Block Introduction

Information transfer and dissemination has been recognised as an essential or input for all research and developmental activities in developing countries since a long time. Thus, libraries and information centres have been putting considerable efforts in the design of information services and products and in distributing the same efficiently and effectively. However, a lacuna exist in the transfer of information, especially, interdisciplinary areas. Increasingly, in recent times, R&D efforts have been mainly focussed on problems uncounted which require access to information that cuts across many disciplines. As an immediate response, new services and products were designed and developed. Ironically, however, the users felt that they were not being served and appropriately. This led to an in-depth analysis which revealed, surprisingly, that the services were not user-oriented largely because of the non- involvement of users (in their design) and also that the extent of use made of these services was unknown to the generators of the information services ! In other words, libraries and information centers instead of being "responsive" tended to be unresponsive organisations. This, perhaps, is true of many a library and information centre in this sub-continent. Probably, by designing and developing an appropriate marketing strategy, the situation could be altered and improved upon.

Prof. N Parvathamma

UNIT -9

INFORMATION PROFESSION AND PROFESSIONAL ETHICS

9.0.OBJECTIVES

- To introduce the concept of Information Professional and Professional Ethics.
- To familiarize with characteristics of an Information Professionals and the Skills to be possessed.
- To explain the Ethics of the Information Profession.
- To create awareness about the responsibilities of Information Professional to Information and Users.

9.1.1 INTRODUCTION

Information Science is a generalized basic discipline forming the foundation of the profession of Information work meant for rendering information service to the users of information involved in various activities such as following:

-Generation of new information;

-Understanding and evaluation of existing information;

-Decision-making and carrying other managerial functions relating to production systems of all kinds;

-Enhancement of productivity in all production sectors;

-Education – formal and informal;

-Mass communication; and

-Derivation of emotional satisfaction.

The Information Scientist, as a professional is committed to the mission of ensuring and promoting the utilization of existing information resources for developmental activities by overcoming all the barriers that stand in the way of providing right information to the right users at the right time. He comes into the picture of rendering information services only after the generation and communication / dissemination of primary information is completed.

Recent developments in Library and Information Profession has led to the change in the role of Librarian / Information Scientist. There is need to shift from document-based information service to supply of need-based information. Present day Information

Professional is one who allows himself to teach, to guide, to assist novice and full fledged scholars thereby contributing to the intellectual society.

An Information Professional strategically uses information in his / her job to advance the mission of the organization that deliver information-based solution to a given set of users. Some commonly used names for these organizations include Libraries, Information Centers, Intranet departments, Knowledge Rresource Centers, Content Management Organizations. Information Professional harnesses technology as a crucial tool to accomplish goals. Information Professionals include, but are not limited to Librarians, Knowledge Managers, Chief Information Officers, Web Developers, Information Brokers and Consultants.

9.1.2 RESPONSIBILITIES OF AN INFORMATION PROFESSIONAL

The diverse responsibilities of an Information Professional include:

-Developing and offering cost-effective, client-valued information services that are oriented towards the needs of the organization and client groups;

-Building a dynamic collection of information resources based on a deep understanding of clients' information needs;

-Gathering evidence to support decisions about the development of new services and products;

-Maintaining current awareness of emerging technologies;

-Assessing and communicating the value of the information organization, including information services, products and policies to senior management and client groups;

-Contributing effectively to senior management strategies and decisions regarding information applications, tools and technologies, and policies for the organization.

9.1.3 CHARACTERISTICS OF THE NEW INFORMATION PROFESSIONAL

The following five characteristics are believed to be the key to professional success.

They are, the ability to:

-Guide in the face of an uncertain future;

-Collaborate;

-Prioritize and maintain flexibility in the face of changing goals;

-Empower; and

-Understand the core capabilities of one's organization, work group and colleagues.

i) Guide: No one can be certain about the future. For example, no one predicted the massive changes that the Internet and Web have brought over the recent years. Information Professionals needs to move forward with the spirit of pioneers. In this situation, the information professional needs to take on the role of expedition guide – to see one self pioneering new knowledge frontiers. Information professional can be the physical guide, procedural guide and the intellectual guide to knowledge resources in various formats. However, sometimes we may need to follow while someone else steps up for a while. The success of the expedition requires the information professional to be both leader and follower, consistently providing guidance from either role. This leads to the next ability.

ii) Collaborate: The second characteristic of the new Information Professional is the ability to collaborate. None of us have the capabilities to do all the jobs , or even to know everything. Cooperation is the key for the future, and all information professionals are to function as collaborators / team workers. We will have to collaborate not only with the people we know, but with unfamiliar people, remote users, about whom we have no prior knowledge. Information Professional has to learn to collaborate with these new people in very short time. To do that, there is need to have a deep understanding of needs and capabilities, our own and our collaborators. However, team work and collaboration are not appropriate for every activity or every decision that needs to be made. We must apply it to the right situation and ensure that the right components are in place for collaboration to create effective results.

iii) Prioritize: A third characteristic is to set the priorities. The priorities may change during the course of work depending upon the change in the priorities of the organization. Information Professional needs to be increasingly flexible – in procedures, structures, directions, what he / she do, how long he do it for, with whom he works etc. He / she needs to be responsive to the changing needs, strategies, technologies, leaderships and other factors in the environment. It is the combination of agility and priority setting that will allow us to

respond successfully to our institution, external influences and the needs of our user communities.

iv) Empower: Fourth characteristic is the ability to empower people. Doing that involves recognizing what it takes to empower and what it takes to be empowered. We must find appropriate roles for the colleagues within our organization, while enabling those who are willing to take on added responsibility to do so.

v) Understanding Core Capabilities: It is critical for information professionals to understand the core capabilities of their organization – from the capabilities of the entire organization or institution, to the units within which they work, to those individual staff members and themselves. Information professional needs to leverage their capabilities with complementary capabilities of his / her team. The Role of the New Information Professional

9.1.4 SKILLS TO BE POSSESSED BY INFORMATION PROFESSIONAL

An ideal Information professional would probably require:

i) Professional Skills

- Suitable subject knowledge;
- An understanding of information sources and information flow;
- An awareness of users needs and how to satisfy them;
- Good negotiating and communication skills, including that of repackaging of information;
- Training and consultancy skills;
- Knowledge management; and
- Economic aspects of information.

ii) Management Skills

- Change management style;
- Strategy planning;
- Financial management;
- Human Resource management
- Communication; and Marketing skills

THE FUTURE

Information Professionals of the future need to have the spirit of the pioneer. They need to be both flexible and agile. They need to be able to translate planning and decision-making into actions. Staff needs to be empowered to learn. The role of the information professional is at the heart of all the critical activities of an organization – technology development, technology applications, content development, new ways of collaborating etc. They have to use the opportunity to claim their leadership within their organizations.

SELF CHECK EXERCISE

Describe the responsibilities of an Information Professional.

Explain the skills required for an Information Professional.

NOTE:

Write your answers in the space given below.

Check your answers with the answers given at the end of the unit.

PROFESSIONAL ETHICS

9.2.1 ETHICAL PRINCIPLES FOR INFORMATION PROFESSIONALS

An 'ethical code' may be defined as a code of professional responsibility, which may dispense with difficult issues of what behaviour is "ethical". A code of ethics is often a formal statement of professional's values on certain ethical and social issues. These codes are often promulgated by the governmental agency responsible for licensing a profession or the professional associations. Information Professionals are the essential link between information users and the information or the piece of literature users require. They therefore occupy a privileged position which carries corresponding responsibilities. The purpose of the Principles and Code of ethics is to provide a framework to help library and information professionals to manage the responsibilities and sensitivities which figure prominently in their work. CILIP has identified the following characteristics for the conduct of Information Professionals :

1. Concern for the public good in all professional matters, including respect for diversity within society, and promoting of equal opportunities and human rights.
2. Concern for the good reputation of the information profession.
3. Commitment to the defence, and the advancement, of access to information, ideas and works of the imagination.
4. Provision of the best possible service within available resources.
5. Concern for balancing the needs of actual and potential users and the reasonable demands of employers.
6. Equitable treatment of all information users.
7. Impartiality, and avoidance of inappropriate bias, in acquiring and evaluating information and in mediating it to other information users.
8. Respect for confidentiality and privacy in dealing with information users.
9. Concern for the conservation and preservation of our information heritage in all formats.
10. Respect for, and understanding of, the integrity of information items and for the intellectual effort of those who created them.
11. Commitment to maintaining and improving personal professional knowledge, skills and competencies.

12. Respect for the skills and competences of all others, whether Information Professionals or Information Users, Employers or Colleagues.

CODE OF PROFESSIONAL PRACTICE FOR LIBRARY AND INFORMATION PROFESSIONALS

Personal Responsibilities

People who work in the information professional have personal responsibilities which go beyond those immediately implied by their contact with their employers or clients. They should therefore: Strive to attain the highest personal standard of professional knowledge and competence. Ensure they are competent in those branches of professional practice in which qualifications and / or experience entitle them to engage by keeping abreast of developments in their areas of expertise.

3. Claim expertise in areas of library and information work or in other disciplines only where their skills and knowledge are adequate.

9.2.3.2 Responsibilities to Information and its Users

The behavior of the professionals who work with information should be guided by a regard for the interests and needs of information users. People working in the information profession also need to be conscious that they have responsibility for a growing heritage of information and data, irrespective of format. Members should therefore: ensure that information users are aware of the scope and limits of the service being provided. make the process of providing information, and the standards and procedure governing that process, as clear and open as possible.

3. Avoid inappropriate bias or value judgment in the provision of services.

4. Deal fairly with the competing needs of information users, and resolve conflicting priorities with due regard for the urgency and importance of the matters being considered.
5. Protect the confidentiality of all matters relating to information users, including their enquiries, any service to be provided, and any aspects of the users' personal circumstances or business.
6. Deal promptly and fairly with any complaints from information users, and keep them informed about progress in the handling of their complaints.

7. Ensure that the information systems and services for which they are responsible are the most effective, within the resources available, in meeting the needs of the users.
8. Respect the integrity of information sources, and cite sources used, as appropriate.

SELF CHECK EXERCISE

3. Explain the Ethical Principles to be followed by an Information Professional.

NOTE:

1. Write your answers in the space given below.
2. Check your answers with the answers given at the end of the unit.

9.3 SUMMARY

The Information Professional is committed to the mission of ensuring and promoting the utilization of existing information resources by overcoming all the barriers that stand in the way of providing right information to the right user at the right time. Present day Information Professional is one who allows himself to teach, to guide, to assist novice and full-fledged scholars thereby contributing to the intellectual society. Responsibilities of an Information Professional, characteristics to be possessed by an Information Professional and skills to be developed have been discussed in detail in this unit. There will be a set of principles and code of ethics in all professions to provide a framework to the professionals in that field to manage their responsibilities and sensitivities which figure prominently in their work. A set of code of ethics Identified by CILIP and personal and professional responsibilities of an Information Professional are discussed in detail in this unit.

9.4 ANSWERS TO SELF CHECK EXERCISES

1. Responsibilities of an Information Professional are:

Developing and offering cost-effective, client-valued information services that are oriented towards the needs of the organization and client groups; Building a dynamic collection of information resources based on a deep understanding of clients' information needs; Gathering evidence to support decisions about the development of new services and products; Maintaining current awareness of emerging technologies; Assessing and communicating the value of the information organization, including information services, products and policies to senior management and client groups; Contributing effectively to senior management strategies and decisions regarding information applications, tools and technologies, and policies for the organization.

2. An ideal Information professional should possess the following skills:

I. Professional Skills

Suitable subject knowledge;

An understanding of information sources and information flow;

An awareness of users needs and how to satisfy them;

Good negotiating and communication skills, including that of repackaging of information;

Training and consultancy skills;

Knowledge management; and

Economic aspects of information.

II. Management Skills

Change management style;

Strategy planning;

Financial management;

Human Resource management

Communication; and

III. .Marketing Skills.

3. Code of Ethics for an Information Professional are:

Attain the highest personal standard of professional knowledge and competence. Ensure they are competent in those branches of professional practice in which qualifications and / or experience entitle them to engage by keeping abreast of developments in their areas of expertise. Claim expertise in areas of library and information work or in other disciplines only where their skills and knowledge are adequate.

9.5 KEYWORDS

Information Professional	An Information Professional is committed to the Mission of ensuring and promoting the utilization of existing information resources by overcoming all the barriers that stand in the way of providing right information to the right users at the right time.
Code of Ethics	A formal statement of professional's values on certain ethical and social issues.

9.6 REFERENCES AND FURTHER READING

CILIP. : Ethical principles and code of professional practice for Library and Information Professionals.

WIKIPAEDIA : Ethical code. From Wikipedia, a free encyclopedia.

GRIFFITHS (JOSE-MARIE): The New Information Professional. ASSIS Bulletin, Feb / March 1998.

RAJYALAKSHMI (D) : Information professionals – knowledge and skills, for information management. ILA Bulletin, 40, 3; 2004; 5 – 12.

UNIT-10 : INFORMATION MARKETING :OVERVIEW

Structure

OBjectives

After reading this unit, you should be able to :

- Realise the importance of marketing for information services
- Understand what and why of Marketing.
- Identify the components of the marketing mix.

10.0 INTRODUCTION

Information transfer and dissemination has been recognised as an essential or input for all research and developmental activities in developing countries since a long time. Thus, libraries and information centres have been putting considerable efforts in the design of information services and products and in distributing the same efficiently and effectively,. However, a lacuna exist in the transfer of information, especially, interdisciplinary areas. Increasingly, in recent times, R&D efforts have been mainly focussed on problems uncounted which require access to information that cuts across many disciplines. As an immediate response, new services and products were designed and developed. Ironically, however, the users felt that they were not being served appropriately. This led to an in-depth analysis which revealed, surprisingly, that the services were not user-oriented largely because of the non- involvement of users (in their design) and also that the extent of use made of these services was unk.10wn to the generators of the information services ! In other words, libraries and information centers instead of being "responsive" tended to be unresponsive organisations. This, perhaps, is true of many a library and information centre in this sub-continent. Probably, by designing and developing an appropriate marketing strategy, the situation could be altered and improved upon.

10.2 "\VHY MARKETING ?

In the library and information centre environment, the function of marketing has long been overlooked. This is largely because some information managers felt that marketing is inimical to the nature of their activities. They don't seem to realise

that marketing is essential to effective library management. Therefore, if libraries are to "survive" or to "thrive", the complete spectrum of marketing approaches becomes essential.

Some of the reasons cited for the need for marketing are:

- Library and information Services are not highly used. (Pittsburgh study shows
  - 7% of collection only used)
- Justification of Library and Information centre expenditures getting difficult.
- Information services are not user-oriented.
- Little involvement of users in the design of services.
- Feed back on relevance of information services \products usually not available.
  - Their, evaluation not generally made.
  - Information services do ne d professional selling.
- More effort is required in selling information than for tangible products.

10.3 WHAT IS MARKETING?

The term "Marketing" means many things to many people. While to some it is selling, to others, it is promotional activity. Bl:lt, in actual fact, it includes a whole gamut of activities, selling and promotion being part of these activities. This takes us on to he question "What is marketing ? " . While one sells cars, he markets transportation . In other words, in marketing, one looks at transportation needs, devises and offers a vehicle that will satisfy the need at an exchange rate that the market will bear or afford. Similarly, when one markets information services/ products, it is presumed that he has identified the users' needs and devised a product that satisfies the n 'eds at a price the user can pay in terms of money and / or time. Perhaps, marketing c . · be said to be an exchange process where a user who has recourse to a non-profit inrormation service anc obtains a document or information, Ce cost (of the service) being met by the user or the community through taxes. In other words, there is always p!·ice to 'Je paid whatever the context of the exchange.

While other definitions are given in library literature, the following seems to be pragmatic and appropriate :

Marketing is planning that focuses on products, place of mode of delivery, adjustment of cost / price to the market, and promotion to specifically targeted segments of special librarians market (Zachert & Williams 1986).

Marketing takes the focus off the product and puts it on the user's needs. Products are developed from the user's point of view, not the producers. (Kotler et al 1977).

Marketing is a stance and an attitude that focuses on meeting the needs of uses. Marketing is a means of ensuring that libraries, librarians, and librarianship are integrated into both to-day's and tomorrow's emerging global culture. Marketing is not separate from good practice. It is good practice (Smith, 1995).

Marketing can be summed as the process of customer-satisfaction engineering" (Cronin, 1985).

"Marketing can be summed as the process of customer-satisfaction engineering" (Cromin, 1985).

Thus, in an information context, marketing may be considered as a management philosophy where the organisation:

1. Actively Monitors the needs of its customers--the users and non-users ;
2. Matches itself and its products or services with identified customer needs so as to satisfy them ;
3. Subsequently makes itself known by communicating with customer; and
4. Finally, Measures customer's satisfaction in order to make any necessary adjustments (Majoro, 1993.)

In other words, marketing means adapting to the needs of the market and not it a product thought to be useful to it.

Hence, it has bee;.1 suggested that libraries and information centres to be reasonably viable, they dopt the marketing approach which, has substantially modified the traditional approach (See Table-1). While in the former, the emphasis is on the customer and the satisfaction of his or her needs, in the latter it is the organisation itself or the existing product / service.

Table-1 : Product-Oriented Approach and marketin : Approach

	Starting point	Product-oriented approach	Marketing approach
1.	Attitude to customers	Must be content with product	Information service must adjust to their needs
2.	Approach to customers	Until customers turn up	Anticipate Customer's wishes
3.	Relationship with customer	Instrumental (as brief as possible)	Helpful and open-ended
4.	Time required to obtain a service/product	Depends on technical services access	Depends on customer needs
5.	Services/products supplied	Only what is available on the spot	Outward - looking network approach
6.	Innovations	Chiefly designed to lower production costs	Aimed at providing better customer service
7.	Attitude to services/products	Information service supplies only what it produces	Information service endeavours to produce what it should be supplying.
8.	Evaluation of information needs	Restricted: Mainly in terms of printed matter	Broad : in terms of information (audio - visual, etc.)
9	Feedback in relation to service provided	Mainly concerned with internal efficiency	Mainly in terms of effectiveness with regard to cqstomers

10.3.1 Marketing Concepts

According to Jannifer Rowley (1994), the concept of marketing can be better understood if a few fundamental questions listed below are answered :

WHO

are our customers ?
should our customers be ?
are our competitors ?

WHAT

new/existing products and services should be developed?
new/existing markets should we enter?

WHERE

Should we develop?
are our customers ?
should we distribute our products and services ?
are our competitors ?

WHEN

should we launch new products and services ?
should we enter/leave existing markets ?

HOW

should we promote our products and services ?
should we distribute our products and services ?
should we handle consumers reactions/expectations ?
should we compete ?
should we maximise our returns ?
should we maintain our performance and evaluate new opportunities ?

WHY should

consumers buy our products and services ?
we develop new products and services ?
we remain in particulars markets/business ?

In short, the marketing approach suggested provides a manager the mental map to think systematically on the 5Ps of any product or service - - aptly called the "Marketing Mix" which are the following:

PATRON

PRODUCT

PLACE / DISTRIBUTION

PRICE

PROMOTION

In addition, user education and evaluation are key concepts in Marketing.

10.3.2 Objectives of Marketing of Information Services & Products

On the basis of a definitional analysis of marketing, one can identify the following as objectives of marketing of information services and products :

-);> To enhance use os information sources and services
-);> To increase customer satisfaction
-);> To generate resources for running the service
-);> To facilitate production of user-oriented rather than producer-oriented products.
-);;.- To help in the design, implementation and evaluation of marketing programme_

Self check Excercises :

1. List the reasons for the need for marketing.
2. Define "Marketing" in an information context.

3. What is the difference in emphasis in the marketing and product-oriented approaches ?

4. Enumerate the objectives of marketing of information services & products.

Note:

1. Write your answers in the space given below.
2. Check your answers with the answers given at the end of the unit

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10.4 MARKETING OF INFORMATION SERVICES & PRODUCTS IN INDIA

The concept of marketing of information services and products in India can be said to be still in infancy. This is inspite of the fact that the doyen of Library Service, Dr. S. R. Ranganathan had focu ed on the need for marketing (though, perhaps, he did not use the term) when he enunciated the Five Laws of Library Science in 1930. As a matter of fact, the Five Laws can be used as a basis for developmeat of marketing orincipJes in the context of libraries and information centres. This sad state of affairs may be attributable to the following reasons :

a) Confusion of the conceptual level among librarians and information scientists that marketing s nothing but promotion and sales.

b) Lack of a definite marketing policy- -end user policy, product policy, distribution policy, tariff policy, services policy either at the National or :Jocallevel.

c) User Needs Assesments Studies are inadequate due to he methodological deficiencies and due to the fact that they are not carrieo out on a continuing basis.

d) Lack of proper market research and segmentation studies.

e) Product development and targeting leaves much to be desired due to the absence of market research and segmentation.

f) Reluctance on the part of users to pay for information services resulting in adoption of economy measures. As a consequence, the physical quality and to get up of products are adversely affected.

g) Evaluation of information services and products generated is conspicuous by its absence.

h) Marketing concepts either not taught or least emphasised in library schools. In most cases, it does not form part of the curriculum.

i) Information is a low priority item of users and motivation to share is even lower.

j) Information consolidation activities / products, especially, value-added products which are very useful to users are not generated to the extent needed.

In short, the four barriers to adoption of marketing approach by information professionals have been identified as :

);> ATTITUDINAL-- happy with satisfying a limited clientele, that too when asked for.

);> STRUCTURAL - - staff coming into contact with clientele are not informaticn pr<)fe ssionals and hence there is no staff to think from the point of view of Ihe client.

SYSTEMIC - - library and information systems developed do not seem to allow the ciient or client's point of vtew inside the system.

>- ENVIRONMENTAL -- the cultw·e, still believers in that information should be free.

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In other words, the need of the hour is for information professionals to shift the emphasis from product-orientation to client orientation and adopt a marketing approach so that both provision and use of information is facilitated.

Self-Check Exercises :

5. List the barriers to adoption of marketing approach by information professionals.

Note:

i) Write your answer in the space given below :

ii) Check your answer with the answer given at the end of the unit.

10.5 . ELEMENTS INVOLVED IN MARKETING

The marketing of information services and products involves the following key marketing concepts.

Market Research and Analysis

Segmentation of the clientele

Development (or adaptation) of products or services

Cost and Pricing

Promotion

User Education

Dissemination

Evaluation of Products and Services (Sarasevic & Wood, 1981).

Echoing similar views, Zacharet and Williams (1986) have described marketing as a cyclical process comprising of the following five major steps, represented by five marketing concepts.

i) MARKET SEGMENTATION - - Identification of actual and potential markets and potential markets .and non-markets within the institution. Information gathering Quantification.

ii) CONSUMER ANALYSIS-- Determination of needs and preferences. Information gathe_·i'lg. Quantification.

iii) MARKET POSITIONING-- Prioritising clients, groups and information service. Policy making.

iv) MARKETING PROGRAM-- Determination of optimal mix of product, price delivery mode (place), promotion. Planning. Customisation. Coordination .

v) MARKET AUDIT - - Evaluation of plan and implementation. Information gathering Quantification. Making judg ments. Reporting.

Basically speaking, marketing approach would consist of identification of the targe ustomers or user groups, determination of their information needs, designing of s 1·vices/products appropriate to their needs and at a fair price, choosing the right type of distribution channel after necessary promotional or adverti sing capacity, and last but not 1-te least, feedback and evaluation of products and services. In other words, the steps involved in a marketing programme are :

PLAN:NING

Market ?.es(-.arch & Market Segmentation.

Product Development.

Pwmotion

Distribution

Pricing

Evaluation

};> IMPLEMENTATION

Review the Marketing Plan

Schedule specification

Resource Mobilisation

Staff & User Education and Training

Promotional activities

Monitoring

};> EVALUATION in relation to

Objectives

Products

Performance

Distribution Channels

Self - Check Exer-cises

6, · List the steps involved in a marketing programme.

Note:

i) Write your answer in the space given below.

ii) Check your answer with the answer given at the end of the unit.

10.6 SUMMARY

In this unit, we have discussed.

The need and purpose of marketing.

The concept of marketing, especially in the information context.

The difference between product-oriented and marketing approaches.

The situation of information services and products in India with particular reference to barriers in adopting marketing approach by information professionals.

The steps involved in marketing of information services and products.

Thus, this unit has provided m overview of marketing.

10.7 ANSWERS TO SELF CHEC:((EXCERCISE.

1. The reasons are : Library and Information Services are not highly usee!; justification of library and information centre expenditure getting difficult Information services are not user-oriented; information services do need professional selling, etc.

2 In an information context, marketing may be considered as a management philosophy whereby the organisation ;

   i) Actively monitors the needs of its customers ;

   ii) Matches itself and its products or services with identified customer needs so as to satisfy them ;

   iii) Subsequently makes itself known by communicating with customers ; and

   iv) Fir.ally, measures customer's satisfaction in order to make any necessary adjustments .

3. While in marketing approach the emphasis is on the customer and the satisfaction of his or her needs, in the product-oriented approach, it is the organisayon itself or the existing product/service.

4. The objectives of marketing of information services & products are:

   - To enhance use of information sources and services
   - To increase customer satisfaction
   - To generate resources for running the service
   - To facilitate production of user-oriented rather than producer-oriented products.
   - To help in the design, implementation and evaluation of marketing programme .

5. The barriers to adoption of marketing approach by information professionals have been identified as :

   - ATTITUDINAL-- happy with satlsfying a limited clientele, that too when asked for
   - STRUCTURAL -- staff coming into contact with clientele are not information professionals and hence there is no staff to think from the point of view of the client.
   - SYSTEMIC -- library and information systems developed do not seem to allow the client or client's point of view inside the system.
   - ENVIRONMENTAL-- the culture, still believes in that information should be free.

6. The steps involved in a marketing programme are:

   - PLANNING

     Market Research & Market Segmentation

Product development
Promotion
Distribution
Pricing
Evaluation

IMPLEMENTATION

Review the Marketing Plan
Schedule specification
Resource Mobilisation
Staff & User Education and Training
Promotional activities
Monitoring

EVALUATION in relation to

Objectives
Products
Performance
Distribution Channels

10.8 KEY WORDS

Market Mix It is the combination of product design, pricing, promotion and distribution.

Market Research Is the gathering together of all information at every level in the marketing process. It is putting into order the information that enables management to make better decisions.

Market Segmentation : Is the act of dividing a market into meaningful parts or segments. Members of a particular segment are alike and different from members of other segments.

10.9 REFERENCES AND FURTHER READING

CRONIN (B) The Marketing of library & information services.1981 - London ASLIB.

KOTLER (P) Marketing for Non-Profit organisations. 1975 New Jersey Prentice - Hall.

ROWLEY (J) Information Marketing in a digital world. (Library HiTech 20,3; 2002;352-8) .

SEETHARAMA(S) Information Marketing : A new dimension in library & information Science. (In Probir Roychoudhary and N.Mukhopadhyay, Eds. Library & Information Services in India (Dr.S .M.Ganguly Commemmoration volume , Kolkata 2000, IASLIC, P. 213-232)

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UNIT - 11 : MARKETING RESEARCH AND MARKET SEGMENTATION

Structure:

11.1 OBJECTIVES

On Completion of this unit, you should be in a position to

- Define Marketing Research
- Describe the stages in Marketing Research as well as types of Marketing Research
- Explain the concept of Market Segmentation
- Identify the methods of segmenting markets for marketing purposes.

11.2 INTRODUCTION

According to Serraf, "Marketing is a coherent, three-pronged system of *research, strategy and action* --- the purpose of which is to identify, anticipate, contact, and monitor customers and to cope with changes and developments in the market "While strategy and action constitutes. the "operational phase" of marketing, research constitutes "functional phase" involving the collection that will be used to establish the strategies and terms of action. In this stage, information about the market, customers and environment is collected. This can be construed as a prerequisite for marketing and facilitates segmentation of the library or information centre's market into smaller, more manageable groups that have like characteristics so as to design and develop appropriate services and products.

While this unit discusses details regarding marketing research and market segmentation, the subsequent units will provide details on marketing Mix and Marketing in aigital environment.

11.3 MARKETING RESEARCH

Marketing research is useful for improving marketing decisions and understanding of marketing phenomenon in any marketing situation. It is specially useful for marketing of library information products and services. It is essential to effective strategic planning and implementation and its consideration needs to be a

continual process for most libraries and information services in the present complex and constantly changing world. The information generated by marketing research can be put to effective use in forecasting, planning, instructing and illuminating the whole management decision-making process (Rowley, 2001).

11.3.1 Definitional Analysis

While Kotler (1982) defines that "Marketing Research is the systematic design, collection, analysis, and reporting of data and findings relevant to a specific marketing situation or problem facing an organisation, "Green and others define "Marketing Research is the systematic and objective search for and analysis of information relevant to the identification and solution of any problem in the field of marketing "In other words, marketing research is a process whereby the information necessary for decision making in marketing is generated.

It is useful for improving marketing decisions and understanding of marketing phenomenon in any marketing situation. The decisions to be made are identification and selection of marketing opportunities; design of marketing strategy for tapping the selected opportunity, design of marketing mix elements, i.e., products, price, promotion and distril-Jution; and feedback & control of marketing effort.

Thus, marketing research is active and aim oriented ; it draws on statistic s, psychology, socioiogy and anthropology. It looks at marketing mixes , pricing research , the effectiveness of advertising and investigates the whole of mark eting communication. On the other han d , market research i s a subset of marketing research which ann s at identifying, measurin g and testing markets, so tha t services and produ cts can be more effectively targeted.

11.3.2 Stages in Marketing Research

The stages in marketing research proper are the same as in the scientific approach and include .

1. Identification of the problem (For example : Why does library use stagnate at around 20% of the population ? Which segments of the market make no use of data banks ? Why not ? How can a specific segment be reached ?).

2. Review of Literature

3. Formulation of Objectives

4. Selection of methodology

5. Data Collection

6. Data analysis and drafting of report.

11.3.3 Types of Marketing Research

The choice of methodology in marketing research generally depends on the advantages sought, having due regard for the nature of the problems posed and the physical context of the study. Certain methodologies do offer specific advantages; some are more economic while others may be quicker.

Perrin, Cheron and Zins identify three major types of marketing research: Exploratory, Causal and descriptive. While exploratory research is rarely conclusive and is associated with data-gathering methods which are cheap and relatively simple to apply like use of secondary data & case studies, the purpose of causal research is to establish the cause-effect relationship between the variables affecting a marketing situation and employs very sophisticated types of methodology including experimental methods and sophisticated statistical methods. On the other hand, descriptive research is the commonest type of research in information services, particularly for the identification of customer needs. In descriptive researches, the methods employed are observation, questionnaire, diary method, personal and group interviews, correspondence, etc., Depending on the situation, these methods are used either singly or in combination.

Fi :.l : Different Types of Marketing Research

Exploratory Research

Secondary Data

Case Studies

Causal Research

(Experimental)

Descriptive Research

Observation

Questionnaire

Diaries

Personal Interviews

Group Interviews

Telephone Interviews

By Correspondence

11.2.4 Marketing Research in Information Context

Marketing Research for information services involves the study of communication and behavioural patterns of the users and those to whom he has de egated his search. It is necessary that the research activity must continuously study the changing needs of users to avoid basing strategies on past, no longer applicable assumptions. Marketing Research is especially applicable to answer questions about. the basic elements of what marketing professionals have identified as the marketing mix -- products, promotion. place and price. Research is necessary in each of these areas to maximise final acceptability and success of the information product.

While *Product Research* is concerned with such elements as content, coverage, currency, format, frequency, graphics, packaging / repackaging, indexing and production caoability; *Place Researh* is concerned with existing distribution methods and the cost of alternative means of distribution of the product. On the other hand. while *Promotion Research* must determine (after considerable trial and error) the most effective means of promotion of products, *Price Research* requires complete data on the cost of production, basic financial policy and profitability goals of the organisation / library, competitive products and services, etc., (Reed, 1992).

Marketing Research, In its turn, would involve the steps of Data collection, Data Analysis, Data interpretation, Presentation of Research, and Feedback or Follow up (Ritchie, 1994). A diverse group of techniques and methods are appropriate and effective at each stage of Marketing Research.

Self- Check Exercises

1. Distinguish between Marketing Research & Market Research.
2. List the different stages in marketing research.
3. What are the major types of marketing research.

Note:

i) Write your answer in the space given below

ii) Check your answer with the answers given at the end of the unit.

11.3 MARKET SEGMENTATION

Market Segmentation is the segmentation of the clientele / users on the basis of individual differences and group similarities. Essentially, segmentation is the division of the library or information centre's market into smaller, more manageable groups that have like characteristics. Marketing mixes can be fine tuned to serve the needs of these groups or segments and marketing communications targeted more precisely. It is believed that the practice of segmenting markets would lead to better use of resources and services since those resources and services can be targeted with maximum effectiveness.

11.3.1 Characteristics of Segmentation

A market segment needs to satisfy the following criteria if it is to be targeted successfully :

It should be homogenous i.e., the characteristic variables of the group need to be identifiable and strong enough to warrant different treatment.

It should be accessi ole for targeting to succeed. An identifiable segment may be available only at particular times, student populations in term-time, twilight shift workers, etc.

The segment size should be measurable and justify targeting. This does not always mean large numbers , but cost-effectiveness should be a primary question for librarians and information managers .

Appropriate or natural segments will be identified as prime targets when there is a positive answer to the following questions :

Awareness-- can they be made aware successfully?

Availability-- can the service be made available to them dfectively ?

Affordability -- can the segment afford to use the service ?

Acceptability-- can the service be made more acceptable to them ?

11.3.2 Methods of Segmentation

Market segmentation involves the identification of the users (target groups) -- actual and potential --, and their needs assessment. This would involve collection of information on the institutional projects and programmes as well as individual user's interests and needs.

In the designing of the user study, the objective of the study, the variables to be studied, the model to be followed, the population sample to be studied, the data collection methods to be adopted, the analytical methods to be followed are to be

determined with care. In its turn, a study of clientele facilitates the identification and analysis of their needs which may be categorised as functional / problemistic / social / emotional / epistemic needs. Another categorization would be for retrospective searches, current awareness , browsing, specific information , problem-solving, managerial decision-making, etc.

While the methods of dividing the markets into segments are many, it is often a combination of methods that leads to success . Segmentation can be by subject / institution / volume of use / age groups (adult, young, children, etc.), special interest groups, such as, faculty, students and researchers. Ultimately, the goals of market segmentation are to predict and influence customer or user behaviour.

Markets can also be divided by :

GEOGRAPHIC SEGMENTATION by country, region, state or city.

DEMOGRAPHIC SEGMENTATION according to demographic variables such as age, sex, income, occupation, race, nationality, religion, education, family size and family life cycle stage (Bachelor stage, Newl y married couples, Married couples with dependent children, older couples with the head of household still working or retired etc.)

GEODEMOGRAPHIC SEGMENTATION according to where they live (A Classification of Residential Neighbourhoods (ACORN System): Modern family housing, higher incomes; Better off council estates; High status, non-family areas ; Multi-racial areas), Social Class Grades -- Upper middle class, Middle class, Lower middle class, skilled working class, Working class, Pensioners).

BEHAVIOURAL SEGMENTATION differentiates target markets ace;orging to usc: ge rates, Willingness to innovate or user perception of benefit .

LIFE STYLE SEGMENTATION attempt<; to profile a person's way of living and acting. VALS approach (Values And Life-style Segmentation) classifies the population into a number of categories: *Sustainers*, who are disadvantaged but

fighting hard to escape ; *Belongers,* who are conventional , nostalgic, generally reluctant to experiment ; *Achievers* , who make things happen and enjoy life; and *Societally Conscious,* who have a marked sense of social responsibility .

);;- PSYCHOGRAPHIC SEGMENTATION is based on the practical applications of psychographies , where-in personal, psychological, social and cultural factors that govern user behaviour are considered.

Thus, marketing research and segmentation study is a User Needs Assessment study with stress on economic aspects and constraints, as well as on alternate products or services. Table 1 gives a market segmentation of user groups and the services / products targeted to them . This is one of the essential and important steps in marketing as it facilitates in the development of an appropriate "Marketing Mix"-for each audience or target market. The Marketing Mix deals with four "Ps" -- Products , Promotion, Price and Place -- together with the fifth "P"- "Processing" .

11.3.3 Strategies for Market Segmentation

It is absolutely necessary that libraries identify those parts of the mass market which they can most effectively serve. There are three strategies that can be adopted :

);;- Undifferentiated marketing

);;- Differentiated marketing

);;- Concentrated marketing

Undifferentiated marketing where all users have similar needs and the library caters to the whole group with standard services and products. In other words, those services and products which appeal to the broadest number of users are provided. This strategy is resorted to when there are financial constraints and special services are to be curtailed.

Differentiated marketing, on the other hand, is the dividing of the target market i1tc, smaller groups and designing of separate services and products for each group. In

this strategy, the library recognises the different needs of users and each individual group's special, needs are examined and appropriate services are provided. Obviously, this approach involves additional staff costs, administrative and promotional costs.

Concentrated marketing occurs when the library concentrates upon a small number of submarkets and provides in-depth services in a few areas, thereby serving a small percentage of the market place. For example, a specialist library may decide to concentrate on selective dissemination of information and High Speed Reference Service. In other words, prioritising is resorted to among the users in provision of serv1ces.

Self Check Exercises

4. What is Market Segmentation ?

5. List the different methods of market segmentation.

6. Enumerate the strategies for market segmentation.

11.4 SUMMARY

In this unit, we have :

- Explained the concept of marketing research.
- Identified the stages and types of marketing research.
- Discussed Marketing Research in an information context.
- Explained the concept of market segmentation.
- Identified the different methods of segmentation and the strategies that can be adopted.

11.5 ANSWERS TO SELF CHECK EXERCISES

1. \\.hile Marketing Research is active and aim-oriented and looks at marketing mixes, pricing research, the effectiveness of advertising and investigates the whole

of marketing communication, Market Research which is a subset of marketing research aims at identifying, measuring and testing markets so that services and products can be more effectively targeted.

2. The different stages in marketing research are identification of the problem, Review of literature, formulation of objectives, selection of methodology, Data collection, Data Analysis and Drafting of Report.

3. The major types of marketing research are Exploratory Research, Causal Research, and Descriptive Research.

4. Market Segmentation is the segmentation of the clientele / users on the basis of individual differences and group similarities. Essentially, it is the division of the library or information centre's market into smaller, more manageable groups that have like characteristics.

5. The different methods of market segmentation are Geographic segmentation, Demographic segmentation, Geodemographic segmentation, Behavioural segmentation, Life style segmentation, Psychographic segmentation.

6. The strategies for market segmentation are : Undifferentiated marketing, Differentiated marketing, and concentrated marketing.

11.6 KEYWORDS

Market Mix — It is the combination of product design, pncmg, communication and distribution.

Marketing — It is a planned approach to identifying and gaining the support of users and developing appropriate services in a manner which benefits the users and furthers aims and objectives of the library / information centre.

Marketing Audit — It is an independent examination of the entire marketing effort of an organisation covering objectives, programmes, implementation, organisation, and control for the purpose of determining what is being done and recommending what should be done in t 1e future.

11.7 REFERENCES AND FURTHER READING

CRONIN (B) Marketing of Library and information services 1981, London, ASLIB.

KOTLER (P) Marketing for Non-profit organisations 1975, New Jersey, Prentice- Hall.

ROWLEY (J) Information Marketing in a digital world (Library Hi Tech 20,3 ;2002;352-8).

SEETHARAMA (S) Information Marketing - A new dimension in library & Information Science. (In Probir Roy Choudhury and Nirmaluder Mukhopadhyay , Eds. Library & information Services in India (Dr.S.M. Ganguly Commemoration Volume).Kolkata. IASLIC.2000.P213-232).

UNESCO Workshop on Marketing of information products and services 27 Nov.-1Dec.1989.New Delhi.

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UNIT-12: MARKETING MIX : SUPPLY MIX

Structure :

12.1 OBJECTIVES

After reading the unit, you should be able to :

Identify the ingredients of the marketing mix

Describe Product, Price, Place / Distribution of the marketing mix in the information context.

12.2 INTRODUCTION

You have already realised the importance of marketing in the information context as well as understood the what and why of marketing in unit 10. In addition, the elements involved in marketing, especially, Marketing Research and Market Segmentation have been discussed in detail in unit 11.

In this unit, the analysis of the various elements of the marketing mix related to the product and the conditions under which it is to be supplied, its price and distribution are described in detail. This would be followed by an introduction to marketing communication in the context of information services in unit 13.

12.3 DEFINITIONAL ANALYSIS

In attempting to discuss the subject of "Marketing Mix", it would be helpful to provide definitions of terms used.

Marketing Mix: It is the combination of product design, pricing, communication and distribution. It is the set of ingredients which make up the marketing strategy, the aim of which is to maximize the satisfaction of customer needs. Each element in the mix is itself composed of sub-elements which form a mix. There is, Therefore, a "Product" mix, a "distribution" mix, a "Communication" mix, etc. The precise configuration of each of these elements and sub-elements will be worked out on the basis of the results of marketing research.

Product constitutes the heart of marketing. The term "Product" refers to the overall output of an organisation : goods, services and activities. It refer's to both tangible physical product (Car, Soap, CD-Rom containing information) as well as intangible services (insurance, banking products, etc). Chirouze defines the product from the marketing standpoint as a set of material and intangible elements fulfilling a practice and a prestige function, which the consumer wants for the services it provides and its capacity to satisfy needs Levitt (1991) notes, "To a potential buyer, a product is a complex cluster of value satisfactions ... Customers attach value to a product in proportion to its perceived ability to help solve their problems or meet their needs. "Kotler, (1994), on the other, has defined product as "anything that can be offered to a market for attention, acquisition, use or consumption that might satisfy a want or a need".. He distinguishes three levels in the concept of a product :

(i) Tangible Product which is perceived directly by the customer. E.g.: books or physical documents.

(ii) Core Product is the essential benefit obtained by the customer. E.g.: Information supplied by documentation centres, leisure activities provided by public libraries, Knowledge and learning which may be obtained by consulting a university library.

(iii) Augmented product covers the advantages perceived by the customer who obtains or purchases a product, for example, the quality and objectivity of the information provided by a reputable documentation service.

Distribution has been defined by Lovelock and Weimberg as the various means available for providing customers with access to "The right product at the right time at the right place". Product distribution structures are, therefore, devised to match the habits and behaviour of the groups of target customers. As a matter of fact, distribution is a matter of access over time. The service must be available when the customer needs it.

Price:

The Concept of price as an element of the marketing mix covers two different types of Price: The monetary Price, which concerns the payment of a certain sum by

the customer/ user, and the social price which corresponds to the additional effort which the customer must make in order to obtain access to a product. As a matter of fact, the term "Price" is used to describe the market value assigned to an item. It is the real cost to the customer or user, including other costs than solely money. Price is ascribed value, generally expressed in terms of currency units, such as rupees, ponds, dollars. It may also be expressed in terms of services or other goods which the seller and buyer may agree to exchange for the item. Price goes by many names-- Price (most physical merchandise), Tuition (Education, eg. :College Courses), Rent (a place to live or the use of equipment for a specific time period), Interest (use of money), Fee (Professional services: charged by lawyers, doctors, consultants), Fare (Transportation: air, taxi, bus).

Self Check Exercises

1. Define the terms "Product" and "Distribution".

Note:

(i) Write your answer in the space given below

(ii) Check your answer with the answers given at the end of this unit.

12.3 PRODUCT

One common mistake in marketing is to define the product too narrowly, which Levitt refers to as "marketing myopia". This is the reason why the term "Product" has been defined extensively in Sec.l2.2.

Based on the information collected in Marketing Research & Sepmentation, the management can take decisions on :

(i) who should be the user groups to whom the information services / product should be targeted to?

(ii) what should be the service / products that can be produced and marketed to the different target groups ? Are there any alternatives?

12.3.1 Parameters in Product Design

Obviously, in the planning, designing and development of a product, the parameters to be considered are :

Type of library / information centre

Users and their informational requirements

Use put of the information accessed

Purpose-- stimulation, knowledge, current awareness, Productivity, theorising, comparison, problem solving, education, decision-making, adaptation, etc.

Periodicity

Sources of information (for generating the service / Product)

Content aspects -- Technical sophistication, Temporal aspects, Quality & Accuracy, Editorial Qualities, etc.

Presentation of information-- textual and non-textual

Format for presentation

Coverage / Scope -- Subject, Period

Distribution / Audience

Pricing & Promotion

Manpower requirement-- knowledge and skill required, number of personnel.

Technology--computer, Communication, Reprography and its utilisation

Finance -- Revenue & Expenditure

Managerial considerations-- Feasibility, Phases of Development, Cost (Start-up, Operational, Re-imbursable & Non-reimbursable costs), Ease of availability of facilities, Manpower, sources, materials, etc, Length of start-up time, Training required (if any), Extent of derangement of existing organisational structure including displacement of personnel, etc.

Details regarding these parameters have been dealt with elsewhere (Seetharama, 1990). It is worthwhile mentioning here that presentation of information in information products has not been given due attention. This has been aptly expressed by the statement "Presentation is the Cindrella of the information Age". Perhaps, this is what Alvin Toeffler meant in "The Third Wave" When he remarked "many people feel cut off because the very packages., in which information arrives are unfamiliar... " Therefore, a necessity has risen for adoption of innovative techniques for "packaging, customising and presenting information products to prospective customers or users of information. Information Consolidation & Repackaging is one such technique since it plays a significant role in making available and accessible to users information that is appropriate to the task at hand and structured and packaged to coincide with his or her level, language and available time. Thus, one can see the emphasis on customer satisfaction -- which is the major objective of marketing. Incidentally, this is in consonance with Blaise cronin's definition that "Marketing can be summed as the process of Customer- Satisfaction Engineering". Consequently, Value-added information products are appearing on the information scene. This repackaging process has been further enhanced by the advances in information technology, particularly by the designing and development of appropriate software packages. (Rath & Seetharama, 1996).

Therefore, while in the demand-driven approach one must design and develop services and products required by the target group, in the supply-driven approach,

efforts should be in the direction of ensuring a feedback from the users on the information products and services. Some of the areas for feedback include usefulness of products, ways in which information is applied by the users, ease of use, suitability of information supplied, suggestions for improvement. In other words, customer satisfaction, a key concept in the marketing approach should be the object of focus in the design and development of information services and products. Such an approach not only ensures provision of information in the right form at the right time, but also facilitates use of information. This is in conformity with the framework for information consolidation. Thus, one can observe the process of information consolidation and repackaging as a marketing mechanism.

12.3.2 Lines and Ranges of Products in Information Services

It is necessary that information professionals must consider the Lines & Ranges of Products which are to be provided to the users. Line of products is the totality of products of a single type offered by a library. Examples would be the various types of documents available from an information service: monographs, periodicals, films, microfiches, etc. The range of products comprises all the product lines offered by the organisation, for example the various documents, customer services and research services. The Figure below illustrates some possibilities for an information service.

Range of Products	Documents	Assistance for user	Research services
	Monographs Periodicals Maps / Plans Audio-visual	General Guidance Reference & Information specialised Reference	Access to data banks, Retrospective bibliographies, SDI.
	PRODUCT LINE	PRODUCT LINE	PRODUCT LINE

12.3.3 Life Cycle of a Product

Information professionals need to realise that products are not permanent and have a life cycle. They pass through various stages characterised by different levels of market acceptance. The stages / phases include :

- *Introduction Phase,* when the product unknown to public is introduced by special effort of advertising.
- *Growth Phase,* during which the product achieves a wider distribution. One feature of this stage is development of competition among same products produced by different organisations.
- *Maturity Phase,* when the level of sales of product stabilises.
- *Decline phase,* follows maturity phase when the product declines. At this stage, when new rival products appear, customer preferences alter and fashion changes. However, there is no definiteness in regard to the duration of each phase as well as the total life cycle of any product. The implication is that even information products decline and die over time and need to be replaced by new innovative products appropriate to changing user needs.

12.3.4 Stages in the creation of a Product

The creation of a new product is usually said to involve the following eight stages :

(i) Search for ideas -- Generation of many ideas with the aim of turning them into products or services.

(ii) Sifting the ideas -- Collected for purpose of selecting the best of them.

(iii) Defining the concept of the product with particular reference to content and form, the structure, method of indexing, interrogation and access facilities, mode of distribution, etc.

(iv) Economic & Commercial analysis-- to determine the viability of the product.

(v) Define the marketing strategy to decide how it will combine with the other elements in the mix.

(vi) Product development

(vii) Product testing for finding out the reaction of the users to the product.

(viii) Product launching

12.3.5 Products by Diffusion Stages.

Perhaps, it is worthwhile here that one of the methods of targeting is adjusting the products(s) to correspond to information needs at different stages of the diffusion process . Saracevic and Wood (1981) have given examples of products by diffusion stages in academic / research institution in the following table :

Awareness	**Interest / Knowledge**	**Attitude formation**	**Trial Decision**	**Adoption / Confirmation**
Journal notices, Short announcements in professional news letters	State-of-the art report Critical Reviews, Synthesised research results	Synthesis of Critical reports and evaluations Comparative Results	Research data Training/ Education materials know- why information	Continui 11g Synthesised SDI reports Selective ctrr nt contents

In addition, package media-- print, audio-visuals, demonstrations, interpersonal contact, etc for the product also should be considered in marketing of information services and products. In other words, in the design of information services and products:

(a) The target user groups and the appropriate mix to be developed should be decided.

(b) The existing infrastructural facilities available for the creation of the products has to be examined.

(c) Planning individual information services and products taking into consideration the various . Parameters, including packaging and repackaging and naming of the product.

Self Check Exercises :

2. List the parameters to be considered.in the design and development of information products.

3. Enumerate the different stages in a Product life-cycle.

Note:

(i) Write your answer in the space given below

(ii) recheck your answer with the answers given at the end of this unit.

12.4 PLACE / DISTRIBUTION

Place is usually translated into "Distribution" in a commercial marketing mix, but suits admirably for libraries and information centres, since it refers to "where" and "how" a service is made available to the users: The keyword is "convenience" in the context of place, and if one makes a service convenient and automatically the service use will grow. Since, if the point of access.-- whether it is a geographical location or Via a telecommunication network -- is convenient from the user's point of view, the service / product will be used and appreciated. One other factor which is important is "Accessibility". It is a well known fact is that availability does not guarantee accessibility. This concept of "accessibility" covers both "where" and "when". For example, opening and closing hours of a university library are important. The library should be kept open in the early morning as well as late evening hours to students / staff who would be attending academic programmes / courses the whole of the day and hence library becomes inaccessible during that time. It would be ideal if the library is accessible all the twenty four hours in a day, but is rarely the case in a traditional

library environment. However, in a network-based electronic environment, accessibility at all times is possible. But, the user needs to be computer-literate if he wants to enjoy 24- hour accessibility. In addition, the users need to be trained in using network-based services like web and intranet services.

Another factor that affects 'distribution' is the environment as the user assesses the quality of the service en the basis of the environment in which it operates. However good a service may be, it tends not to be used if the environmcni is incompatible physically and mentally to the users.

Saracevic and wood (1981) have identified the following major channels of dissemination / distribution:

(a) Interpersonal delivery :Products personally delivered either on the request or in anticipation of a need. This method is most costly and time-consuming, though it is very effective.

(b) Group personal delivery : products delivered to a whole group of users as at meetings, conferences, seminars, demonstrations, etc.

(c) Strategic placement :Products placed at strategic location frequented by users like canteen, sports complex, etc.

(d) In-house dissemination : reference and referral

(e) Local depositories : Products through cooperative arrangements with an information system.

(f) Mass-media : Dissemination through newspapers, Professional journals, magazines, etc. Products to be in narrative style.

(g) Broadcasting : Radio & Television

(h) Mailing of products through postal facilities

(i) Telephone

(j) computer net-works, etc.

In this step, the activities involved and decisions to be taken are as follows:

(i) Identification of channels of distribution vis-a-vis the information services and products.

(ii) choice of channel as well as type of level

(iii) Channel performance evaluation-- marketing service output (Volume of products delivered over a period of time), costs and efficiency, and innovativeness (ability of channel to adjust quickly and properly to changes)

While each channel has its own advantages and disadvantages, a judicious mix of different channels should be used for distribution of information products.

Self Check Exercises :

4. List the different methods of dissemination / distribution of information products.

Note:

(i) Write your answer in the space given below
(ii) Check your answer with the answers given at the end of the unit.

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_____

_____

_____

12.5 PRICE

A critical element in the marketing mix is "Price" --the analysis of what products really cost and the relationship between that cost and customer demand for information serv ces and products. Pricing of information services and products is relatively a new co11.cept. It has not been considered seriously since library and information services

were provided "free". But, with increased emphasis on accountability and self-sufficiency in relation to resources, it has become necessary to cost the various activities and to recover costs as much as possible. Further, the fact that (i) information brokers and consultants are charging high fees for services provided and are thriving successful is indicative of the users' willingness to pay for good products. At this point of time, it should not be forgotten that they are generating services using the "free" materials / services provided for in the various libraries. On the other hand, it may be argued that since most libraries -- public, academic, special -- are supported either directly or indirectly by the government (using the taxes received from the public), why should the end-users be asked to pay. This is a question of ethics and hence not considered here. However, it should be remembered that not charging is also a pricing decision.

Pricing of products should be based on costs incurred in the generation of a product or a service. This is not an easy process as whether overhead costs, depreciation, interest on capital, etc should be included in costing is a difficult question to answer. But, costing is a must as it comes in handy at the time of budget justification, especially, if cost-benefits and cost-effectiveness can be highlighted. Thus, to arrive at a pricing decision, the following questions need to be answered:

(i) What are the costs involved in the generation of services and products? what factors / parameters need to be considered in arriving at costs ? which of these factors can be overlooked or ignored for costing and why ?

(ii) Should the information services and products be given "free" of charge ? If so, to whom and why? what would be the impact in relation to value of product, if given free?

(iii) If the services / products are to be charged for, what should be the criteria for pricing ? Full cost-recovery ? Partial or Marginal recovery ? Should variable price based on ability to pay by the user be considered ? Should a profit percentage be added to the cost in pricing ?

(iv) Who should be charged-- internal or external clientele or both? What would be the impact on users in relation to pricing of products ? Would they be willing to pay ? Would demand fall and to what extent if products are priced ?

Product pricing is fluid, changing and rather uncertain as technology is changing the relative economics of traditional forms of publication against optical media, of use of on-line databases versus CD-ROMs, and so on. Pricing strategies to be adopted for information products can be determined through the consideration and inter-relation of three elements:

Objectives of the particular service or product;

Nature of the costs of the function and aims for cost recovery ; and

Nature / level of demand and the market. On the other hand, a model of levels of information service was developed which has under applic bility and may be used to guide pricing. They are:

Level 1 : Advice concerning routine use of the library (free, and free use of library of university if they wished to use it).

Level2 Quick reference queries, which can be handled, by reference to available resources within approximately 15 minutes time not charged.

Level3 Provision of information where the results are passed to the organisation in the original format, e.g., Online printout or photo copy of the original document, with appropriate annotations are appropriate-based on direct charges, plus time-factor.

Level4 Provision of information where the results are reformatted to the organisation's needs -- direct charges, plus much higher charge for time factor.

Level5 Provision of information where results are presented with some interpretations or value-judgement -- time charged, near management consultancy rates.

Level6 Acting as a consultant for organisation on information management -- consultancy charges, based on hourly and daily rates.

Level 7 Acting as consultant for information strategy of a company, as 6

Level 8 : Acting as management consultant as 7 but higher rates (Brindley, 1993).

A similar line of thinking can be seen in Zais's Pricing approaches and Merkulov's five pricing models. Clague (1992) has suggested the following guidelines on charging of information services :

(a) Charge enough

(b) Know what you want to achieve

(c) Keep pricing structure simple and stick to it

(d) Identifying and monitoring expenditure

(e) Setting fees

(f) Maintaining the achievements of income goals.

Thus, the practical issues involved in charging fees for certain services include : Setting the services, staff, determining the charges, legal aspects, market analysis, promotion and distribution of funds.

12.5 MAJOR PRICING STRATEGIES

In pricing of information services and products, formulation of a pricing policy becomes essential. The pricing policy, in its turn, is dependent on the thinking of the management -- to recover costs, to make profit, to maintain standards of service, or a social objective of providing a service irrespective of the costs involved. Thus, depending on the pricing policy, one of the following approaches can be adopted :

>- COST - BASED PRICING -- Where the objective would be to attain a "Break-even" point where no loss is incurred or where fixed costs and variable costs are recovered.

DEMAND-BASED PRICING-- Where, as the name suggests, prices are based on the demand, i.e, lower prices where demand is weak and higher prices where demand is high, i.e., price discrimination based on demand.

COMPETITION- BASED PRICING-- Where prices of products / services are based on what others are charging for a similar service or product, irrespective of the demand and costs incurred.

MARGINAL COST-PRICING -- Where the price is set to equal the marginal costs.

DUAL PRICING-- Where price is set on the basis of the paying capacity of the user.

SUBSIDISED PRICING-- Where price is set below the costs incurred more as a social objective.

PROFIT-BASED PRICING --Where, as the name suggests, the objective is to make a profit over and above the costs incurred.

Zais's Views that "Price setting is an art. But if information from models can aid the decision maker in the process of price formulation, then it should be explored and used" are worth noting by Indian librarians and information scientists.

Self Check Exercises :

5. List the major pricing strategies.

Note:

(i) Write your answe in the space given below

(ii) Check you answer with the answer given at the end of the unit.

12.6 SUMMARY

In this unit, we have analysed the various elements of the marketing mix related to the product and the conditions under which it is to be supplied: its price and distribution. In particular, the various parameters in the design and development of information services and products, the major channels of distribution, and the type of pricing strategies for products that can be adopted have been discussed in detail in this unit.

12.7 ANSWERS TO SELF CHECK EXERCISES

1. Product refers to the overall output of an organisation: goods, services and activities. It refers to both tangible products and intangible services. Kotler, on the other hand, defines product as "anything that can be offered to a market for attention, acquisition, use or consumption that might satisfy a want or a need". Distribution has been defined as the various means available for providing customers with access to " the right product at the right time at the right place".

2. The parameters to be considered in the design and development of information products are : Type of library / information centre, users and their information requirements, use put to of information accessed, purpose of product, periodicity, sources of information, content aspects, presentation of information, format for presentation, coverage, distribution, pricing, promotion, manpower, technology, finance and managerial consideration in instituting services.

3. The different stages in a product lifecycle are: Introduction phase, Growth phase, Maturity phase, Decline phase.

4. The different methods of distribution are: Interpersonal delivery, group personal delivery, strategic placement, In-house dissemination, Local depositories, Mass media, broadcasting, mailing of products, Telephone, Computer networks, etc.

5. The major pricing strategies are : Cost-based pricing, Demand-based pricing, competition-based pricing, Marginal cost pricing, Dual pricing, subsidised pricing, Profit-based pricing.

12.8 KEYWORDS

1. Cost-Benefit Analysis	It is a technique that attempts to set out and evaluate the social costs and social benefits of investment projects to help decide whether or not a project should be undertaken.
2. Marginal Cost	The change in total cost production which results when output is varied by one unit.
3. Market Mix	It is the combination of product design, pricing, communication and distribution.

12.9 REFERENCES AND FURTHER READING

1. BRINDLEY (LJ)	Information service and information product pricing. (Aslib Proc. 45; 1993;297-305).
2. KOTLER (P)	Marketing for non-profit organisations Ed 2. 1982.Englewood Cliffs.New Jersey, Prentice-hall.
3. MAJARO (S)	The essence of marketing. 1993. Englewood Cliffs, New Jersey. 1993-Prentice-Hall.
4. SARACEVIC (T) and	Consolidation of information A handbook of evaluation,
WOOD (JS)	restructuring and repackaging of scientific and technical information. 1982, UNESCO, Paris.

5. SEETHARAMA (S) Information Marketing : A new dimension in library and information science. (In Probir Roychoudhury and N.Mukhopadhyay, Eds. Library & Information Services m India. (Dr.S.M.Ganguly Commemoration Volume). Kolkata, IASLIC, 2000. p 213-232).

6. UNESCO Workshop on Marketing of Information Products and Services. 27 Nov-1 Dec, 1989, New Delhi.

7. ZACHERT (MJ) and WILLIAMS (RV) Marketing measures for information services. (Spec Libraries. 77; 1986 ; 61-70).

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NOTES

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Master of Library and Information Science

M.Lib.I.Sc - 1

Foundations of Information Science

BLOCK - 4

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BLOCK

4

INFORMATION USERS AND THEIR REQUIREMENTS

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Developed by Academic Section KSOU, Mysore

M.Lib.I.Sc - 1: Foundations of Information Resources
Block – 4 : Information Users and their Requirements

Block Introduction

In BLISc course, you have been already introduced to 'user studies' and 'user education'. If 'user education' aims to educate users about the library system, 'user studies' is concerned with educating librarian about users. Significance, content and scope of user studies together with finding characteristics, requirements and behavior of user and methods and techniques used in such studies have been briefly explored in BLIS. This block is completely devoted to information users and their requirements. You will recapitulate user studies and their development (Unit-13), study in detail, the concepts of information need, want and requirement (Unit – 14), explore typology of information needs (Unit –15) and finally understand the use studies and their relation to user studies (Unit – 16). Please note that it is now titled as 'information users' and not just 'library users'.

Unit – 13 in this block makes you understand the basic tenets of user research and helps you know how to conduct user studies most of the user studies have adopted survey and case study methods, but have failed to understand user behavior in real perspectives. Use of holistic qualitative methods is broadly needed in this area of research. The unit, at the end suggests the need for foolproof research analysis and interpretations.

Unit – 14 focuses on the concepts of information needs, wants, requirements and other related concepts. Different approaches such as constructive approach, value added approach and sense making approach to understand and to conduct studies on information need are explained. Further, what major factors affect the information needs of users are indicated.

Unit – 15 is an extension of 16 and enables you to understand 'information need' in different perspectives some of the past studies on 'information users' and their results

are briefly indicated. They provide the basis and some insight for future information need studies.

Unit – 16 gives you the major findings of the past studies on ‘use and user information’. The another’s own research on this area at ISAC Library, Bangalore. Emerged with pattern of use IT books, journals, reports and standards. The study gives the ‘use pattern’ within centre (library) and ‘lentouts’ reasons for ‘under use’ and ‘non use’ are highlights.. Information behaviour in general and Information Seeking Behaviour (ISB) in particulars of space scientists/technologists at ISRO is the focus of the study.

Researcher in librarianship is profuse with ‘user studies’, user education. ‘Information Seeking Behaviour’ and this block
give you the guidelines and some tips to proceed with this type of research.

Prof. V G Talwar

Unit -13
CONCEPT OF USER STUDIES AND ITS DEVELOPMENT

Structure:

13.0 Objectives

This unit introduces you to basic concepts of user studies and helps to know how to conduct user studies. After studying this unit you will be able to (i) appreciate the importance of user studies in establishing and running a library on information system (ii) scope and limitations of user studies (iii) Understand various aspects of user studies and steps involved in conducting user studies.

13.1 Introduction

In BLIS course, you have been already introduced to 'user studies' and 'user education'. If 'user education' aims to educate users about the library system, 'user studies' is concerned with educating librarian about users. Significance, content and scope of user studies together with finding characteristics, requirements and behavior of user and methods and techniques used in such studies have been briefly explored in BLIS. This block is completely devoted to information users and their requirements. You will recapitulate user studies and their development (Unit-14), study in detail, the concepts of information need, want and requirement (Unit – 15), explore typology of information needs (Unit –16) and finally understand the use studies and their relation to user studies (Unit – 17). Please note that it is now titled as 'information users' and not just 'library users'. When we use the term 'information'' we are reminded of many associated terms. Examine the following common everyday statements to identify and distinguish them:

- What *news*?
- May I have some *information* on X ?
- I have lot of *data*?
- Do you have *knowledge* of Y ?
- I need your *advice* on Z ?
- His *intelligence* can help us to solve the problem
- Do you have *facts* of this case ?
- Let us have *wisdom* of elders

What all these associated terms mean and how to go about for defining and distinguishing them is out of scope of this unit. You may find some of them under 'Information services' Unit.

However, the following three practical definitions of ‘information’ may be kept in view for the purpose of conducting use and user studies.

(i) Information as a noun means contents of a message irrespective of its manifestations and length of exposition
(ii) Information is a stimulus that causes change in the degree of certainty or uncertainty of the receiver
(iii) Information adds to knowledge and /or helps one in decision-making and problem solving situations

From the above, It is clear that information is an amorphous concept, less susceptible to a precise definition. Yet, everyone has to deal with it in many ways throughout one's life. Indeed, information has been described as the fifth need of man ranking after air, water, food and shelter. Information-collection, transfer and use are all-pervasive and universal activities in all walks of life. Knowingly or unknowingly, intentionally or unintentionally, all of us most of the time of our life and work (including the actions of the author and the reader at this moment) are concerned with information - its generation, recording, processing, repackaging, transfer, receiving, use and application. Information is the vehicle, substance and a resource for power .

Knowledge in general and information in particular become more meaningful when they are transferred and communicated. Compared to information, knowledge is believed to be passive and an item of knowledge becomes an item of information only when it undergoes the active process of communication. Information `explodes' into power only when it is transferred and communicated. In other words, information is activated by communication. The purpose of transfer and communication of information is `use'. Without the intention on the part of the ultimate receiver or beneficiary of information to use it, the whole exercise of transfer and communication becomes futile and information transferred becomes redundant. On the other hand, seeking and communicating information are two sides of the same coin from the viewpoint of individuals concerned. Both have the same purpose : use. Information which has no use is no information. Thus the central thread of the whole range of activities relating to information-transfer and communication is `use'. Hence the emphasis on `use' and user-orientation in all communication and information relates endeavor-whether from a formally designed and operated information-system or from an informal source. A wide range of research works centered around `use' and ‘user’ of information called `use and user-studies' have cropped up for last half-a-century.

13.2 Need for User-Research

The user is the key person in any information-system. All the luxuries of information-revolution and problems of information-explosion are centered round the user and his convenience. Understanding the user is half the battle in providing information-services. The success of any information-system depends considerably on how best the system design is based on a close and accurate understanding of the users. The user is not only the most important aspect, but is also, paradoxically, a dynamic component of information-system. As such, understanding `user' is an important and a continuous activity. `Know the customer' is the cardinal rule of any business enterprise. Accordingly, extensive market research, customer-behaviour studies and demand forecasting are carried out in business. A formal information centre or library, unfortunately, does not carry it out with the same spirit. Information-system is not concerned with just demand, it has to stretch its hands to know the information-needs, the motives and purposes of seeking information, ways and means of gathering information and the entire user-attitudes and practices in relation to information. An important starting point is the target for information - the individuals who constitute the `receiving' community. The user has to be given adequate consideration from any point of view in most information-supplying systems. The user has to be studied, understood and identified before the system is evolved .

If the systems designed and implemented are unfriendly, complex and not concerned with the perceived needs of users, user-education does not help . What is more important is intensive librarian-education about users than mere education of users of the existing system. Hoadley and Clark (1972, p133) say that a library can achieve its goal "... if the library is more precise about who its users are. This precision, coupled with more research into behaviour and information-gathering patterns of these user groups, will assist the library more effectively in developing programs and using its resources and limited funds to achieve desired goals." Accurate and up-to-date knowledge about users and their information-behaviour is one of the essential ingredients for designing an information-system. The need is for user-driven design than technology-driven design and more research on human variables of information-system than technology and system variables. In other words, a practicing librarian has to have technical skills as well as information (or 'soft') skills.

The effectiveness of library and information-system depends on the extent to which the system-characteristics correspond with the user and on how much the potential user is willing and able to make use of it. Kunz and others (1977, p9) say "A sufficient identification, analysis and co-ordination of the `real' information-needs of the user is an essential basis for the planning, implementation and operation of information-systems and networks." Further, Disregarded is the fact that a particular class of people will accept modes of information-transfer only if they are applicable to their habits, their style of work, etc., and only if certain minimum practical requirements are met".

Research in library and information science is more meaningful if the findings increase the efficiency and effectiveness of information flow. To do this the emphasis should shift from system or service-oriented research to user-oriented research. Like in business, efforts should be put in primarily to relate product or system design to the perceived needs of those for whom the product or system is intended and the system operation should be guided by the knowledge about the user. Selling or promoting the information-services and user-education should only take a secondary position subject to the condition that the system design is based on a proper understanding of the user. In this way only a librarian can improve upon his role as an information-transfer agent. He has to intimately and individually understand the requirements of his users and continuously update his knowledge about users through systematic studies and observations.

There is another very interesting line of argument from Garvey about why librarians should actively involve themselves in user-related research, communication and information-transfer process. As a scientist Garvey (1979, p5) analyses the role of librarians and pleads "the sooner librarians can interact with scientists in this process [of communication] the better they can fulfil their information-service functions." His argument is that "a real scientist cannot become sole `information man' unless he sacrifices his research productivity" (p10) and "since it is not likely that the typical scientist is going to become an expert in librarianship, then the librarian must become expert in the communication structure of the world of science" (P16). In the words of Foskett (1984, p61) "it is not enough for librarians merely to respond to new ways of recording and disseminating information. A more creative approach will come from a much greater involvement with both producers and consumers of information."

User-studies are necessary not only for planning and designing information systems but also for their efficient and effective operation. A systematic and comparative study often reveals unanticipated data, which may prompt hitherto unconsidered courses of action. There will be many surprises to even an experienced librarian about his own clientele as he would not have heard them all in a systematically planned setup in his day-to-day work. The obvious drawback in relying on experience is bias towards outspoken and intensive users, which is, at times, either too pleasant or too bitter. Incidentally, user-studies would help to improve the relation of the library with users in an objective way provided it is done within the organisation concerned. More user-studies are needed not just to determine and confirm the

general patterns of information-gathering, but to identify departures from the norm which, even if only in small areas, have significant practical effects.

Markee (1972, p119) stresses the need for user- research in the parent organisation and says that "a review of the library literature reveals that the amount of library research being done by the librarian at his institution is not in proportion to his professional responsibilities." He answers the question as to where the research should originate by saying that the "library research should begin and continue right in the parent institution." This bottom-upward approach can only provide a solid foundation for national information systems of developed and developing countries.

Major national information system designs should be preceded by systematic, reliable and comprehensive user-studies. They should not be made to survive under `symmetry of ignorance', mathematical induction of convenient good or bad things, subjective considerations and idiosyncrasies of people involved in planning information systems. Some systems are thriving under dubious reasons of avoiding the duplication of research and resultant economic benefit arising out of information systems but the hidden apparent reasons of an information system, as Myers (1970, p26) says, could be treating information system as prestige centre or a form of fringe benefit to employees or a paid up insurance to serve an unanticipated need or to sublimate the feeling that one does not read or a centralised way of budgetary control over expenditure on documents.

Self-check exercise :

1. Explain the importance of user studies in designing and operations of an information system?

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

---

13.3 Scope and Development of User Studies

The studies named variedly as `user-studies', `information-need studies', `use-studies', `information-transfer studies', `communication-behaviour studies', `Information-behaviour studies', `dissemination and utilisation studies' are closely related, and often not precisely defined. Menzel (1966, p43) tries to delineate these studies and says "when approached from the point of view of the scientist or technologist, these are studies of scientists' communication-behaviour. When approached from the point of view of any communication medium, they are use studies. When approached from the point of view of the science communication system, they are studies in the flow of information among scientists and technologists." Hence the terminology depends much on the approach and the angle from which one sees. A simple linear approach assumes some motives and purposes of users give rise to information needs and requirements. To satisfy such needs and requirements users adopt many ways and means of accessing and searching sources of information. Then they try to acquire necessary information both regularly and in an ad hoc way as necessary from these sources. In the act of acquiring information, the user uses or calls upon the sources of

information and applies the information to the purposes as predetermined, thus leading to satisfaction or dissatisfaction in relation to purposes and needs. In reality these sequentially represented steps are neither discernible nor strictly linear. Though information-seeking behaviour in one sense deals with actual seeking of information represented at the stage of searching various sources of information, it would be more appropriate to cover other earlier stages and later stages to get a clear picture of the entire sequence.

In the past, there was no agreement about the scope of Information behaviour as well as user-studies. `Seeking' is used interchangeably with `gathering' and `using' information. The terms `communication- behaviour' and `information-transfer/flow' are used almost synonymously with Information behaviour. However, a thin line of demarcation can be drawn. Information behaviour studies confine to the point of view of user as receiver of message or information. The communication behaviour studies primarily emphasise user as producer and/or sender of message or information. Hence as a person communicating information, user also plays the role of source of information or a creator of a source of information. In other words, the user often plays multiple roles such as receiver, creator and sender of message in communication-behaviour studies. The third broadly related area is the information transfer/flow studies where the whole process is looked at from a systemic view without much slant to either receiver or sender of information. Wersig (1970, 1973) as well as Wersig and Windel (1981) discussed the systematisation of user-research and divides it into four areas emphasising user as channel for communication, as information receiver, as data sources and as information sender. Thus user assumes the role of a channel and a source too. Kunz and others (1977, p 66) also identify how the distinction between `users' and `sources' of information is vanishing and both become `partners' participating in the networks of knowledge generation and transfer.

Many significant contributions have been made to user research by psychologists, sociologists, behavioural scientists and others in addition to library and information science personnel. As a result, the literature is scattered across many disciplines and varied collections have to be scanned for location of literature. Further, there is a very wide variation in the scope of user-studies. These studies touch upon many peripheral areas such as bibliometric studies, use-studies and citation studies. There is no consistency in the use of terms and concepts in user-research. Loose and interchangeable use of terms have made it difficult to compare findings of various studies.

Geographically and historically, U.S.A. has taken a lead in empirical user-research followed by U.K. and other European countries. Studies on information needs and uses were rigorous in U.S.A. during 1960s, but the early 1970s also saw a remarkable array of concerted efforts in other nations, particularly U.K., Canada, The Netherlands., Russia and East Germany to study the information needs and uses of scientists and technologists. One can call 1960s and 1970s respectively as the renaissance of user-studies in U.S.A. and U.K. Other countries in general, the developing and under-developed countries in particular, carried out some studies in the recent past.

13.4 Conceptual Framework and Theoretical Background for User-Studies

One of the widely accepted conceptual frameworks for user-research is that suggested by Paisley (1968). He places the information-user at the centre of ten systems namely cultural system, political system, membership group, reference group, `invisible college', formal organisation, work team, one's head/mind, legal and economic system and a formal information system each forming concentric circles around the user. Except one's own head or mind, all other systems are external to the individual and they form his environment. However, one should not forget the complex interactions involving one's own head/mind in terms of personal attitudes and accumulated experience with one's present role, function, task and all other environmental systems. It is these complex interactions which lead to individual information-behaviour. This conceptual framework, however, is in congruence with the

functionalist theory/view of scientific growth propounded by Merton (1957) especially the fact that science exists as a subsystem within a larger social system. Yet, some hold the view that scientists live in two worlds, scientific world and a separate `outside' world (Garvey, 1979, p 3). From this it appears that each one of the systems proposed by Paisely are not only task-dependent and situational, but also exert influence on the user to a varying degree.

The factors/variables which affect information-transfer process and user-behaviour are innumerable and any empirical study has to make its own assumptions to simplify the situation (Oldman, 1976,p 34). Otherwise, one would be lost in the jungle. A model of information-seeking activities of scientist and his research group presented by Orr (1970) provides a fairly exhaustive list of factors that affect the scientist's Information Behaviour). He asserts that any particular type of communication-behaviour must be assessed in relation to all other communication-behaviours.

In the process of seeking information what mainly takes place is an effort to match a cognitive need of user with a source of information and seeking supply of information to satisfy the need. This process naturally involves many phases and factors. First, the need could be unclear and uncertain. Secondly, user could be biased, subjective, conservative, habituated and having his own styles and idiosyncrasies. Further, in the context of apathy towards a new service or system in the context of formalisation of informal communication such as `invisible college' and `gatekeeper' functions , Cronin observes that "scientists display a remarkable conservation in their information seeking practices" (1982, p 228) as echoed in the experimental projects of APA (American Psychological Association), AIP (American Institute of Physics) and NIH (National Institute of Health, USA) is not unusual .

Havelock and others (1969, p 4.10) observe that "...individuals who are consistently exposed to innovations which fail or innovations which produce only minimal success may develop a general resistance to the acceptance of innovations". It appears like an inverse of `success breeds success theory' and `Matthew effect'. They conclude "...that individuals are just not very simple; they continue to elude the social scientists' attempts to place them in neat categories which would provide the base for clear theoretical statements" (p 4.11). As such, the individual's initiative plays an important role to recognise a need for information, to seek and search information and to use it irrespective of availability of services (Wilkin, 1981, p 4.30). However, this does not underestimate the importance of availability of information facility/service for one to seek and use. In fact, availability or existence of needed information is one of the necessary conditions, next only to the need and the initiative to use. Then comes the sufficient conditions that the available facility/service should not only be accessible to the user but also easy to use. Above all, the user should perceive that the source or facility is useful for the need concerned. The perceived utility of a source is based on both the quantity and quality of information expected from it. Ignorance about a piece of useful information either due to the apathy of the user or due to failures of information system when realised leads to alter the composition of monitor, reserve and supply of information in a cost efficient way to yield a relatively satisfactory information supply provided the ignorance is neither too small to worry about nor too large to be remediable (Wilson, 1977, p 74). In the process of adaptation of altered system the cost in terms of time and efforts is optimised and sources that adapt to the needs of user are preferred to sources which require the user to adapt himself. In other words, personal information-gathering is often purposive, adaptive, habitual and economical (Wilson, 1977, p 80). The lack of awareness on the part of the user about existing information-systems could also be a factor for its non-use in addition to convenience, responsiveness and ability to conduct dialogue with the system (Ackoff et.al., 1976, p 143).

Atherton (1977, p 7) summarises these factors involved in seeking and using information in the following words. "The working habits of the individual needing information, the importance placed on getting it, the facilities available for seeking it, the knowledge about the facilities, the judgment of their value, the estimate of the probability of getting what is wanted - all of these factors may affect information-seeking behaviour. Unless a person who wants

information is fairly sure of getting it without much trouble, he is apt to do without it if it is not essential. Relying on memory, skirting around the issue or making do with incomplete or vague information from a colleague are not unusual behaviour traits. There is, however, a small group of users who actively seek information spending effort and resources to acquire pertinent information and these users in fact are the most progressive in economic activity". Scientists and engineers are more likely to invest or reinvest efforts and resources for reinventing than to derive it from the research or development work of someone else, especially someone they don't know, in a different organisation and in a different discipline. (Havelock et. al., 1969, p 8.16). They may even estimate that generation of new knowledge will be cheaper than an expensive and possibly fruitless search (Paisley, 1968, p19-20).

The complex trio concepts, viz., accessibility, `ease of use' and perceived utility of a channel are extensively investigated by Allen and Gerstberger (1967, 1968). The concept `ease of use' which is akin to `law of least efforts', Mooer's law (Users will utilise an information-service only when doing so costs them less than not using it) and `why bother theory of information usage' (Cooper, 1978) appears to be the supreme criterion in use of a source of information (Rosenberg, 1966, p19). Moor (1972) has developed a model incorporating seven dimensions as measurable components of the concept `ease of use' of an information system. The dimensions are - movement required (out of the user's personal work area), time delay, interaction, interface structure, required location of use, permanence (nature of information provided) and response filter. The model was empirically tested from the data from R&D personnel and concluded that these dimensions do serve as a model for identifying behaviour.

Accessibility

Accessibility means bringing together physically or technologically the source and the user so as to enable user to become informed or learn from a source and accede to the evidence that the source will yield the information required. Access to a source can be better understood by looking at the possible barriers to access. Barriers are of two kinds. Firstly, non-intellectual barriers are those which are not directly concerned with communication or transfer of information from the source to the user but concerned with bringing physically the source and the user together. Following are some important non-intellectual barriers. (i) *Lack of indicative or bibliographic access:* The indicative or bibliographic access is concerned with the way of ascertaining existence of a source and having knowledge about existence of a source. or identification of a source This essentially put forth the strong need for 'bibliographic control' of information output. (ii*) The Physical barrier:* The physical access or the document delivery which is a logical extension of bibliographic access, depends on available logistics and technology. Classified nature of a source, policy of the information system and other logistics play their own roles in creating physical barriers between user and the source. (iii*) Cost barrier:* 'Cost of access' is the cost in terms of money, time, efforts and discomfort or inconvenience to be incurred by the user (iv) *Barrier of system cost:* Cost to the system or the source or provider of information in terms of money, time, efforts and discomfort or inconvenience. Non-monetary values like social, cultural and political values including the reasons of national security, private or corporate vested interest and indecent or irreligious materials can also contribute to the cost of the system.

The second kind of barriers are intellectual barriers directly concerned with communication or transfer of information from the source to the users. These barriers are more or less created by or concerned with the user and his limitations. There are two groups of intellectual barriers. *(i) Lack of expertise:* Inability to have cognitive and conceptual access (or subject and knowledge access) due to insufficient expertise of user to understand a source. In other words, the user need better understanding of basic concepts of the subject before he uses a source of information which could be intensely theoretical and goes over head. There are two ways to overcome this barrier of cognitive and conceptual access to a source of information. Firstly, more explanation can be provided to the source of information in terms of providing a translation (if the failure is due to linguistic access) or easily understandable summary or

informal explanation or interpretation to the source. In other words the source is augmented with explanation to ease the cognitive and conceptual access. Second approach (which is quite traditional to libraries) is concerned with helping and providing education to the user including consultation of dictionaries, encyclopedias, experts, etc. (ii) *Unacceptability of the source*: Choice of a source is a matter of judgment depending on purpose. Information found in a source could be 'soft' and the user might be seeking 'hard' information. Unacceptability of the source may be due to individual's attitude as well as misperception of the source and/or the need. The user could be reluctant to accept the source of information as credible source or find it not having adequate 'cognitive authority'. It could also be due to 'cognitive dissonance' i.e.,., users unwillingness to accept the evidence of the source as it conflicts with his other beliefs.

Further, three very interesting aspects of access to the source of information need mention here. Firstly, the access itself could become a barrier to use of a source of information when it becomes excess. This problem of 'information explosion', 'information indiscipline', 'information overload' or 'access to excess' is the result of ill effects of luxuries of 'information revolution' and quite opposite to information malnutrition. In addition, inevitable duplication, deliberate redundancies and re-presentations of information in different sources or within the same source further add up to the pollution. For example, the observations like "90% of all scientific papers are unread by anyone but their authors" (Longuet-Higgins,1970) and "it is cheaper to conduct an experiment to find something out rather than to attempt to discover whether the experiment has previously been performed" (Kemp, 976,p131) speak of the intensity of problem of 'access to excess' and are much against the principle of 'reinventing the wheel'.

Secondly, the technological affluence has also caused some barriers. With easy and cheap way of reproduction of reading materials and abundant xerox machines, the document delivery and physical access to information sources have so much improved that the users have started 'accumulating' Xerox copies rather than attempting to 'assimilate' all that is copied and possessed. Possession of large amount of Xerox copies of would-be-reading materials itself has become barrier to access, retrieve and use information. Otherwise, 'access to excess' is a problem could also exist in the minds of the users and cause stress and frequently increased errors. Some of the possible solutions for this problem are increased specialisation of users, frequent delegated approach to search and collection of information, more efficient ways of processing information including information analysis and consolidation services with greater selectivity, evaluation, review and synthesis.

The third unusual barrier in accessing the source of information is none other than the organiser or the intermediary (i.e., librarian) himself ! One may wonder how the organiser of information sources could become a barrier. In the normal process of organising a library and its collection and establishing a system lot of rules and procedures are instituted restricting access to the source of information with punitive measures for those who violate the rules. Traditionally, libraries have many restrictive practices like closed access, chained books, restricted membership, restricted borrowing facilities for a limited time, restricted hours of opening , punitive fines for late returning, etc. Further, the means and techniques like classification schemes, storing mechanisms, etc., and tools like catalogues, bibliographies, etc. created in the process could also be hurdles between the user and the source if these tools and techniques are badly developed or excessively deployed. The very effort of librarians to linearly store multidimensional information embodiments rather than having a 'hyperstack' is a classic example of access limitations to users. Knowingly or unknowingly, intentionally or unintentionally many such barriers have been evolved or created by librarians and information professionals.

Ease of Use:

Ease of use is another important condition for an user to use a source of information. This condition has far reaching and very large implications on the physical and other organisation

of the sources of information. Physical storing and arrangement, classification, indexing and cataloguing of documents at the system level and the physical medium, organisation and presentation of contents at document level might cause barrier to the use of sources of information. The popular Mooer's law (1960,p204) states that "an information retrieval system will tend not to be used whenever it is more painful and problem some for a customer to have information than for him not to have it".

The role played by the building, layout, interior decoration, furniture, lighting, fixtures, colour, etc., which create 'conducive environment' in a library, on ease of use cannot be undermined. A thorough understanding of 'zones in personal distances' and 'types of human territories' within library environment are necessary. The design influences of libraries on user-behaviour are not yet known fully (Campdell and Shlechter, 1979). In digital environment and computerisation 'ease of use' assumes more importance in the form of 'user-friendliness.'

Perceived Utility

Perceived utility of the source also matters very much for a user to select the source. How the user perceives the source about its usefulness to him is very important irrespective of the intrinsic worth of the source. This is basically a user related factor and depends on the quality and quantity of information expected from the source by the user. Perception involves detection, selection, organisation and interpretation of sensory stimuli/ information. Perception can be seen as an active and constructive process affected by internal factors like interests, needs, expectation, emotion and motivation as well as external factors (physical characteristics) like intensity, size and contrast. Above all perception is also selective. Perception is the sensation reinforced by memories, images, etc., derived from past experience and called up by association. Both the processes of falling back on past experience and calling up by association while perceiving a source can cause havocs. For example, if a user is already exposed to an inefficient, irrelevant and difficult-to-use type of source, his perception of the utility of that or other similar sources is obviously be very low. Similarly, if an user has an 'ill' feeling about or an 'unpleasant' experience with an institution, it is likely that by association, he perceives very low utility of library or information system of that institution.

Subjectivity in perception of utility of a source could be caused by 'perceptual constancy' as well as misperception. The error due to 'perceptual constancy' occurs when a user attributes qualities to an object in perception which are not merely additional to but incompatible with the qualities that are actually sensed. In case of misperception, the perception is greatly influenced by the preliminary direction of user's attention, by expectation, or by desire. In other words, familiarity, expectation or interest or wishful thinking of user may lead to sub-excitement of brain pattern before the actual perception occurs. The subjectivity in perception of utility of a source is not necessarily be adverse or negative. For example, bewilderness of a user at large collection or huge library building could lead him to perceive it as highly useful collection or source of information.

Perceived utility of the source talks of the 'psychological distance' between the user and the source. And often, the 'psychological distance' may be more serious barrier than physical distance (Line, 1974,p48).

Self-check excercise :

2. Explain the concepts 'accessibility', 'ease of use' and 'perceived utility' in relation to user studies.

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

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13.5 Characteristics of Users

Customers cannot be assumed to be a heterogeneous group. Attempts are often made to segmenting customers with common characteristics into more homogeneous groups. Segmenting is a well-known marketing tool. The purpose is to emphasise customer perspective, meet customer requirements and to be able to target specific products or services to specific groups, or even to individuals. It is impossible to address every individual's requirements. But at the same time it is dangerous to assume that a single product or service will meet the requirements of every customer.

The customer base for libraries should include actual and potential users. Hence, it is necessary to identify and address the entire market or customer base including the non-users. In other words, identifying all the customers (internal, external and future users) - enables designing suitable services as well as identifying the activities and services which outlived their usefulness.

A good customer-supplier relationship provides the best feedback for further refining the customer requirements. The best opportunity for building customer-supplier relationship in libraries is to encash on the situation where users are unsure of their needs and how it can be met. Helping to perceive their needs, formulating the need, evaluating different sources and accessing the sources of information lead to interaction and hence provides rich experience of user requirements.

No user-community of an information system is completely homogeneous. Though a majority of the users of a system would come together for a particular purpose and are comparable by one or two criteria, they are divided among themselves by many individual characteristics. As noted earlier, the knowledge of the population being served by an information system is an essential requirement for providing useful services. Just like understanding the user is half the battle in providing information-services, knowing the structure and composition of the user-community in terms of various characteristics by which they can be compared and contrasted is half the task in understanding the users.

The characteristics of users are innumerable and there are several ways of grouping them. Apart from identifying many characteristics of users as recipients of information the institutional environment and work activity (job) have major impact on information users. The three clusters of factors which affect user's utilisation of information are psychological factors, effectiveness of available services and characteristics of the user and his environment.

User-studies look for similarities and differences among the users in terms of their backgrounds like status, age, experience, education, specialisation, field of research, discipline, etc. When the analysis is at the organisation level (as against individual level) they look for differences in nature of organisations, and at the same time users were also grouped as theoreticians or fundamental research workers, experimentalists or applied research workers, technologists, technicians, practitioners, etc.

Most of the studies have adopted the individual as the unit of analysis. However, occasionally analysis have been carried out at group, unit or organisation levels treating the organisation as a composite entity and drawing typical representatives. At this level, variations within the organisation are ignored and the nature, type and size of the organisation become variables.

In user studies with the individual as the unit of analysis, it is possible, and easy, to list many characteristics of individuals. Unless the relevance and the context of a user characteristic are clearly established, it is likely that the results will be conflicting. "To attempt to isolate each environmental element seems hopeless, but awareness of the variety of environments may lead to potentially useful hypotheses" (Krikelas, 1983, p11). The number of systems to which each user belongs and the variety of roles he has to play are important in understanding the information-transfer process.

User-characteristics could be internal or external to the individual. They may also be classified as sociological, demographic, psychological, personality (work-related), organisational, professional, etc. Some specific characteristics of interest in user studies are age, experience, gender, educational level, performance, productivity, creativity, motivation, emotional stability, temperaments, interests, personal idiosyncrasies, communication, citation and other activities, nature of work or function, various roles, responsibilities, and status of users have also to be understood in user studies.

13.6 Behaviour, Attitude, Priorities, Preferences and Opinions of Users

Behaviour is a broad concept. It involves attitudes and character traits of individuals as well as environmental determinants. Behaviour is considered to be a compromise and a result of multiple forces to which individuals are subjected to. Attitude itself is a latent state of readiness to respond in particular ways. They are normally dormant most of the time but they represent what we are prepared to do. In other words, attitude is a tendency to act or react in a certain manner when confronted with certain stimuli. Attitudes are expressed in speech or behaviour when object is perceived. Like other components of behaviour, attitude is an abstraction and hence it is difficult to directly measure attitude. One has to infer attitude from overt behaviour. Attitudes are often related to feelings and emotions.

An individual's enduring persistent response pattern across a variety of situations is called personality. It comprises of relatively stable patterns of action, i.e., traits, dispositional tendencies, motivations, attitudes and beliefs, which are combined into an integrated self structure. 'Trait' is used to classify and describe certain persistent and fundamental human characteristics, both learned and original. In the increasingly enduring and deepening order we find beliefs followed by attitudes, values and personality in individuals.

There are many ways of looking at user behaviour in libraries and in relation to seeking gathering, using and communicating information. For example, one may attempt to study motives and purposes of seeking information, nature and type of information required, ways and means of acquiring information, sources of bibliographic (reference) information used, delegation of information-gathering work, time spent on information-gathering activities, dependence on sources of information, tolerable delay in supplying information, satisfaction about existing sources of information, informal communication network and the communication behaviour, inter-personal information sharing, use of library and user interactions with the library, etc.

Self-check excercise :

3. *What do you understand by 'behaviour'?*

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

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13.7 Conducting User Studies

The unhappy relationship between research and practice in librarianship has often been aired by many experts as they are not mutually nourishing each other. Same is the case with relationship between research in librarianship and other related fields of inquiry. The need for looking at research, practice and education for librarianship as an integrated learning system has to be emphasized for development of librarianship as an academic discipline and achievement of excellence in professional practice. "Unless appropriate and sufficient research is conducted, the library community will not be able to transform itself but will be absorbed by other groups that will take over the information function in society" (Maguire, 1986, p 3).

Having seen the importance and vast scope of user studies as well as the need for integrated approach to research in librarianship, let us see the scope of methods and techniques of user studies. Sound methods and techniques used in research serve as a barometer to measure the quality of research in that field. Tested methodology is very much required for research to enable researcher to objectively navigate through his research, to put him back in the right track in case he deviates from the path and to help him to achieve the objectives of his research without wasting his efforts.

User studies are basically concerned with people, their attitude, priorities, preferences and behaviors. Hence the methods and techniques used by social researchers particularly behaviour scientists and psychologists are quite relevant for user studies. It is neither feasible nor desirable to discuss in this unit, the entire research methodology required for user studies.

Following are the main steps for conducting user studies:

(i) Selection and formulation of research problem and working hypothesis
(ii) Literature survey
(iii) Overall design or planning the strategy of the study
(iv) Sampling and sampling strategy or plan
(v) Data collection
(vi) Measurement and scaling techniques
(vii) Pilot study
(viii) Processing and analysis of data
(ix) Testing of hypotheses
(x) Interpretation, generalization and realization of objectives
(xi) Preparation, writing, presentation and dissemination of research results

The above steps are not exhaustive, nor mutually exclusive but represent a series of closely related, continuously overlapping and interdependent non-linear actions.

13. 8 Summary

In this opening unit of the block on user studies, you have recapitulated the basics of user-research. You have learnt several reasons why library and information science should undertake user-research as well as vast scope for user studies. Development of user studies and status in USA, UK and India are noted. Various theoretical concepts and backgrounds for user research have been explored. A detailed account of variety of factors which help or hinder user coming closer to information source is given. Innumerable user-characteristics have been narrated. An understanding of user behaviour and attitude together with important steps to conduct a sound user study is presented.

Most of the user studies are imitative than imaginative, exploratory rather than experimental and descriptive rather than decisive. Majority of them have adopted survey and case study methods rather than controlled or quasi-controlled experimental methods They often dealt with more of `what' than `why'. In other words, the basic research aspect of why the user behaves as does is rarely attempted. As a result the numbers and opinions have become predominant in user studies. Unfortunately what majority users say has become the ultimate truth forgetting the fact that what a user say is not always what he needs or does.

Asking people (through questionnaire, interview, discussion or diaries), observing users and their activities, content analysis (of records), semi-controlled experiments on subjects and a host of indirect methods could be employed more fruitfully in understanding users. While choosing appropriate methods, choice has to be made between qualitative and quantitative approach, survey / case study and experimental method, cross sectional design and longitudinal experimental design, depending on problem, available resources, competence of the staff and the kind of data desired. In the process of collecting data, number of problems like non-response, disinterestedness and carelessness, bias, prejudices, ignorance, misunderstanding, `hallo effect' and response sets of respondents have to be faced and suitably resolved.

The general picture of the findings like `average user of an average library' is less useful to practical situations. Use of holistic qualitative methods are badly needed in this area of research. Over-concentration on how users obtain information rather than what they want, why they want it and what they do with it as well as on formal communications (documents) than informal (interpersonal) communications are increasingly making the results more useful to sociologists of science than information professionals.

There are many methods and techniques of social research particularly those used in psychology and sociology which need to be tried for user studies. For example, the projective techniques and multiple complimentary methods of data collection (triangulation techniques) would be more appropriate to user studies than traditional questionnaires.

Irrespective of excellent methods and techniques adopted, the findings of most of the user studies (and even so in respect of findings of many social research) are often subjected to cynicism and criticism if they are of extreme in nature i.e. either too simple, common, obvious and expected or totally unbelievable / unexpected. To combat such criticisms, one has to have foolproof research design, hard and reliable data with systematic and accurate analysis and interpretation. Further, user studies demand a mixture of common sense and technical expertise.

13.9 Keywords

Demand: Demand is what an individual asks for; more precisely a request for an item of information which is believed to be wanted. Individuals may demand information they do not need, and certainly need or want information they do not demand. Demand is partly dependent

on expectation, which in turn depends partly on existing provision of library or information service. A demand is a potential use.

Need: It is more abstract and difficult-to-define concept. Information need is an awareness or recognition of not knowing or existence of uncertainty. Alternatively need is what an individual ought to have. A need may or may not be identified as want.

Nonuse and Nonuser: In case of user studies, the term use includes `non-use' or statistically almost zero use and user includes potential user, non-user, under-privileged, unserved, underserved and deprived users. A non-user could be an involuntary non-user who do not have a library to use or voluntary (willful) non-user. A voluntary non-user is one who has access to a library and lives in an information rich society and yet suffers from information malnutrition (Sridhar, 2004).

Requirement: It is a useful bridging term for need, want and demand.

Research Methods and Techniques: Method' and `technique' are often almost interchangeably used. Methods and techniques are those used in performing research operations. While `technique' refers to behaviour and instruments used in research operations, `method' refers to behaviour and instruments used in selecting and constructing technique (i.e. methods are more general). On the other hand, research methodology is a science of studying how research is done scientifically. In other words, research methodology is a way to systematically solve the research problem by logically adopting various steps. Interestingly, research itself is a search for new knowledge through objective, systematic and scientific method of finding solution to a problem.

Use: Use is what an individual actually uses. A use may be a satisfied demand, or it may be the result of browsing or a chance. Individuals can use what is available. Use is, therefore, heavily dependent on provision and availability of library and information service. A use usually represents a need of some kind. But need is independent of use. Uses can be partial indicators of demands, demands of wants, and wants of need. Identification becomes progressively more difficult from 'hard' use to the often nebulous and unstated need.

Want: Want is what an individual would like to have, whether or not the want is actually translated into a demand on the library. Individuals may need an item they do not want, or want an item they do not need. A want, like a need, is a potential demand.

13.10 Answers to self-check exercises

1. Explain the importance of user studies in designing and operation of an information system ?

The effectiveness of a library and information system depends on the extent to which the system characteristics correspond with the users and on how much the potential users are willing and able to make use of it. System designers, planners and managers of library and information systems have to properly consider the role of human factors and their effect on acceptance and utilisation of information. Relating the system or product/service being designed to the perceived needs of those for whom it is intended as well as to guide the operation of the system by the knowledge about the user and to justify the existence of the system are essential. Hence user studies are a must at the time of designing a system or service as well as for efficient and effective operation of a library system or service. User studies are also required for evaluation of a system or service. Libraries need to have periodic user studies.

A systematic user study can also reveal some un-anticipated data about the dynamic user component. It may also promote a new course of action hither to not considered and hence, as

mentioned above, helps efficient and effective operation of the library and information system. Further, as no system has the luxury of unlimited resources and funds, user studies are required to check whether intended goals are served by the system, if not, to alter the priorities and programmes so as to ensure judicious allocation of limited resources. User studies are also required not only to determine and confirm the general patterns of use of libraries but also to identify departures from the norms (in specific cases), even if it is only in small areas. User studies help improve public relations of a library with its users and explain what librarians have found out by more indirect means. User studies, like market research, provide effective ground for marketing service products of libraries. In nutshell, user studies is an area of continuous librarian-education about users as against user-education about library.

2. Explain the concepts 'accessibility', 'ease of use' and 'perceived utility' in relation to user studies

The complex trio concepts , viz., accessibility, `ease of use' and perceived utility of a source of information are extensively investigated by many researchers. Accessibility of a source of information is the most basic necessary condition for a user to put in his efforts to seek information. One who does not have access to a source of information, naturally, will not make any attempt to access the source. The concept `ease of use' which is akin to `law of least efforts', Mooer's law (Users will utilise an information-service only when doing so costs them less than not using it) and `why bother theory of information usage' appears to be the supreme criterion in use of a source of information. Unless the user finds it easy to use and the efforts require to use is not too much, he is unlikely to use the system. The efforts here could refer to distance or movement required, time, delays, interaction with people etc., Lastly, the perceived utility is more psychological concept, and depends on user and his pre-disposition. The success of a user coming close to a source of information to satisfy his information requirement depends on his perception of utility of that source. In other words, even if a user has access to a source of information and finds it easier to user it, he may not seek information from that source, until he perceives that given source of information has the required information.

3. What do you understand by 'behaviour'?

Behaviour is a broad concept. It involves attitudes and character traits of individuals as well as environmental determinants. Behaviour is considered to be a compromise and a result of multiple forces to which individuals are subjected to. Attitude itself is a latent state of readiness to respond in particular ways. They are normally dormant most of the time but they represent what we are prepared to do. In other words, attitude is a tendency to act or react in a certain manner when confronted with certain stimuli. Attitudes are expressed in speech or behaviour when object is perceived. Like other components of behaviour, attitude is an abstraction and hence it is difficult to directly measure attitude. 'Trait' is used to classify and describe certain persistent and fundamental human characteristics, both learned and original.

13.11 References cited and for further reading

Ackoff, Russell L. et al. Designing a National Scientific and Technological Communication System (The SCATT Report). Pennsylvania: University of Pennsylvania Press, 1976.

Allen, Thomas J. and P. G. Gerstberger. Criteria for Selection of an Information Source. MIT-284-67. Cambridge: MIT, Alfred P.Sloan School of Management, 1967.

---------. "Criteria used by research and development engineers in the selection of an information source." Journal of Applied Psychology 52 (4) 1968: 272-279.

Atherton, Pauline. "Handbook for Information Systems and Services."Paris: Unesco, 1977

Bawden, David. User-oriented evaluation and information systems. England: Gower, 1990.

Cooper, William S. "Why bother theory of information usage." 2 (1) April 1978: 2-5.

Crane, Dbana. "Information needs and uses". In Carlos A.Cuadraed. Annual Review of Information Science and Technology. Chicago: Encyclopedia Britanica Inc., 1971. Vol. 6: 3-39.

Foskett, D. J. "Pathways for Communications : Books and Libraries in the Information Age"London: Clive Bingley, 1984

Garvey, William D. "Communication : The Essence of Science "Oxford: Pergamon, 1979

Havelock, Ronald G. et al. "Planning for Innovation Through Dissemination and Utilization of Knowledge" Michigan: The University of Michigan,The Institute for Social Research, CRUSK, 1969.

Hoadley, Irene Braden and Alice S Clark eds. "Quantitative Methods in Librarianship : Standards, Research, Management - Proceedings and Papers of an Institute held at the Ohio State University,3-16 August 1969."Contributions in Librarianship and Information Science No.4. Connecticut: Greenwood Press, 1972: 133

Kothari C.R. Research methodology: methods and techniques: 2nd ed. New Delhi: Vishwaprakashan, 1990.

Krikelas, James. "Information-seeking behaviour : patterns and concepts." Drexel Library Quarterly 19 (2) Spring 1983: 5-20

Kunz, Werner et al. "Methods of Analysis and Evaluation of Information Needs : A Critical Review"Munchen: Verlag Dokumentation, 1977

Line, Maurice B. Library surveys: an introduction to the use planning procedure and presentation of surveys. 2nd ed. London: Clive Bingley, 1992.

Lipetz, Ben-Ami. "Information needs and uses". In Carlos A.Cuadra ed. Annual Review of Information Science and Technology. Chicago: Encyclopedia Britanica Inc., 1970. Vol. 5: 3-32.

Maguire, Carmel, "What qualifies as research in librarianship". In: Allen, G.G. and Exon, F.C.A. edition: Research and the practice of librarianship an international symposium. Perth: The Library, Western Australian Institute of Technology, 1986, P.1-10

Markee, Katherine M. "Where is the library researcher". In Irene Braden Hoadley and Alice S.Clark eds. Quantitative Methods in Librarianship : Standards, Research, Management - Proceedings and Papers of an Institute held at Ohio State University,3-16 August 1969. Connecticut: Greenwood Press, 1972. 119-121

McGarry, Kevin. "Communication, Knowledge and the Librarian" London : Clive Bingley, 1975.

Menzel, Herbert. "Information needs and uses". In Carlos A.Cuadra ed. Annual Review of Information Science and Technology. New York: Interscience Publishers for ADI, 1966. Vol. 1: 41- 69

Merton,Robert K. "Social Theory and Social Structure" New York: Free Press, 1957.

Moor, William Chattle. "Development and preliminary test of behaviour related dimensions of information systems." Journal of the American Society for Information Science 23 (1) January- February 1972: 50-57

Morris, Ruth C.T. "Toward a user-centered information service". Journal of the American Society for Information Science, 45(1) 1994: 20-30.

Myers, J. M. "Information as a saleable commodity". In Accelerating Innovation : Papers given at a Symposium held at the University of Notingham, March 1969. Organised by Aslib, U.K.Ministry of Technology and Research Associations. London: Aslib, 1970.

Oldman, Christine. "Value of Information"Library Research Occasional Paper No.1. Bradford: MCB Publications, 1976.

Orr, Richard H. "Scientist as an information processor : a conceptual model illustrated with data on variables related to library utilization". In C.E.Nelson and D.K.Pollock eds. Communication among Scientists and Engineers. Massachusetts: D.C.Heath Lexington, 1970. 143-190.

Paisley, William J. "Information needs and uses". In Carlos A. Cuadra ed. Annual Review of Information Science and Technology. Chicago: Encyclopedia Brittanica Inc., 1968. Vol. 3: 1-30.

Rosenberg, Victor. Application of Psychometric Techniques to determine the Attitudes of Individuals toward Information Seeking. MS Thesis; AD 637 713 ; AFOSR 724-66. Bethlehem, Pa.: Lehigh University, 1966

Simpson I.S. How to interpret statistical data: A guide for librarians and information scientists. London: Library Association, 1990.

Slater. Margaret ed. Research method in library and information studies. London: Library Association 1990.

Sridhar, M. S. "Information-seeking behaviour of the Indian space technologists." Library Science with a slant to Documentation and Information Studies 26(2)June 1989:127-165.

----------. "Studies on use of library collections by scientists, engineers and technicians" AGLIS Journal 7(4)Dec 1989: 9-17.

----------. "User-research: A Review of Information- behaviour Studies in Science and Technology". Bangalore: BIBLIO INFON Service, 1990.

----------. "Information behaviour of scientists and engineers" . New Delhi: Concept Publishing Company, 1995.

----------. "Waiting lines and customer satisfaction", SRELS journal of information management, 38 (2) June 2001, 99-112.

----------. "Library use and user research: with twenty case studies". New Delhi: Concept Publishing Company, 2002.

---------. “OPAC vs. card catalogue : a comparative study of user behaviour” , The Electronic Library, 22 (2) April 2004, p 175 - 183.

Stone, Sue and Harris, Colin. Crus guide. 1. Designing a user study: General research design. Sheffield: British Library Board, 1984.

Wersig, Gernot and Gunther Windel. "Potential basic research on users for new orientation of information services." International Forum on Information and Documentation 6 (4) October 1981: 21-23.

Wilkin, Anne. Information Needs of Practitioners : A Review of the Literature. BLR&DD-5611. London: The London University, 1981

Wilson, Patrick. "Public Knowledge and Private Ignorance : Toward a Library and Information Policy" London : Greenwood Press, 1977

Unit - 14

CONCEPTS OF INFORMATION NEEDS, WANTS AND REQUIREMENTS

Structure:

14.0 Objectives

In the previous unit of this block, you have been introduced to basics of user studies and how to conduct them. This unit will have a more focused discussion on the concepts of information needs, wants, requirements and other related concepts. Studying this unit, you will know (I) the importance of user needs (ii) definition of information need, want, demand, use, requirement and user (iii) how the concept of information need is viewed in constructivist approach, value added approach and sense making approach (iv) a birds-eye-view of information need and requirement studies as well as factors affecting information needs/requirements.

14.1 Introduction

It needs no overemphasis that library and information services need to be looked from user-centred approach by paying increased attention to the needs of the users of the system. Even evaluation of information systems and services need to be user-oriented as against management-oriented and library–oriented evaluation. User needs must be assessed on a regular basis and reasons for under-use or non-use of systems must also be explored and analysed not only in traditional library set up but also in digital information system.

User needs sometimes referred to as 'information needs' cover all experiences of an individual associated with the search for information. These experiences includes those that are internal (to individual) like thoughts and motivation, external like searching an OPAC, interpersonal like asking peers and intra-personal like conscious decision to abort the search and not to seek information.

User needs is a critical aspect for both information system designers and practicing librarians. There is a need to fine tune an information system and finding most relevant information depended on the best understanding of the most dynamic user needs. This also necessitated understanding the context of seeking information by users and information professionals. Above all, research on user needs is a social responsibility of the profession.

You have already noticed in Unit 14 that information is quite complex to define. If information adds to and modifies user's internal knowledge structure it is inherently subjective. Individuals integrate new information into their existing system of knowledge with known relationship expanding their understanding, then information and knowledge are two ends of a continuum. Then knowledge can be *conceptual* (focused on things and the explanations of their meaning), *contextual* (or operative which helps one to act in a specific situation) and *empirical* (like a statistic or figurative written text). As far as the search processes are concerned, the definition of information seeking is also highly subjective.

During 1980's information system designers have shifted their emphasis from information transfer model to a study of user-centred information activities. So doing the entire IR research have grown vast and incidentally expanded the scope of user studies. The dimension of user research has eventually touched even the 'user satisfaction' studies.

14.2 Information need, want, demand, use and requirements

A use/ user study has to necessarily keep a set of defined population of users in the background. It is also necessary to understand other related concepts and terms like need, want, demand and requirement before commencement of any user/use study. These concepts introduced to you as keywords in the previous unit (Unit-14) are further explained here.

`Need' is a more abstract and difficult-to-define concept. Both Ford (1980) and Krikelas (1983, p6) define `information need' as an awareness or recognition of not knowing or existence of uncertainty. The draft definitions of `need', `want', `demand', `use' and `requirement' in relation to library and information proposed by Brittain (1971) and supported by Line (1974, p87) have undergone the test of the time and are quite adequate for the purpose of understanding these concepts.

`Need' is what an individual ought to have, for his work, his research, his education, his recreation, etc. A need may or may not be identified as want. The interesting and most practical aspect is that "... needs arise out of the roles an individual fills in social life. So far as specialized information system is concerned, the most relevant of these roles is `work role', that is, the set of activities, responsibilities, etc., of an individual, usually in some organizational setting in pursuit of earnings and other satisfactions" (Wilson, 1981, p9).

`Want' is what an individual would like to have, whether or not the want is actually translated into a demand on the library. Individuals may need an item they do not want, or want an item they do not need. A want, like a need, is a potential demand.

`Demand' is what an individual asks for; more precisely, a request for an item of information which is believed to be wanted. Individuals may demand information they do not need, and certainly need or want information they do not demand. Demand is partly dependent on expectation, which in turn depends partly on existing provision of library or information-service. A demand is a potential use.

`Use' is what an individual actually uses. A use may be a satisfied demand, or it may be the result of browsing or a chance. Individuals can only use what is available. Use is, therefore, heavily dependent on provision and availability of library and information service. A `use' usually represents a need of some kind. But `need' is independent of `use'. Uses can be partial indicators of demands, demands of wants, and wants of need. Identification becomes progressively more difficult from the `hard' use to the often nebulous and unstated need. It may be noted that 'use' as statistic adopted in use studies are just counts of borrowing, browsing or referring within a library.

Hence, the concept of `use' is often defined as the extraction of content from a message to meet a need. This aspect of 'use' tries to represent the way user collects information. But how user puts information into action is most crucial and that deals with utility or usefulness of sources of information. User studies have often, not attempted for usefulness or utility of a source of information or library or information system. What is attempted, often is physical count of use. Hence 'use' and usefulness are different and we have to keep this in mind while interpreting the results of user/ use studies. The concept of 'user-satisfaction' comes into picture only when the definition of use meaning application of information (ie., action) is explored. In other words, the counting of borrowed use can hardly be used as a basis for user-satisfaction

studies. The operational definition of `Use' for collecting data about the use of library documents could be stated as physical selection and the act of leafing through pages of document as far as in-house use is concerned (Kent et. al., 1979, p61) and for circulation or loaned use, each record of having lent-out or renewed is considered as one externally circulated use of a document.

As mentioned earlier, the term `user' includes actual as well as potential users and even non-users.

`Requirement' is a useful bridging term; it can mean what is needed, what is wanted, or what is demanded, and can therefore be usefully employed to cover all three categories. But the term `requirement' is closer to the term `need'. Many studies of `needs' have in fact been studies of user requirements.

Self-check exercise :

1. Explain the concept of Information requirement and how it bridges the other related concepts of user studies?

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

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14.3 Approaches to study of information needs

For understanding the user (particularly information needs), many approaches (or models) have been used in the recent past as conceptual frame works. For example, constructivist model views information as something constructed by the user and says that individuals constantly strive to make sense of themselves and their environment through continual adjustments. The cognitive model emphasizes the cognitive activity in individual user and explore the problem state and how information is sought and matched to solve the problem. Another model seeks to understand how specific environment including physical setting, nature of information and nature of characteristics of problems affect information seeking by users. Yet another identifies stages of research where intervention on the part of information professionals can help users both identity and resolve their information needs.

There has been a criticism that most of information need studies are constrained by the systems' perspective. Why user behaves as does is the basic research aspect of user studies addressed very little in librarianship. Most information search process studies attempt to explore this fundamental aspect focusing on the role of affective (feelings), the cognitive (thoughts) and the physical (active) aspects on various stages of search like initiation, selection, exploration, formulation, collection and presentation in the search process. It is argued that information seeking is a process of sense making within a personal frame of reference and hence 'need studies' and 'user studies' have to look from the user's perspective (Kuhlthau, 1991). Information search process of users (particularly in OPACs, databases, online systems and the Internet) are viewed from this angle with the assumption that people actively and constantly construct their view (constructivist approach) of the world with what they already

know or have experienced. In this process interaction between the user and the information system (even library) has to be guided by affective needs as well as by cognitive needs. This implies that the system (or library) continuously affects and modifies the needs and the knowledge store of users. As per the cognitive approach an information search begins with the user's problem and the gap between the user's knowledge about the problem or topic and what the user needs to know to solve the problem is the information need. Like the need of user is affected and changes during search process, their judgment of relevance are also likely to change. The affective aspects like attitude, stance and motivation may influence specificity, capability and relevance judgment as much as cognitive aspect like personal knowledge and information content.

Three principles underlie most research on user needs: (i) users assimilate or make sense of the information they encounter in different ways depending on such factors as their learning styles, cognitive functions and affective responses (ii) different users evaluate or judge the same information differently (iii) Information seeking not only has a context but that context is crucial. These principles are described as "constructivist" because they grow out of the belief that users do not positively receive information but rather they "construct" their own meaning out of their information- seeking experiences.

Kelly's theory of personal constructs propounds *that* people use templates or patterns to recognise and interact with aspects of life. These templates are constantly changed and even discarded not on the basis of what fits best with external reality, but on the basis of what is comfortable and acceptable to the individual. The 'Personal Constructs' (ie., templates) created by individuals may be tested against reality to examine the ways in which things are alike as well as different. Given a choice between two or more possible constructs, people generally choose the one that seems to give the greater possibility of extending and defining (and thereby conforming) their extant system of constructs. From this cognitive approach comes the effort to understand how users frames of reference relate to the availability of information, how the

choice of information is determined by those frames of reference and how information may change or affect the frame of reference. So meaning from information must be seen primarily as the creation of the user. This active process of purposive constructs and selectivity is the basis for information searching.

Taylor places the user's cognitive process in the forefront of consideration of information provision and identifies four levels of information need as evident in user's queries. (1) Visceral : An actual, but unexpressed need for information. (2) Conscious : within brain description of need. (3) Formalised: A formal statement of need, and (4) Compromised: The query as presented to the information system. This is called Taylor's *value added approach.* This approach considers that data move through process changing along the way. That is, organised *data* makes information, analysed *information* adds on to existing knowledge. Judgments based on *knowledge* make it *productive and new* and the *decisions* taken on those new knowledge lead to actions.

Brenda Dervin's research on " Sense making " is the process in which individual encounter problematic situations , identify information gaps that might pertain to the problem solution, and use the information in a way that alleviates the problem. It is an internal or external communication behaviour an individual uses to gain a better understanding of the works or to move towards some desired goal. Seeking, processing, creating and using information are central sense making activities. Sense making is a process. Sense is the product of this process and hence sense making process is important to LIS. Information seeking is the technique used to gather what is required to bridge the gap in one's knowledge and make sense of the whole. As knowledge is absorbed it may spark new information needs, so that both the user's state of knowledge and state of need are dynamic. User is an active participant who constructs meaning from information and brings internal source of information like the reason for the search, necessary belief, objects of the search, object knowledge, domain knowledge and search knowledge to the process.

Self-check exercise :

2. How does ‘Sense making approach’ explain the concept of information need?

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

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14.4 Information requirement studies

You have noticed earlier that ‘information requirement’ is used as a convenient bridging term to cover need, want and demand. The information-requirements refer to a lookout for a sort of relevance of information to a given user and to his areas of concern, interest, likes and dislikes. In the process it is to know the amount of irrelevant information he is prepared to tolerate. Relevance is not a simple property inherent in information, but varies with content, format, context, the variety of uses of information as well as user himself (Cott, 1970). "The

selection and reception of the information will depend upon the individual's conception of his own needs; one man's information is another man's noise ..." (McGarry, 1975, p58).

There have been numerous studies as well as reviews about user-needs and requirements, but with little accumulation of body of knowledge. Meaning, scope, levels and types of information-needs have varied very widely. Problems of defining terms and concepts, lack of theoretical frameworks and other problems and issues of an empirical study of information needs and requirements persist (Brittain, 1971, p 2). The successive reviewers like Menzel, Martyn and Crawford have pointed out (in ARIST, 1966, 1974 and 1978) the extremely complex, varied and difficult-to-measure nature of information-need. Menzel has even preferred to call `information needs and uses' as a study of the behaviour and experiences of scientists and technologists. Hatt (1976,p42-43) called them `user behaviour studies' and Wilson(1981) advocated that the term `information-needs' should be replaced by `information-seeking towards the satisfaction of needs.'

While discussing the issue of information-needs, a natural assumption is to consider the needs as perceived by the users. But some are of the view that there is a need to create information-needs among users if they do not exist (Harris, 1985, p2) and that information-seekers may be ignorant of the information that would be useful to them (Oldman, 1976, p23).

14.5 Factors affecting information requirements

As noted earlier, Information-needs are affected by many factors. Range and knowledge of information-sources/facilities available, varieties of uses to which information will be put, the background, motivation, professional orientation, discipline, type and area of work and other individual-characteristics of the user, the social, political and economic system as well as the consequences of information-use (Cronin, 1981, p39; Lin and Garvey, 1972, p8-10).

Due to this contingency nature, generalised one-time conclusions about information-needs of users is impracticable. Of all the factors influencing or determining the user-needs, two factors which may not always be congruent, are the corporate objectives of the organisation where the user is employed, and the needs of the individual user (See keywords for organizational information needs). The factors which decide the choice of a source of information by a user apart from task and purpose of seeking information, are physical proximity, accessibility, perceived quality and utility, `ease of use' and previous experience about the source or acquaintance with the source. These factors have been discussed in detail in Unit-14.

These factors are very much inter-related. It is found that accessibility and `ease of use' are stronger factors than perceived quality and the amount of information expected to yield by a source. An irrationality (i.e., a curious filtering process) is that engineers use channels in proportion to accessibility and `ease of use', but they accept ideas from those channels in proportion to technical quality (Gerstberger and Allen, 1968; Rosenberg, 1970).

Self-check exercise :

3. What major factor affect the information needs of user?

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

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14.6 Summary

Information needs are most critical to both designers and service providers of libraries and information systems. Professional researchers of the past have provided good clarity on the terms and concepts. Yet information requirement has been used to consolidate information need, want and demand. The conceptual analysis of 'information' by different experts has lead to develop different approaches like constructive approach, value added approach and sense making approach to understand and study information needs. Extensive studies have been carried out in the area of information needs/requirements. An array of factors are found to affect the user need/requirement.

14.7 Keywords

Customer satisfaction: This is a new area being embraced by user research. Traditionally, customer satisfaction has been a base for library evaluation and discussed under service management and quality management. Customer satisfaction, at the broad level, is determined by customer expectation, perception of service delivered and the demands made by customer.

End-user needs: There has been numerous studies addressing the needs of end-users in information search process keeping information professionals as intermediaries. They are more

concerned about the online search process than the basic information needs addressed in user studies.

Information audit: A synthesis of the view points of 'user needs' as well as "use studies" has led to the development of the information audit as a tool to measure information requirements, the availability of resources, and how the resources are delivered to meet the requirements.

Information audit is about purpose, not process. Purposes are expressed in terms of the wider business activities that they support, processes in terms of what has to be done to achieve the purposes. Given a cost for a resource, how has it been deployed and how has that been used over its life span are addressed in information audit. User needs are important in information audit. A range of needs are looked at in a matrix against user locations or divisions in the information audit.

Information audit is more qualitative than quantitative as there are no numbers to say 'good' or 'bad'. The outcome of the audit is an overall statement of how organisational information needs are perceived and met.

Organisational information needs: It is believed that the information needs of organisations can be better understood as expressed through the information needs of the individuals working in them. The information needs of individuals considered as parts of functional groups and measured against the needs of those groups, forms the organisation's information needs.

Search process/ user interface: There is yet another user related studies in LIS and that is user interface studies of softwares. This is basically an extension of user search process as applied to LIS software's

14.8 Answers to self-check exercises

1. *Explain the concept of Information requirement and how it bridges the other related concepts of user studies?*

`Information requirement' is a very useful bridging term in user studies. It can mean what is needed, what is wanted, or what is demanded, and can therefore be usefully employed to cover all three categories. In other words, information requirements covers information need, information demand and information use. But the term `requirement' is closer to the term `need'. Many studies of `needs' have in fact been studies of user requirements.

2. *How does 'Sense making approach' explain the concept of information need?*

It is the process in which individual encounter problematic situations , identify information gaps that might pertain to the problem solution, and use the information in a way that alleviates the problem. It is an internal or external communication behaviour an individual uses to gain a better understanding of the works or to move towards some desired goal. Seeking, processing, creating and using information are central sense making activities. Sense making is a process and hence sense is the product of this process. Sense making process is important to LIS. Information seeking is the technique used to gather what is required to bridge the gap in one's knowledge and make sense of the whole. As knowledge is absorbed it may spark new information needs, so that both the user's state of knowledge and state of need are dynamic. User is an active participant who constructs meaning from information and brings internal source of information like the reason for the search, necessary belief, objects of the search, object knowledge, domain knowledge and search knowledge to the process.

3. *What major facts affect the information needs of user?*

Information-needs are affected by many factors. Range and knowledge of information-sources/facilities available, varieties of uses to which information will be put, the background, motivation, professional orientation, discipline, type and area of work and other individual-characteristics of the user, the social, political and economic system as well as the consequences of information-use. Due to this contingency nature, generalised one-time conclusions about information-needs of users is impracticable. Of all the factors influencing or determining the user-needs, two factors which may not always be congruent, are the corporate objectives of the organisation where the user is employed, and the needs of the individual user. The factors which decide the choice of a source of information by a user apart from task and purpose of seeking information, are physical proximity, accessibility, perceived quality and utility, `ease of use' and previous experience about the source or acquaintance with the source. These factors are very much inter-related. It is found that accessibility and `ease of use' are stronger factors than perceived quality and the amount of information expected to yield by a source. An irrationality (i.e., a curious filtering process) is that engineers use channels in proportion to accessibility and `ease of use', but they accept ideas from those channels in proportion to technical.

14.9 References cited and for further reading

Brittain, J. Michael. User Studies in Education and the Feasibility of an International Survey of Information Needs in Education. Bath: Bath University, 1971.

Cott, Van. "National information system for psychologists : a proposed solution for a pressing problem." American Psychologist 25 (5) May 1970: i-xx.

Crawford, Susan. "Information needs and uses". In Martha E.Williams ed. Annual Review of Information Science and Technology. Martha E.Williams ed. New York: Knowledge Industries Inc. for ASIS, 1978. Vol. 13: 61- 81.

Cronin, Blaise. "Assessing user needs." Aslib Proceedings 33 (2) February 1981: 37-47.

Dervin, B. “An overview of sense-making research : Concepts, methods and results to date”. Seattle: School of Communications, University of Washington 1983.

Dervin, B., & Nilan, M. “Information needs and uses”. In M.E. Williams (Ed.) Annual Review of Information Science and Technology (ARIST), 21, 3-33, 1986.

Ford, N. "Relating information needs to learners characteristics in higher education." Journal of Documentation 36 (2) June 1980: 99-114.

Gerstberger, Peter G. and Thomas J. Allen. "Criteria used by research and development engineers in the selection of an information source." Journal of Applied Psychology 52 (4) August 1968: 272-279.

Gillman, Peter.”Analysing the organisation’s information needs”. In: Scammell,Alison ed. Handbook of special librarianship and information work. 7ed.London:Aslib, 1997, p23-51.

Harris, Colin and Steve, Sue.“Crus guide 1.Designing a user study: General research Design”. Sheffield: Centre for Research on user studies, 1986.

Hatt, Frank. "Reading Process : A Framework for Analysis and Description"London: Clive Bingley, 1976.

Kent, Allen et al. "Use of Library Materials : The University of Pittsburgh Study"New York: Marcel Dekker, 1979.

Krikelas, James. "Information-seeking behaviour : patterns and concepts." Drexel Library Quarterly 19 (2) Spring 1983: 5-20.

Kuhlthau, Corol C. “Inside the search process : information seeking from the User’s perspective”. Journal of the American Society for information Science, 42 (J) 361-371, 1991.

Lin, Nan and William D. Garvey. "Information needs and uses". In Carlos A.Cuadra ed. Annual Review of Information Science and Technology. Chicago: Encyclopedia Britanica Inc., 1972. Vol. 7: 5-37.

Line, Maurice B. "Draft definitions : information and library needs, wants, demands and uses." Aslib Proceedings 26 February 1974: 87.

Martyn, John. "Information needs and uses". In Carlos A.Cuadra ed. Annual Review of Information Science and Technology. Washington, D.C.: ASIS, 1974. Vol. 9: 3-23.

McGarry, Kevin. "Communication,Knowledge and the Librarian" London: Clive Bingley, 1975.

Menzel, Herbert. "Information needs and uses". In Carlos A.Cuadra ed. Annual Review of Information Science and Technology. New York: Interscience Publishers for ADI, 1966. Vol. 1: 41- 69.

Morriss Reeth C.T. “ Towards a user-centred information service”, Journal of the American Society for Information Science , 45 (1) 20-30, 1994.

Oldman, Christine. "Value of Information"Library Research Occasional Paper No.1. Bradford: MCB Publications, 1976.

Rosenberg, Victor. "Factors affecting the preferences of industrial personnel for information gathering methods ". In Tefko Saracevic comp.& ed. Introduction to Information Science. New York: R.R.Bowker, 1970. 95-100.

Taylor, Robert S. Question-Negotiation and Information Seeking in Libraries. AD-659168. Bethleham,Pa.: Lehigh University Centre for the Information Sciences, 1967.

Westbrook, Lynn. “User needs” In : Kent, Allen ed. : Encyclopaedia of library and information Science V.59 suppliment 22 . New York. Marcel Dokker Inc., 1997, 316-347.

Wilson, T. D. "On user studies and information needs." Journal of Documentation 37 (1) March 1981: 3-15.

Unit -15

TYPOLOGY OF INFORMATION NEEDS

Structure:

15.0 Objectives

This unit, as an extension of previous (Unit 15), will enable you to understand 'information need' from diverse perspectives. After studying this unit, you will be able to (i) choose and decode what aspect of 'information need' is appropriate for a given user study (ii) understand the different ways in which past studies have explored information need and their significant findings (iii) design a case study of information requirement of users.

15.1 Introduction

You have seen in the previous unit, that 'information need' is not a simple concept. It has very wide connotation and diverse interpretation. As a consequence of innumerable studies carried out on information needs of users, 'need' is expressed in different ways. These empirical studies together with theoretical frameworks has lead us to different ways of expressing information needs. Which way of expressing information need is right is not the question, but which is the most appropriate for a given user

study is important. For this reason we need to study various types of information need. You have already noted that one man's information could be another man's noise. The typology of information needs will give a broader outlook to user studies.

15.2 Typology of Information-Needs

Studies relating to `information-needs' have categorised needs in the following ways:

- `perceived needs' and `actual or idealised needs'
- `immediate needs' and `deferred needs'
- `continuous needs' and `discrete needs'
- `regular' and `irregular needs'.

Further, information-needs could be

- unexpressed or expressed/articulated,
- felt or unfelt,
- dormant or delitescent.

In addition, information-needs of users can be expressed in terms of

- time (i.e., urgency)
- content and
- amount or quantity of information required.

Accordingly, information-needs have been classified as

- needs for single facts or exhaustive information
- up-to-date, historical or current information
- technical or business information

However, information-needs are frequently determined in terms of kind of message

- nature and type of information
- the types of document embodiments of information needed
- the purpose of use.

In the last classification, the value of information should be such that it meets the subject interest of the user. It should have a level of detail that makes the requirement and it is delivered in the form and in a time-scale that fits the user's requirement. Many studies have investigated need for channels, but only a few have focused on the need for substance or nature of material in terms of characteristics of texts (Lin and Garvey, 1972, p12).

Dervin (1976) has analysed the taxonomy of everyday information-needs of average citizen and proposed a study of six linkages among the following four elements:

(1) The individual citizen
(2) Information-needs
(3) Information-sources
(4) Solutions to information-needs.

Each one of the linkage represents interaction between two elements.

Havelock (1976,p211) provided a linkage model/process describing the internal problem-solving cycle within a user who is related to an external resource.

As mentioned in the previous unit, Taylor places the user's cognitive process in the forefront of consideration of information provision and identifies four levels of information need as evident in user's queries.

(1) Visceral : an actual, but unexpressed need for information
(2) Conscious : within brain description of need
(3) Formalised : a formal statement of need, and
(4) Compromised : the query as presented to the information system.

As mentioned earlier, in the past, each study has adopted its own classification of information-need based on the nature and type of information sought by users. Some of the significant classifications are

- personal, technical and task-related information (Ford, 1973, p88-89)
- current, everyday (specific) and exhaustive information (Voigt, 1961, p4)
- theoretical information, results and data and methods and procedure information (Columbia University, 1960)
- educational information, methodical or how-to-do-it information and task-related information (Auerbach Corporation, 1966).

Many others like Slater and Fisher, and Hanson have attempted to determine the amount or level of information requirements in core versus peripheral areas of interest of users. In addition, the non-technical information required, information requirements in new fields versus old fields have also been attempted The profession and organisation-oriented work-related information-needs are the main information-needs are the main information-needs in all that studies apart from life-long learning or educational needs and needs about the governing rules of the society around user. It may be noted that the work-related infiormation-needs are the main information-needs.

15.3 Results of some past studies

Initially, there have been more information need studies in science and technology than in social and behavioural sciences. The findings of different studies on information requirements of scientists, engineers, technologists and technicians roughly indicate that basic S&T information, background information and everyday information on one hand and technical, physical, design and other technical data, facts or figures, product, process, method and equipment information on the other hand have occupied the highest position. For example, need for basic S&T knowledge (82%, Shuchman, 1981, p 32-33; 1982, p 106-109) by American industrial engineers, everyday information (68.8%, Wood, 1967, p 212) by British mechanical engineers and background reading coupled with up-to-date information by users of British technical libraries (27% + 19%, Slater and Fisher, 1969, p 32-33, 36,47 and 49) as well as American technical libraries (49%, Rawdin, 1975, p 41-42) ranked highest in some studies. On the other hand, performance-characteristics and specifications (42%) followed by design technique, experimental processes, procedures (13%) ranked highest in DOD user-study (Auerbach, 1965, p 1-19). A closely similar situation of 33% seeking equipment information, properties of materials, design and performance of plant followed by 11% seeking operating procedures of equipment and plant was found by Cole (1958) and respondents of Herner and Herner (1959) sought process and method information (25.5%), physical, chemical and engineering properties of materials (24.6%), apparatus or equipment information (16.8%), physical and chemical constants (16.4%). A hefty 64% of respondents wanted facts in Raitt's study (1984, p 204-208). Thus analysed the World Federation of Engineering Organisations (WFEO, 1979, p 15) :"...the most proper form of information for engineers is the factgraphic information, analytical-synthetical elaborations and state-of-arts". These types of factual data ranked second in the studies of Shuchman, Rawdin, Slater and Fisher. More than two decades ago, Hanson (1964, p 67-68) summarised that one-fifth of the times, scientists, engineers, technologists and technicians need a figure or a single simple fact, between a quarter and a third of the times a description of an object, a process, a method or procedure and remaining half of the time general information and ideas from background reading. At the lower end of the need came the business and general information (16%, Shuchman, 1981, 1982), exhaustive information (11%, Rawdin, 1975, p 41-42; 18.6%, Wood, 1967, p 12), ideas, advice and opinion (respectively by 23%, 10% and 8%, Raitt, 1984) and non-technical information (18%, Herner and Herner, 1959). In a study of information behaviour of Indian Space Technologists (Sridhar, 1995), the space technologists were found to seek more of theoretical background, experimental results, methods, processes and procedures, product, material, equipment and apparatus information and physical, technical and design data (in that rank order) than state-of-the-art, review literature, standard and patent specifications. Information is sought only when it is utmost needed and there is a strong need for internally generated information and product information. Different types of information are used intermittently in an intermixed way by the space technologists depending on the nature of work. Change in the nature of work of the space technologists is found to affect both the intensity of need and the type of information required. The problem of ‘information overload’, enlargement of boundaries of interest and intensification of space activities in the country, impact of electronics boom and resultant need for

condensed information-services and need for fast serving information intermediaries or agents are felt by the Indian Space technologists.

There were some interesting results about information-requirements of users in core areas as compared to peripheral areas, new areas as compared to developed areas and urgency of demand for information. Slater and Fisher (1969) not only found highest success rates of searches (67%) in core subjects (It is possible that respondents ignore failures of searches on areas not really connected with work and hence the actual difference in success rate might be even more) than peripheral subjects (58%) but also found higher demand for information on core subjects in academic libraries and on peripheral problems in other types of libraries. The demand for information on core areas was highest (61%) among scientists and lowest (46%) among engineers and demand for information on peripheral and unfamiliar subjects was highest among engineers compared to skilled workers, technicians, teachers, etc. In support of this, Wood (1967, p 212) also found that 27.5% of the mechanical engineers needed information outside mechanical engineering. Further, the highest demand for information on practical problems was from engineers (16%) and lowest from scientists (6%) (Slater and Fisher, 1969). Hanson (1964, p 67) in his analysis of `acts of library use' found that a third of use was for information on a specific subject and remainder mainly for browsing or reading current journals. Back (1962, p 20) speculated that scientists in upcoming and new fields had broader information-needs than those in fairly developed fields. Lastly, by introducing a crude measure of urgency of information-need in the survey, Slater and Fisher (1969) found that 59% of their respondents had some degree of urgency and for 30% time was no object. By introducing a crude measure of urgency of information-need in the survey, Slater and Fisher (1969) found that 59% of their respondents had some degree of urgency and for 30% time was no object.

Even though ‘information need’ studies are plenty in science and technology, social science and humanities have hardly had any significant information need studies except INFROSS (Information Requirement of the Social Sciences). User studies have started a little late in social science and humanities. INFROSS is a significant research in this area. Though information behaviour of social scientists are similar to physical scientists, social scientists depend more on formal sources of information than on informal ones. Harder a discipline within social sciences, the heavier the use of secondary journals. User studies of humanists are concerned, Bouazza (1989) while reviewing literature says “…humanists have largely been overlooked”, Humanists are found to differ both from scientists and social scientists, due to their nature of work, methods of conducting research and materials needed by them for research. Humanists have a tendency to be ‘lone worker’, ‘solitary individuals’ and ‘nomads’ working alone due to the nature of humanities and obviously, this has lead them not to delegate literature search and form less and less of ‘invisible colleges’. A strong personal experience and personal view point necessitate browsing as a more important activity than among humanists. They tend to rely more on formal source of information than on informal and they make heavy use of library resources.

15.3.1 Correlation of Information-requirements with user-characteristics

Characteristics of users and characteristics of information resources (including physical forms) have to be determined using standard data collection methods and data analysed before arriving at a matrix to match the user requirements.The information-needs and requirements have been correlated in the past with discipline (by Singh, Aims, Gray and Perry), nature of employment (by Hanson), nature of work (by Wilson, Gray and Perry), status (by Singh) and experience (by Garvey and others). Unfortunately, the important factors or characteristics which substantially affect user-needs and requirements are not clear and correlation of information needs with many other user characteristics like educational level, performance, etc., have not been dealt with sufficiently in pragmatic studies. Most of them are either speculative or theoretical in nature and are not supported by a rigorous analysis of hard data. Past studies have not addressed the information-needs and requirements of under-privileged and deprived users and nonusers and have also not explored the ways of dissipation of unmet needs (Ford, 1977, p 20).

Aims (1965) hypothesised that the information-needs of engineers differ widely from those of physicists and chemists and Gray and Perry (1975, p 53) speculated that engineers differ widely from those of R&D workers in their information-needs. The differences in needs and demands for information are more strongly related to the kind of employment and type of organisation than the discipline in another study (Hanson, 1964, p 69-70). An observation that electronics and telecommunication and industrial engineers cite to the maximum from other disciplines (B.N.Singh, 1981, p 183) is highly vague as an equally strong interdisciplinary need for information is expected in many other disciplines too. Surprisingly, and contrary to others, Raitt (1984, p 255) has generally confirmed his hypothesis that "...the information needs and communication patterns of scientists and engineers in general are similar and cannot be readily distinguished."

Shuchman (1981) has tried to relate five variables to the nature and type of information sought by American industrial engineers and found that the job activity and type of industry appeared to make the most consistent difference. The occupational role and the nature of work of user is considered to be the most important clue for understanding personal information-gathering behaviour by Wilson (1977, p 50). As engineers perform a wide variety of functions, their information-needs are quite varied depending on their respective functions. For example, design engineers need numerical data in a compact and easily usable form (Gray and Perry, 1975, p 55). A recent contrary finding is that the status of the scholars belonging to the research community did not appear to be influencing their information needs (B.N.Singh, 1981, p 182). In another survey, it is found that the least experienced scientists have greater information-needs than the most experienced (Garvey, et.al., 1975,

p 501). The correlation results of the study of Indian Space Technologists (Sridhar, 1995) mentioned earlier is presented as part of the case study in the next section.

Self-check exercise :

1 Explains the scope of information-requirements and ways in which information-need is categorised in the past user-research ?

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

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15.4 A case study of Information requirement of Indian Space Technologists

The case study (Sridhar, 1995) is concerned with nature and type of information required/sought by the Indian space technologists (IST). As mentioned earlier, the information-requirements refer to a lookout for a sort of relevance of information to a given user and to his areas of concern and interest, and likes. Relevance is not a simple property inherent in information, but varies with content, format, context, the variety of uses of information as well as user himself (Cott, 1970). "The selection and reception of the information will depend upon the individual's conception of his own needs; one man's information is another man's noise ..." (McGarry, 1975, p58). But some are of the view that there is a need to create information-needs among users if they do not exist (Harris, 1985, p2) and that information-seekers may be ignorant of the information that would be useful to them (Oldman, 1976, p23).

The felt and expressed information requirements of the Indian space technologists, in respect of nature and type of information, have been ascertained through a questionnaire on five point scale in a census survey of 80% persons with 68.5% response and the result presented in Table 1. It is clear from

the Table that the respondents not seeking `Statistical, economic, business and general information' (J-26.3%), `Standard and patent specifications and codes of practice' (G-24.1%), `Computer program and model building information' (F-23.0%) and `State-of-the-art and review literature' (A-19.4%), are quite considerable. Other types of information as shown in Table 1 are required by more than 90% of the respondents. On the other hand more respondents have highly sought `Scientific and technical news' (I-47), `Experimental designs, results and applications' (C-102),`State-of-the-art and review literature' (A-84) and `theoretical background/basic scientific and technical information' (B-84), than other types of information. An interesting feature is that, the state-of-the-art and review literature is not required by 101 respondents while it is highly sought after by 84.

The rank order of the nature and type of information required by the space technologists, based on weighted mean, is given below. The top ranks occupied by S & T news (I) and basic S & T information (B) are in congruence with the top ranking motives and purposes like acquiring knowledge about latest developments, self improvement and keeping update in the field.

Table 1

Nature and Type of Information Required

Nature and Type of Information	Not Required (O)		Required				Total		Mean	S.D.
	No.	%	1	2	3	4	No.	%		
A. State-of-the-art and review literature	101	19.4	94	97	144	84	419	80.6	2.03	1.37
B. Theoretical background/basic scientific and technical information	7	1.3	35	126	280	84	525	98.7	2.75	0.85
C. Experimental designs, results and applications	29	5.5	59	129	207	102	497	94.5	2.56	1.09
D. Methods, processes and procedures	46	8.8	69	170	173	65	477	91.2	2.27	1.12
E. Product, material, equipment and apparatus information	43	8.2	79	195	137	69	480	91.8	2.21	1.11
F. Computer programs and model building information	120	23.0	147	135	75	45	402	77.0	1.57	1.24
G. Standard and patent specifications and codes of practice	125	24.1	163	121	77	32	393	75.9	1.47	1.19
H. Physical, technical and design data	16	3.1	70	178	198	59	505	96.9	2.41	0.96
I. Scientific and technical news	10	1.9	34	147	192	147	520	98.1	2.82	0.96
J. Statistical, economic, business and general information	136	26.3	215	122	36	9	382	73.7	1.16	1.20
K. Others	17	36.2	10	4	9	7	30	63.8	1.55	1.50

Key: O, Not required; 1,Rarely required; 2,Occasionally required; 3,Frequently required; 4,Highly sought-after; S.D.,Standard Deviation.

Note: 1. Three hundred and fifteen have left the open-ended category 'Others' (K) blank.
2. Invalid and not answered responses upto a maximum of 17 in any category are excluded.
3. The mean score for anonymous responses worked out to 1.55, 3.10, 2.30, 2.07, 2.03, 1.14, 1.43, 2.27, 2.57, 0.86 and 0.05 respectively for categories A to K.

Rank	Code in Table 1	Nature and type of Information
1	I	Scientific and technical news
2	B	Theoretical background/basic scientific and technical information
3	C	Experimental designs, results and applications
4	H	Physical, technical and design data
5	D	Methods, processes and procedures
6	E	Product, material, equipment and apparatus information
7	A	State-of-the-art and review literature
8	F	Computer programs and model building information
9	G	Standard and patent specifications and codes of practice
10	J	Statistical, economic, business and general information

Adding/subtracting one standard deviation to/from mean in Table 1, one can statistically say that, nearly 68% of respondents have sought `Scientific and technical news' (I) with the weightage ranging from 1.86 to 3.78, `Experimental designs, results and applications'(C) with weightage ranging from 1.47 to 3.65; `physical, technical and design data' (H) with weightage from 1.45 to 3.37; `methods, processes and procedures information' (D) with weightage from 1.15 to 3.39; and `product, materials, equipment and apparatus information'(E) with weightage ranging from 1.1. to 3.32.

The top ranked need for basic S & T information and S&T news by the space technologists is close to that found by Shuchman (1981, p 32-33; 1982, p106-109) about American industrial engineers, Wood (1967, p212) about British mechanical engineers, Slater and Fisher (1969, p32-33, 36, 47 and

The next in the rank order, the space technologists sought experimental designs, facts, data, methods, procedures and product information which again is close to the second ranked type of information in the studies of Shuchman, (1981, 1982), Rawdin (1975) and Stater and Fisher (1969). However, this type of information ranked topmost in the studies of DOD users by Auerbach (1965, p 1-19), Cole (1958), Herner and Herner (1959) and Raitt (1984, p204-208). At the lowest end of the rank, the space technologists needed general information (similar to that found by Shuchman, 1981, 1982 and Herner and Herner, 1959), state-of-the-art and review literature (similar to that found by Rawdin, 1975, p41-

42 and Wood, 1967, p212), model building information and specifications. The above differences appear to be due to differences in structure of the populations studied in DOD user study and by Raitt and the way nature and type of information is grouped and methodology (in case of studies of Cole, Herner and Herner and Slater and Fisher).

Discussions with respondents revealed that general information to keep abreast with current developments and specific work related information to solve practical problems are two main types of information required by the space technologists and they seek information only when it is essential. A typical respondent said "I gather information only if utmost needed". However, for information of general interest, they "browse news magazines, technical journals and conference proceedings to keep informed about the latest developments, the NASA and ESA reports for futuristic systems planning. They also appear to have moderately strong need for internally generated information and product information. A mission operation person writes that he has greater need to "have full knowledge about every sub- system of satellite" and hence turns mostly to internally generated information. It is interesting to discern from what another respondent has written about how his need for equipment, product and component-related information leads him to seek theoretical background information. He said "When I want some information on any component or equipment I go through the text books to build up the theoretical background and then refer to data and product catalogues and application notes. Then I go through the journals, if necessary." Thus there appears to be an intermittent and intermixed use of different types of information by the IST.

15.4.1 Correlation of Nature and Type of Information Required with User-characteristics

The results of association/correlation tests of nature and type of information sought with status, qualifications, nature of work, specialisation, experience and professional activities and achievements of the IST are presented in Table 2. One may observe statistically significant relation of need for state-of-the-art literature (A), computer programs and model building information (F) and standard and patent specifications (G) with all the above characteristics. The requirements of physical, technical and design data (H) are found to be independent of all the above user characteristics, except status. Tables 3, 4, 5 and 6 respectively present the weighted mean score of nature and type of information sought versus status, qualifications, nature of work and specialisation.

Table 3 reveals that as the status of a user raises, his requirement for state-of-the-art and review literature (A) (r_s=0.95), experimental results (C) (r_s=0.92), product, material and equipment information (E) (r_s=0.98), computer programs and model building information (F) (r_s=0.72) and physical, technical and design data increases linearly. But the requirement of standard and patent specification (G) (r_s=-0.72) decreases linearly as status increases.

It may be seen in Table 4 that the requirement of all types of information except physical, technical and design data (H) and S&T news (I) has varied significantly with the level of qualifications of the space technologists. The relation is not linear in case of any type of information.

Table 5 shows that the need for state-of-the-art and review literature (A), methods, processes and procedures (D), computer programs and model building information (F), standard and patent specifications (G) and statistical, economic, business and general information has varied significantly with the nature of work of the IST.

As could be seen from Table 6, physicists have sought more of state-of-the-art and review literature (A), experimental results (C), product, material and equipment information (E) and S & T news (I) than other types of information. Compared to others, mathematicians have naturally sought more of computer programs and model building information (F), and mechanical engineers have sought more of standard and patent specifications (G). The requirement of state-of-the-art and review literature (A) and theoretical background (B) is strongest among aeronautical and structural engineers. Electrical engineers require more of experimental results (C) and S & T news (I) than other types of information. Lastly, electronics engineers also have sought more experimental results (C) together with physical, technical and design data (H) than other specialists (However, the need for following types of information varied significantly with the subject of specialisation of the IST : State-of-the-art literature (A), experimental results (C), product, material and equipment information (E), computer programs and model building information (F), standard and patent specifications (G), S & T news (I) and statistical, economic, business and general information (J)).

It can also be inferred from the Pearson product moment correlation coefficients (r) in Table 5.2 that higher the experience of the space technologists higher the need for state-of-the-art literature (A) (r=0.16), standard and patent specifications (G) (r=0.12) and S & T news (I) (r=0.13), but lower the need for theoretical background (B) (r = -0.12) and computer programs and model building information (F) (r=-0.21) and vice versa.

The professional activities and achievements of the IST are positively correlated with the need for state-of-the-art literature (A) (r=0.42), methods, processes and procedures information (D) (r=0.13), and computer programs and model building information (F) (r=0.23) but negatively correlated with the need for standard and patent specifications (G) (r=- 0.21).

The need for the state-of-the-art literature for the IST is, very highly, linearly and positively correlated/associated with status (rs=0.95), qualifications and nature of work, slightly and positively with experience (r=0.16), moderately and positively with professional activities and achievements(r=0.42). The need for theoretical background is almost linearly and positively related

to qualifications of users and slightly and negatively correlated (r=-0.12) with length of experience of users. The need for experimental results is very highly and positively correlated (rs=0.92) with status of users. The qualifications and specialisation of users are also related to the need for experimental results. The degree of requirement of information related to methods, processes and procedures showed a significant relation with qualifications and nature of work and a slight positive correlation (r = 0.13) slight positive correlation (r=0.13) with professional activities and achievements of the users. The need for product, material and equipment information has almost perfectly and positively correlated (rs=0.98) with status and has a significant relation with qualifications and specialisation of the users. Mathematicians and aeronautical and structural engineers have lesser need and others a higher need for product, material and equipment information which is on line with findings of Shuchman (1981, p68). The need for computer programs and model building information has a low negative correlation (r=-0.21) with experience, low positive correlation (r=0.23) with professional activities and achievements of users, a high positive rank order correlation (rs=0.73) with status, a linear relationship with qualifications, curvilinear relationship with nature of work and a significant relationship with specialisation of the Space technologists.

Table 2

Association/Correlation Test Results of Nature and Type of Information Required with (Selected) User-Characteristics

Nature and Type of Information	Status (r_s) df= 8	Qualifications (X^2) df=16	Nature of work (X^2) df=24	Specialisation (X^2) df=20	Experience (r) df≈390	Professional Activities & Achievements Index (r) df≈192
A. State-of-the-art	0.95*	176.56*	97.86*	83.96*	0.16*	0.42*
B. Theoretical background	0.55	56.20*	29.50	20.11	-0.12*	0.02
C Experimental results	0.92*	44.35*	27.27	39.51*	0.02	0.09
D Methods, processes and procedures	0.58	51.20*	45.56*	29.79	-0.03	0.13*
E Product, material & equipment information	0.98*	27.25*	22.26	43.01*	0.08	0.08
F Computer programs & model building information	0.72*	83.23*	46.22*	104.30*	-0.21*	0.23*
G Standard and patent specifications	-0.72*	73.46*	39.36*	67.16*	0.12*	-0.21*
H Physical, technical and design data	0.72*	13.25	35.79	29.48	0.04	-0.03
I S&T news	0.43	22.80	21.94	39.98*	0.13*	0.07
J Statistical economic, business and general information	0.71*	38.30*	41.48*	32.20*	0.05	0.05

Key: *, The association/correlation is statistically significant at 0.05 significance level (p) for a two-tailed test.

Note: The tabulated values of X^2 at 0.05 significance level (p) for a two-tailed test for 16, 24 and 20 degrees of freedom (df) are 26.296, 36.415 and 31.410 respectively.

Table 3

Nature and Type of Information Required Vs Status

(Mean Score)

Nature & Type of Information	Status											
	A,B,C & D	E	F	G	H	I	J	K	L	M & N	Total	r_s
A State-of-the-art	3.29	3.37	3.06	2.27	1.92	1.44	1.00	0.88	1.21	0.41	2.00	0.9515*
B Theoretical background	2.81	2.75	2.96	2.74	2.80	2.81	2.82	2.31	2.63	2.11	2.74	0.5515
C Experimental results	2.76	2.85	2.87	2.60	2.67	2.39	2.44	1.84	2.23	1.82	2.53	0.9152*
D Methods, processes and procedures	2.05	2.51	2.37	2.25	2.33	2.25	2.32	1.92	2.10	1.60	2.25	0.5758
E Product, material and equipment information	2.62	2.27	2.54	2.21	2.19	2.04	2.19	2.04	1.93	1.79	2.16	0.9758*
F Computer programs and model building information	1.52	1.73	1.84	1.65	1.56	1.53	1.55	1.04	0.95	0.47	1.49	0.7212*
G Standard and patent specifications	0.95	1.38	1.30	1.08	2.14	1.65	1.83	2.04	2.00	2.00	1.52	-0.7242*
H Physical, technical and design data	2.38	2.46	2.54	2.45	2.39	2.38	2.43	2.21	2.30	2.44	2.36	0.7227*
I S&T news	2.95	3.02	2.90	2.61	2.67	2.76	2.82	2.52	2.88	2.89	2.72	0.4303
J Statistical, economic, business and general information	1.29	1.38	1.30	1.04	1.27	1.02	1.27	1.09	1.15	0.65	1.14	0.7121*

Key: r_s, Spearman rank order correlation; *, the critical value of t at 0.05 significance level in a two-tailed t-test for 8 degrees of freedom is 2.306 and the correlations marked * are found valid at 0.05 significance level as their t-value exceed 2.306.

Note: Status A to N are in the descending order of hierarchical rank

Table 4

Nature and Type of Information Required Vs Qualifications (Mean Score)

	Nature and Type of Information	Qualifications					Total	X^2
		U	D	B	M	P		
A	State-of-the-art	0.93	1.21	2.18	2.58	3.52	1.96	176.5601*
B	Theoretical background	2.31	2.88	2.86	2.75	3.35	2.76	56.2022*
C	Experimental results	1.96	2.53	2.75	2.58	2.78	2.52	44.3481*
D	Methods, processes & procedures	1.72	2.40	2.28	2.18	2.96	2.21	51.1971*
E	Product, material & equipment information	1.87	2.27	2.41	2.09	2.35	2.19	27.2499*
F	Computer programs & model building information	0.80	1.38	1.50	1.91	2.43	1.52	83.2269*
G	Standard & patent specifications	2.08	1.91	2.58	1.05	1.17	1.49	73.4616*
H	Physical, technical & design data	2.29	2.62	2.46	2.34	2.43	2.42	13.2545
I	S & T news	2.66	1.13	2.73	2.70	2.91	2.74	22.7967
J	Statistical, economic, business and general information	0.88	1.10	1.38	1.16	1.00	1.16	38.2992*

Key: *, The association is statistically significant at p=0.05 as the tabulated value of X^2 at p=0.05 for 16 degrees of freedom is 26.296; Qualifications-U, Undergraduate; D, Diploma holder; B-Graduate; M, Post-graduate; P-Doctorate.

Note: The contingency tables on which chi-square test is made are not shown.

Table 5

Nature and Type of Information Required Vs Nature of Work
(Mean Score)

	Nature & Type of Information	Nature of work							Total	X^2
		A	B	C	P	D	E	F		
A	State-of-the-art	2.83	2.47	2.18	2.32	1.21	1.56	1.85	1.95	97.8563*
B	Theoretical background	2.62	2.84	2.83	3.03	2.58	2.74	2.90	3.24	29.5012
C	Experimental results	2.43	2.44	2.71	2.89	2.40	2.53	2.79	2.52	27.2735
D	Methods, processes & procedures	2.20	2.20	2.29	2.50	2.04	2.31	2.05	2.20	45.5626*
E	Product, material, & equipment information	2.45	1.79	2.31	2.41	2.15	2.19	1.89	2.19	22.2593
F	Computer programs & model building information	1.55	1.95	1.69	1.82	1.13	1.38	1.30	1.52	46.2171*
G	Standard & patent specifications	1.36	1.14	1.45	1.39	1.76	1.58	1.74	1.97	39.3603*
H	Physical, technical & design data	2.24	2.16	2.57	2.68	2.43	2.10	2.16	2.41	35.7904
I	S & T News	2.83	2.72	2.74	2.61	2.76	2.62	2.50	2.73	21.9382
J	Statistical, economic, business and general information	1.43	1.43	1.16	0.08	0.98	1.26	1.25	1.16	41.4792*

Key: *, The association is statistically significant at p=0.05 as the tabulated value of x^2 at p=0.05 for 24 degrees of freedom is 36.415; Nature of work - A, Management/Supervision; B, Planning/System Analysis; C, Design and Development; P, Both C & D; D, Fabrication and Testing; E, Operational Activity; F, Others.

Note: The contingency tables on which chi-square test is made are not shown.

The need for standard and patent specifications is highly and negatively correlated with status (rs=-0.72), slightly and positively with experience (r=0.12), slightly and negatively with professional activities and achievements (r=-0.21), and has significant relation with qualifications, nature of work and specialisation of the users. The need for physical, technical and design data is highly and positively

correlated (rs=0.72) only with status of the users. The requirement of S & T news is significantly related to specialisation of the users and slightly and positively correlated (r=0.13) with length of experience of the users. The `need for statistical, economic, business and general information' is highly and positively correlated (rs=0.71) with status and significantly related to qualifications, nature of work and specialisation of the users.

From the above discussion and the data in Table 3, it is clear that the status of the user has a significant relation with all types of information listed, except S & T news and methods, processes and procedures. Hence, the observation of B.N.Singh (1981, p182) that status does not influence the information-needs is disproved in the present study. Further, the general observation of Garvey and others (1975, p501) that the information needs of least experienced are greater than those of the most experienced is true, as far as theoretical background/ basic S & T information (not S & T news) and computer programs and model building information are concerned. However, the reverse is true as far as state-of-the-art, S & T news and standard and patent specifications are concerned (See Table 5.2 under experience column).

In case of American industrial engineers, Shuchman (1981) has reported that out of the five variables used to evaluate the responses to nature and type of information sought, the job activity and type of industry appeared to be the two that make the most consistent difference. The qualification (degree) and the data of acquiring the qualification were not significant variables. As it could be seen from the Table 2, the present study does not support the observation of Shuchman. (1981, p73-74) has reported that "the aerospace engineer is a large user of computer information".) For the Indian space technologists, the status and qualifications made the most consistent difference in (eight of the ten) types of information sought followed by the subject of specialisation (in seven types of information), nature of work and experience (each in five types of information) and professional activities and achievements (in four types of information).

15.4.2 Effect of Change in Nature of Work on Information Requirements

A follow-up discussion held with selected respondents who had substantial change in the nature of work in recent years showed, broadly four types of changes in nature of work and their effect on information requirements and information-seeking activities; (i) Changing from operational activity, testing, design and development to supervision and planning has generally increased the need for information. In case of pure R&D works, the original activities continued and for additional responsibilities delegation of information-gathering work became inevitable; (ii) Changing from a specialised area to project work (i.e. from a more specific area to general area) has considerably decreased the need for information except routine information and vice versa. Delegation of information-gathering becomes a way of doing work in project, though the need for subject-

information is reduced; (iii) Changing from a project work to a facility/service and production sector resulted in further reduction in need for information as the lack of any information did not drastically affect the work in facility/service and production sector. Lack of time and motivation are two major reasons for not seeking information in this area; (iv) Changing from engineering and technology-oriented work to slightly science-oriented work has resulted in increased need for information, particularly, theoretical background and basic S & T information.

15.4.3 Future Information Requirements

A free discussion with selected space technologists about their future information requirements revealed that a large majority (over 60%) do not foresee any significant change in their information requirements in the near future. Even if there is a little change they do not find it difficult to adapt to the circumstances over time. Out of the rest who thought of some changes in their information requirements in future, some expressed their fear at the problem of availability of increased quantity of information than what one could digest (i.e., the problem of `information overload'). This is not merely because of production of information, but because of enlargement of boundary of interest and activities of the organisation. Others thought of the impact of electronics boom and some others explained how the organisation has to intensify its activities, increase its capabilities, reliability, quality and hence risks. The outcome of the discussion is that they are recognising the need for some condensed information services, new media of information and fast serving information agents. A sort of digesting agents as intermediary professionals are likely to come up in the core teams of project both to cut short delays and face the problem of information-overload

Self-check exercise :

2. Explain one typology of information need in terms of contents of information.

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

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15.5 Summary

Information-need studies have dominated the area of user-research. Due to enormous number of (both theoretical and practical) studies information-needs have been looked from diverse perspective. Consequently, there have been many ways of information needs identified in user studies. The findings of the past studies are neither cumulative nor conclusive. However, they provided basis and some insight for future information-need studies. The same can be said about the correlation of information requirements of users with their personal characteristics. A case study of information requirements of Indian Space Technologists has been presented to enable you to choose the typology of need appropriate to your study and design your own information-need study

15.6 Keywords

Information seeker: A person when needs information and actively looks out for the same for his use.

Information transfer: A combination of transfer of materials, availability and location of information and provision of specific information and data including advice, at the point of use.

Information Service: A service designed, developed and delivered by library or similar agency through publishing information or informational materials available with it by preparing and circulating data sheets, subject surveys, abstracts, reading lists, etc., which may be of interest to potential seekers of information.

15.7 Answers to self-check exercises

1 *Explains the scope of information-requirements and ways in which information-need is categorised in the past user-research ?*

Information-requirement as a bridging term covers needs, wants a demands. Studies relating to `information-needs' have categorised needs in the following ways:

- `perceived needs' and `actual or idealised needs'
- `immediate needs' and `deferred needs'
- `continuous needs' and `discrete needs'
- `regular' and `irregular needs'.

Further, information-needs could be

- unexpressed or expressed/articulated,
- felt or unfelt,
- dormant or delitescent.

In addition, information-needs of users can be expressed in terms of

- time (i.e., urgency)
- content and
- amount or quantity of information required.

Accordingly, information-needs have been classified as

- needs for single facts or exhaustive information
- up-to-date, historical or current information
- technical or business information

However, information-needs are frequently determined in terms of kind of message

- nature and type of information
- the types of document embodiments of information needed
- the purpose of use.

2. *Explain one typology of information need in terms of contents of information*?

Melvin J. Voigt has identified three types of information needs of scientists and engineers. These are categorised as follows:

1. *The Current Approach*: this is the need for information about current research and development activities and their socioeconomic implications, in one's own field of specialization as well as in peripheral fields.

2. *The Everyday's approach(Specific approach)*: This is the need for particular items of information essential to the day-to-day work of scientists and engineers. This need for a speicific piece of information or data, a method, an equation, etc., is felt by scientists and engineers in the course of their daily work.

3. *The Exhaustive Approach*: This is the need to find and to check through all of the relevant information existing on a given subject to determine the current state of the art in a given subject field, problem, or technology. This need arises when a researcher starts work on a new investigation

and when reporting on the results of an investigation in the form of a paper, a patent application, a technical report, or a dissertation.

15.8 References cited and for further reading

Aims, A. "Survey of information needs of physicists and chemists." Journal of Documentation 21 (2) June 1965:83-112.

Auerbach Corporation. DoD User Needs Study, Phase I. Final Technical Report, 2 vols. DoD 1151-TR-3 ; AD 615 501,2. Philadelphia, pa.: Auerbach Corporation, 1965.

Auerbach Corporation. "What's wrong with information retrieval?" Machine Design 38 (16) 7 July 1966: 106- 109.

Back, Kurt H. "Behaviour of scientists : communication and creativity." Sociological Inquiry 32 (1) Winter 1962: 82-87.

Bath University. Investigation into information requirements of the social science. Research Report No. 105, Bath University, 1972.

Bouazza, Abdelmagid. “Information user studies” In Kent, allen ed. Encyclopedia of library and Information Science, Vol 44, Supplement 9, New York: Marcel Dekker, 1989, p144-164.

Cole, P. F. "Analysis of reference questions records as a guide to the requirements of scientists." Journal of Documentation 14 (4) December 1958: 197-207.

Columbia University, Bureau of Applied Social Research. Review of Studies in the Flow of Information among Scientists (Study Director: Herbert Menzel) 2 vols. New York: Columbia University, BASR, 1960.

Dervin, Brenda. "Everyday information needs of the average citizen : a taxonomy for analysis". In Manfred Kochen and Josephe Donhue eds. Information for the Community. Chicago: ALA, 1976. 19-38.

Ford, Geoffrey. "Research in user behaviour in university libraries." Journal of Documentation 29 (1) March 1973: 85-106.

Ford, Geoffrey ed. "User Studies : An Introductory Guide and Select Bibliography" CRUS Occasional Paper 1. Sheffield: University of Sheffield,CRUS, 1977

Garvey, William D. "Dynamic scientific information user ". In Anthony Debons and William J. Cameron eds. Perspectives in Information Science. Leyden: Noodhoff, 1975. 483-509.

Gray, John and Brian Perry. "Scientific Information "New York: Oxford University Press, 1975.

Hanson, C. W. "Research on users' needs : where it is getting us?" Aslib Proceedings 16 (2) February 1964: 64-78.

Havelock, Ronald G. "Research utilization". In Manfred Kochen and Joseph C. Donohue eds. Information for the Community. Chicago: ALA, 1976. Chapter 13,200-213.

Herner, Saul and N. Herner. "Determining requirements for atomic energy information from reference questions". In Proceedings of the International Conference on Scientific Information, Washington, D. C. 16-21 November 1958. Washington, D.C.: National Academy of Sciences, 1959. 1: 181-187.

Lin, Nan and William D. Garvey. "Information needs and uses". In Carlos A.Cuadra ed. Annual Review of Information Science and Technology. Chicago: Encyclopedia Britannica Inc., 1972. Vol. 7: 5-37.

Line, M B. ‘The investigation and needs of social scientists: an overview of INFROSS”. Journal of Documentation, August 1971Vol 23: 412-434

Raitt, David Iain. Communication and Information Seeking and Use Habits of Scientists and Engineers in International Organisations and National Aerospace Research Establishments in Europe. PhD Thesis. Loughborough: Loughborough University of Technology, 1984.

Rawdins, Eugene. "Field survey of information needs of industry sci/tech library users". In Proceedings of the 38th ASIS Annual Meeting. New York : Greenwood, 1975. 12: 41-42.

Shuchman, Hedvah L. Information Transfer in Engineering. Rep-461-46-27. Connecticut: Futures Group Inc., 1981.

----------. "Information technology and the technologist : a report on a national study of American engineers." International Forum on Information and Documentation 7 (1) January 1982: 3-8.

Singh, B. N. "Information needs of engineering scientists." International Library Review 13 (2) April 1981: 167-188.

Slater, Margaret and P. Fisher. "Use Made of Technical Libraries" Aslib Occasional Publication No.2. London: Aslib, 1969

Sridhar, M S. "Information requirements of the Indian space technologists." Library Herald 29(3-4) October 1990-January 1991: 125-136.

Voigt, Melvin J. "Scientists' Approaches to Information", ACRL Monograph, No.24, Chicago : ALA, 1961.

World Federation of Engineering Organisations, Committee on Engineering Information. Engineer's Needs for Scientific and Technical Information. By A. David et.al. Paris: WEFO, 1979.

Wilson, Patrick. "Public Knowledge and Private Ignorance : Toward a Library and Information Policy" London : Greenwood Press, 1977.

Wood, D. N. "Where mechanical engineers get their technical information." The Chartered Mechanical Engineer 14 (5) May 1967: 212-215,220.

Unit - 16

USE AND USER INTERACTION STUDIES

Structure:

16.0 Objectives

Having understood the user studies in general and information need studies in particular you will be studying use studies and user interaction studies in this last unit of the block. After studying this unit

you will know (i) findings of selected past use and user-interaction studies, (ii) studies on use of libraries and library documents and their limitations, (iii) studies on user-interactions like user-visit, movement within library, length of stay, pattern of card catalogue or OPAC consultation, interaction with staff for reference, literature search, document delivery and other services, suggestions for new documents, reservation pattern, and finally (iv) a case study of use and user-interaction study.

16.1 Introduction

You might have already noticed in Unit 14 that user-studies and communication behaviour studies when approached from the point of view of communication medium become use studies. Bibliometric studies and informatric studies are akin to use studies because of their common quantitative (or 'counting') approach. Naturally, all these studies (including quantitative, communication and authorship studies) follow the popular 80/20 rule that 80% of the items account for 20% of the use and the remaining 20% account for 80% of use.

You may recapitulate the definition of the concept 'use' from unit 14. `Use' is what an individual actually uses. A use may be a satisfied demand, or it may be the result of browsing or a chance. Individuals can only use what is available. Use is, therefore, heavily dependent on provision and availability of library and information service. A `use' usually represents a need of some kind. But `need' is independent of `use'. Uses can be partial indicators of demands, demands of wants, and wants of need. Identification becomes progressively more difficult from the `hard' use to the often nebulous and unstated need. An operational definition of 'use' is also given in Unit15 for conducting user studies. The operational definition of `Use' for collecting data about the use of library documents could be stated as physical selection and the act of leafing through pages of document as far as in-house use is concerned (Kent et. al., 1979, p61) and for circulation or loaned use, each record of having lent-out or renewed is considered as one externally circulated use of a document. Like use of library, library documents and library services as well as users interaction with library for a variety of purposes are very important. Such interactions are a rich and fertile area of research to understand the user and his behaviour. Thus study of user visits (their

frequency), movement within the library, length of stay in the library, interaction with staff for reference, literature search, ILL or other services, consultation of catalogue or OPAC, requests for new documents, document delivery service, reservation of documents, etc are quite useful in user-research.

16.2 Use of library and library documents

Most user studies are opinion surveys and not an in depth study of how users actually behave. How users behave are addressed in user-interaction studies, which are quite limited in number. Some studies have tried to find out what users think as their behaviour. It is also tragically true that many assess the use of libraries through questionnaire survey asking users to check whether they use a particular form of information with how often or how many items. Unless it is highly guarded critical incident study with tightly designed sample assessing use of libraries through questionnaire is futile and misleading. In the present day automated systems, use of library need to be assessed from the accumulated log records of library. It is also to be remembered that the data about use of library does not reveal much about users. But the pattern of use of library together with user-interactions will have a lot to offer in evaluating libraries and some understanding of users. Such rich data of use of library and user-interactions with library should be the basis for finding consumer behaviour in library and information system.

With the objective of having potentially most useful stock pattern, a library has to strive hard to know optimum size of its collection. In practice it is very difficult to precisely decide how many documents a library should buy and how long they should be kept on active shelves. Yet carefully designed use studies can give some broad guidelines in striking a balance among costs, benefits and utilities. Use studies normally "…. attempt to determine what is used, how frequently it is used, the time span for which material is useful, the national origins of the materials used, etc." (Shaw, 1971, p7). Thus, use studies contribute to sound acquisition policies. Collection of a library is largely built on anticipated demand based on paternalistic policies. Quite often, document selection itself is based on limited information available at the time of selection. Hence, what has been acquired may or may not be of high utility. The acid test for such acquisitions is the actual use made of the collection.

Apart from evaluating the collection, use studies help to know how much good a library has done. Usage of documents make a quantitative assessment of a library. Use studies help in identifying the need, if any, for promotion and also designing ways and means of promoting use of library documents.

Though everyone agrees that the so-called obsolete documents should be discarded from or weeded out of active collection of a library, it is quite difficult in practice to decide which are the obsolete to be discarded. Hence, a defensive strategy to play safe is normally adopted. Year of publication alone should not be used as a criterion to judge obsoleteness of material. However, systematic use study strengthen the hands of library authorities to take bold decisions relating to weeding policies.

Further, use studies have been helpful in knowing most frequently used documents, how heavily used documents are used, obsolescence and half life of documents, how many titles can satisfy say 60 percent of user's needs, which ones to be sent for compact, remote, less expensive storage, who are the less intensive users, what should be procured in duplicate, what back volumes of periodical be bought, right type of binding policies, balanced budget for future acquisitions, future use pattern, etc. By and large "… researchers agree that past use is the best indicator of future use of materials" (Kent et. al. 1979)

Use of a library can be viewed from two principal angles. One is looking at use from the angle of a set of documents of the library with its various characteristics such as subject, age, year of acquisition of document, etc, for a given period by a defined set of users. The other is looking at use of a set of documents of the library from the angle of a defined set of users having various characteristics such as psychological, environmental and demographic characteristics.

Based on the method of data collection, use studies could be either synchronous or diachronous. They are also called cross-sectional and historical studies of use of books. "*Synchronous* studies are made on records of users or references at one point in time and compare the uses against the age distribution of the material used or cited and *Diachronous* studies follow the use of particular items through successive observations at different dates" over a certain life span (Line and Sanderson, 1974, p52). In other words, diachronous studies are nothing but longitudinal use studies.

Self-check exercise :

1. Enumerate the utilities of use studies of library documents ?

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

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16.3 Limitations of Use Studies

User studies are quite familiar to every one. Familiarity often should not lead to complacency and which in turn can cause retardation to further research in the area. Hence, it is necessary to note the limitations of use studies. Use studies may not reveal the spill over effects of use, indirect use of a library and many fruitful interactions of users with library. Further, use of a library and its utility to users are often quite different. A library may be used but it may not be useful; another may be useful but may not be used; a third may be neither useful nor used and ideal is one which is both used and useful.

It is very difficult to define use of a library document. Even in economics, the term use is vaguely defined. Use of a document is often defined as a process of extracting content of a message to meet a need. Interestingly, it is possible that a document is used without utilising its content or information and vice versa (Martin and Lancaster, 1981 P88). Leave alone measuring the benefit derived from use, what could be treated as one use of a document is very vague. A document inadvertently or reluctantly taken out of shelf, a document seriously consulted in the library, a document borrowed from the library and sub-lent, returned without reading, read but not put into application or action, renewed without reading etc., are often equated and considered and concluded as one use. Further, the ultimate use of library document is not measurable.Likewise, 'document' as unitised as 'one document' by use studies has a very wide variations in volume, size and content.

Use of documents when operationally defined essentially constitutes in-house use, circulation or lentout use, inter-library loan use and use through reprographic service. Thus "…. total library use can hardly be expressed in terms of circulation's statistics which are, at best, only a rough indications of trends in the use of library (and) … library use cannot be measured merely in terms of loan figures" (Walford, 1975, p285)

The use study shared include `non-use' of documents and library items user should includes potential user, non-user, under-privileged, un-served, under-served and deprived users. A non-user could be an involuntary non-user who do not have a library to use or voluntary (willful) non-

user. A voluntary non-user is one who has access to a library and lives in an information rich society and yet suffers from information malnutrition (Sridhar, 1994).

Self-check exercise :

2. What limitations of use studies should be kept in mind while conducting a use study ?

Note: i) Write your answer in the space provided below ii) Compare your answer with the model answer given at the end of the unit

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16.4 Findings of some past use-studies

There have been many use-studies of library collections and majority of use-studies have analyzed what is used, frequency of use, lifetime and obsolescence rate of material used etc., with varied objectives. Some of them were also thought of as demand-studies. Many indirect studies like bibliometric and citation studies have also attempted to study and determine use of library

collections by scientists, engineers and technicians, but owing to their in-built limitations and non-local scope their utility and even reliability are limited. The critical incident data of specific demands made on typical libraries should reveal behavioral trends, and indicate their underlying motivation better than a theoretical and qualitative investigation (Slater and Fisher, 1969, p 1).

At the outset, as mentioned earlier, it should be made clear that the use of a document or library does not imply its utility or usefulness. Nor does a high or intensive user-interaction with the library necessarily imply that the user is an intensive user of the library or a highly library-dependent user. However, depending on the intensity of use, the users are classified as `High Information-Potential' (HIP) and `Low Information-potential' (LIP). LIPs are further divided into (i) the NOSTALGIC, who would like to keep informed but never have time, (ii) the BEREAVED, who think it is now too late to update themselves and (iii) the LOST SOULS, the confirmed non-users (Shuchman, 1981, P 1). Secondly, the number of users who have need of information far exceed those who actually use information (Atherton, 1977, p 7). At the same time, it should also be noted that the services of libraries are not restricted to those actually use them, but reach others via actual users due to `spillover effect' (Wilson, 1977, P 83). As a matter of fact the LOST SOULS (among engineers) might be heavy users of information in different forms (Shuchman, 1981, p 23). Thirdly, the "...concern with users should not be equated with an objective of maximizing use (sales)" (Oldman, 1976, P 37). Lastly, it is not yet established that the use of libraries has any definite influence on anything else (Ford, 1977, p 101).

One of the ways of exploring use and user studies is to study the actual incidents of use of information and documents. By and large, the use of library collection is a `minority event' i.e., a very small segment of rightful members really use collection of their `primary library'. Like insurance, for a majority of the users the library appears to be a necessary adjunct to the regular work without much direct consequence attributable to the existence of the library. However, its absence is normally felt by some marginal users too. The studies of Shuchman,

Scott, Gilmore and others, Slater and Fisher and that of `The Social Survey' have very much shown this aspect. For an example, `the social survey', in its survey of UK electrical industrialists found that in case of those firms which had a library less than half of them used it and 18% of the respondents said that they did not use libraries of any kind (Scott, 1960, P 36). Similarly, in the case of Slater and Fisher's survey (1969, P 21) the ratio of potential-users of library to total membership was 26.3% for industrial firms and 22.6% for government establishments. Surprisingly the same was as high as 69% in an Indian study (Sridhar, 1985, p 31-32). A study of science library at MIT (Bush, et. al. 1956, P 94) showed that the ratio of visits to enrollment as 0.37 and Shuchman (1981, P 30) found technical libraries serving only a small proportion of the engineers. When the use of library documents is examined we find that still smaller segment of users use library documents typically following the 80/20 rule.

Just as inter-personal communication follows the inverse square law, the amount of use of a library is also inversely related to the square of the distance between the library and the functional group to which a user belongs (Frohman, 1969). Yet the psychological distance may be more important than physical distance (Line, 1974, p 48).

Among all types of documents, `use of journals' has been studied by many with different methodologies. It was found in these studies that a major portion of the reading of the scientists, engineers and technologists is in journals (Shaw, 1971, P 23-24, 32-35 and 81-82). In journal-reading behaviour, "issues" like how many journals a user regularly reads, how much time he spends on journal reading, the place of reading journals and the factors which affect journal reading have also been investigated. Though the findings are almost unanimous that a user can cope up with his field by reading few journals, the average number of journals actually read varied widely. In Menzel's study (Columbia University, 1958, P 135), three most important journals accounted for 0.49 fraction of articles read by research scientists. Two surveys of Case Institute of Technology (1960, p 12) showed that ten mostly-read journals accounted for 55.1% and 49.8% of the chemists' journal reading time respectively. Many studies have confirmed that an average

scientist/engineer/technologist reads 5 to 15 journals while normally a scientist reads more journals than an engineer or a technologist (Scott, 1959, P 113; Martyn, 1964, P 20; Bernal, 1948; Martin, 1962, p 98; Wood and Hamilton, 1967; Graleswka-Vickery, 1976, P 274; Hanson, 1964, p 65; Ford, 1977, p 32). The use of books and other documents of library have very widely varied from library to library, from subject to subject, and no generalized conclusion except 80/20 rule cited above can be made as far as user-behaviour is concerned.

In a study of Indian Space technologists (Sridhar 1995), it was found that the frequency-distribution of use of journals is less skewed than that of books, and books than that of reports. In other words, the interest of the Space technologists more widely spread among different journals than in case of books and more widely among books than in case of reports. Unusually, more use of the library is made during reviews for promotion although the space technologists do not attribute seeking information for getting promotion as a major motive or purpose. The borrowed use of books is quite intensive (80%), journals moderate (14%), reports marginal (5%) and standards negligible (0.2%). The in-house use of journals is much more than borrowed use. Though the use of journals is much less than that of books, the average time spent by the users in journals section of the library is much longer than that spent in books and reports area. Interestingly, there exists a statistically significant moderate positive rank order correlation (rs=0.55) between inhouse use of library documents and the nearness of the functional division/ project of the user to the library. The average in-house use by project personnel is maximum and that of the service sector personnel is minimum.

16.4.1 Correlation of Use of Library Collections With User-Characteristics

The correlation of use of library documents with user-characteristics has not always shown consistent results. Interestingly, a person who saw more journals tended to be active in many ways like attending more meetings and conferences, actively engaged in the work and having better qualifications (Scott, 1959, p 28).

First of all, the use of library documents is found to vary with the type of organization and users. Those employed in government establishments and industries have made relatively less use of library (and journals) than those employed in academic and non-profit organizations (Slater and Fisher, 1969, P 15; Meadows and O'Connor, 1969). The analysis of use of library in science subjects versus engineering/technology is found to be fairly close to that of scientist versus engineer/technologists pattern i.e, scientists particularly those in research made more use of libraries than engineers and others (Case Institute of Technology, 1960, p 21). Surprisingly, the average number of documents consulted by scientists (3.9) was lower than that of engineers, but the used to useful documents ratio was more favorable for scientists. The pressure of time bothered engineers slightly more than it did scientists, but slightly less than it did non-technical personnel. Technicians were found to be underprivileged group in the information-complex (Slater and Fisher, 1969, p 17-18 and 50).

The use of library documents (and Journals) was found to be linearly and positively related to age and experience of users as per studies of Scott (1966, p 28), Lipetz (1970), Fearn and Melton (1969). However, beyond the age of 45 years and 10 years of experience the use was found to decline. But the opposite (i.e., negative relation) was found in studies like that of Bath University Library (1971), Barkey, (1966) and Ford (1977, P 93). Women space technologists did not differ from men in making borrowed use of library documents but differed significantly in in-house use and interactions with the library (Sridhar, 1987). Again the use of the library was found to be positively related to the level of education of the users (Scott, 1966, P 16; Lipetz, 1970; Fearn and Melton, 1969).

Creativity, performance, excellence in work and publication activities are also found to be positively related to use of libraries (Lufkin and Miller, 1966, p 180; Case Institute of Technology, 1960, p 21). However, another study found no strong relation between use of libraries and academic performance of users (Hiscock, 1986). In addition, high status scientists and

engineers tended to use more of library materials and subscribe to more journals (Shaw, 1971, P 17,20, 48-49) and managers and supervisors, particularly those in research and production areas, tended to read more journals than others (Scott, 1960, p 28).

16.4.2 Use of library services and User-interactions with library

Studies of user-interactions with libraries did not receive enough attention in the past. Like `use of library', user-interactions with the library is also a phenomenon of a minority of users. In fact, both the use of library and the user-interactions with the library are highly interdependent and related. However, there is not much research work done about user-interactions with the library. What is available in literature are fragmentary stray attempts to study some interactions of users with libraries. This may be partly due to the time-consuming observation technique to be followed for the purpose. For the same reason many use-studies also did not venture to consider the in-house use of library documents.

The user-behaviour within the library in terms of physical interactions with various library services and facilities is an interesting and less explored area in user-research. Such a study has to necessarily exclude the non-users of the population. A user visits the library for many purposes. Interestingly, Slater and Fisher (1969, p 29) found that 38% of their respondents visited their libraries for work space (11% exclusively for work space). Even in the study of science library at MIT (Bush et.al., 1956, P 88) a considerable number of persons used the library only as a study hall to make use of their own material. On the contrary, Scott (1959, P 113) found that 59% of the respondents claimed to do most of their journal reading at home followed by 27% at place of work, 2% during journey on train, 3% in a library, 1% in other places and 2% of the respondents did no reading of technical journals. In a study of in-house use of library documents and seat occupancy, the space technologists were found to visit the library more during departmental reviews for promotion. The distribution of user-visit data over a typical day was bimodal, roughly symmetric and the same was cyclical over a typical week with maximum during mid of a working week (Sridhar, 1982). Like use of library documents, the reservations made by the space

technologists for lent-out documents followed skewed distribution and year of acquisition of a document had a stronger effect on its chances of getting more reservations than year of publication (Sridhar, 1983). Collection development in anticipation of demand is a rule rather than an exception for any special library. On the other hand, every document acquired by a special library should have some relevance to the potential needs of its users. Developing relevant collection in anticipation of demand, depends heavily on active participation of users in terms of timely, adequate and useful suggestions for documents. But direct and overt participation of users in collection building is often limited to a few rightful users. In another study, it was found that less than one-fourth of the space technologists have had participated in collection development of the library (Sridhar, 1983). Yet another case study showed non-use of classified catalogue, heavy use of subject catalogue and a roughly symmetric bimodal distribution of card catalogue consultation over a typical day by the space technologists. Further, card catalogues are consulted most of the time either to locate a document on the shelf or to interact with the circulation counter than for literature search (Sridhar, 1986). A rational summary of enormous data of use of the library collection and interactions with the library by Indian space technologists is done by way of developing suitable indexes of library-use and user-interactions with library (Sridhar, 1988). Interestingly enough, the chances of reserving a document by the IST increases by 56% when the interest of colleagues in the new books is publicised. A user who used library documents has greater chances of interacting with the library for other purposes and vice versa. Even a user of a single type of document has a greater chance of using other types of documents and one who interacts with the library for one purpose/service has a greater chance to interact for other purposes/services.

As mentioned earlier, there are not many research about specific aspects of user-behaviour within library Few findings of user movement/traffic, card catalogue-consultation, in-house use, length of stay, seat occupancy, etc., are evaluable for academic or public library users. Apart from science library at MIT mentioned above, Pings and Anderson's (1965) study of user movement/flow pattern, the study made by the University of Cambridge Library Management

Research Unit (1975) about seat occupancy, and Campbell and Shlechter's (1979) study of library design influences on user-behaviour are some of the studies in this direction.

16.6Summary and conclusion

The lentout use study (Sridhar, 1985, p26) of ISAC Library has shown some clear trends in the use of books, reports, journals and standards by its users. Books are used intensively, journals moderately, reports marginally and standards negligibly at ISAC Library. Based on a 20% `collection sample', it is found that books and reports are lentout, on an average, 1.51 and 0.22 times respectively during the ten months. In case of current journals, the average number of times a current issue is lentout is 1.22 in a quarter (Sridhar, 1986, p77-80). The analysis of a three months `circulation sample' of lentout use of ISAC Library documents revealed that books constituted 80% of daily issues followed by journals with 14.8%, reports with a meager 5% and the standards with a negligible 0.2%. Like inhouse use, lentout/borrowed use of library documents has also increased during departmental reviews for promotion and on a typical day it followed the bimodal roughly symmetric distribution (Sridhar, 1982). But over a typical week, the borrowed use is in the reverse pattern of inhouse use i.e., minimum during middle of the week and maximum during beginning and end of the week. During 3 months study of circulation sample, 69% of members of the ISAC library borrowed one or more documents (i.e., the ratio of potential users to total membership) which is significantly higher than that found in earlier studies (Slater and Fisher, 1969, p21; Scott, 1960, p3; Bush et. al, 1956, p94 and Shuchman, 1981, p30).

16.7 Keywords

Cost Benefit Analysis and use studies

The McGraw-Hill encyclopaedia of professional management defines cost-benefit analysis (CBA) as determining "... the ratio of the benefits of a given project to its cost, taking into account the benefits and costs that cannot be directly measured in dollars" (Bittel ed. 1978, p242). A closely related concept of cost-effectiveness analysis (CEA) "... is defined as a way of finding the least expensive means of reaching an objective or a way of obtaining the greatest possible value from a given expenditure" (Bittel ed. 1978, p242). Either to arrive at a benefit to cost ratio of a single project or to assess relatively the effectiveness of different projects, the identification and pertinent measure of all the costs and benefits of projects on identical scale of measure (e.g., dollars or Rupees) is necessary. While CBA seeks to develop standards and criteria for determining how well the existing services of a library meet the requirements of its users, CEA aims at discovering new, improved procedures and devices for providing better services to the users (Leimicuhler, 1978). CBA has been considered as a valuable tool for increasing people's awareness of the costs and benefits of information and documentation as a production factor and to provide better basis for budgeting and strategic planning (Lungberg, et. al.,. 1976).

Libraries are largely service-oriented paternalistic systems and are not susceptible to precise quantitative assessment. The cost of establishing and running a library can be estimated, but how does one measure its intangible benefits? In the past, mixed reactions have greeted the use of CBA in Librarianship in general and in dealing with journals in particular. Yet, the need for CBA in libraries has been stressed by many (White, 1979; Leimikuhler, 1978). Though a substantial amount of literature has been brought out on CBA, very little has been done to demonstrate the use of CBA in libraries.

Wills and Oldman (1977) reviewing some cost-benefit studies of libraries, question the assumption that "use" equals "value", and criticise the use of CBA for two reasons: (1)

economic analysis is inappropriate where decisions have to be based on political factors (2) it is essential to explore how information supplied by libraries is used. Jenson (1978) also concludes that the CBA is not applicable in assessing library service. The upper hand of non-economic considerations (Sridhar, 1985) in decision making in libraries has been stressed by Raffel (1974), who says that the more critical the decision, the less useful a CBA to library decision makers.

The numerous use studies of libraries have never attempted to measure "utility" or "value" (it is almost impossible to measure precisely the utility of a document or a library) but have made certain assumptions about the operational definition of "use" of a document. Francis (1976) for example, finds an absence of costing standards and suggests that many problems exist in translating the statistics of book circulation into equivalent social benefits.

Non-user and Non-use of Information

The terms 'non-use' and 'non-user' are difficult to define without answering the questions such as 'non-use of what?' and 'how much use or how frequently using can be termed as non-use?' A non-user of a library is one who has a right to use the library but he does not do so over a specific period and/or for a specific sample of collection or transactions. Here we are not concerned with involuntary non-users who unfortunately do not have a library to use, but interested in voluntary or willful non-users (Slater, 1984, p2) of a given library. For Grose (1974,p9) non-users are the "... groups of people in an affluent society who are never given the means to satisfy their needs, or are geographically cutoff from centers of provision which are theoretically open to them or are so occupied that even while surrounded by all they need never stop to enjoy it and suffer a form of (information) malnutrition...". These non-users live in an information-rich society and yet voluntarily suffer from information malnutrition. Deprived users are usually considered to belong to the first group (i.e.,. involuntary non-users).

A library can have some non-users who do not use library or its collection or services at all and such non-users are absolute non-users. However, a substantial number of users who make marginal use of a library can be called marginal users. The result of some absolute non-users and many marginal users makes a library under-used. In other words, a library may be under-used due to absolute non-users and marginal users but absolute non-use of a library is quite hypothetical. Under-usage of a library is equally important in the study of non-use and non-users of libraries because from the angle of the library there is no measure or standard to say how much use can be called fair usage.

16.10 Answers to self-check exercises

1. Enumerate the utilities of use studies of library documents ?

Use studies contribute to sound acquisition policies. Collection of a library is largely built on anticipated demand based on paternalistic policies. Quite often, document selection itself is based on limited information available at the time of selection. Hence, what has been acquired may or may not be of high utility. The acid test for such acquisitions is the actual use made of the collection.Apart from evaluating the collection, use studies help to know how much good a library has done. Usage of documents make a quantitative assessment of a library. Use studies help in identifying the need, if any, for promotion and also designing ways and means of promoting use of library documents.Though everyone agrees that the so-called obsolete documents should be discarded from or weeded out of active collection of a library, it is quite difficult in practice to decide which are the obsolete to be discarded items. Hence, a defensive strategy to play safe is normally adopted. Year of publication alone shared not be used as a criterion to judge obsoleteness of material. However, systematic use study strengthen the hands of library authorities to take bold decisions relating to weeding policies. Further, use studies have been helpful in knowing most frequently used documents, how heavily used documents are used, obsolescence and half life of documents, how many titles can satisfy say 60 percent of user's needs, which ones to be sent for compact, remote,

less expensive storage, who are the less intensive users, what should be procured in duplicate, what back volumes of periodical be bought, right type of binding policies, balanced budget for future acquisitions, future use pattern, etc. By and large "… researchers agree that past use is the best indicator of future use of materials" (Kent et. al. 1979).

2. *What limitations of use studies should be kept in mind while conducting a use study ?*

Use of a document is often defined as a process of extracting content of a message to meet a need. Interestingly, it is possible that a document is used without utilising its content or information and vice versa (Martin and Lancaster, 1981 P88). Leave alone measuring the benefit derived from use, what could be treated as one use of a document is very vague. A document inadvertently or reluctantly taken out of shelf, a document seriously consulted in the library, a document borrowed from the library and sub-lent, returned without reading, read but not put into application or action, renewed without reading etc., are often equated and considered and concluded as one use. Further, the ultimate use of library document is not measurable.Likewise, 'document' as unitised as 'one document' by use studies has a very wide variations in volume, size and content.Use of documents when operationally defined essentially constitutes in-house use, circulation or lentout use, inter-library loan use and use through reprographic service. Thus "…. total library use can hardly be expressed in terms of circulation's statistics which are, at best, only a rough indications of trends in the use of library (and) … library use cannot be measured merely in terms of loan figures" (Walford, 1975, p285).

16.11 References cited and for further readings

Allen, Thomas J. Utilization of Information Sources During R&D Proposal Preparation. MIT-97-64. Cambridge: MIT, Alfred P.Sloan School of Management, 1964.

Allen, Thomas J. et al. Time Allocation among three Technical Information Channels by R&D Engineers. MIT Working Paper No.184-66. Cambridge,Massachusetts: MIT, Alfred P.Sloan School of Management, 1966.

Allen, Thomas J. and Maurice P. Andmen Jr. Time Allocation Among Three Technical Information Channels by R&D Engi-neers. MIT-131-65. Cambridge: MIT, Alfred P.Sloan School of Management, 1965.

Atherton, Pauline. "Handbook for Information Systems and Services."Paris: Unesco, 1977.

Auerbach Corporation. DoD User Needs Study, Phase I. Final Technical Report, 2 vols. DoD 1151-TR-3 ; AD 615 501,2. Philadelphia, pa.: Auerbach Corporation, 1965.

Barkey, P. "Patterns of student use of college library." College and Research Libraries 27 1966: 277-282.

Bath University Library. Investigation into Information Requirements of the Social Sciences. Research Report 1-5. Bath: University of Bath Library, 1971.

Bernal, J. D. "Preliminary analysis of pilot questionnaire on the use of scientific literature". In Report of the Royal Society Scientific Information Conference,21 June-2 July 1948. London: Royal Society, 1948. 589-637.

Bernard, Jessie et al. Informal Communication among Bioscientists. Washington,D.C.: George Washington University, 1963/1964.

Byrd, Gary D and Michael E.D. Koenig. “Systematic serials selection analysis in a small Academic Health Sciences libraries”, Bulletin of Medical Libraries Association, 66, No.4, October 1978: 397-406

Campbell, David E. and Theodore M. Shlechter. "Library design influences on user behaviour and satisfaction." Library Quarterly 49 (1) January 1979: 26-41.

Case Institute of Technology, Operations Research Group. Operations Research Study of the Dissemination and Use of Recorded Scientific Information. Cleveland,Ohio: Colarado State University Libraries, 1960.

Fearn, Robin A. C. and Jessica S. Melton. "Information centre user study". In Jeanne B.North ed. Proceedings of the 32nd Annual Meeting of ASIS, San Francisco, California, 1-4 October 1969. Westport,Connecticut: Greenwood Publi- shers, 1969. 6: 463-470.

Francis, D Pitt “Cost-benefit analysis and public library budgets”, Library Review, 25, 1976: 189-92

Frohman, Alan. Determinants of Library Use in an Industrial Firm. Term Paper. Cambridge,Massachusetts: MIT, Alfred P. Sloan School of Management, 1969.

Gerstberger, Peter G. and Thomas J. Allen. "Criteria used by research and development engineers in the selection of an information source." Journal of Applied Psychology 52 (4) August 1968: 272-279.

Gralewska-Vickery, A. "Communication and information needs of earth sicence engineers." Information Processing and Management 12 (4) 1976: 251-282.

Grose, Daphne. "Some deprived information users." Aslib Proceedings 26 (1) January 1974: 9-27.

Hanson, C. W. "Research on users' needs : where it is getting us?" Aslib Proceedings 16 (2) February 1964: 64-78.

Hiscock, Jane E. "Does library usage affect academic performance? A study of the relationship between academic performance and usage of libraries at the Underdale site of the South Australian College of Advanced Education." Australian Academic and Research Libraries 17(4) December 1986: 207-214.

Jenson, Neils. “Cost-benefit and library service Just Don’t go together”, Bibliotek, 70(12) 1978: 310-11 (In Danish)

Kent, Allen et al. "Use of Library Materials : The University of Pittsburgh Study"New York: Marcel Dekker, 1979.

Kochen, Manfred. "What makes a citizen information system used and useful". In Manfred Kochen and Joseph C.Donhue eds. Information for the Community. Chicago: American Library Association, 1976. Chapter 10, 149-170.

Kraft, Donald H and Richard A Polacsek. “A Journal Worth measure for a journal selection decision model”, Collection Management, 2, No.2, Summer 1978: 129-39

Langrish, L. et al. "Wealth from Knowledge"London: Macmillan, 1972.

Leimicuhler, Ferdinand F. “Evaluation of costs and benefits of libraries, Arlington, VA: ERIC Document reproduction service, 1978. ERIC-Report-ED-163947 (A paper presented at the Annual conference of the Special Libraries Association, Kaansas city, Missouri, June 1978)

Line, Maurice B. "Fortyseventh Aslib annual conference summing up: the information service in practice." Aslib Procee- dings 26 (1) January 1974: 47-53.

Lipetz, Ben-Ami. "Information needs and uses". In Carlos A.Cuadra ed. Annual Review of Information Science and Technology. Chicago: Encyclopedia Britanica Inc., 1970. Vol. 5: 3-32.

Luckhman, B “The Library in Society: A study of the Public Library in an Urban setting,” London: The library Association, 1971.

Lufkin, J. M. and E. H. Miller. "Reading habits of engineers: a preliminary survey." IEEE Transactions on Education E-9 (4) December 1966: 179-182.Macadam, E. J. et al. "Technical Information for Engineers : What they Need and What They Get."London: Institution of Mechanical Engineers, 1969.

Lungberg, Sixton et al. “Investigation on the use of information in R&D at a research intensive company, Phase II: possibilities of economic evaluation”. Tidsk Dokum, 32(2) 1976: 17-23.

Martin, Miles W. "Use of random alarm devices in studying scientists' reading behaviour." IRE Transactions on Engineering Management 9 (2) June 1962: 66-71.

Martyn, John. "Report of Investigation on Literature Searching by Research Scientists"London: Aslib, 1964.

Meadows, A. J. and J. G. O'Connor. Investigation of Information Sources and Information Retrieval in Astronomy and Space Sciences. OSTI 5044. Leicester: University of Leicester,Astronomy Department, 1969.

Meltzer, Leo. "Scientific productivity in organisational settings." Journal of Social Issues 12 1956: 32.

Meltzer, Leo and James Slater. "Organisational structure and performance and job satisfaction of scientists." American Sociological Review 27 (3) January 1962:351-362.

Menzel, Herbert. Formal and Informal Satisfaction of Information Requirements of Chemists. PB-173261. Columbia: Columbia University,Bureau of Applied Social Research, 1970.

Rafeel, Jeffrey A “From economic to political analysis of library decision-making”, College and Research libraires” 35 (6) November 1974: 412-23

Raisig, Miles L. et al. "How biomedical investigators use library books." Bulletin of the Medical Libraries Asso- ciation 54 April 1966: 104-107.

Raitt, David Iain. Communication and Information Seeking and Use Habits of Scientists and Engineers in International Organisations and National Aerospace Research Establishments in Europe. PhD Thesis. Loughborough: Loughborough University of Technology, 1984.

Robertson, S E and Sandy Hansman “Journal acquisition by libraies: Scatter and cost-effectivenness”, Journal of Documentation, 31, No.4, December 1979: 273-82

Scott, Christopher. "Science of science : what scientists read and why?" Discovery 20 (3) March 1959: 110-114.

----------. "Use of technical literature by industrial technologists". In Proceedings of the International Conference on Scientific Information,Washington,D.C.,16-21 November

1958. Washington,D.C.: National Academy of Sciences,National Research Council, 1959. 1: 245- 266 (Preprints p.235-256).

----------. Use of Technical Literature by Industrial Technologists : A Study of Technical Information in the Electrical Industry 1957-58 (Survey designed by Leslie T. Williams). The Social Survey Report No. 245. London : The Social Survey, 1960.

Shaw, Ralph R. “Pilot Study of the Use of Scientific Literature by Scientists"Washington,D.C./Metuchen, N.J.: NSF/ Scarecrow Reprint Corporation, 1956/1971.

Shuchman, Hedvah L. Information Transfer in Engineering. Rep-461-46-27. Connecticut: Futures Group Inc., 1981.

----------. "Information technology and the technologist : a report on a national study of American engineers." International Forum on Information and Documentation 7 (1) January 1982: 3-8.

Slater, Margaret. "Non-Use of Library-Information Resources at the Workplace : A Comparative Survey f Users and Non-Users of Onsite Industrial-Commerical Services."London: Aslib, 1984.

Slater, Margaret and P. Fisher. "Use Made of Technical Libraries"Aslib Occasional Publication No.2. London: Aslib, 1969.

Sridhar, M. S. "Study of library visits and inhouse use of library documents by Indian space technologists." Journal of Library and Information Science 7 (2) December 1982: 146-158.

----------. "Document reservation pattern in a special library : a case study." Library Science with a slant to Documentation 20 (1) March 1983: 39-48.

----------. "User participation in collection building in a special library ; a case study." IASLIC Bulletin 28 (3) September 1983: 99-106.

----------. "Use of current journals by Indian space technologists." The Serials Librarian 10 (3) Spring 1986 : 77-93.

----------. "Subject and longitudinal use of books by Indian space technologists." Collection Management 8 (1) Spring 1986: 101-115.

----------. "Information and communication behaviour of women space technologists." R&D Management 17 (4) October 1987: 301-309.

----------."Library-use Index and librarary-interaction index as measures of effectivesness of a special library; A case study". In: Proceedings of XXXIV All India Library Conference on library and Information Services: Assessment and effectiveness, Calcutta: ILA, 1988: 449-65.

----------. "Sociometric analysis of Infromation communication among Indian Satellite Technologists", Library Science with a Slant to Documentation and Information Studies, 25(2), June 1988: 78-111.

---------. "Non-users and non-use of libraries", Library Science with a Slant to Documentation and Information Studies, 31(3), September 1994: 115-28

University of Cambridge, Library Management Research Unit. "Factors affecting the use of seats in academic libraries." Journal of Librarianship 7 (4) October 1975: 262-287.

University of Pittsburgh. The Senate Committee. The Study of library use at Pitt by Professor Allen Kent et.al. A Pittsburgh Reply, Univeristy of Pittsburgh, July 1979: 30-38

Vermaelen, C H "What about the non-users of the Public Library?" South African Journal for Librarianship and Information Science, 49(1), July 1981: 10-14.

Voigt, Melvin J. "Researcher and his sources of scientific information." Libri 9 (3) 1959: 177- 193.

Wills, Gordon and Christine Oldman "An examination of cost benefit approaches to the evaluation of library and information services" in F W Lancaster and C W Cleverdon ed., Evaluation and Scientific management of libraries and infromation centers, Leydon, noordhoff, 1977: 165-84

Wilson, Patrick. "Public Knowledge and Private Ignorance : Toward a Library and Information Plolicy" London : Greenwood Press, 1977.

Wolek, Francis W. "Engineer : his work and needs for information". In: J.B.North ed. Proceedings of the 32nd Annual ASIS Meeting. New York: Greenwood, 1969.

Wood, D. N. "Where mechanical engineers get their technical information." The Chartered Mechanical Engineer 14 (5) May 1967: 212-215,220.

Wood, D. N. and D. R. L. Hamilton. Information Requirements of Mechanical Engineers : Report of a Recent Survey. London: The Libary Association, 1967.