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Block 4

KNOWLEDGE AND SOCIETY

UNIT 14 KNOWLEDGE SOCIETY

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14.0 OBJECTIVES

After reading this Unit, you will be able to:

- perceive knowledge as a basic resource for material advances in modern societies;
- get a good grasp of the factors of social transformation;
- describe the causes and the instruments of changes with reference to the emergence of a knowledge society;
- comprehend the impact of changes on the education and information and knowledge support systems;
- perceive the effect of digital divide caused; and
- assess these changes influencing or affecting the Indian Society.

14.1 INTRODUCTION

In this Unit, we are discussing the emerging knowledge society wherein knowledge is the power that advances the material well-being of a society.

The study is on the basis of different factors that have effected sweeping changes in society. Social transformation itself has been an evolutionary process and has taken several millennia to reach the current stage wherein knowledge assumes the central role in bringing about a radical change in societal progress. The early two landmarks in the transformation of societal changes were caused by the agricultural revolution and the Industrial Revolution.

In the agrarian society, agriculture was the predominant occupation of people who created the knowledge base. The process and the progress were quite slow. The social structure was fairly simple. The power foci were the landed gentry. Life for the people was centered on cultivation of crops and animal husbandry. Village life provided a settled life for people. In their leisure, people developed rural crafts, folk arts and music. In the competition for scarce resources, the mighty had a large share.

The industrial society was triggered by the Industrial Revolution that started in Great Britain and moved to most parts of Western Europe. The changing society was organised around energy as the main source of production of goods and services on a mass scale. The majority of the workforce was engaged in the manufacturing activities and distribution of outputs. A new class of blue collared factory workers emerged. Trade and commerce flourished. Colonialism and capitalism provided enormous wealth for most of Europe. Power and prestige moved from the landowners to the wealthy owners of the manufacturing industries and factories. There was a dramatic change in the social structure. There was a remarkable improvement in the standard of living of people. The principle of economic production was influential in shaping the values and ways of life.

While the effects of agricultural revolution lasted for 10,000 years, within 300 years of the industrial revolution, life and things started changing phenomenally in the industrial society.

In the emerging knowledge society, the time span of changes is within decades. In this society, it has been observed that human knowledge is the source of power that has been instrumental in ushering astounding changes in society. Different authors have named this emerging new society differently. As: the Post-industrial Society, the Third Wave, the Information age, the Electronic Era, Scientific-technological Revolution, Information Society and so on. While material advancement of a society has always been effected by information and knowledge in all societies, why is the modern society termed as a knowledge society?

We shall study what are the different factors that have contributed to the changes that have led to the emergence of a knowledge society. Some of the factors are: unprecedented growth of new knowledge, its dissemination, distribution, accessibility and availability; globalisation of trade, commerce and business; polity, governance, shifting power foci and levers of power; development planning and process of implementation; emergence of a professional class named as knowledge workers and their predominant role and many others. One running thread of great strength that has affected every aspect of change is the spectacular advances of information and communication technologies, caused by synergising science and technology, convergence of computers and

communication technologies, microelectronics, media technology, etc. We shall also observe all these changes in the different institutional mechanisms, which actually have been effecting the changes. The information and knowledge have created a considerable division in their benefits to the world population, particularly in the developing countries. This digital divide has been a major issue of debates and discussions.

We shall also comment as to how the Indian society is evolving in the context of the phenomenal changes that are taking place, primarily in the western societies.

14.2 SOCIAL TRANSFORMATION

Commenting on the sea changes taking place in knowledge society, Peter Drucker observes, "No century in recorded history has experienced so many social transformations and such radical ones as the twentieth century. They, I submit, may turn out to be the most significant events of this, our century, and its lasting legacy. In the developed free-market countries — which contain less than a fifth of the earth's population, but are a model for the rest — work and work force, society and polity, are all, in the last decade of this century, qualitatively and quantitatively different not only from what they were in the first five years of this century but also from what has existed at any other time in history and in their structures."

He further says that in earlier periods of history, changes have taken place triggered by civil wars, rebellions, and violent intellectual and spiritual crises. In striking contrast to this, the social transformations of this century have caused by nothing more than a stir. They have proceeded with a minimum of friction, with a minimum of upheavals, and minimum of attention from scholars, politicians, the press and the public. In fact, the twentieth century has been the cruelest and most violent in history, with two world wars, its mass tortures, ethnic cleansings, genocides and holocausts. But the social transformation was not due to any of these events. It has been, in fact, caused by an intellectual activity resulting in new knowledge arising out of research in science and technology, innovative thinking, and more precisely their application in an organised manner towards material advancement.

The main points that flow out from these observations about the knowledge society are:

- The amazing speed and rapidity with which these changes have taken place in the twentieth century.
- The changes have affected each and every aspect of the life of people.
- The changes have been triggered by great advances and development of the synergizing science and technology.
- The converging computer and communication technologies have provided unprecedented facilities for knowledge recording and dissemination.
- These changes are seen in the western societies most conspicuously.
- A new class of knowledge workers is emerging, considered as the intellectual capital of an organisation.

- Most importantly the power foci is shifting largely on account of the substantial economic transformation of wealth, its distribution and concentration.
- There has been an unequal distribution of wealth, power and benefits even in the industrially developed countries.

In the following section, we shall study the attributes of a knowledge society on the basis of the observations made so far.

Self Check Exercise

- 1) What are the main points that flow out from the observations on social transformation.?

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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14.3 FEATURES OF A KNOWLEDGE SOCIETY

In a knowledge society, knowledge comprehends a wide range of human skills. Knowledge arising out of research in science and technology, social sciences, humanities, individuals who are endowed with special skills, experience, and expertise, that may be tacit or explicit, embedded knowledge in nature and artifacts of various kinds and similar others constitute knowledge in our study in this Unit.

14.3.1 Accelerated Growth of Recorded Knowledge

Beginning with the 18th Century, research has been a major pursuit for the creation of new knowledge. However, the creation of new knowledge, innovations, and inventions has been largely due to the efforts of individuals with a flair for research, intense passion and total dedication. They created the necessary research environment. themselves. Therefore growth of knowledge was sporadic and slow. The time lag between the creation and application of this newly generated knowledge to various productive activities was quite long.

But with the beginning of the twentieth century, more particularly in the later half of this century, research has been a corporate activity by specialised research institutions, supported by governments, industries, UN specialised agencies and other international organisations. Most western countries have built up excellent infrastructure facilities for conducting research. A class of professional researchers, with career opportunities has evolved, with liberal funding facilities from governmental and non-governmental bodies for taking up research projects. Almost along with these developments, research communications in

the form research papers gained momentum with the arrival of research periodicals and research reports and similar other products. With the advent of computer and communication technology, dissemination and research results have acquired tremendous speed in diffusion and accessibility, triggering new ideas for further work in any discipline. Today this pool of accumulated knowledge is available through Internet and web pages almost instantaneously throughout the world, irrespective of geographical location, economically rich or poor region, to almost all. Every subject or discipline in all its dimensions is represented in Internet, which has been a boon for the creation of new knowledge, by research specialists.

This phenomenal growth of new knowledge, its accessibility, organised through very well structured information and knowledge industry, in almost every micro-discipline, has been one of the most important causes for the change towards a knowledge society. Besides these, ICT has also enabled a number of other facilities such as e-mail, teleconferencing, chat sessions, speeding up the process of creating new knowledge.

14.3.2 Knowledge of Individuals

In today's fierce competition in business, knowledge of individuals is considered a vital resource, which is obtained by careful nourishing of experts in companies who employ them. This is considered as the intellectual capital of the organisation. Knowledge engineering and knowledge management, backed by artificial intelligence, expert systems, decision support systems, are new disciplines emerging in this context. The knowledge engineering process involves the capture, representation, encoding and testing/evaluation of expert knowledge. As such, a knowledge base is built containing the set of facts and heuristics (rules of thumb) relating the experts' well-defined task of knowledge. Knowledge management involves identifying or locating and capturing knowledge. Once the knowledge is captured, including tacit knowledge, which deals with what is in the heads of individuals, and explicit knowledge, which can be easily codified, the knowledge, can be shared with others. The individuals will apply this shared knowledge and internalise it using their own perspectives. This may produce new knowledge, which then needs to be captured, and the cycle starts over gain.

Intelligent systems, which are software programs, a product of human brains, have given a cutting edge to companies to combat the fierce competition in business.

This type of knowledge is the exclusive property of an organisation and hence will not be available in the public domain.

14.3.3 Embedded Knowledge

Knowledge and know-how are also embedded in things, natural and man-made. For instance, the study of natural resources, their occurrences, compositions, how they may be extracted, manipulated, converted, applied and preserved, applied (e.g. biodiversity studies) for human benefit, is an exercise in knowledge generation and application. By gaining such knowledge, it may become possible to synthesise or recreate or simulate some of nature's offerings. Knowledge is also embedded in machines, tools and devices by

those who design, develop and innovate them. In all these cases, there is considerable investment in knowledge and therefore, those who make the investments would want to obtain returns on them and prevent unauthorised use of the knowledge. Thus, arise issues relating to intellectual property rights, patenting, piracy, etc. This type of knowledge is hidden and not always available in the public domain. [Neelameghan, 1999].

From the foregoing account of the nature of knowledge and its comprehensive scope, one can glean the value that knowledge acquired in all production and distribution activities of material advances for enriched human living.

Self Check Exercise

- 2) Mention the types of knowledge that get generated in a knowledge society. Explain embedded knowledge.

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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14.4 KNOWLEDGE ECONOMY

Another aspect of far reaching changes towards knowledge society is the new thinking that is giving a new dimension to the factors of economic production. To the conventional factors of economic products viz. land, labour, capital and organisation, is added 'information and knowledge'. A new economic theory is evolving with knowledge as a prime factor of production.

Until a few decades before, economists had an understandable reluctance to consider information and knowledge as a distinct factor of production, deserving a special treatment. Information and knowledge was, in fact, considered along with overheads for the purpose of accounting and budgets. But perceiving the pervasive and influential role of information and knowledge in micro and macroeconomics, economists have developed information/knowledge economics as a speciality.

Lamberton, a specialist in information economics, says that the speciality has emerged "as a response to the deficiencies of economic theory built on unrealistic assumptions about the richness and sureness of information available to decision makers, failures of governments and business policies and the spectacular advent of intelligent electronics with its greatly enhanced capacities for communication, computation and control." In fact, he claims, "the emergence of this new paradigm is transforming economics and probably other social sciences".

In fact, information and knowledge with a number of intangibles, has a number

of characteristics uncommon to other economic resources. Some of these characteristics are:

- Shareable, not exchangeable and can be given away and retained at the same time;
- is expandable and increases with use;
- infinite and ever expanding, dynamic;
- is compressible, able to be summarised, integrated, etc.
- is acquired at a definite measurable cost;
- Possessing a definite value, depending upon its user which may be quantified and treated as an accountable asset;
- vary in value over time in an entirely, unpredictable way;
- 'consumption rate' which can be quantified;
- amenable to the use of cost and accounting technique; and
- sources of both economic and political power.

Self Check Exercise

- 3) What are the characteristics of knowledge economics that distinguish it from other factors of economic resources.?

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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The brief outline of scope and ramification of information economics given below has arisen out of the fact that today information and knowledge have become the most significant factors of production. As against the other factors of production, information and knowledge are intangible source and cannot be measured in terms of the benefits and returns that accrue on all production aspects. However, investments on information and knowledge generation and their dissemination, accessibility, use have been increasing. It is in this context that information economics has emerged as a new discipline. Several aspects such as value, risks, uncertainty, pricing and costing at the macro and micro level are being studied and researched today. In order to appreciate and understand their implications, the following account gives a quick glimpse of the scope and ramifications of information economics. However, this section can be skipped without any loss to understand the features of knowledge economy.

14.4.1 Scope and Ramifications of Information Economics

In order to appreciate and understand the value of information economics in the production of wealth, a brief overview of the scope and contours of this subject is given below, as delineated by Prof. Fritz Machlup, a pioneer in this study.

Considering information and knowledge as human capital, the significance and effect of this capital are analysed as a factor of economic growth and development. The role of information and knowledge of markets is studied in the formation of market prices, information problems relating to markets, trading commodities, insurance, labour, finance, etc. are examined with reference to buyers and sellers. Knowledge and information are examined as public goods, especially technological innovations, dispersed knowledge, central planning, etc. Economic agencies that are involved in their respective activities have an information and knowledge component, which constitutes another dimension of study and research. Empirical research, theoretical analysis and applied enquiry get special consideration as methodological aspects of the economics of information and knowledge.

Machlup has also given a classificatory map for information economics. The ramifications of the subject, as depicted here, consist of 17 groups, divided into 115 sub-groups. The seventeen main groups are listed below:

- Economics of knowledge and information, in general;
- Production and distribution of knowledge. Knowledge industries, Information Services, Information machines.
- Ignorance, chance, risk and uncertainty as factors in the explanation of individual choices, and particular economic institutions and phenomena.
- Uncertainties, risk-aversion, venture spirit, innovativeness and alertness as factors in the explanation of entrepreneurship and profit.
- New knowledge (Invention, Discovery) and its applications (Innovation, Imitation) as factors of production.
- Transfer of technology and know-how.
- Economic forecasting.
- Cost and value of information private or social, alternative information systems.
- Decision theory and Game theory.
- Decision making by consumers with incomplete and uncertain knowledge.
- Decision making by workers and job seekers with incomplete and uncertain knowledge.
- Decision making by private firms in various market positions with incomplete and uncertain knowledge.
- Policy making in government and public agencies with incomplete and uncertain knowledge.

- Formation of revision of expectations and their role in economic dynamics.
- Role of information, knowledge, expectations, risks and uncertainty in the functioning of markets and the formation of prices.
- Prices as information system for resources allocation and product distribution in market economics and planned economics, national programming and planning.
- Human capital. The accumulation of knowledge and skills.

With this background of the ramification of information economics, let us study how these concepts operate at the macro and micro level of economics of production and distribution.

14.4.2 Knowledge Economics at the Macro Level

At the macro level, economics deals with economic issues at the national and international levels to bring about material well being for people. The government of a country being the owner of most of its resources, and also having responsibility for the welfare of its people, mobilises the resources, developing an economic system. The economic system could be a free market economy, or a planned economy. In a planned economy, the resources are allocated by a centralised administrative process. In a mixed economy, the resources are owned privately and publicly in parts. In this system, the resources are allocated partly by means of the price mechanism and partly by government through centralised planning. Although every economy has both free market and planned elements, these elements are found in different proportions in different economies.

Economic issues like setting goals and targets for national economic growth, priorities for investments, nationalisation and privatisation, means of production and distribution, competition and monopoly, national income, gross national product, international trade and balance of payments, etc. constitute concepts that concern governments in formulating economic policies. Various political and social factors influence or bind governments in finalising economic policies.

Information and knowledge has a vital role to play in sorting out all these issues in the formulation of national economic policies. Information economic theorists profess that knowledge is basic form of capital. Economic growth is driven by the accumulation of knowledge. Traditional economics predicts diminishing returns on investment. Increasingly, it is said, there is less and less return on the traditional resources land, labour and capital. The main producers of wealth have become information and knowledge.

Among the major components of the national economy exemplified by economic surveys indicate that: 1) Information workforce, 2) Information goods and services, 3) Emergence of information industry and new markets, 4) Knowledge and information infrastructure are prime factors that determine economic growth and production.

A few economic indicators vouchsafe these assumptions. The Gross National Product (GNP) in USA accounts for 65 to 75 per cent from the service sectors. The workforce engaged in service sectors constitutes nearly 80 per cent.

14.4.3 Knowledge Economics at the Micro Level

Micro-economics of information economics deal with narrow aspects of economics concerned with uncertainty and risks, risk-aversion, information in markets, asymmetry in buyer and seller information, value, cost and pricing of information, decision-making by various economic agents. All these are considered as aspects of study in microeconomics of information, concerned mainly in the context of institutions, firms, individuals, households. For details of this study consult Unit 10 of this course.

14.4.4 Emergence of Knowledge Worker

The new class of knowledge workers includes engineers, programmers, and designers whose major output is research that translates into new products and services. This group constitutes the workforce as given below:

Table 4.1: Categories of Knowledge Workers

Knowledge Workers	Occupation
Information producers	Create new information/knowledge and package existing information. into appropriate form.
Information processors	Receive and respond to information inputs as the basis for further action.
Information distributors	Convey information from the initiator to the recipient.
Information infrastructure	Installation, operation and repair of the machines and technologies used to support information activities.

In the context of knowledge management, this group constitutes knowledge manager, chief knowledge officers, directors of intellectual capital, knowledge analysts, knowledge engineer, intelligent system managers, etc.

To what extent this group would become a power lobby, remains to be seen as the society advances to towards a knowledge society.

Self Check Exercise

4) What are the groups that make up knowledge workers?

Note: i) Write your answer in the space given below

ii) Check your answer with the answers given at the of the Unit.

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14.4.5 Information and Knowledge Industry

Examples of products and services of the information and knowledge workers of the information industry and business that contribute to the enhancement of the efficiency and productivity of various sectors of the economy and the trade which can contribute directly to GNP, are given below:

- 1) **Content Services:** Electronic and non-electronic databases, indexes, libraries, information brokering, database distribution/marketing, videotext, news services.
- 2) **Content Packages:** Newspapers, directories, periodicals, books, reports, films, records, tapes, videodiscs, micropublishing.
- 3) **Facilitation Services:** Time sharing databanks, bank services, electronic fund transfer, software services, advertising services, video conferencing, system design services, management consultancy services, market and business research facilities management services, services bureaux.
- 4) **Information Technologies:** Computers, peripherals, office information equipment, micro-forms, business forms, printing and graphic equipment, time sharing.
- 5) **Integrating Technologies:** Packet switches, switchboards, modems, digital switches, routers, facsimile equipment.
- 6) **Communication Technologies:** Radio, television, videodisc and tape players, telephone, transmission systems, mail equipment, switch bands.
- 7) **Communication Channels:** Physical delivery of message, post-office, telex, international record-carriers, computer mediated communications (e-mail), satellite carriers, cable television, mobile services, paging services, value-added services, Internet services.
- 8) **Broadcast Channels:** Radio networks, multipoint distribution system, TV networks, Telecast.

In the final analysis of asserting knowledge as an economic force, Peter Drucker says, "How knowledge behaves as economic resource, we do not yet fully understand; we have not had enough experience to formulate a theory and to test it. We can only say that we need such a theory. We need an economic theory that puts knowledge into the centre of the wealth-producing process. Such a theory alone can explain the present economy. It alone can explain economic growth. It alone can explain why newcomers, especially high tech fields can, almost overnight, sweep the markets and drive out all competitors, no matter how well entrenched they are."

There are different methods of developing knowledge. 1) By continuing improvement of process, product, service; 2) By the continuous exploitation of existing knowledge to develop new and different products, processes and services, and 3) By genuine innovation. These are equally necessary to build up knowledge reservoir. "But their economic characteristics, viz. their costs as well as their economic impacts, are qualitatively different. So far at least, it is not possible to quantify knowledge. We can, of course, estimate how much it costs to produce and distribute knowledge. But how much is produced — indeed, what we might mean by 'return on knowledge' — we cannot say. Yet

we have no economic theory or a model that expresses economic events in quantitative relationships. Without it, there is no way to make a rational choice and rational choices are what economics is all about.” [Drucker, 1993].

14.4.6 Globalisation of Trade, Commerce and Business

Globalisation is the process of integration of world's economies for creating conditions of free flows of trade and commerce and movement of persons across borders. This has been facilitated by ICT for instant communication of information and knowledge. Internationalisation of production has been taking place over the last few decades through Multinational Corporations (MNCs), operating with tens and thousands of affiliates. Their sales in 1998 were of the order of two trillion dollars, almost one-third of the world trade in merchandise. Global trade rose to 6.2 trillion dollars in 2000 as against 3.4 trillion in 1990. World trade and commerce has been growing faster than the world outputs.

Though market forces are taking over some of the effects of economics, and the role of public sector is diminishing in most countries, the state can intervene effectively and play a positive role in promoting optimum production, improving access to markets, facilitating technological advances, and providing the necessary conditions for the healthy functioning of markets which could be well-regulated.

Globalisation has been a major outcome of information and knowledge economy with all the advances in ICT. E-Commerce is creating a new and distinct boom, rapidly changing economy, society and politics.

One example of the effect of e-commerce is illustrated. A middle-sized company in US, founded in 1920s, run by the third generation persons of the founder, used to have some 60 per cent of the market in inexpensive dinnerware for fast-food service for schools and office cafeteria, hospitals within a hundred-mile radius of its factory. Chinaware is heavy and breaks easily, and hence cheap chinaware is traditionally sold within a small area. Almost overnight the company lost more than half of its market. One of its customers, a hospital cafeteria where someone went searching the Internet, discovered a European manufacturer who offered chinaware of apparently better quality at a lower price and shipped by air. Within a few months, the main customers in the area shifted to the European supplier. Few of them, it seems, realised that the material came from Europe. [Haravu, 2002].

In the words of Peter Drucker, “In the new mental geography created by the railroad, humanity mastered distance. In the mental geography of e-commerce, distance has been eliminated. There is only one economy and only one market.”

He further adds, “One consequence of this is that every business must become globally competitive, even if it manufactures or sells only within a local or regional market. The competition is not local anymore – in fact, it knows no boundaries. Every company may well become obsolete. Its manufacturers and distributes in a number of distinct geographies, in which it is a local company.

But in e-commerce there are neither local companies nor distinct geographies. Where to manufacture, where to sell and how to sell will remain important business decisions. But in another twenty years they may no longer determine what a company does, how it does, and where it does it.”

Two important aspects of modern industry and business are manufacturing customer-need based products, largely due to multinational involvement, products in a limited quantity to suit small markets. In other words, the trend today is de-massifying of products as against mass scale manufacture. Thus smaller units compete with larger general products units or obtain contracts from the latter to produce value-added products and services. The price mechanism is also suitably modified.

Self Check Exercise

- 5) What do you understand by globalisation of trade, commerce and business?
- 6) What are the two aspects of production and international markets?

Note: i) Write your answer in the space given below

ii) Check your answers with the answers given at the of the Unit.

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14.4.7 Polity, Power Structure and Shift: Policy Issues

In a knowledge society, the political form of a country is conditioned by its changing economy. The investment priority is on the need for generation of new ideas and their conversion into applications, products and services. This is accentuated because of the high rate of obsolescence of goods, ideas and services. The increased importance of knowledge means that the net stock of intangible capital viz. education, research and development, innovation, etc. has grown faster than tangibles viz. buildings, transportation, roads and machinery, etc. In US, the investment has been increased on intangibles for instance, from 60 per cent of the value of federally financed capital in 1970 to 93 per cent in the 1990s. This is equally true in business.

This policy of governments creates a change in the power foci. In an information and knowledge society the power foci shifts to those who possess or have access to information and knowledge, know-how and the ability and skill to apply and use. In the second wave industrial economy, mass strikes by groups or workers is a demonstration of their bargaining power, in the knowledge economy, the bargaining power shifts to knowledgeable individual specialist. Knowledge workers, though not, constituting the majority in a knowledge society, being the largest single population and workforce group, will be the most powerful lobby. They may not be the ruling class in a knowledge society, but they will be the leading class. In their characteristics, social positions, values and expectations, they differ fundamentally from any group in history that has ever occupied the leading position.

Another implication of a knowledge society is how well, a country, an individual, an organisation, an industry does in acquiring and applying knowledge. As knowledge is equally shareable and never lost in use by any, there will be no excuses for non-performance. There will not be poor countries but only ignorant countries. In fact, developed societies, individuals, organisations, etc. have become infinitely more competitive than were societies of the beginning of this century, leave alone earlier ones.

An interesting observation by Toffler on the nature of power shift in a knowledge society is illustrated by the physicians in US who dominated health care for years, suddenly losing their position of power.”Throughout the heyday of doctor-dominance in America, physicians kept a tight chokehold of medical knowledge. Prescriptions were in Latin, providing the profession with a semi-secret code, as it were, which kept most patients in ignorance. Medical journals and texts were restricted to professional readers. Medical conferences were closed to the laity. Doctors controlled medical-school curricula and enrollments. Contrast this with situation today, when patients have astonishing access to medical knowledge. With a personal computer and a modem, anyone from home can access data bases like Index Medicus and obtain scientific papers on everything from Addison’s disease to zygomycosis and in fact, collect more information about a specific ailment or treatment than the ordinary doctor has time to read.” “In short, the knowledge monopoly of the medical profession has been thoroughly smashed. And the doctor is no longer a god.”

“In many other fields, too, closely held specialists’ knowledge is slipping out of control and reaching ordinary citizens. Similarly, inside major corporations employees are winning access to knowledge once monopolized by management. And as knowledge is redistributed, so, too, is the power based on it.”

What is obtained in US, even if a little exaggerated, may not be applicable to many other countries. Even so, the power shift is a phenomenon that needs to be kept in view in fast changing power structures.

Self Check Exercise

- 7) Explain the effect of e-commerce in business and trade in knowledge economy?

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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14.4.8 Life and Culture in a Knowledge Society

The life of a common person, in a knowledge society has changed very drastically due to the cumulative effect of industrial and information revolution.

These changes are reflected in practically every aspect of life. The most conspicuous changes are: 1) The high standard of living, 2) Almost instant access to information and knowledge through Internet, 3) Increasing trend towards consumerism, and 4) Influence of mass media, leisure industry and show business.

The high standard of living is indicated by the *per capita income* of the western societies. It ranges from 25000 to 35000 US dollars (Approximately 15 -16 lakhs in rupees), compared to 1000 to 2000 US Dollars in most developing countries (50 thousand to 1 lakh in rupees). This easily explains the high standard of living in western societies.

Another very significant aspect of life of people in western societies is their accessibility to information and knowledge through Internet. This has a tremendous effect on their quality of life. Access to information for daily activities such as to food and recipes, health care, education, entertainment, travel, social security, news on current events, activities and personalities, weather, and on a host of other subjects could be had for people in the western societies through Internet. Naturally, living conditions today in developed countries are quite different from what they were about a generation ago.

Consumerism

An interesting feature of persons in a modern affluent society is consumerism. In the words of the well-known British Economist John Robinson, "there is an ever-rising consumption of industrial products by the middle class of farmers, small business, professionals, including personnel of the techno-structure itself, and that part of the working class which has become absorbed into the system; the system has come to be known as the consumer society."

Advertisements in the ubiquitous media encourage people to keep on increasing their wants endlessly. It creates new wants through built-in obsolescence of existing products or services and by projecting changing fashions. Advertisements then encourage emulation and competition among individuals. Thus, as the eminent American economist Galbraith puts it, "the pressure of emulation and competition in adornment and display has no clear terminal power."

Leisure Industry

Another conspicuous feature of a modern affluent society is leisure that people have with all the modern standards of living. The mass media, the leisure industry and show business are providing the most advanced level of e-entertainment. A new culture is developing on account of both consumerism and e-entertainment, which is resulting in a new style of living in the western societies. This culture is getting emulated in developing countries.

To have an idea of western homes let us discuss the concept of smart homes as explained below:

Smart Homes: Houses automated to control the environment and do such tasks called Smart Homes are becoming popular. Smart Homes store the user's profile and act depending on that in any given situation. For example, if the user prefers to drive and the spouse prefers to take the public transport, the

direction given to both of them would be totally different and would be stored with their preferences in their individual profiles. These profiles would be automatically updated depending on their direction in various circumstances.

The smart home could update them with good deals on merchandise of their interest and of course the shortest way to get to the place to buy it or how to order if it is an online deal. It would adjust lighting, temperature and could start their car for them. The possibilities are endless, given enough money to implement them. Variations in behaviour of the resident could be measured and beyond a tolerance level the house could automatically call the doctor, police, or insane asylum.

Currently smart homes do direct movement in a house where the owners are known to be out. The house then alerts the owner via cell phone. The owner could, over the Internet, check the images from the security camera installed in the room where the movement was detected and take appropriate action.

Hotels offer another kind of service. Restaurants in some large hotels carry tablets, which enable patrons' orders to be communicated directly to the kitchen. The tablets, display multilingual descriptions and photos of menu items, in the hotel itself, staffs carry Personal Digital Assistance (PDA's) around to access information. They add information, like the preferences of a particular patron, into the database instantly.

These are some of a few novel facilities offered by business institutions to people, using ICT to be in competition in the business environment.

So far we have been discussing some of the features of the emerging Knowledge society, which have tremendous influence on the developing countries. In the next section, we shall see how these impact some of the organisational mechanisms that have been built-up.

Self Check Exercise

8) Describe briefly the life and culture of people in modern society.

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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14.5 IMPACT ON A FEW SECTORS

While every sector of an economy is affected by the fast changing dimensions of the emerging knowledge society, we shall discuss below: 1) the education and training sector, as this sector is primarily going to be the basic feeder to the class of knowledge workers, and 2) the information support infrastructure that makes information and knowledge provide the means for further

development of knowledge. Only these two sectors are taken up here to assess the impact of knowledge society mainly because these are the most vital sectors in developing the knowledge sector, which contributes wholesomely to the growth of new knowledge.

14.5.1 Education and Training

A society's socio-economic growth and development are entirely dependent on the quality of the educated class whose knowledge forms the intellectual capital. Education is the process of acquiring general and specialised knowledge by means of study and learning that develop intellectual power and judgment. It also includes acquisition of skills for executing various professional and vocational functions, development of culture, which is an expression of the mode of thought and feelings. All these are accomplished by the educational system at different stages and levels of study and learning. In the knowledge society, it is envisaged that this process of education should get the highest priority in terms of investment. The proper channeling of it is sure to create the necessary conditions for further developing knowledge skills at all levels of society.

In the western society today, the information and communication technologies have become part of the teaching and learning tools in schools at all levels. Peter Drucker says that this would change the economics of education. From being a labour intensive, it will become more capital intensive. More importantly, as embarking in knowledge society, a new vision of learning institutions will have to be conceived and operated. Education should produce persons who will function in a knowledge society to deliver 'yields' out of knowledge. While technology is the tool, the philosophy of education should focus on substance contents, and focus. In knowledge society people have to learn how to learn.

Drucker prescribes a set of new specifications for an educational system for a knowledge society:

The school (standing for education, an educational system from primary to the highest level of advanced and professional learning), has to provide universal literacy of a high order — well beyond what "literacy" means today which is the very foundation. Universal literacy, besides the three "Rs, at the school levels, should include numeracy, a basic understanding of science and of the dynamics of technology, acquaintance with foreign language and skills to be effective as a member of an organisation. These contents would vary according to the levels of schooling. An educational system has to inspire students at all levels and of all ages with motivation to learn and with the discipline of continuing learning. An educational system has to be an open system, accessible both to highly educated people who for whatever reason did not gain access to advanced education in their early years.

It has to impart knowledge both as substance and as a process. An educational system can no longer be a monopoly of the conventional education institutions. Education in a knowledge society has to permeate the entire society. Employing organisations of all kinds — business houses, government agencies, and non-profit organisations— must become institutions of learning and teaching as

well. Schools, increasingly, must work in partnership with employers and employing organisations.

“As knowledge becomes the primary source, the social position of an educational system as producer and distributive channel of knowledge and its monopoly are bound to be challenged. And some of the competitors are bound to succeed.

What will be taught and learned, how it will be taught and learned, who will make use of schooling; and the position of the school in society — all of this will change greatly during the ensuing decades. Indeed, no other institution faces challenges as radical as those that will transform the school.

But the greatest change — and the one we are least prepared for — is that the school will have to commit itself to results. It will have to establish its “bottom line”, the performance for which it should be held responsible and for which it is being paid. The school will finally become accountable.” (Peter Drucker)

What has been quoted above may sound more a vision rather than an actuality that may come. Nonetheless, the feeder to the Knowledge Society namely the Educational System may have to reorient itself towards producing results to justify and prove that knowledge is the primary source for material development.

Self Check Exercise

- 9) What is the focus on education in a knowledge society as envisaged by Drucker?

Note: i) Write your answer in the space given below.

ii) Check your answer with the answer given at the end of the Unit.

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14.5.2 Information and Knowledge Support Systems

With the cumulative advances of the technological revolutions, the western society has built up a strong and powerful system of information and knowledge support system. The information chain from the point of generation to the point of use, that provides an effective link to every point in the chain, has been established. Institutional mechanisms, tools and techniques have been developed to disseminate, distribute, provide accessibility, document delivery, etc. The newly created knowledge, dovetailing it with already existing knowledge has also pooled up to create a reservoir of knowledge.

“Impelled by the phenomenal proliferation of computers and information devices, closely linked to an explosion of processing and access speeds, convergence of images, sounds, and writing on one digital medium, and propagated by a worldwide network to satellites and broad band fibre, optic

cables, the information and knowledge age is already a reality to millions in countries all over the world.”

Thus, everything has been set to the emergence of a knowledge society to advance the people of the western society to move further in their material advancement.

14.6 DIGITAL DIVIDE

In the foregoing sections we have learnt about the evolution of the knowledge society that pertains mainly to the western industrialised societies and Japan.

However like all technological revolutions, the information and knowledge revolution also inspired hopes and aspirations that the ‘Digital Age’ would bring benefits to the people all over the world. But unfortunately this has so far touched a tiny minority of the world’s population. If we take the access to the World Wide Web as a criterion for joining the information age, less than 5 per cent of the world’s population of 6 billion had gained access. This disparity has been a subject of debate and discussion beginning from 1999, under the rubric ‘Digital Divide.’

“The term ‘digital divide’ describes the fact that the world can be divided into people who do and people who do not have access to – and the capability to use — modern information technology, such as the telephone, television, or the Internet. The digital divide exists between those in cities and those in rural areas. For example, a 1999 study showed that 86 percent of Internet delivery was to the 20 largest cities. The digital divide also exists between the educated and the uneducated, between economic classes, and globally, between the more and less industrially developed nations.”

This subject of Digital Divide was debated and discussed in a Workshop in 2003, organised at the National Institute of Advanced Studies, Indian Institute of Science at Bangalore. The workshop brought together 30 invited participants comprising activists, academics, politicians and administrators and journalists.

The papers and a report on the discussions have been published with the title *IT Experience in India bridging the digital divide*, edited by Kenneth Keniston and Deepak Kumar. (Kenneth Keniston, Professor and Director of MIT Indian Program at the Massachusetts Institute of Technology, Cambridge, Mass. USA.).

In his introductory paper, Keniston, identifies four different kinds of digital divide. They are that

- It exists within every nation, industrialised or developing, between rich and poor, educated and uneducated, powerful and powerless.

Even US where households with incomes \$ 75,000, have 20 times more Internet access than those in the lowest income brackets; 80 per cent of the rich and 5 per cent of the poor have access to Internet. University educated persons own 69 per cent of computers as compared to 8 per cent to less educated persons; Internet access to the former has 49 per cent versus 3 per cent to the latter.

According to estimates in 2002, in India with a population 1 billion and

more, less than 1 per cent had home access to computers and just 0.5 per cent had home access to Internet.

- The second digital divide is linguistic and cultural. In many nations this separates those who speak English or another Western European language.

In India only 50 million or so Indians speaking English who are also rich, prosperous, urban, highly educated and concentrated in technical fields, own home computers and have access to Internet.

- The third digital divide follows closely from the first two, is the growing digital gap between the rich and the poor nations.

The international disparity in access to ICTs is of course a reflection of other disparities between rich and poor nations. But so far as ICTs are themselves enabling, facilitating and wealth creating, the international divide in information technology widens the already great gulf between industrialised and developing countries.

- The fourth digital divide is the emergence of a new elite group, which Keniston calls the 'digirati'.

These are the beneficiaries of the enormous successful IT industry and the other knowledge-based sectors of the economy such as biotechnology and pharmacology. Unlike older Indian elites, the privileges of the digirati are based not on caste, inherited wealth, family connection or access to traditional rulers, but on a combination of education, brainpower, special entrepreneurial skills and ability to stay on the 'cutting edge' of knowledge.

The consensus Kenniston could discern from the discussions, although they were not officially accepted consensus are stated below:

- Information technologies should be introduced when (and only when), they constitute the most effective available way of meeting basic human needs and fulfilling fundamental human rights.
- The most creative uses of ICTs in development may not entail computers, e-mail or Internet access, but rather the use of other computer-based technologies, including embedded chips, satellite based information, etc. in order to meet local needs.
- Information and communication technology projects must build on an assessment of local needs, as locally defined by local people.
- Beware of inflated rhetoric and grandiose plans; look for results.
- Do not simply assume that a flourishing IT sector will trickle down to the rest of the people.
- Be sure that ICT programs actually reach and really benefit their intended beneficiaries.
- Information and communication technology for development efforts need to share experience within and between nations, especially actual successes and failures at the grassroots level,

In summary, Keniston says that Information poverty of developing nations is not the cause of their deficiencies. It is rather the consequences of other forms of poverty, social inequalities of resources, illiteracy, corruption, injustice, poor health and lack of basic public services.

Self Check Exercise

10) What do you understand by the expression 'Digital Divide'?

11) What are the four types of digital divide mentioned by Keniston?

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

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14.6.1 The Indian Scenario

With the backdrop of digital divide given above, let us look at the Indian scenario vis-à-vis ICT and knowledge society.

In a very thought provoking contribution, (published by *Frontline* of the Hindu in 2002) commenting on the Indian vision of knowledge-based economy, two US based Indian specialists have made some insightful remarks. A summary of their observations is given below:

Proponents of the 'new growth economy' have forcefully and convincingly argued that human capital generates the ideas and knowledge that in turn, decide how efficiently and effectively the traditional inputs of capital and labour are transformed into wealth. This is a function of education levels and the skills of a workforce. The real progress into a knowledge economy will not come without a substantial development of India's human potential.

The reality is that 79 per cent of India's population lives in villages with very limited basic infrastructure for any kind of growth. Over 60 per cent of the Indian population is considered literate. But literacy is defined as the ability to read and write simple words in any Indian language, acquired with or without formal schooling. This criterion is so basic that it is almost irrelevant in the context of knowledge economy.

The value of ICT depends greatly on the existing level of economic growth and development. ICT can indeed make existing assets and processes more effective and efficient but cannot compensate for lack of a basic infrastructure.

Industrial growth derives from investments in large infrastructure such as railways, roadways, power grids, and dams. Such infrastructure supports the growth of physical assets intensive industries such as steel and transportation industry. These create and move physical entities such as goods, water and

people. These ventures employ numerous workers with limited education and skills and uplift large sections of society.

In contrast, ventures in the knowledge economy usually involve the production of knowledge-intensive goods and products (like software) and the large-scale capture, movement and utilisation of information using sophisticated network infrastructure such as computers, cable, fibre, and routers. All these efforts require initial construction, building and maintaining and such infrastructures based on specialised knowledge.

It should be stressed here that the new knowledge economy is an outcome of the cumulative technological advances. The industrial economy made agricultural economy more productive. Industrial economy, in turn, had created great wealth and improved living standards across social divides. This progress, in fact, had set the western countries in an ideal position to create and exploit knowledge to transform the society into a knowledge economy. Crucially, the great source of productivity and growth attributed to the knowledge economy derives not from the knowledge economy itself, but from its effects on the industrial economy.

What is appropriate for a developed economy is not necessarily appropriate for India, where basic elements of infrastructure including quality education, healthcare, electricity and drinking water remain in short supply.

Therefore India should aggressively pursue manufacturing and agriculture-based industries to build a robust industrial economy. It can be made effective with applications of ICT.

The most striking examples of ICT in two major sectors of Indian economy are the railways reservation system and the public banking system. There are also a few other areas where ICT have performed with great success.

The conclusion drawn in the Frontline contribution is that "The Indian vision of a knowledge-based economy will be realised when it is based on the foundation of a robust industrial economy. To be truly beneficial, the rain of ICT must fall at the right place, in the right quantity, at the right time and for the right purpose."

Indian Planning and Targets to be Achieved

The Government of India has set targets through its planning, policies and implementation processes. Its initiation of e-governance, and related ICT applications are positive steps towards progress. As these aspects are described in detail in other units of this course, here these aspects are not elaborated.

What is of relevance and very important for library and information professionals is that they should rise to the occasion in making their contribution to the task of nation building. The skills to be acquired by information professionals are a combination of subject/discipline oriented knowledge, computer skills at a fairly advanced levels, management skills to operate new and emerging information institutions, and communication skills both written and oral. These skills should find their results in adding value to information services. Value-added information products and services could be obtained by the techniques of filtering, validation, analysis, synthesis, presentation and

ease of use. Professional requirements in India currently required are also elaborately treated in other units of this program. Hence not detailed here.

Self Check Exercise

12) How could the Indian economy be prepared to move it to a knowledge-based economy?

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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14.7 SUMMARY

This Unit examines primarily the features of emerging knowledge society which have been a result of Agrarian, industrial and information revolution of the past. The features of knowledge society include the cumulative knowledge of discipline-based knowledge, personal knowledge of individuals and embedded knowledge. Knowledge economy derives its strength from this knowledge, which is, currently, considered the main factor of economic growth and production. Proponents of information economics are involved in studies and research on this powerful factor of economic growth and development at the national, international and local levels. Indian economic growth and development derives its strength from the western model, adopting ICT as the main operating mechanism. But the digital divide of ICT points that it is on the basis of industrial economic strength, ICT could provide adequate scope for development. The conditions obtained in India in its efforts to get for people the benefits of ICT are briefly described. The planning process for this process and the role of information professional in the national building tasks are briefly mentioned.

14.8 ANSWERS TO SELF CHECK EXERCISES

1) The main points that flow out from these observations about the Knowledge Society are:

- The amazing speed and rapidity with which these changes have taken place in the twentieth century.
- The changes have affected each and every aspect of the life of people.
- The changes have been triggered by great advances and development of the synergising science and technology.
- The converging computer and communication technologies have provided unprecedented facilities for knowledge recording and dissemination.

- These changes are seen in the western societies most conspicuously;
 - A new class of knowledge workers is emerging, considered as the intellectual capital of an organisation.
 - Most importantly the power foci is shifting largely on account of the substantial economic transformation of wealth, its distribution and concentration.
 - There has been an unequal distribution of wealth, power and benefits even in the industrially developed countries.
- 2) Conventional/traditional recorded knowledge resulting from R & D activities, tacit personal knowledge and embedded knowledge, hidden in nature. Knowledge and know-how are also embedded in things natural and man-made. For instance, the study of natural resources, their occurrences, compositions, how they may be extracted, manipulated, converted, applied and preserved, applied (e.g. biodiversity studies) for human benefit, is an exercise in knowledge generation and application.
- 3) Some characteristics of information and knowledge are that they are:
- shareable, not exchangeable and can be given away and retained at the same time ;
 - Is expandable and increases with use;
 - Infinite and ever expanding, dynamic;
 - Is compressible, able to be summarised, integrated, etc.
 - Is acquired at a definite measurable cost;
 - possesses a definite value, depending upon its user which may be quantified and treated as an accountable asset;
 - may vary in value over time in an entirely, unpredictable way;
 - has 'consumption rate' which can be quantified;
 - is amenable to the use of cost and accounting technique; and
 - is a source of both economic and political power.
- 4) The new class of knowledge workers includes engineers, programmers, and designers whose major output is research that translates into new products and services.
- 5) Globalisation is the process of integration of world's economies for creating conditions of free flows of trade and commerce and movement of persons across borders. This has been facilitated by ICT for instant communication of information and knowledge.
- 6) The two important aspects of production and international markets are de-massification and need-based production.
- 7) E-commerce has created a new and distinct boom, rapidly changing economy, society and politics.
- 8) Life and culture of people in a modern society of a western economy is

characterised by a high standard of living, consumerism, and leisure time spent in entertainment offered by show business.

- 9) Education in a knowledge society should focus on a new philosophy of education. This philosophy should be based on continuous learning for every person, irrespective of age, already educated persons and the involvement of all organisations of society.
- 10) The term 'digital divide' describes the fact that the world can be divided into people who do and people who do not have access to – and the capability to use — modern information technology, such as the telephone, television, or the Internet. The digital divide exists between those in cities and those in rural areas. For example, a 1999 study showed that 86 per cent of Internet delivery was to the 20 largest cities. The digital divide also exists between the educated and the uneducated, between economic classes, and globally, between the more and less industrially developed nations.”
- 11) Keniston, identifies four different kinds of Digital Divide. They are that:
 - It exists within every nation, industrialised or developing, between rich and poor, educated and uneducated, powerful and powerless.
 - The second digital divide is linguistic and cultural. In many nations this separates those who speak English or another Western European language.
 - The third digital divide follows closely from the first two, and is the growing digital gap between the rich and the poor nations.
 - The fourth digital divide is the emergence of a new elite group, which Keniston calls the 'digirati'
- 12) The Indian economy is to concentrate on building a strong Industrial Economy, using ICT effectively for this process.

14.9 KEYWORDS

Agrarian Society	: A society in which the work-force is predominantly from the agricultural class.
Human Capital	: Human knowledge, information, experience, skills, expertise.
Industrial Society	: A society in which the workforce is predominantly from the manufacturing class.
Information	: (No single definition is possible) Information is the building blocks of knowledge is generally relevant in library and information studies.
Information and Communication Technology	: The acquisition, processing, storage, dissemination and use of vocal, pictorial, textual and numerical information in

digital form by a micro-electronic –based combination of computing and communication.

- Information Flow** : Information transfer through established channels.
- Information Infrastructure** : Mechanisms built for information flow and organisation.
- Knowledge** : Knowledge is an organised set of statement of ideas, presenting a reasoned judgment or an experimental result which is transformed to others through some communication medium in a systematic form.
- Knowledge Economy** : An economy where information and knowledge are the prime factors of production.
- Knowledge Society** : A society in which the society derives its form from a knowledge economy.
- Knowledges** : The aggregate knowledge of conventional research outputs, tacit personal knowledge, and embedded knowledge hidden in nature.
- Social Wealth** : Wealth available freely to all the sections of a society.

14.10 REFERENCES AND FURTHER READING

Asian Productivity Organisation, Tokyo (1992). *Top Management Forum: Knowledge Management for Corporate Innovation*.

Davenport, Thomas H (1998). *Some Principles of Knowledge Management*. Available at: <http://www.bus.utexas.edu/kman/km.htm>.

Drucker, Peter F (1994). The Age of Social Transformation. *Atlantic Monthly*. November, 1994.

Drucker, Peter F (1994). *Knowledge Work and Knowledge Society: The Social Transformation of This Century*. The Godkin Lecture .

Drucker, Peter F (1993). *Post-capitalist Society*. New York: Harper Collins.

Evans, Philip B and Wurster, Thomas S (1997). Strategy and the New Economics of Information. *Harvard Business Review*, September-October.

Haravu, Jairam (2002). *Lectures on Knowledge Management: Paradigms, Challenges and Opportunities*. Bangalore: Sarada Ranganathan Endowment for Library Science.

http://www.ksg.harvard.edu/ifactory/ksgpress/www/ksg_news/transcripts/drucklec.htm

<http://www.ntia.doc.gov/ntiahome/digitaldivide/>

Krishnan, Rishiksha (2002). Knowledge and Innovation: A Strategic Perspective. *Paper presented at Seminar on India: The Knowledge corporation* by IIM, Bangalore.

Kenniston, Kenneth and Deepak Kumar. (eds.) (2004). *IT Experience in India: Bridging the Digital Divide*. New Delhi: Sage publications.

Konna, Prabhudev and Balasubramanian, Sridar (2002). India as a Knowledge Economy: Aspirations and Reality. *Frontline* (02), Jan.19-Feb.01.

Lamberton, D.M. (1984). The Economics of Information. In Kent, Allen (ed.) *Encyclopaedia of Library and Information Science*. New York: Marcell Dekker.

Liebowitz, Ja (2001). *Knowledge Management: Learning from Knowledge Engineering*. London: CRC Press.

Luther, Machiavelli and Salmon. (1999). Beyond the Information Revolution. *The Atlantic Monthly* October 1999.

Machlup, Fritz (1983). *The Economics of Information and Human Capital*. Princeton: Princeton University Press.

Neelameghan, A. (1999). Information Economy and Knowledge Society: An Introduction. *Information Studies* 4 parts.

Preston, Paschal (2001). *Reshaping communications. Technology, Information and Social change*. New Delhi : Sage Publications.

Ribeiro, John (2002). *India Tackles the Digital Divide*. Available at: http://www.hpl.hp.com/india/pressure/news-items/itworld_may14-02.htm

Smart, Barry (1992). *Modern Conditions: Postmodern Controversies*. London: Routledge.

Skyrme, David (1998). *Knowledge Management Solutions: The IT Contributions*. Available at: <http://www.skyme.com/pubs/acm0398.doc>

Toffler, Alvin (1970). *Future Shock*. New York: Bantom Books.

Toffler, Alvin (1980). *The Third Wave*. New York: William Morrow and Co.

Toffler, Alvin (1990). *Power Shift*. New York: Bantom Books.

Vittal, N. (2001). *Cultural Dimensions of E-Governnance*. Talk delivered in the IIIT & M, Gwalior, 20.10.2001.

UNIT 15 KNOWLEDGE MANAGEMENT: CONCEPTS AND TOOLS

Structure

- 15.0 Objectives
- 15.1 Introduction
- 15.2 Data, Information and Knowledge
 - 15.2.1 Types of Knowledge
- 15.3 Knowledge Management (KM)
 - 15.3.1 Interest in Knowledge Management
 - 15.3.2 What is Knowledge Management?
 - 15.3.3 Changing Scenario and Driving Forces
 - 15.3.4 Impact of Information and Communication Technologies
- 15.4 Knowledge Management Systems
 - 15.4.1 Characteristics
 - 15.4.2 Practical Approaches and Strategies
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- 15.7 Summary
- 15.8 Answers to Self Check Exercises
- 15.9 Keywords
- 15.10 References and Further Reading

15.0 OBJECTIVES

After reading this Unit, you will be able to understand:

- the evolution of the concept of Knowledge Management (KM);
- the practice of KM especially in enterprises;
- the strategies of KM in enterprises;
- tools and techniques, such as, data mining, text analysis, and text mining; and
- facets of preparing knowledge products.

15.1 INTRODUCTION

Management as a discipline with its own theories and normative principles evolved during the 20th century although 'management-in-practice' has existed,

that is management has been practised, for centuries. Managers, as a distinct class of professionals, began to emerge as a societal necessity, with the formation of joint stock companies in the 15th and 16th centuries in Europe, more particularly to organise and manage expeditions, explorations, and the growing trade with countries across the oceans. The manager also played (and continues to do so) an important role in the smooth functioning of an enterprise, in the interactions between the workers on the one hand and the investors / shareholders on the other. From the experiences in managing companies, factories, and various other types of corporate entities and services over several decades, commonalities of practice were identified and guiding principles formulated. Such distillation of normative principles led to theories of management applicable to the whole gamut of management practices. Articles in periodicals, new periodicals devoted mainly to the subject 'Management', education and research programmes, associations and institutions with focus on management were started and the new discipline of Management has come to stay. Sub-branches or specialisations of management – financial management, human resources management, services management, public relations management, marketing and sales management, technology management, etc, and now Knowledge Management (KM) have also evolved.

For an information professional, understanding KM—the concept, its practice, tools and strategies is important for two reasons: firstly to design and develop information systems, products and services that support KM practice in the enterprise he/ she serves, and secondly to apply KM efficiently and effectively in the information resource system of which he/ she is the incharge. It may be mentioned here that the learner is familiar with the concepts like knowledge economy and knowledge society and their characteristics. These have been already discussed in Unit 14.

15.2 DATA, INFORMATION AND KNOWLEDGE

There are numerous definitions of data, information, and knowledge in the literature. However, as Davenport and Prusak note, knowledge is neither data nor information but it is related to both. However basic it may sound, it is still important to emphasise that data, information, and knowledge are not interchangeable concepts. The terms 'data', 'information' and 'knowledge' have been defined and distinguished in the write-up for other units of this course. We shall not repeat it here. It is useful to recall that there are three elements involved in the knowledge process: the knowee, the knower, and the process of knowing or cognition (operating in the knower). Knowledge is created when the knower knows the knowee. It implies that knowledge is what a knower knows; and there is no knowledge without someone knowing it: Outside of the knower only embodied knowledge (resource) exists.

Information becomes knowledge once it is processed in the mind of an individual. This knowledge then becomes information again once it is articulated or communicated to others in the form of text, computer output, spoken, or written words or by other means. Knowledge is embodied in nature and its manifestations, in man-made artifacts, documents of all types (including the digital forms) as text, images, sound, and multimedia, and most importantly

in people, not only what is in their brain, but also their skills, cultural practices, traditions, conventions, laws, etc. For an enterprise, it is strategic to focus on proprietary corporate knowledge, intrinsic to its core competence / expertise and is often protected by patents, copyright, non-disclosure policies, and its other intellectual properties

In brief, knowledge is information integrated with experiences, reflected upon and interpreted in a particular context. Knowledge is a renewable, re-usable and an accumulating asset of value to an enterprise that increases in value with employee experience and organisational life. It is intangible, boundary-less, and dynamic, and if it is not used at a specific time in a specific place, it may be of no value otherwise. Although knowledge can be represented in and often embedded in organisational processes, routines, and networks, and in document repositories, it is only the cognitive process and intellection of a person(s) that can generate knowledge or apply it.

15.2.1 Types of Knowledge

It may be noted from the literature that knowledge can be thought of in many ways, and indeed there are a number of different types discussed [Teece, 1998]. From a knowledge management perspective, it is useful to be able to identify and categorise types of knowledge as it may help to indicate which of the categories are more amenable to management than others.

A typology of knowledge is: 'core', 'advanced' and 'innovative' knowledge. Core knowledge is the minimum level of knowledge required for daily operations; advanced knowledge enables a firm to be competitively viable; and innovative knowledge enables a firm to lead the industry to which it belongs, and competitors.

Knowledge is also categorised as 'explicit' and 'tacit' knowledge. Explicit knowledge is expressed in words and numbers and shared in the form of data, scientific formulae, specifications, manuals, and the like. This kind of knowledge can be readily transmitted between individuals formally and systematically. Tacit knowledge is highly personal and hard to formalise, making it difficult to communicate or share with others. Subjective insights, intuition, experience and hunch fall into this category of knowledge. Tacit knowledge is deeply rooted in an individual's actions and experience as well as in his/her ideals, values, and emotions. Tacitness may be considered as a variable, the degree of tacitness being a function of the extent to which the knowledge is or can be codified and abstracted. Knowledge may dynamically shift between tacit and explicit over time although some knowledge always will remain tacit. Codification is the degree to which the knowledge is fully documented or expressed in writing at the time of transfer between individuals. The complexity of knowledge increases with lower levels of codification.

Another categorisation of knowledge is 'practical, experience-based knowledge' and 'theoretical knowledge' derived from reflection and abstraction from experience.

15.3 – KNOWLEDGE MANAGEMENT (KM)

15.3.1 Interest in Knowledge Management

The level of interest in KM has been building for several years and this is partly because of the recognition that knowledge has become increasingly important to an individual firm's success. As pointed out by KPMG (1998) "We are in an era where the traditional pillars of economic power – capital, land, plant, and labour – are no longer the determinants of business success. Instead an increasing number of organisations depend for their value on the development, use and distribution of knowledge-based competencies."

15.3.2 What is Knowledge Management?

Just as there are many definitions of knowledge, there are also numerous definitions of knowledge management. To date, no general approach to managing knowledge has been commonly accepted- although several isolated, and at times diverging notions are being advanced. According to Malhotra (1998) academic notions of knowledge and management are split between the various camps of psychologists, technologists, and organisation theorists, and that the 'trade', press, or practitioners follow a techno-centric approach (looking at how various IT systems can facilitate knowledge management) or they take a human- resource oriented approach (for example looking at the cultural issues that are relevant to knowledge management). However, a simple way of defining Knowledge Management is that "KM is the process of organizing and sharing the diverse forms of business information created within an organisation. KM can include managing enterprise document libraries, discussion databases, Intranet websites, and other types of knowledge bases. KM is the application of enterprise portals to organise, manage, and share the diverse forms of business information created by individuals and teams in an organisation.

We shall be discussing KM in the framework of an enterprise or organisation – a company, a research centre, an educational institution, a project or any other corporate entity.

KM in general relates to unlocking and leveraging the knowledge of individuals so that it becomes available as an organisational resource independent of particular individuals. Many authors view KM from an information systems perspective and is based on the belief that KM systems can be used to capture and store workers' knowledge and make it accessible to others through a searchable application. In this perspective KM should enable an organisation to effectively store, manage, retrieve, and enlarge its intellectual properties. The repository view of KM emphasises the gathering, providing, and filtering of explicit knowledge as the information held in a repository can easily be transferred and shared. Nevertheless, it is neither easy nor appropriate to use de-contextualised information. Knowledge managers often need access to human experts, for their tacit knowledge. This 'expert sharing' dimension of KM emphasises "the human aspects – cognitive, social, cultural and organisational - aspects, in addition to information storage and retrieval. Rather than focusing on the management level of an organisation, expert sharing focuses on the self-organised activities of the organisation's members." (Ackerman, Pipek and Wulf)

There are computer systems that can route queries, assemble people and work, and augment naturally occurring social networks within organisations

Self Check Exercise

- 1) Define knowledge. State its characteristics.
- 2) Differentiate between tacit and explicit knowledge.

Note: i) Write your answers in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

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15.3.3 Changing Scenario and Driving Forces

Over the past few decades, the economy of industrialised societies evolved from industrial economy to information economy and on to knowledge-based economy wherein the level and extent of activities relating to the generation, accessing, retrieving, processing, communication, application and use of information and knowledge are deemed to be an important parameter for measuring the socio-economic development level of nations. The individuals and corporations that possess and/or have access and the means to exploit knowledge resources become the more powerful entities in society. In brief we notice:

- Worldwide shift to information economy and on to knowledge economy.
- Rapid growth in knowledge and information-intensive products and services.
- Intensification of knowledge utilisation in the production of traditional products as well.
- Manual production workers being substituted / replaced by information / knowledge workers in various sectors of the economy.
- New types of knowledge / information-intensive organisations devoted mainly to the production, processing, and distribution of knowledge-based products.
- The significant impact of the rapidly evolving ICTs (information and communication technologies) on enterprises.

Enterprises need expertise in KM to sustain and enhance their competitive advantage of the organisation in an environment of growing competition for resources – finance, human, and physical resources, markets, etc. The knowledge manager, at all levels, is expected to possess special capabilities for creating, mobilising, and communicating knowledge available with the

organisation as well as elsewhere. Knowledge embedded in the organisation's business or work processes and in the employees' including their expertise, skills, experiences, provide the enterprise capabilities to create, produce and deliver customers what they need, when and where they need it.

KM is introduced to help an organisation of whatever nature to create, share, and use knowledge effectively because it pays off in fewer mistakes, less redundancy, quicker problem solving, better decision making, reduced research and development (R&D) costs, increased worker independence, enhanced customer relations, and improved services to customers. Knowledge support functions are needed to implement KM in an organisation.

Another perspective that accelerated the enthusiasm for KM and the development of knowledge products is the 'richness versus reach' thesis [Evans and Wurster, 1997]. It is pointed out that the nature of communication has drastically changed. Until now, one had a choice of richness or reach, but one could not achieve both simultaneously. A face-to-face conversation, for instance, is rich in content, nuance and interactivity but poor in reach. A radio or TV broadcast has great reach but is poor in interactivity and nuance. Communication strategies were always an either-or choice. With the Internet, it is argued that we can craft systems that provide both richness and reach. This has necessitated a rethink on how information and knowledge are shared within organisations, an important concern of businesses wishing to harness knowledge. Knowledge products targeted to specific domains, together with the use of the web as the delivery medium, it is possible to provide the richness and reach sought for in organisations.

Crucial and value-adding knowledge: The decision to invest in knowledge depends upon knowing what knowledge is relevant and crucial to the organisation and what knowledge adds value. Crucial knowledge includes the ever-changing dynamic knowledge necessary to operate within the industry at an acceptable level. It may be obtained through consultation with experts, their tacit knowledge that manifests as problem-solving behaviour. The continued availability, development, and retaining of experts in the organisation with such problem-solving proneness and capability is an important aspect of human resources management.

Much of the literature views KM from an information systems perspective and is based on the belief that KM systems can be used to capture and store workers' knowledge and make it accessible to others via a searchable application.

KM is more than collecting and feeding data and information into a computer database or website. Effective KM ensures that individuals at all levels of an organisation have access to the information they need to accomplish the tasks assigned to them at the same time helping to achieve the organisation's overall goals.

KM calls for combining the appropriate advanced elements of technological resources and the indispensable input of human response and decision-making. It is also about revaluing work and changing the way people perform. The outcome is a shift in the way people work, and in the way leadership is defined. To implement KM system, persons involved and affected need to understand

why they should undertake a KM system initiative, how it will affect their work and why the organisation needs to change.

Self Check Exercise

- 3) Define knowledge management from an information system perspective.
- 4) Discuss the advantages of KM in an organisation.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

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15.3.4 Impact of Information and Communication Technologies

An enterprise is a *purposeful* system, that is a system created to accomplish a mission or objective. The goal of the mission is usually embodied in a “mission statement.” An enterprise may consist of one or more subsystems. It has attributes of a thermodynamic system as well as those of a biological system – e.g. purpose, entropy, requisite variety, viability, homeostasis, adaptation, equifinality, etc.

In a knowledge society environment, application of the emerging ICTs is perceived as an instrument that can contribute to the enhancement of its competitiveness. ICTs offer opportunities as well as pose challenges to managers. Keeping these in view appropriate policies and strategies have to be adopted to derive optimal benefits. Briefly the various opportunities and added value that ICTs can provide to an enterprise management include, for example, better customer response, better management information, timely information about changes in the operational environment of the enterprise, productivity increase, cost control, factor replacement, improved quality of products and services, increased sales, better market intelligence and market share, assist in developing new products for new markets, and systems integration and coordination. There are threats and problems to be faced by non-planned selection and application of ICTs.

15.4 KNOWLEDGE MANAGEMENT SYSTEMS

A Knowledge Management System (KMS) has a knowledge base as a major component of computer-based information systems. A KMS uses its knowledge base about a specific, complex application area to act as an expert / consultant to end-users. Such a system can be used either for management or for operational

applications. Thus a KMS can be classified conceptually as either a operation or management system, depending on whether it is used for expert advice to control operational processes or for assisting in managerial decision making.

15.4.1 Characteristics

KM, as already mentioned above, attempts at the holistic application of the complexities of human intellectual processes, including tacit knowledge, learning and innovating processes, communication cultures, values and intangible assets to assist decision making and control processes. It also recognises the subjective, interpretive and dynamic nature of knowledge. At the same time KM draws from the developments in ICTs for effective and efficient organisational management and development.

In developing a KMS it is necessary to take into account the following factors:

- 1) KM does not come cheap.
- 2) Effective KM requires hybrid solutions using people and technology.
- 3) KM is highly political, has socio-cultural and human implications.
- 4) KM requires development of knowledge managers.
- 5) KM benefits more from maps than models, more from markets than from hierarchies.
- 6) Sharing of knowledge may be perceived as an 'unnatural act'
- 7) KM entails improving knowledge-based work processes and providing knowledge-based products and services.
- 8) Accessing knowledge is only the beginning
- 9) KM is a never-ending continuous process.
- 10) KM requires a knowledge contract.

15.4.2 Practical Approach and Strategies

As mentioned above, in the emerging knowledge society, knowledge is being recognised in an increasing measure as a primary source of wealth production. Economies that can efficiently exploit their knowledge resources are doing better than those that have abundant natural resources but lack the knowledge to exploit them.

The vast and deep impact on the social and economic environment caused by technology and globalisation has forced organisations worldwide to make significant changes to their objectives, strategies, and organisational structures in order to adapt, survive and succeed in the 21st century. Organisations need to become wired, retooled and networked; but also need to change both the extrinsic elements of their products, activities and/or structures and their basic intrinsic way of operating-values, and mind-set, and sometimes even their purpose. Organisations must learn very quickly in order to adapt to rapid environmental changes to survive and succeed. Thus, today's organisation has little choice but to transform itself into 'learning' organisation, one of the

principal purposes will be the expansion of knowledge that comes to reside at the core of what it means to be competitive and productive. The organisation should develop the capacity to collect, store and transfer knowledge and thus continuously transform itself for corporate success. Technology should be judiciously utilised to optimise both learning and productivity.

The knowledge subsystem is designed for the *acquisition, creation, storage, transfer and utilisation of knowledge*.

Acquisition involves collection of existing data and information from within and outside the organisation via environmental scanning, consultations, networks, staff suggestions, etc. **Creation** of new knowledge is mainly through problem solving, innovative programmes and conversion of implicit knowledge to explicit knowledge. **Storing** is the coding and preserving of value-added knowledge for easy access. **Transfer and utilisation** refer to the mechanical, electronic and interpersonal movement of information and knowledge throughout the organisation as well as its application and use by members of the organisation wherever they be located. . These elements are ongoing, interactive and dynamic instead of being sequential and independent.

Only by developing and implementing systems and mechanisms to assemble package, store and distribute the fruits of its thinking will an enterprise be able to transform its knowledge into corporate asset and power. In the practical application of the concept of KM, answers to the following queries about the information and knowledge need consideration:

- What information and knowledge are needed?
- Why they are needed, for what purpose?
- Where they may be found?
- How they may be sourced and obtained?
- How is it to be processed?
- When, where and in what form and format the information is to be delivered?

KM process also need to take into account other factors, such as, cost, ability to tap knowledge, mapping the knowledge, knowledge growth and operations on knowledge, what technology is to be used, etc.

A networked IT platform should be installed to support the knowledge systems. Powerful system navigation and information exploration tools that use hypermedia, dynamic visual querying and tree maps are useful. Employees should be enabled to communicate freely with each other and share data and information across the organisation. To achieve efficiency in performance as many operations as necessary should be automated within the organisation. Centres of expertise and excellence should be created with assigned responsibilities for collecting, storing, analysing and distributing knowledge. These centres can train workers in their specialties to ensure availability of qualified workers and consulting services. The centres may have the following functions in relation to the knowledge repositories:

- Creating and managing the knowledge repository;

- Setting and enforcing standards, methods and practices;
- Assessing work-force competency and performance;
- Providing training and consultancy services; and
- Identifying gaps, to remedy deficiencies in the content and processing of the knowledge repository.

The challenge is to create an organisation that can move and redistribute its knowledge. By finding ways to make knowledge move, an organisation can create a value network, not just a value chain. In order to guide KM assessment and future activities (from a practitioner's perspective), a descriptive KM model such as that described by Ernst and Young (Fig. 15.1) supports a holistic approach to KM that encompasses organisational, cultural, and technological aspects.

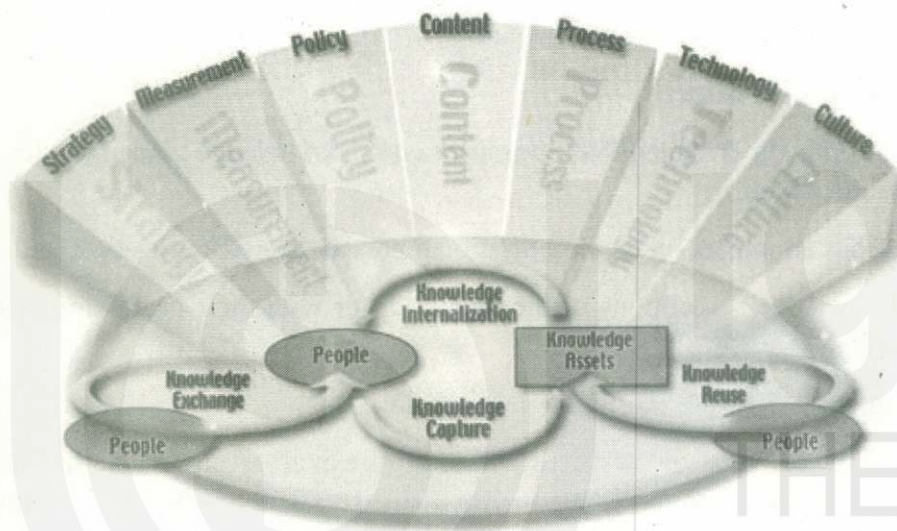


Fig. 15.1: KM : A Two-dimensional Perspective

As illustrated in Fig. 15.1, KM may be viewed from a two-dimensional perspective. The first dimension consists of the activities that are critical to knowledge creation and innovation, knowledge exchange, capture, reuse, and internalisation. Collectively, these processes build a learning organisation — one capable of creating, acquiring, and transferring knowledge as well as adapting its actions to reflect new insights and innovations. The second dimension consists of those elements that enable or influence knowledge-creation activities. These include:

Strategy: the alignment of corporate and KM strategies;

Measurement: the measures or metrics captured to determine if KM improvement is occurring or if a benefit is being derived;

Policy: the written policy or guidance provided by the organisation;

Content: the subset of the corporate knowledge base that is captured electronically;

Process: the processes that knowledge workers use to achieve organisation's mission and goals;

Technology: the information technology that facilitates the identification, creation, and diffusion of knowledge among organisational elements within and across enterprises; and

Culture: the environment and context in which KM processes must occur (often described in terms of values, norms, and practices).

The following are some of the KM strategies:

- Viewing KM as a business strategy;
- Transfer of knowledge and best practices;
- Customer-focused knowledge;
- Personal responsibility for knowledge;
- Intellectual asset management; and
- Innovation and knowledge creation.

Influencing factors are:

- Working environment has an impact on the knowledge perception level of the people;
- IT has an impact on the organisational perspective of knowledge; and
- Knowledge perceptions of the people differ with their profession, age, and also gender.

To summarise, appropriate strategies include:

- Providing facility to people in the enterprise at all levels so that they feel comfortable in the working environment. This will enable them to think technically and help to compete in the environment;
- Considering data, information and knowledge in different ways and give due importance to skill, intelligence, and knowledge available in human capital;
- Making an inventory of intellectual capital i.e., what do we know that is valuable and where else can we use it;
- Tracing the information flows that parallel the routine activities and new challenges;
- Looking for key knowledge by asking: “What do we lose when key people leave?” or “What do we have to teach every new staff member?”;
- Switching our thinking from “training” to “facilitating learning.” Put job aids and learning tools in the hands of people on the job. It is estimated that 70% of learning about a job comes from doing the job; thus we have to find ways to make that more effective; and
- Providing data and knowledge bases.

Self Check Exercise

- 5) Enumerate the processes taking place in the knowledge subsystem.
- 6) Describe KM from a two- dimensional perspective.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

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15.4.3 Richness versus Reach

Another perspective that accelerated the enthusiasm for KM and the development of knowledge products is the 'richness versus reach' thesis of Evans and Wurster. They pointed out that the nature of communication has drastically changed. Until now, one had a choice of richness or reach, but one could not achieve both simultaneously. A face-to-face conversation, for instance, is rich in content, nuance and interactivity but poor in reach. A radio or TV broadcast has great reach but is poor in interactivity and nuance. Communication strategies were always an either-or choice. With the Internet, it is argued that we can craft systems that provide both richness and reach. This has necessitated a rethink on how information and knowledge are shared within organisations, an important concern of businesses wishing to harness knowledge. Knowledge products targeted to specific domains, together with the use of the web as the delivery medium, we believe can provide the richness and reach sought for in organisations.

15.5 KNOWLEDGE PRODUCTS

15.5.1 Need

The Internet, intranets, email and groupware make more data than ever before available to the knowledge worker. Customer / user comments, communications between staff members of an organisation and peers in a professional group, internal research reports, trade and technical publications, and competitor and other web sites are some examples of available heterogeneous electronic data. As a result the literature on KM, information retrieval, corporate portals, digital libraries and web-based information and document management technologies express concern about the information overloaded, web-centered digital world, and the need for better methods of knowledge organisation.

Information managers try to lower the cost of tasks that require discourse / document analysis, if possible by using automated methods, to provide better service to clients and improve the quality of information provided. Information users need to have direct access to relevant information, for rapid awareness of content, and to discover new ideas and relationships. For meeting these needs a rapidly growing class of software products called enterprise KM products has come up. Numerous vendors have entered the KM market with a wide variety of products purported to manage and control the great quantities

of textual and other information needed to support enterprise functions and activities, The tools and products in the KM market include, among many others, search engines, natural language processing software, document management systems, and groupware products.

Thus, the idea of knowledge products arose out of concerns, primarily in the corporate world but also in other spheres (e.g., government), of the information overload phenomenon which we are subjected to because of the proliferation of information in conventional and in digital forms. The ongoing need to manage knowledge and discover the nuggets of knowledge in a sea of information has led to the search for better methods of organising information for knowledge discovery. The term *knowledge organisation system* encompasses all types of schemes for organising information and supporting KM. These include taxonomies, classification, clustering and categorisation schemes that organise materials at a general level, subject headings that provide more specific access, authority files that control variant versions of key information such as geographic names, highly structured vocabularies, such as thesauri, and less traditional schemes, such as semantic networks and ontologies. One kind of knowledge product which had many votaries during the 1970s and 1980s, namely, Expert Systems using artificial intelligence (AI) principles did not make any significant dent primarily because of the difficulties and the cost of capturing domain knowledge in an ongoing dynamic manner.

Many of the methods for knowledge organisation in the web environment are based on the theories, principles and practices that librarians have long formulated, understood and applied. For instance, classification schemes, subject headings, authority files and thesauri. It would be useful to see if some of these theoretical insights can indeed be applied in the context of new methods now being developed to manage the great quantities of textual and other information that drive the web.

15.5.2 Characteristics

Guttenbergs's printing press revolutionised human civilisation and sparked the mass media revolution. Five hundred years later, the printed document or an electronic version of it still largely governs the way we perceive information. But now we are seeing a convergence of media. Technologies that make representation, storage and distribution of not only text but of audio and video as easy as that of text have enabled us to advance beyond the 'document-oriented' paradigm. It is possible today for the development of products that are truly knowledge-based.

A knowledge-based product should:

- have captured the tacit knowledge of one or more experts in a domain of study or practice;
- be the result of collaboration between domain specialists and information specialists;
- promote collaboration between and among users of the products and domain specialists;

- be rich in content and if possible have a wide reach within the potential user community; enable quick and easy access to information about the domain;
- be possible for users of the product to learn new skills, gain insights (or improve skills) in the domain that is targeted by the product;
- where possible, promote cross-cultural information access, understanding and communication; and
- continuously evolve with new inputs resulting from interactions that take place in the process of using it.

Self Check Exercise

- 7) Discuss the need of enterprise KM products.
- 8) How does ICT enable to capture tacit knowledge?

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

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15.5.3 Architecture

The fact that more than 80% of the content on the Web is text has given rise to automated text mining solutions. The Gartner Group, an active consulting firm in KM proposed a multi-tier KM architecture. At the lowest level, an intranet and an extranet with platform servers, network services, and distributed object models are used as the foundation for KM applications. Databases and workgroup applications constitute the next level. Above this layer are the text and database drivers to handle various corporate data and information assets, Knowledge Retrieval (KR) functions and concept and physical knowledge maps. Above this is a web user interface. In this architecture, applications and services are layered and have complimentary roles. No single infrastructure or system is capable of serving an organisation's complete KM needs. Second, Knowledge Retrieval (KR) is considered as the newest addition to the existing IT architecture and is the core of the entire architecture.

The Gartner group presents the KR function along two dimensions: a semantic and a collaboration dimension. In the former, linguistic analysis, thesauri, dictionaries, semantic networks, clustering (categorisation/table of contents) are used to create an organisation's Concept Yellow Pages. These are used as organisational knowledge maps (conceptual and physical). The proposed techniques consist of both algorithmic and ontology generation and usage.

The Collaboration dimension's goal is to achieve "value recommendations" identified by experts and trust advisers, community building activities, and collaborative filters. Domain experts who hold valuable tacit knowledge can be explicitly identified and consulted for critical decisions. (Fig. 15.2).

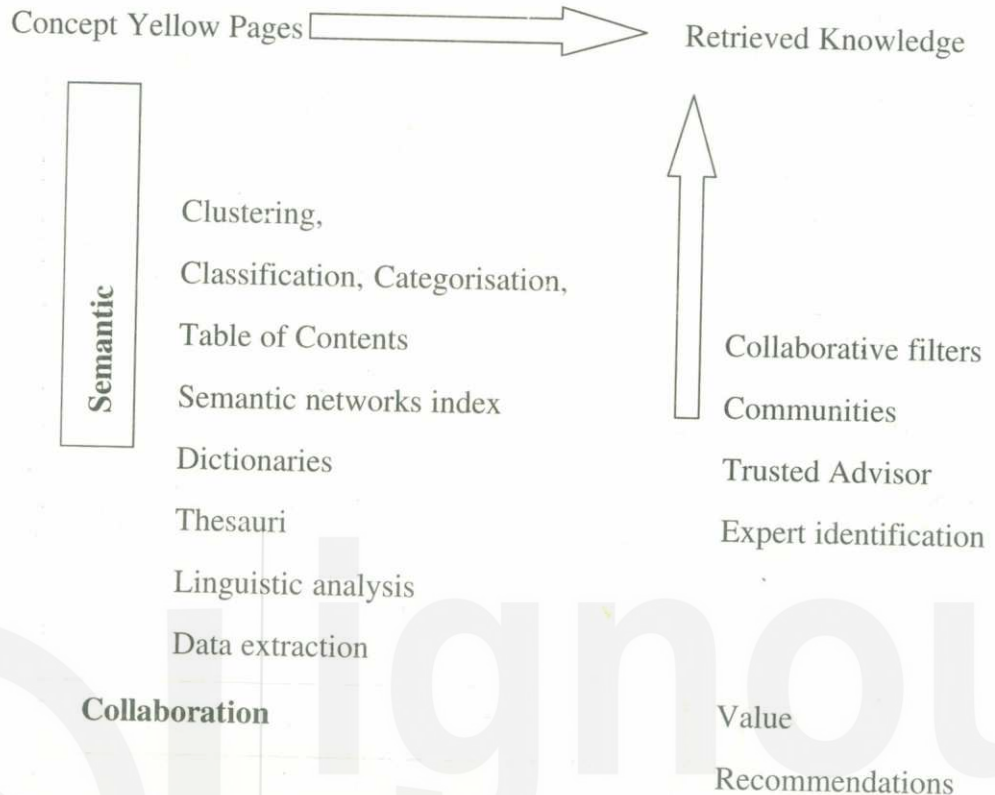


Fig. 15.2: Semantic and Collaboration Dimensions

The above formulation provided by the Gartner group is obviously targeted to text-oriented sources of knowledge. When it comes to multimedia products, which knowledge-based products will predominantly be in the future, text mining alone will not be adequate.

Knowledge products, as defined earlier, are products that utilise both the semantic and collaborative dimensions for their development, albeit in a limited and specific domain. In this sense, such knowledge products could well become an ongoing and integral part of an organisation's knowledge resources. Such knowledge products operate also along three other dimensions, viz., information access, communication and collaboration. [Haravu and Neelameghan, 2003].

Among the several tools and techniques used in KM, text mining has gained popularity. It also aids knowledge discovery an important objective of knowledge-based services in enterprises. Text mining is discussed in some detail below.

These are meant to provide access to information, enable learning to take place, enable collaboration and communication between like-minded people, and the sharing of knowledge in a specific domain, ideally in an ongoing manner and evolving with time.

Self Check Exercise

- 9) Discuss the collaborative dimension of KR function.

Note: i) Write your answer in the space given below.

ii) Check your answer with the answers given at the end of the Unit.

15.6 DATA MINING AND TEXT MINING

15.6.1 Knowledge Discovery in Databases

During the past couple of decades many papers have been devoted to Knowledge Discovery (KD) through information retrieval systems. Various software packages for data and text mining and related processes are available as aids to KD. Roy Davies (1989) has reviewed the literature on the relation between information retrieval and classification and KD. Don Swanson in a series of papers has argued “that some knowledge which has never been stated explicitly or even implicitly (though it may be implicit in the literature as a whole) may be readily inferred from what has already been published. Other authors too have discussed similar ideas. They have used source linking, citation indexes and related tools and methods in their studies. Application of statistical techniques especially in citation studies, bibliometric coupling, correlation, pattern recognition and other areas of informetrics and scientometrics helps in KD.

“Knowledge discovery in databases (KDD) revolves around the investigation and creation of knowledge, processes, algorithms, and the mechanisms for retrieving potential knowledge from data collections.” [Norton, 1999]. “Classification schemes have properties that enable the representation of entities and relationships in structures that reflect knowledge of the domain being classified.” In this context, hierarchies, trees, paradigms, and faceted classification can reflect structures, discover, and create new knowledge [Kwasnik, 1999]. How to find interesting previously unknown implicit information in scientific literature is examined in the paper “Implicit text linkages between medicine records: using Arrowsmith as an aid to scientific discovery” by Swanson and Smallheiser (1999). “Extracting hidden knowledge from humanities databases is especially problematic because the literature, written in ‘everyday’ rather than technical language, lacks the precision required for efficient retrieval, and because humanities scholars seek new analogies rather than causes...an illuminating new humanities analogy was found by constructing a search statement in which proper names were coupled with associated concepts [Cory, 1977]. Small (1999) presents a “methodology for creating pathways through the scientific literature following co-citation links.” Also discusses the “implications of information pathways for retrieval, the unity of science, discovery, epistemology and evaluation.” Quin He (1999) discusses co-word analysis, based on the co-occurrence frequency of pairs of

words or phrases, for discovering links among subjects. Such studies can also help in tracing the development of science. Ahonen (1999) discusses “a method of extracting Maximal Frequent Sequences [MFS] in a set of documents.” An MFS is a “sequence of words that is frequent in the document collection... that is not contained in any other longer frequent sequence... A sequence is considered to be frequent if it appears in at least n documents where n is the frequency threshold given.” The technique is used to discover other regularities and similarity mapping in document collections. This could assist information retrieval, hypertext linking, clustering, and discovery of frequent co-occurrences. Pinto and Lancaster (1999) conclude: “the wide availability of complete text in electronic form does not reduce the value of abstracts for information retrieval activities even in such more sophisticated applications as knowledge discovery.” In “Template Mining for Information Extraction from Digital Documents”, Chowdhury (1999) points out that with the rapid growth of digital information resources, a number of information extraction (IE) systems from natural language text particularly in the areas of news/fact retrieval and in domain-specific areas, such as in chemical and patent information retrieval, have been developed. Template mining approach involving a natural language processing (NLP) technique to extract data directly from text if either the data and/or text surrounding the data form recognisable patterns. When text matches a template, the system extracts data according to instructions associated with that template. Reviews template mining research and also shows how templates are used in Web search engines (e.g. Alta Vista), and in meta-search engines (e.g. Ask Jeeves) for helping end-users generate natural language search expressions. Some potential areas of application of template mining for extraction of different kinds of information from digital documents are highlighted, and how such applications are used are indicated. It is suggested that, in order to facilitate template mining, standardisation in the presentation and layout of information within digital documents has to be ensured, and this can be done by generating various templates that authors can easily download and use while preparing digital documents. An overview of KD literature and some case studies are presented by Neelameghan.

Self Check Exercise

10) What are the techniques used for KDD?

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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15.6.2 Data Mining

Data mining is a step within the Knowledge Discovery in Databases (KDD) process through which an organisation's data assets are processed and analysed

to gain insights to assist decision-making. KDD originates with data held in the organisation's data management systems or data warehouses. The steps to knowledge discovery include data selection, processing, transformation, data mining, interpretation and evaluation leading to discovery of new intelligence or knowledge. In an institution, the internal data assets and those obtained from external sources and warehoused are processed and analysed in depth to gain insights on the research object, event or situation.

Data mining techniques used have to be specific to the domain and also depend on the area of application. Important requirements are that the data collected should be relevant and of a high-quality. (See also Text Mining). Analytical techniques used in data mining include statistical methods, such as, regression analysis, discriminant analysis, factor analysis, principal component analysis, word usage and co-occurrence analysis, and time-series – as well as mathematical modeling. In-depth classification and related indexes are also helpful in data mining.

15.6.3 Text Mining

Text mining is receiving considerable research and development attention. Content searching using a search engine based on a search term – keyword or string – does not address the information overload problem adequately enough even with methods that list the retrievals according to one or other ranking methods. This has led to the need to differentiate between search and discovery. A search engine's main function is to locate documents based on the user's keywords. A discovery engine on the other hand attempts to extract relevant textual data from a corpus of text and then provides a graphical, dynamic and navigable index. The visual presentation of concepts is aimed at promoting a better understanding of the underlying content and structure of the textual data, leading hopefully to improved retrieval and hence productivity of the knowledge worker. Fig. 15.3 shows the difference between a search engine and a discovery engine.

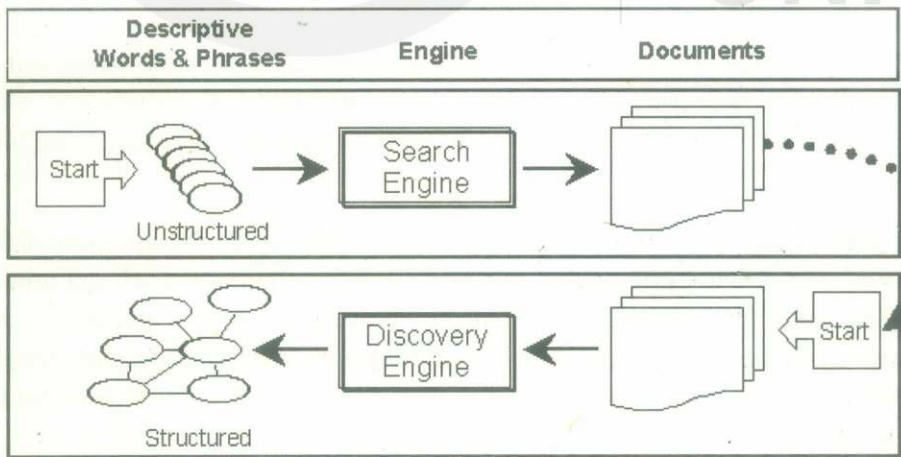


Fig.15.3: Difference between Search Engine and Discovery Engine

Source: Semio Corporation

Text mining is best suited for “discovery” purposes, i.e., learning and discovering information hidden in the documents of an organisation's unstructured repositories. Reasons for using text mining include:

- Uncovering a “narrative” in an unstructured mass of text;

- Learning about a topic;
- Exploring how an environment, e.g. market, is evolving; and
- Looking for new ideas or relations in topics.

Text mining is useful because of the enormous amount of knowledge, either within an organisation or outside of it, that resides in text documents. Since most organisations rely on textual information, both from outside and inside the organisation, working with this sea of text can become extremely difficult. The whole collection of text is simply too large to read and analyse easily. Furthermore, it changes constantly and requires ongoing review and analysis if one is to stay current. Text mining addresses these problems, providing tools to analyse and learn from this kind of dynamic information.

However, text mining is not an end in itself; it is a support tool and complements search engines. A text-mining product supports and enhances the knowledge worker's creativity and innovation with *open-ended* exploration and discovery. The individual applies intelligence and creativity to endow *meaning* and *relevance* to information, turning information into knowledge. Text mining advances this process, empowering the knowledge worker to explore and gain knowledge from a knowledge base.

There are several types of industry players in text mining: IR vendors, such as, Verity, Excalibur, and Dataware are refining their product functionalities from text retrieval to text mining. There are also niche document management players, such as, PCDOC and Documentum who have developed successful products for managing document content and workflows. Large IT platform companies such as Oracle, Lotus, and Microsoft are aiming to improve the KR functionalities of their database or workgroup products. These companies may lack in significant linguistic and analytical abilities. The last type of vendor consists of small, new companies such as Autonomy, Perspecta, InXight, Semio and KCC. These have new analytical and linguistic technologies but may lack in execution experience and integration ability.

According to Chen, the approaches of consultants and refinements being sought by IT vendors, described briefly above, are evidence of the trend away from the use of simple and basic search and retrieval techniques to KR using text-mining technologies.

Text processing and analysis is significantly more difficult than processing and analysis of structured data as in DBMS systems. The status of text mining today is much like that of DBMS twenty years ago. The real challenges and the potential payoffs for an effective universal text solution are equally appealing. It is inevitable that whoever dominates this space will become the Oracle (in text).

The above formulation is obviously targeted to text-oriented sources of knowledge. When it comes to multimedia products, which are likely to be predominant in the future, text mining alone will not be adequate.

Self Check Exercise

- 11) What are the techniques used for data mining?

- 2) Distinguish between search engine and discovery engine.
- 3) Describe the usefulness of text mining.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of this Unit.

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15.6.4 Text Analysis and Mining Techniques

First, text mining requires natural language processing abilities. Second, while data mining attempts to identify causal relationships through classification or supervised learning techniques, text mining aims to create organisational knowledge maps or concept yellow pages. Third, text mining deals more with diverse and eclectic collections of systems and formats (email, web pages, Notes databases, newsgroups, etc.). Both data mining and text mining adopt significant analytical methods and their results are often highly visual and graphical. Data visualisation and information visualisation techniques attempt to create an interface that is well suited for human decision-making.

At the heart, text mining is a cross between IR and AI. IR has gone through several generations of development. In the 1970s, computational techniques based on inverted indexes and vector spaces were developed and tested on computer systems. Also, probabilistic retrieval methods based on Bayesian statistics were developed. Although more than 30 years old, this still forms the basis of modern IR systems. In the 1980's, coinciding with the developments of new AI techniques, knowledge-based and expert systems that aim to emulate domain specialists were developed. User modeling and natural language processing (NLP) techniques were developed to assist in representing users and documents. These were applied to improve online searching.

Haravu and Neelameghan (2003) discuss the limitations of text mining in knowledge mapping.

Realising the difficulties of creating domain-specific knowledge bases and heuristics, researchers in the 1990's adopted new machine-learning techniques for information analysis. AI techniques such as neural networks, genetic algorithms, and symbolic learning were tested in IR [Chen, 2001]. Text analysis includes such features as natural or statistical language processing, indexer or phrase creator, entity extraction, conceptual associations (automatic thesauri), domain-specific knowledge filter (using vocabularies or ontologies), automatic taxonomy creation (clustering), multi-document and multi-language support. Core text mining analysis can be classified into four main layers: linguistic analysis and NLP, statistical or co-occurrence analysis, statistical and neural networks clustering/categorisation, and visualisation. (Fig. 15.4)

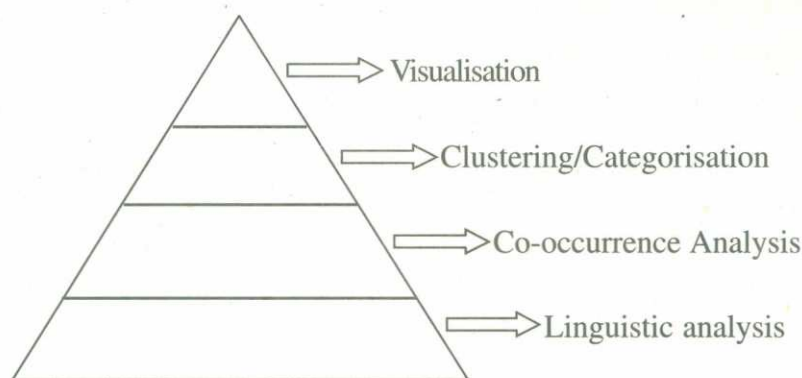


Fig. 15.4: Layers of Core Text Mining

At the lowest level, linguistic analysis and NLP techniques aim to identify key concept descriptors (who/what/where/when) embedded in textual documents. Different types of linguistic analysis techniques have been developed. Word and inverted indexing can be combined with stemming, morphological analysis, Boolean, proximity, range and fuzzy search. The unit of analysis is 'word'. Phrasal analysis, on the other hand, aims to extract meaningful noun phrase units or entities (e.g., people names, organisation names, location names). Both linguistic and statistical analysis techniques are plausible. In addition, semantic analysis based on techniques, such as, semantic grammar and case grammar can be used to represent semantics (meaning) in sentences. Semantic analysis is domain specific and lacks scalability. This often requires a significant knowledge base or a domain lexicon creation effort and hence it may not be suitable for general-purpose text mining across a wide spectrum of domains.

Based on significant research in the IR and the computational linguistics communities, it is generally agreed that phrasal-level analysis is more suited for coarse but scalable text mining applications. Word-level analysis is noisy and lacks precision. Sentence level is too structured and lacks practical applications. It is not coincidental that most of the subject headings and concept descriptors adopted by library classification schemes are noun phrases. Based on statistical and co-occurrence techniques, link analysis is performed to create automatic thesauri or conceptual associations of extracted concepts. Existing human-created thesauri can also be integrated with system-generated thesauri.

Statistical and neural network-based clustering and categorisation techniques are often used to group similar documents, queries or communities in subject hierarchies, which could then serve as corporate knowledge maps. Hierarchical clustering (single link or multi link) and statistical clustering (multi-dimensional scaling, factor analysis) techniques are precise but often computationally expensive. Neural network clustering by Self-Organising Map (SOM) technique (cf. Teuvo Kohonen's self-organising networks, and visualisation), performs well and is fast and is most suited for large scale text mining tasks. In addition, SOM lends itself to intuitive graphical visualisation based on such visual parameters as size (a large region represents a more important topic) and proximity (related topics are grouped in adjacent regions).

Visualisation and Human-Computer Interaction (HCI) help to reveal concept associations and visualise knowledge maps. Different representation structures (tree, network) and interaction techniques (e.g., zooming, spotlight) can be adopted to reveal knowledge more completely.

Self Check Exercise

- 14) Enumerate the characteristic features of text analysis.
- 15) Enumerate the different clustering techniques.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

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15.7 SUMMARY

This Unit, to begin with, briefly discusses the emergence of 'Management' as a discipline; differentiates data and information from knowledge, and different categorisations of knowledge.

Following consideration of what is knowledge management (KM), discussed the changing socio-economic environment in a knowledge society and the impact of information and communication technologies especially on enterprises.

After presenting the characteristics of knowledge management systems, discusses practical approaches and strategies of KM

Following discussion on the need and characteristics of knowledge-based product; outlines the architecture of knowledge products.

Concludes with a discussion on data mining, text analysis and text mining – their usefulness and limitations in developing knowledge products

15.8 ANSWERS TO SELF CHECK EXERCISES

- 1) Knowledge is what the knower knows. It is specific to the knower, created from information, integrated with experience, reflected upon and interpreted in a particular context. Outside it exists as embodiments in the form of documents, man-made artifacts, cultural practices etc. Knowledge is renewable, reusable, increasing in value with use. It is intangible, boundary less, dynamic, and of no use if not used at a specific time.
- 2) Knowledge is of two types, viz., tacit and explicit. Explicit knowledge can be communicated and expressed in the form of documents. Tacit knowledge, on the other hand, is highly personalised and subjective. It is inherent to an individual embedded in his actions and experiences. It is difficult to formalise and document.
- 3) KM refers to managing the knowledge of individuals to be used as an organisational resource. From an information system perspective, it implies

capturing and storing employees' knowledge to use by making accessible to others in the organisation.

- 4) KM helps an organisation in quicker problem solving, better decision making, reduced R&D costs, increased worker independence, enhanced customer relations, and improved services to customers.
- 5) The processes taking place in the knowledge subsystems are: acquisition, creation, storage, transfer, and utilisation of knowledge.
- 6) KM from a two-dimensional perspective involves:

Activities involved in building a learning organisation, viz., creating, collecting, exchanging, using, and internalising knowledge for innovation and development.

The second dimension refers to activities that enable knowledge creation. These are:

- a) Strategy: for alignment of corporate and KM strategies;
 - b) Measurement: of the benefits of KM;
 - c) Policy: guidelines for KM provided by the organisation;
 - d) Content: subset of corporate knowledge base in electronic form;
 - e) Process: includes the processes used by employees to achieve the goals of the organisation;
 - f) Technology: includes the ICT elements used for KM;
 - g) Culture: Refers to the organisational environment for KM
- 7) KM products refer to a variety of software products that have been designed to overcome the information overload problem in KM products. These help to provide better quality of products and thus, improved services to users.
 - 8) Tacit knowledge is specific to an individual embedded in his actions and behaviour. ICT helps to capture these through microphones, cameras, etc.
 - 9) The collaborative dimension of KR helps to place a value on the KP. It is done through domain experts, collaborative filters, trust advisers, and community building activities.
 - 10) The techniques used for KDD include: faceted classification that helps to draw hierarchies, trees; statistical techniques, e.g., co-word analysis, co-occurrence frequency of pairs of words; and bibliometric, and scientometric techniques.
 - 11) Statistical techniques, e.g., regression analysis, discrimination analysis, factor analysis, principal component analysis, word usage, co-occurrence analysis, and time series analysis is used for data mining.
 - 12) A search engine locates documents in response to a user's request whereas discovery engine extracts relevant information from a corpus of text and then provides a graphical, dynamic, and navigable index.

- 13) Text mining provides tools to analyse the vast sea of textual information, which is dynamic and difficult to handle and analyse for a learning organisation.
- 14) The characteristic features of text analysis are: Natural or statistical language processing, indexer or phrase creator, entity extraction, conceptual associations, domain specific knowledge filter, automatic taxonomy creation, and multi-document and multi- language support.
- 15) The different clustering techniques are: Hierarchical clustering, Statistical clustering, and Neural network clustering.

15.9 KEYWORDS

- Abstract Knowledge** : The form of knowledge that is characterised into essential features of meaning and cause- and – effect relationships that can be communicated and codified. Abstraction provides structure and meaning to phenomena.
- Concrete Knowledge** : Knowledge can be made concrete when it is embedded in physical artifacts like products, production processes, equipments, and technology.
- Data Mining (DM)** : Data Mining (DM) is part of a process by which information can be extracted from data and databases and used to inform decision-making in a variety of contexts .DM includes a range of tools and methods for extracting information. DM incorporates not only data analysis but also involves determining appropriate questions and interpreting the results.
- Declarative Knowledge** : The basics of a shared and explicit understanding of concepts, ideas, relationships, and categories that enables effective communication among people in organisations. It is characterised by know-what of an event or task.
- Explicit Knowledge** : Knowledge that is transmittable in formal, systematic language.
- Knowledge** : Knowledge is a fluid mix of framed experience, values, contextual information, expert in and grounded intuition that provides environment and framework for evaluating and integrating new experiences and information. It originates and is applied in the minds of the knower. In organisations, it often becomes embedded not only in documents and repositories but

- 13) Text mining provides tools to analyse the vast sea of textual information, which is dynamic and difficult to handle and analyse for a learning organisation.
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- also in organisational routines, processes, practices, and norms. (Davenport and Prusak).
- Knowledge Base** : A computer accessible collection of knowledge about a subject in a variety of forms such as facts, rules of inference, frames, and objects.
- Knowledge Management** : The process of organising and sharing the diverse forms of business information created within an organisation. KM can include managing enterprise document libraries, intranet websites, and other types of knowledge bases.
- Knowledge Management Systems (KMS)** : Knowledge – based systems that support the creation, organisation, and dissemination of business knowledge within the organisation.
- Knowledge Workers** : People in an organisation whose primary activities include creating, using, and distributing information and knowledge.
- Organisational Learning** : The process improving actions through better knowledge and understanding and the process of detecting and correcting errors. It occurs through shared insights, knowledge, and mental models. It builds on past knowledge and experience.
- Procedural Knowledge** : Is how an activity is performed or happens. Procedural knowledge shared among people in organisations enables their actions to be coordinated smoothly.
- Tacit Knowledge** : Is personalised, context specific, and hard to formalise and communicate.

15.10 REFERENCES AND FURTHER READING

- Abell, Angela (2001). *Competing with Knowledge: The Information Professional in the Knowledge Management Age*. London: Library Association Publishing.
- Ackerman, Mark S. [et al.]. (2003) *Sharing Expertise: Beyond Knowledge Management*. Boston: MIT Press.
- Ahonen, Helena (1999). Knowledge Discovery in Documents by Extracting Frequent Word Sequences. *Library Trends*. 48(1); 160-181.
- Al-Ali, Neermien (2003). *Comprehensive Intellectual Capital Management: Step-by-Step*. New York: John Wiley & Sons.

- Albrecht, K. (2003). *The Power of Minds at Work: Organisational Intelligence in Action*. New York: American Management Association
- Allee, Verna (1997). *The Knowledge Evolution: Expanding Organisational Intelligence*. Boston, MA: Butterworth-Heinemann.
- Amindon, Debra M. (2001). *Innovation Strategy for the Knowledge Economy*. Oxford: Butterworth-Heinemann.
- Amindon, Debra M. (2001). *Innovation Superhighway: Harnessing Intellectual Capital for Collaborative Advantage*. Oxford: Butterworth-Heinemann.
- Andersen, Brigitte (2000). *Knowledge and Innovation in the New Service Economy*. Cheltenham: Edward Elgar
- Bal-I Bahra, Nicholas (2001). *Competitive Knowledge Management*. New York: Palgrave.
- Bar, Bartlett et. al. (2000). *Managing knowledge and learning: Case Study*. Boston: Harvard Business School Press.
- Barquin, Ramon C. (2001). *Knowledge Management: The Catalyst for Electronic Government*. Vienna: Management Concepts.
- Baumard, Philippe (2001). *Tacit Knowledge in Organisations*. London: Sage Publications.
- Berghel H (1997). Cyberspace 2000: Dealing with Information Overload. *Communications of the ACM*. 40 (2).
- Berz, Frederick (2001). *Executive Strategy: Strategic Management and Information Technology*. New York: John Wiley & Sons.
- Beynon-Davies, Paul (2002) *Information Systems: An Introduction to Informatics in Organisations*. New York: Palgrave.
- Boome, Mary E. *Managing Interactivity; Executing Business Strategy, Improving Communications, and Creating a Knowledge-sharing Culture*. New York: McGraw-Hill.
- Camarinha-Maros, Luis M. (2002). *Collaborative Business Ecosystems and Virtual Enterprises*. Boston: Kluwer Academic Publishers.
- Castells M (1996). *The Rise of the Network Society*. Malden, MA: Blackwell.
- Chauvel, Daniele (2001). *Knowledge Horizons: The Present and the Promise of Knowledge Management*. Oxford: Butterworth-Heinemann.
- Chen, Hsinchun (2001). *Knowledge Management Systems: A Text Mining Perspective*. Tucson, Arizona: Knowledge Computing Corporation.
- Chowdhury, Govinda G. (1999). Template Mining for Information Extraction from Digital Documents. *Library Trends*, 48(1); 182-208.
- Clarkson, Gavin (2000). *Intellectual Asset Valuation: Case Study*. Boston: Harvard Business School Press.
- Collins, Heidi (2003). *Enterprise Knowledge Portals: New Generation Portal Solutions for Dynamic Information Access, Better Decision Making, and Maximum Results*. New York: Amacom.
- Cory, Kenneth A. (1999). Discovering Hidden Analogies in an Online Humanities Database. *Library Trends*, 48(1); 60-71.

- Data Mining Techniques* (2002). Hyderabad: University Press.
- Davenport T and Prusak L (1998). *Working Knowledge: How Organisations Manage What they Know*. USA: Harvard Business School Press
- Davies, Roy (1989). The creation of New Knowledge by Information Retrieval and Classification. *Journal of Documentation*, 45(4); 273-301
- Davis, Juliw L (2001). *Edison in the Boardroom: How Leading Companies Realize Value from their Intellectual Assets*. New York: John Wiley & Sons.
- Dawson, Ross (2001). *Developing Knowledge-based Client Relationships: The Future of Professional Services*. Boston: Butterworth-Heinemann.
- Desai, Bipin C., [et al.] (1999). CINDI: A Virtual Library Indexing and Discovery System. *Library Trends*, 48(1); 209-283.
- Day, George S. (2000). *Wharton on Managing Emerging Technologies*. New York: John Wiley & Sons.
- Dieg-Kuntz, Rose (2002). *Knowledge Management and Organisational Memories*. Boston: Kluwer Academic Publishers.
- Easterby-Smith, Mark (2003). *The Blackwell Handbook of Organisational Learning and Knowledge Management*. Malden, MA: Blackwell Publishers.
- Evans, P.B. and Wurster, T.S. (1997). Strategy and the New Economics of Information. *Harvard Business Review*. 75(15); 70-82.
- Firestone, Joseph M. (2003) *Enterprise Information Portals and Knowledge Management*. Amsterdam: Butterworth-Heinemann.
- Fong, Joseph (2001). *Knowledge Management and Intelligent Enterprises*. U.S.A.: World Scientific Publishing Co.
- Garfield, Eugene. (1994). *Linking Literatures: An Intriguing Use of the Citation Index*. *The ISI essays*. Philadelphia, PA: Institute for Scientific Information.
- Garfield, Eugene. (1994) *Mapping the Precursors of Modern Structural Biology*. *The ISI essays*. Philadelphia, Pa: Institute for Scientific Information.
- Garfield, Eugene. (1994). *Scientography: Mapping the Tracks of Science*. *The ISI Essays*. Philadelphia, Pa: Institute for Scientific Information.
- Garvey, Bob. (2002). *Beyond Knowledge Management: Dialogue, Creativity and the Corporate Curriculum*. Harlow: Financial Times- Prentice Hall.
- Gogula, Ratnaja (2002). *Knowledge Management: A New Dawn*. Hyderabad: ICFAI.
- Gunasekara, Angappa (2003). *Knowledge and Information Technology Management: Human and Social Perspectives*. Hershey: Idea Group Publishing.
- Haravu., L.J. (2002). *Lectures on Knowledge Management: Paradigms, Challenges and Opportunities*. Bangalore: Sarada Ranganathan Endowment for Library Science
- Haravu, L.J. and Neelameghan, A. (2002). Content Summarization and Indexing of Internal Documents Using a Text Mining Software. *National Seminar on Cataloguing of Digital Resources, Bangalore, 9-11 August 2002*. [Papers]. Bangalore, India: Sarada Ranganathan Endowment for Library Science; Paper F.

Haravu, L.J. and Neelameghan, A. (2003). Text Mining and Data Mining in Knowledge Organisation and Discovery: The Making of Knowledge-based Products. *Cataloging & Classification Quarterly*, v..37 (1-2); 97-113

Harryson, Sigvald J. (2002). *Managing Know-who Based Companies: A Multinetworked Approach to Knowledge and Innovation Management*. Ed. 2. Cheltenham: Edward Elgar

Hatten, Kenneth J. (2001). *Reaching for the Knowledge-edge: How the Knowing Corporation Seeks, Shares and Uses Knowledge for Strategic Advantage*. New York: Amacom.

Holsapple, C.W. (2002). *Handook of Knowledge Management*. 2 v. V.1: *Knowledge Matters*; V.2: *Knowledge Directions*. Berlin: Springer.

Honeycutt, Jerry (2000). *Knowledge Management Strategies*. New Delhi: Prentice-Hall of India

Huff, Anne Sigismund (2002). *Mapping Strategic Knowledge*. London: Sage Publications.

Jackson, Susan E. (2003) *Managing Knowledge for Sustained Competitive Advantage: Designing Strategies for Effective Human Resource Management*. San Francisco: Jossey-Bass.

Jan Qin. (1999). Discovering Semantic Patterns in Bibliographically Coupled Documents. *Library Trends*, 48(1); 109-130.

Joia, Louiz Antonio (2003). *IT-based Management: Challenges and Solutions*. Hershey: Idea Group Publishing

Kennaly, Sultan (2002). *Effective Knowledge Management A Best Practice: Blueprint*. New York: John Wiley & Sons.

Kohonen, Teuvo. [http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/k/Kohonen Teuvo/html](http://www.informatik.uni-trier.de/~ley/db/indices/a-tree/k/Kohonen%20Teuvo/html)

Krog, Georg von (200). *Enabling Knowledge Creation: How to Unlock the Mystery of Tacit Knowledge and Release the Power of Innovation*. Oxford: Oxford University Press

Kutnick, Dale (2002). *Building Operational Excellence: Strategies to Improve it, People and Processes*. Boston: Addison Wesley

Kwasnic, Barbara H. (1999) Role of Classification in Knowledge Representation and Discovery. *Library Trends*, 48(1); 22-47.

Lant, Theresa K. (2002). *Organisational Cognition: Computation and Interpretation*. Mahwah: Lawrence Erlbaum Associates, Publishers

Lave J and Wenger E (!991) *Situated Learning. Legitimate Peripheral Participation*. Cambridge: Cambridge University Press

Lesser, Eric L. (2001). *Knowledge and Social Capital: Foundations and Applications*. Boston: Butterworth-Heinemann

Liebowitz, Jay. (2001). *Knowledge Management: Learning from Knowledge Engineering*. Boca Raton: CRC Press

Little, Stephen E. (2002). *Managing Knowledge: An Essential Reader*. London: Sage Publications.

- Maeir, Ronald (2001). *Knowledge Management Systems: Information and Communication Technologies for Knowledge Management*. Berlin: Springer.
- Malhotra, Yogesh (2001). *Knowledge Management and Business Model Innovation*. Hershey: Idea Group Publishing.
- McLeod, Raymond (2001). *Management Information Systems*. Ed. 8. New Jersey: Prentice-Hall
- Merrina, Kai (2001). *Knowledge Management: Best Practices in Europe*. Berlin: Springer.
- Morey, Daryl (2001). *Knowledge Management: Classic and Contemporary Works*
- Myers, Paul S. *Knowledge Management and Organisational Design*. Boston: Butterworth-Heinemann..
- Natarajan, Ganesh (2000). *Knowledge Management: Enabling Business Growth*. New Delhi: Tata-McGraw- Hill
- Neelameghan, A. and Hemalata Iyer (2003). Information Organisation to Assist Knowledge Discovery: Case Studies with Non-bibliographic Databases. *Cataloging & Classification Quarterly*. 37(1-2); 115-130.
- Newell, Sue (2002). *Managing Knowledge Work*. Houndmills: Palgrave.
- Nonaka, Ikujiro. (1991). The knowledge Creating Company. *Harvard Business Review* 1991 Nov-Dec
- Nonaka, Ikujiro. (1995) *The Knowledge Creating Company: How Japanese Companies Create the Dynamics of Innovations*. New York: Oxford University Press.
- Nonaka, Ikujiro. (2001). *Managing Industrial Knowledge: Creation, Transfer and Utilization*. London: Sage Publications.
- O'Dell, Carla (1998). *If Only We Knew What We Know: The Transfer of Internal Knowledge and Best Practice*. New York: The Free Press
- Pinto, Maria and Lancaster, F.W. (1999) Abstracts and Abstracting in Knowledge Discovery. *Library Trends*, 48(1); 90-108.
- Polanyi, L (1997). *The Tacit Dimension, Knowledge in Organisations*. Boston: Butterworth-Heinemann
- Probst, Gilbert (2000). *Managing Knowledge*. Chichester: John Wiley & Sons
- Prusak, Laurence (1998). *Working Knowledge: How Organisations Manage What They Know*. Boston: Harvard Business School Press.
- Prusak, Laurence (2001). *Knowledge in Organisation*. Boston: Butterworth-Heinemann.
- Qin He. (1999). Knowledge Discovery Through Co-word Analysis. *Library Trends*. 48(1); 131-159.
- Pyka, Andreas (2002). *Innovation Networks: Theory and Practice*. Cheltenham: Edward Elgar.
- Raman, A Thothathri (2003). *Knowledge Management: A Resource Book*. New Delhi: Excel Books.

- Rao, Madanmohan (2003). *Leading with Knowledge*. New Delhi: Tata-McGraw-Hill
- Roy, Rajkumar (2001). *Industrial Knowledge Management: A Micro-level Approach*. London: Springer
- Sachs P (1995): Transforming. Work: Collaboration, Learning and Design. *Communications of the ACM* Vol. 38, No.9
- Sanchez, Ron (2001). *Knowledge Management and Organisational Competence*. Oxford: Oxford University Press.
- Smith, David E (2001). *Knowledge, Groupware and the Internet*. Boston: Butterworth-Heinemann
- Sparrow, John (1998). *Knowledge in Organisations. Access to Thinking at Work*. London: Sage Publications.
- Semio Corporation (2002). Text Mining and the Knowledge Management space.(Webdocument: <http://w.dmreview.commaster.cfm?NavId=6180&WhitepaperID=80>)
- Skyrme D (1998). Developing a Knowledge Strategy. *Strategy*, 1998 January.
- Small, Henry. (1999). A passage through Science: Crossing Disciplinary Boundaries. *Library Trends*. 48(1); 72-89
- Srinivasan, R, (2002). *Designing and Knowledge Management Architecture: How to Implement Successful Knowledge Management Systems*. New Delhi: Response Books.
- Stapleton, James J. (2003). *Executive's Guide to Knowledge Management: The Last Competitive Advantage*. New Jersey: John Wiley & Sons.
- Stewart, Thomas A. (2001). *Intellectual Capital: The New Wealth of Organisations*. London: Nicholas Brealey Publishing
- Sullivan, Patrick H. (2000). *Value-driven Intellectual Capital: How to Convert Intangible Corporate Assets into Market Value*. New York: John Wiley & Sons
- Svelby, Karl Erik. (1997). *The New Organisational Wealth: Managing and Measuring Intangible Assets*. San Francisco: Berrett-Koehler Publishers.
- Swanson, D.R. (1986). Fish oil, Raynaud's Syndrome and Undiscovered Public Knowledge. *Perspectives in Biology and Medicine*. 30(1); 1986; 7-18.
- Swanson, D.R. (1986b). Undiscovered Public Knowledge. *Library Quarterly*. 56(2); 1986; 103-118.
- Swanson, D.R. (1988). Historical Note: Information Retrieval and the Future of an Illusion. *Journal of the American Society for Information Science*, 39(2); 92-98.
- Smallheiser, Neil R. (1999). Implicit Text Linkages Between Medline Records: using Arrowsmith as an aid to Scientific Discovery. *Library Trends*, 48(1); 49-59.

- Smallheiser, Neil R. (1993). Intervening in the Life-cycles of Scientific Knowledge. *Library Trends*, 41; 606-653
- Sydanmaanlakka, Pentti (2002). *An Intelligent Organisation: Integrating Performance, Competence and Knowledge Management*. Oxford: Capstone.
- Szulanski, Gavriel (2003). *Sticky Knowledge: Barriers to Knowing in the Firm*. London: Sage Publications.
- Teece, David J. (2000). *Managing Intellectual Capital: Organisational, Strategic, and Policy Dimensions*. Oxford: Oxford University Press.
- Terra, Jose Claudia (2002). *Realizing the Promise of Corporate Portals: Leveraging Knowledge for Business Success*. Boston: Butterworth-Heinemann.
- Thompson, Leigh L. (1998). *Shared Cognitions in Organisations: The Management of Knowledge*. Mahwah: Lawrence Erlbaum Associates, Publishers.
- Tidd, Joseph (2000). *From Knowledge Management to Strategic Competence*. U.S.A.: World Science Publishing Co.
- Tissen, Rene (2000). *The Knowledge Dividend: Creating High Performance Companies Through Value-based Knowledge Management*. London: Prentice-Hall.
- Tiwana, Amrit (2000). *The Essential Guide to Knowledge Management: E-business and CRM applications*. Singapore: Pearson Education Asia.
- Tiwana, Amrit (2000). *The Knowledge Management Toolkit: Practical Techniques for Building a Knowledge Management System*. New Jersey: Prentice-Hall.
- Upadhyaya, Padma (2002). Peoples' Perception to Knowledge – Based System in Working Environment: A Study Manipal. *Information Studies*. 8(3); 181-191.
- Wenger, Etienne (2002). *A Guide to Managing Knowledge: Cultivating Communities of Practice*. Boston: Harvard Business School Press.
- Zack, Michael H. (2001). *Knowledge and Strategy*. Oxford: Butterworth-Heinemann.

UNIT 16 KNOWLEDGE PROFESSION

Structure

- 16.0 Objectives
- 16.1 Introduction
- 16.2 Knowledge Profession
 - 16.2.1 Normative Principles of Knowledge Resources Management and Services
- 16.3 Emerging Knowledge-based Environment
 - 16.3.1 Factors Influencing Knowledge Access and Delivery
 - 16.3.2 The Digital Environment
- 16.4 ICTs Application Areas
 - 16.4.1 Education and Research Support
 - 16.4.2 E-Governance and Management
 - 16.4.3 Some Solutions to the Information Overload Problem – Knowledge Manager
 - 16.4.4 Mobilisation of Human Knowledge Resources
- 16.5 Knowledge Professional and Knowledge Management
- 16.6 Knowledge Products
 - 16.6.1 Knowledge Products Development and Marketing
 - 16.6.2 Knowledge and Skills for Content Organisation in Web-based Products
- 16.7 Library and Information Science Professional as Knowledge Professional
- 16.8 Preparing Knowledge Workers of the New Millennium
- 16.9 Summary
- 16.10 Answers to Self Check Exercises
- 16.11 Keywords
- 16.12 References and Further Reading

16.0 OBJECTIVES

After reading this Unit, you will be able to:

- recognise the attributes of a ‘Profession’ in general and of the ‘Knowledge Profession’ in particular;
- appreciate the qualities and abilities expected of a knowledge professional in action;
- know the categories of knowledge professionals;
- adapt existing normative principles of library service to knowledge resources;
- understand more about knowledge-based products and the knowledge and skills necessary to produce them;
- comprehend the nature of computer-mediated work; and
- appreciate how the knowledge worker of the new millennium be trained even from childhood.

16.1 INTRODUCTION

Our society is changing from an economy based on the assets of capital and energy to one based on assets of knowledge and information. Our library and information profession which was peripheral part of industrial age, has now become central part of information/ knowledge age. We live in an age of increasing complexity with regard to the range and quantity of information available.

The 1990s have seen great change in the way organisations are viewed as production-oriented entities divided by function and controlled by layers of management. On the other hand it will be knowledge-based organisation in which the employees' knowledge is the organisations' primary asset. Successful organisations in knowledge-based economy will be those that can differentiate their services from others in terms of personalised, localised, specialised, and customised services. They will have to develop new economic strategies, better understand user needs, develop skills of staff and users, and develop new services. The ability to weave information and knowledge into flexible and adaptable structures will be a necessary asset. This is a role that becomes more central in the new millennium organisations. It needs flexible, adaptable individuals, who can manage, change innovatively, imaginatively, and proactively recognising new opportunities and grasping new challenges. In other words, just as we are seeing different professions converging on the "emerging community of knowledge practice" we also witness the emergence of specialist knowledge professionals. These professionals are variously titled as: Knowledge engineers, Knowledge editors, Knowledge analysts, Knowledge navigators, Knowledge gatekeepers, Knowledge brokers, Knowledge handyman, Knowledge asset manager, etc. with different functions and responsibilities. However, we have to understand that all these are knowledge workers who will be engaged in the activities of creating, using and distributing information and knowledge in an organisation.

16.2 KNOWLEDGE PROFESSION

Before we discuss about 'knowledge profession' let us try to know what a profession is. The dictionary tells us that it is a 'paid occupation especially one involving training and a formal qualification.' Dale (2001) suggests two other definitions:

- a calling requiring specialised knowledge and often long intensive academic preparation
- an occupation, such as law, medicine, or engineering, that requires considerable training and specialised study.

For a profession to be accorded societal recognition, it would seem that a number of criteria have to be met:

- there must be an identifiable subject which is not immediately accessible to the uninitiated person;
- there must be a long apprenticeship involving the learning of both theory and practice, and the application of the latter;

- the application of the subject matter of this apprenticeship must be useful to the society;
- the profession must promulgate standards for the products and services that are produced and delivered by its members; and
- members of the profession are individually responsible for the standards of their work and for their professional conduct but are overseen by a professional body that has the powers to ensure compliance.

A profession involves a set of activities undertaken in a specific area / field. The persons undertaking these activities are called professionals. Bhattacharya enlists the following attributes of a profession:

- i) It must have a goal of public / social service;
- ii) It must be practised;
- iii) Its practice must call for long and intensive education and training, primarily formal and secondarily informal, in the branch of knowledge or field of specialisation;
- iv) The extent of knowledge and skills acquired by an aspiring professional must give him/her a clear idea of the “why”, “what” and “how” of the professional tasks, he/she is to carry out;
- v) Every aspiring professional must commit himself/herself to continuing education and training to ensure efficiency and effectiveness in professional practice even as the field of specialisation advances;
- vi) A professional must maintain a high standard of performance, ethics, and conduct;
- vii) A professional must self-evaluate or get evaluated periodically by peer groups and he/she be alert about any inadequacy of the education and training for the profession at the formal level, and if any deficiency is noticed / experienced he/she must try to make up for the deficiency;
- viii) A professional must realise that his/her foundation discipline is amenable to continuous development to meet the changing needs of the society he/she serves, taking advantage of relevant new developments in the theory, practice, techniques and technologies; and
- ix) The essential contents of the knowledge and skills constituting any professional discipline are amenable to generalisation, and can be enriched through interdisciplinary interactions, collaboration, cooperation, and exchanges.

16.2.1 Normative Principles of Knowledge Resources Management and Services

As mentioned in previous section the study and research in a subject or branch of knowledge are usually guided by a set of normative principles.

Dr. S.R Ranganathan enunciated the Five Laws of Library Science (more appropriately Five Laws of Library Service)

Books are for 'use

Each reader his/her book

Each book its reader

Save the time of the reader/Save the time of library staff

Library is a growing organism

He also defined the concept 'Book' as made up of the trinity:

- 1) Soul – the ideas / knowledge embodied;
- 2) Subtle body — the language of expression, format, illustrations, style etc. of the presentation of the ideas embodied; and
- 3) Gross body — the physical carrier of the ideas embodied.

New types of gross body - physical carrier – have been devised over the years:- from marking on walls to palm leaves, to paper, film, microchip, to digital media. New types of subtle body – presentation, format, etc. – corresponding to the newer forms of embodiment and physical carriers of ideas have emerged. *However, irrespective of the changes in the physical carrier and the form and format of presentation of the ideas, what people seek, search for, access and use has remained the same, that is, ideas / knowledge embodied.*

Therefore, for the 'knowledge profession' Ranganathan's Five Laws of Library Service can be adapted, as enumerated below, as the normative principles of knowledge resources management and service in all types of organisations.

- 1) Knowledge is for use (implies that knowledge if not used has no value)
- 2) Each user (knowledge seeker) his/her piece of knowledge
- 3) Each piece of knowledge (idea) its user
- 4) Save the time of the knowledge seeker / save the time of the knowledge professional
- 5) Knowledge (re)sources domain is a growing organism.

Here 'growth' comprehends both physical growth as well as organic biological growth, such as, degeneration of existing cells and (re)generation of new cells.

Developments in information and communications technologies (ICTs), in particular, have brought in many significant changes in the subtle body and gross body which necessitate new approaches, strategies, techniques, etc. to enable deriving maximal advantage of the developments in satisfying the knowledge seeker's needs. In other words, these new developments, judiciously used, can assist in meeting the implications of normative principles 2, 3, and 4 mentioned above.

16.3 EMERGING KNOWLEDGE-BASED ENVIRONMENT

16.3.1 Factors Influencing Knowledge Access and Delivery

The service of the Knowledge Professional (KP) is mainly a supporting function to the corporate entity he/she is called upon to serve. This function is affected

by the developments and changes in the socio-economic and technological environment in which the KP performs. (See Units 14 and 15 of this course). Briefly, we may notice.

- Worldwide shift from a mainly agriculture-based and industry-based economy to information economy and on to knowledge economy. Such a shift may be more pronounced in the industrial countries than in the developing countries, although in all countries all the three economies may co-exist concurrently though in different proportions.
- Rapid growth in knowledge – and information-intensive products and services.
- Enabling even less developed countries develop faster and compete with the so-called developed countries.
- Intensification of knowledge utilisation in the production of traditional products as well.
- Manual production workers being substituted / replaced by information / knowledge workers in various sectors of the economy.
- New types of knowledge / information-intensive organisations devoted mainly to the production, processing, and distribution of knowledge-based products.
- The significant impact of the rapidly evolving ICTs on enterprises.

Knowledge is embodied in nature, its manifestations and offerings, and in made-made artifacts. It is also embodied in documents whatever be the physical carrier or medium of presentation (text, image, graphics, tables, sound, or multimedia). *The most important source of knowledge and information is people within and outside the organisation, including their tacit knowledge, skills, conventions, traditions, practices, etc.*

In this context there appears to be several claimants to be included in the KP. For example, Stewart (1998) discussing knowledge product development and marketing writes: “You can instill knowledge in homely old products like toasters, distill it into fancy new ones like best-practices studies – or offer it as service only you can provide. The knowledge economy rests on three pillars – the growing role of knowledge in transactions, where it is becoming the stuff that we buy and sell, our raw material and our finished goods; the concomitant rise in importance of knowledge assets, which transform and add value to knowledge stuff; and the emergence of ways to manage these materials and assets. The last – knowledge management, especially management of knowledge materials – gets the lion’s share of attention, perhaps because it has a pride of glamorous, clamorous sellers who have created a multibillion-dollar industry in half a decade.”

The field of knowledge management encompasses every big consulting firm and hundreds of software shops, and it seems as if every large company is buying in, one way or another. Every company – whether it is high-tech or low, New Age or old-line – can gain from managing knowledge better, just as it can from superior financial management.”

Other claimants include: database designers; content developers and organisers, information /knowledge aggregators, knowledge products distributors, web page designers, web portals designers, Internet service providers, and so on.

Self Check Exercise

- 1) Define a profession. Give examples to differentiate a calling from a profession.

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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16.3.2 The Digital Environment

Writings on information systems and information retrieval, knowledge management (KM), corporate portals, digital libraries and web-based information and document management technologies increasingly express concerns about the information overload to information seekers and information providers arising from the emerging web-centered, digital world. The need for better methods of knowledge organisation is also evident from these writings.

Heterogeneous Embodiments of Knowledge

Examples of the heterogeneous and multiplicity of electronic data/digital information available and accessible via intranets and extranets (e.g. the Internet) are email, listservs. Customer comments, communications between staff members of an organisation and peers in a professional group, internal research reports, trade and technical publications, competitor and other web sites, e-journals, e-prints and other e-documents, and a large number and variety of web sites.

Self Check Exercise

- 2) Enumerate the different types of knowledge professionals.

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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Instant Access to Original Works

During the next decade, some 30 per cent of all conventional publications and audio, video records are expected to be produced and stored in digital form and format. With electronic publishing and distribution, the material can be accessed on the network as soon as the author has keyed in the text or created the graphs, images, etc. Copies can always be made from the original master. Mechanical aspects of printing and publishing and of resources directories can be bypassed.

Better Connected: More Interactions

By the end of 2003 more number of people was connected via the Internet than ever before. Half a billion people around the world had access to Internet from their homes. Of these nearly 500 million could surf the web. People from Asia continued to connect faster than anywhere else (home access grew by 5.6 per cent during the last quarter of the year. (Nielsen/NetRatings, Hong Kong). Convergent technologies – text, audio, and video, TV – will facilitate virtual teamwork, global access to experts, video conferencing, etc.

Direct Access - No Intermediaries?

Information seekers will have direct access to relevant information wherever located, for rapid awareness of content, and to discover new ideas and relationships therefrom. This will be facilitated by e-publications via networks without the intervening services of editors, indexers, publishers, and perhaps even librarians in their current avatar.

Some call these changes a paradigm shift and is reflected in the information support function of libraries in such changes as mentioned below [Soundara Rajan, 2002]:

Table 16.1: Information Support Functions of Libraries: Paradigm Shift

From	To
Ware-house-like function	Research support, management support, with desk-top delivery at home, office or anywhere else
Desk-bound, waiting for service request	Pro-active service
Mainly paper-based document collections	Limited paper-based collection; more information from digital resources available within and outside of the organisation even at global distances
Mainly bibliographic service, some with abstracts, annotations	Value-added services, analyzed and repackaged knowledge; knowledge-based products
Library management and operations use of ICTs, mainly manual	Knowledge management; fuller intranets and extranets

16.4 ICTs APPLICATION AREAS

Application areas and types of applications of ICTs are many. Some are enumerated below as examples:

16.4.1 Education and Research Support

Onsite information delivery: Researchers, teachers, scholars and others need not personally visit knowledge resource centres, e.g. the library. They can browse online the library catalogues and other resource directories. Electronic methods can deliver the required text pages, images and voice recordings to users in their place of work, dormitory, home or wherever they are saving travel and other costs. Thus ICTs have enabled:

- Seamless access within organisation and globally;
- Scholarly communication made easier and global;
- Virtual team research and discussion fora; and
- Digital library products and services.

16.4.2 E-Governance and Management

Wide range of applications of information communication technologies. For example:

- Resources management; health care delivery; disaster management; crime detection; forensic work; environment protection, etc.
- Inter-departmental linking for better information access, flow, cooperation, and coordination.
- E-governance; telecentres. Sub-national level (State, District, Taluq, Village) linkages within each domain and with other larger units and nationally.

16.4.3 Some Solutions to the Information Overload Problem: Knowledge Manager

Knowledge managers in enterprises attempt to meet the information overload problem by analysing, filtering, selecting, and synthesising products in which the information is maximally relevant, organised and convenient to the category of users. In such work another objective is to lower the cost of tasks that require discourse / content analysis, by using automated methods wherever possible, without compromising on the relevance and quality of information provided.

For meeting these needs, a rapidly growing group of software products called enterprise KM products has come up. Numerous vendors have entered the KM market with a wide variety of products purported to manage and control the great quantities of textual and other information that drive organisations of all kinds. The tools and products in the KM market include, among many others, search engines, natural language processing software, document management systems, and groupware products.

Self Check Exercise

- 3) Enumerate the different KM tools and 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.

16.4.4 Mobilisation of Human Knowledge Resources

As already mentioned the most important source of knowledge and information for an enterprise is people within and outside the organisation, including their tacit knowledge, skills, conventions, traditions, practices, etc.

The knowledge management system should identify the human knowledge sources – who they are, where located, what are their specialisations, what sources they use, etc. Who is asking what questions to whom? What responses and information flows take place? How these can be mobilised, supported, and drawn upon? With the cooperation of the human sources, a sort of digitised yellow page may be developed for the information provider as well as information seekers can make use of.

16.5 KNOWLEDGE PROFESSIONAL AND KNOWLEDGE MANAGEMENT

The course material for Unit 15 overviewed the definition, role and methods of Knowledge Management (KM), an area that the KP is increasingly involved in. Here we highlight some of the principal issues:

Enterprises need expertise in KM to sustain and enhance their competitive advantage in an environment of growing competition for resources – finance, human, and physical resources, markets, etc. The knowledge manager, at all levels, is expected to possess special capabilities for creating, mobilising, and communicating knowledge available within the organisation as well as elsewhere. Knowledge embedded in the organisation's business or work processes and in the employees including their expertise, skills, experiences, build the enterprise capabilities to create, produce and deliver customers what they need, when and where they need it. The KP has to design and develop systems and strategies to provide the push to this know flow and use. First of all creating a Knowledge Yellow Page as it were, to know who is asking what questions and to whom; who is answering what questions; what source materials (internal documents and external sources) are being used; which queries do not find answers within the organisation and so on.

Enable interpersonal interactions through seminars, group discussions, video conferencing and the like ICTs can facilitate.

KM is introduced to help an organisation of whatever nature to create, share, and use knowledge effectively because it pays off in fewer mistakes, less redundancy, quicker problem solving, better decision making, reduced research and development (R&D) costs, increased worker independence, enhanced customer relations, and improved services to customers. Knowledge support functions are needed to implement KM in an organisation.

Another perspective that accelerated the enthusiasm for KM and the development of knowledge products is the 'richness versus reach' thesis. It is pointed out that the nature of communication has drastically changed. Until now, one had a choice of richness or reach, but one could not achieve both simultaneously. A face-to-face conversation, for instance, is rich in content, nuance and interactivity but poor in reach. A radio or TV broadcast has great reach but is poor in interactivity and nuance. Communication strategies were always an either-or choice. With the Internet, it is argued that we can craft systems that provide both richness and reach. This has necessitated a rethink on how information and knowledge are shared within organisations, an important concern of businesses wishing to harness knowledge. Knowledge products targeted to specific domains, together with the use of the web as the delivery medium, it is possible to provide the richness and reach sought for in organisations.

Crucial and value-adding knowledge: The decision to invest in knowledge depends upon knowing what knowledge is relevant and crucial to the organisation and what knowledge adds value. Crucial knowledge includes the ever-changing dynamic knowledge necessary to operate within the industry at an acceptable level. It may be obtained through consultation with experts, their tacit knowledge that manifests as problem-solving behaviour. The continued availability, development, and retaining of experts in the organisation with such problem-solving proneness and capability is an important aspect of human resources management.

The Internet, intranets, email and groupware make more data than ever before available to the knowledge worker. Customer / user comments, communications between staff members of an organisation and peers in a professional group, internal research reports, trade and technical publications, and competitor and other web sites are some examples of available heterogeneous electronic data. As a result the literature on KM, information retrieval, corporate portals, digital libraries and web-based information and document management technologies express concern about the information overloaded, web-centered digital world, and the need for better methods of knowledge organisation. How can the KP mitigate this overload and consequent stress? Providing for filtering, document and data analysis and repackaging services.

Traditionally libraries and publishing industry handled the acquisition and dissemination of generic knowledge in the form of books, journals, reports, conference proceedings, etc. These are more in the nature of study and reference materials. With the Internet and electronic form of storing and distributing knowledge, libraries have begun offering some of the generic body of knowledge in the form of objects databases. New information suppliers have emerged like the database designers, aggregators and distributors. Journals and databases in diverse fields such as commerce, economics, agriculture, statistical data, health information and multimedia content are increasingly available in electronic form. This is a challenging and complex new development in several ways for the library community for several reasons as cited below [Srivathsan, 2004; Haravu, 2002]:

- a) IT (information technology) today is still evolving in both technology and management sense. Issues like security, privacy, fair use, intellectual

property issues – copyright and ownership – virtual organisations management, etc. have arisen.

- b) There are emerging needs to support virtual knowledge driven enterprises where members from different organisations pool together the requisite information and competencies to offer services of value over the web to users. These call for appropriate methodologies to manage information resources generation and utilisation. We may call them, as explained later, as thematic communities.
- c) The user of information ultimately gains value from the information provided it is the *right information* available at the *right time, in the right place* and *in the right context* as and when he/she is engaged in knowledge intensive work. Hence effective value proposition goes with efficient organisation of knowledge-related activities like interaction, group collaboration, messaging services, etc.
- d) The Internet and IT world itself is swiftly changing over from the client – server interactions to seamless peer-to-peer interactions over web accessed information and interaction services. Users may access information from anywhere independent of the client systems they use.
- e) With ever increasing proportion of information in complex multimedia and digital form, there are immense challenges ahead concerning archiving and retrieval of the same. With sophisticated technology needed for access and playback of the same, the world is yet to intelligently grapple with preservation of human heritage over the coming decades. This calls for reinvention of computer systems and information presentation devices such that the technology to a good extent may evolve reasonably independent of modalities of knowledge creation and its utilisation in the society.

In the above context, we have to consider not only the information sharing aspects per se, but need to look at the dynamics of how this information is put to use by its users. Here it will be useful to identify as to how we use information in the real world when we are engaged in knowledge driven activities.

Self Check Exercise

- 4) Discuss the functions of a knowledge professional.

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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16.6 KNOWLEDGE PRODUCTS

16.6.1 Knowledge Products Development and Marketing

The designing, development and marketing of knowledge products is an important activity of the KP. In the write-up for Unit 15 we have discussed the two main dimensions of knowledge product development: the collaboration dimension and the semantic dimension. Some case studies have been presented by Haravu and Neelameghan (2003).

Stewart (1998) emphasises, “Knowledge strategy should not stop with KM. It should not start there either. It should start with a strategy for selling knowledge. Knowledge can be sold as explicit knowledge or as implicit knowledge”.

“Creating knowledge products: 1) Having some knowledge and asking “How can I make it into a product; and 2) Answering the question “How can we add knowledge to the product we have got?” In (1) K is distilled and packaged, and sold. In (2) it is instilled and sold.”

With respect to information resource centres, what is implied in instilling knowledge in existing products is that value can be added to the services and products offered in libraries and information centres such that users can derive ‘intelligence’ (e.g., business intelligence) from such presentations to assist in their management activities.

Marketing of knowledge-based products is an important area that the KP must acquire skill through training and experience.

The first step in developing a knowledge product marketing strategy is to find out what knowledge customers are seeking (and buying) Stewart point out that “often these are hidden. A lawyer sells more than knowledge of the law, for example – negotiating ability, relationships with other lawyers, and knowledge of his client’s priorities are also part of his product line.” Next step is identify alternative ways of providing the knowledge – the form, format, presentation, language, etc Different knowledge packages have different economics, which might mean different strategies. What channels and delivery mechanisms may be used to reach the enquirer and perhaps also other potential users also needs consideration. Another aspect is will the service pay for itself, will user(s) pay for the added value?

16.6.2 Knowledge and Skills for Content Organisation in Web-based Products

A crucial aspect of the design and development of web-based products and services relates to content organisation. Knowledge and skills needed for content organisation cover the following:

- Web information architecture.
- Internet-based information services.
- How are the applications accessed?
- Issues in content hosting.
- Content formats. and
- Tools for content creation and processing.

Web information architecture

Knowledge Profession

- Web servers and browsers.
- Web sites and URLs.
- Anatomy of a web site.

Applications

- Internet-based applications in a library.
- Requirements: Library web site as the integrating factor.
- Information about the library and its services.
- Locally owned and remote digital sources.
- Push-based services.
- Housekeeping operations.
- Other content / services:
 - Training materials and guides.
 - Administrative, procedural manuals. and
 - FAQs feedback

Self Check Exercises

- 5) What is meant by instilling knowledge in information products?
- 6) Enumerate the knowledge and skills needed for content organisation.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

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Accessing the Applications

- Integrating the services through the library website Web browser used for web site access and browsing through HTML pages.
- Selecting a 'link'.
- Browser compatible format.

Content Hosting Issues

- Content Formats for the different files and records.

- What content is to be given access?
- What delivery medium is needed?
- Web-enabled content: - creation, format, storage, delivery – techniques, tools
- Security required for purchased content (Locally hosted, Remote sources)

Some Principles, Methodologies and Strategies

Many of the methods for knowledge organisation in the web environment are based on principles, which librarians have long discovered, understood and used. For instance, classification schemes, subject headings, authority files and thesauri. Add to this knowledge mapping, self-organising maps, etc. In addition, library and information professionals have made significant contributions to the theories that underlie classification schemes and thesaurus development that are applicable to web-based content development too. Research being carried out to explore the usefulness of some of these theoretical insights in the context of new methods now being developed to manage the great quantities of textual and other information that drive the web, should be further expanded and supported, rather than reinvent the wheel.

Related Knowledge

Information and knowledge managers should also be well aware of:

- Legal and Ethical Issues;
- Vulnerability of digital records; susceptible to manipulation;
- Little control over Internet content;
- Junk; porno stuff;
- Confidentiality; security, encryption;
- Hacking; virus;
- Cyber crimes; cyber-terrorism; and
- IPR issues: Copyright, cyber laws .

Politics / Geopolitics of ICTs

- Power of information and ICTs;
- Information on rights, privileges and responsibilities of citizens, women, children, and those socially, physically and/or mentally challenged;
- Empowerment;
- Digital divide;
- Control over information dissemination;
 - selective filtration; complete blackout;
 - control over media; file transfer, etc; and
 - mis-/dis-information; data manipulation.

As already mentioned there is growing impact of ICTs on activities of enterprises and on those of the information resources centres. Thus, the KP's knowledge of human-machine interaction has to be rethought and broadened.. Conceptually, computer-mediated work, interaction design and other concepts focus on these new concerns. The KP needs to deal with or collaborate with other professionals to deal with the emerging technological challenges, the variety of technologies dynamically interconnected in complex webs spaces. The KP will also recognise that the emerging convergent technologies are being used by new groups of users, in different configurations and contexts, in the work place, at home, and on the move. The KP's work has to be more and more co-operative and collaborative with other professionals "in information intensive and dynamical work settings." Such cross-disciplinary collaboration may give rise to new theories, and new design methods and approaches to systems that encompass more adequately human-machine interactions and relations and address such issues as machine-mediated work, collaboration among heterogeneous groups of professionals and knowledge users, and learning processes in such environments.

Self Check Exercise

- 7) How does the Knowledge Professional tackle the various issues before him in the information field?

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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16.7 LIBRARY AND INFORMATION SCIENCE PROFESSIONAL AS KNOWLEDGE PROFESSIONAL

We have noted that there are several groups who may claim to belong to the Knowledge Profession. Obviously Library and Information Science (LIS) professional also has legitimate claim to be included in the knowledge profession. The LIS professional has the education, knowledge and skill to manage large collections of knowledge resources of various types including their electronic versions. The LIS professional is also knowledgeable and has the skill and experience of many decades in the processing, organisation, and retrieval from such sources to produce various types of information products and services desired by end-users. Manual and technology-based tools and techniques for accomplishing such tasks have been developed. However, LIS professionals need to: (1) expand their horizon vis a vis their potential clientele,

and (2) extend interaction and collaboration – across disciplines and user groups of different interests and service requirements.

Of the two principal dimensions of KM, already mentioned – Semantic dimension and Collaborative dimension – LIS professionals have long been performing adequately in the semantic dimension. But in the collaboration dimension they need to advance much further [Srivathsan, 2004]. The investment and effort in this dimension will not only enable them obtain feedback of the use of the existing information system but also develop their capability to move closer to providing full fledged knowledge-based products and services to all categories of users assist in knowledge discovery and innovations, etc. by applying techniques and technologies available in other specialisations (e.g. natural language processing, artificial intelligence, imaging, web-design, etc.).

It is widely accepted that an LIS professional, especially one who has to manage and organise information resources in specialised fields and interact with and provide information services to subject specialists will perform better if he/she has a background or analytical knowledge of the main subject area(s) of the user groups. This issue is even better appreciated in the case of a KP. However, it has also to be recognised that a KP possessing such an ideal competence – combination of subject knowledge with expertise in knowledge resources management – may not always be available. In large organisations there may be teams of subject specialists and information specialists working together to derive best of both worlds as it were. In smaller organisations, which are much larger in number, such teams may not be realised easily. More often than not, it is for the LIS professional to acquire domain knowledge.

In the training programme at the Documentation Research and Training Centre, Bangalore, this matter received attention from the beginning in 1962. Firstly, the admission to the course was restricted to candidates with a Masters degree level knowledge in a particular domain. The courses offered included such modules (and practices) to enhance the competence of the information professional to acquire domain knowledge. For example:

- 1) Universe of Subjects: Its Structure and Development;
- 2) Design and Development of Depth Classification Schedules for a specific knowledge domain – theory and practice; involves domain analysis, structuring, knowledge organisation, etc.;
- 3) Design and development of other knowledge organisation tools and techniques – indexing, and thesaurus;
- 4) Preparation of a report on the trend of R&D in a particular domain;
- 5) Information resources in specialised fields;
- 6) Interactions with potential information users in a particular organisation (e.g. a manufacturing company); and
- 7) Designed lectures by domain specialists on the ‘highways and byways’ of selected subject etc.

Bhattacharyya has elaborated on the content of such courses, the teaching /

learning strategies adopted, and the type of competencies built up. Feedback from the graduates of the programme indicates that course contents and teaching methodology adopted did help most of the graduates acquire competence in developing their knowledge of specialised subjects and thereby become efficient and effective in preparing knowledge-based products and services.

Hjorland (2002) discusses several approaches to domain analysis, to acquire domain specialisation. These include: “producing literature guides and subject gateways; producing special classifications and thesauri; research on indexing and retrieving specialities; empirical user studies; bibliometric studies; historical studies; document and genre studies; epistemological and critical studies; terminological studies; discourse studies; studies of structures and institutions in scientific communication; and domain analysis in professional cognition and artificial intelligence.”

Self Check Exercise

- 8) Discuss the advantage to LIS Professionals of developing expertise in collaborative dimensions of knowledge management.

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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16.8 PREPARING KNOWLEDGE WORKERS OF THE NEW MILLENNIUM

Librarians and other information professionals are educating themselves on new developments in ICTs and KM. During the past decade education and training in information science and cognate subjects have become available at school and higher education levels. There are programmes designed for young children to become computer literate so that they will fit in comfortably and derive greater benefits in the emerging digital age.

Dr. Michael Medland has given some thought and devised programmes for the knowledge worker of the new millennium. He is involved in research on meta-cognitive tools for improving learning skills of young children – the potential knowledge workers of the 21st century, as he calls them. He is interested in Dr. S.R.Ranganathan’s facet analysis and synthesis in knowledge organisation, and has been successfully teaching this mode of thinking to four-year olds. Extracts from his correspondence / writings are given below:

“What will the literate citizen be doing in the new millennium?”

Those with a futuristic bent give a very simple answer: citizens will be knowledge workers doing knowledge work. Knowledge work is an individual or group process (activity) of unpacking the contents of knowledge sources

(analysis) and then packing the knowledge found (synthesis) in order to answer a learning problem. What is this new literacy?

- 1) The new conception of literacy seeks to instill tomorrow's citizen with more than just content.
- 2) Reading, science, and mathematics learning are highly related in the context of the new literacy.
- 3) Knowledge workers will be continually learning throughout their lives; thus, they will need to learn rapidly and "enjoy" that learning.
- 4) Knowledge workers will participate extensively in collaborative and concurrent activities to produce knowledge.
- 5) All citizens will be engaged in knowledge work to help their "enterprise" move successfully into the future.

The enterprise could be the knowledge worker's family, the community, the corporation, or the government. In addition, there is more to a citizen than being just a knowledge worker — the values for instance. Yet developing knowledge workers, those with enough literacy to contribute, is an important task to ensure the continual development of the nation."

"How can we guarantee that our children will become knowledge workers?"

Dr. Medland answers this question by breaking it into seventeen applied research questions, supplying a possible answer to each, and then outlining a five-year research project to produce the products that will begin to move all children toward becoming tomorrow's knowledge workers.

Within this framework another issue will be: ***What would a "language code" look like and do?***

A research direction can be found within the fields of artificial intelligence and information science. The artificial intelligence community has turned to the examination and construction of ontologies to deal with disparate backgrounds, languages, and techniques. From the practical side, an accepted ontology is a commitment to use a common language to talk about knowledge (content) in a domain. It is a way to talk about a knowledge base (domain) so its contents can be parsed, represented, searched, and expanded.

Knowledge Sharing Criterion

"What is an ontology for?" It is for knowledge sharing and reuse. In the process of building sharable and reusable ontologies, the artificial intelligence community has taken an engineering approach to their design: evaluate them to the extent to which they promote the goals of knowledge sharing and reuse, and then revise to achieve greater effectiveness.

By using the ontology (a common language), users can share knowledge. From a psychological perspective, knowledge sharing is a social activity. Moreover, by using language to talk about what is known, it becomes a meta-cognitive activity. Thus, ontological language functions as a meta-cognitive tool to grasp, relate, share, and promote "knowledge."

Knowledge Reuse Criterion

"Knowledge reuse refers to the ontology's ability to handle an expanding knowledge-domain. This is a helpful criterion, but incomplete for teaching and learning purposes. The educational community needs an expanded reuse criterion. It would make no sense to posit a new ontology for each subject domain. Such would just burden and muddle the "thinking" of learners; it would cripple the assimilation and accommodation of knowledge. Therefore, there needs to be an "across-domain" criterion for the ontology. Students and teachers would learn one ontology and then apply it to all knowledge domains to expedite the teaching and learning process. Students can make queries and assertions about what is learned, and to quickly assimilate and accommodate knowledge. *This is the heart of the knowledge worker's task.* Essentially, it would give muscle to the skeletal process of getting meaning from text.

Across-Domain Criterion

"The fields of information science, knowledge representation, and database design have methods for knowledge-base construction, retrieval, and expansion that can help our understanding of just what an across-domain ontology must do. All libraries, or database engines, catalogue embodied knowledge. Every catalogue system takes embodied knowledge and codes it for retrieval (Neelameghan, 2000). The encoding mechanism, with its categories and subcategories, is ontology: a way to fracture the world of embodied knowledge so that it can be placed in a database and retrieved. The Dewey Decimal, the Library of Congress, and the Colon Classification Systems, to name just a few, are all ontologies. In addition, they all possess one thing in common: they have symmetry. The classification scheme is the same one used for retrieval. Ranganathan's (1963) analytic-synthetic method, as part of his Colon Classification system, stressed the importance of symmetry in the classification of knowledge. The importance of symmetry cannot be ignored. We see it in the languages of science and most clearly in the symmetric relationship between explanation and prediction. Throughout science and technology, the language tools used to analyse worlds are the same ones used to synthesise them. In the same vain, young students who analyse a text must perform a synthesis activity to place what is learned into their existing knowledge base and/or create a new text to answer the learning problem that spurred the analysis."

"How can we do this? How would an ontology or language code (1) help the teacher/learner communication process (sharing criterion), (2) foster the analysis and synthesis of any domain of embodied knowledge (across domain criterion), and (3) handle the expanding knowledge students will encounter during schooling and beyond (reuse criterion)? The ontology should provide students with a tool during individual or group learning sessions to both assimilate and accommodate content in the context of the knowledge work. Basic comprehension questions—who, what, why, when, where, and how—do not give the student or teacher an organisational tool. The social construction of knowledge requires analysis and synthesis processes that mirror each other, that are complex enough to eventually help students handle complex text, yet simple enough to be learned and used by young children, starting at about four years of age."

Self Check Exercise

- 9) What are the different approaches to acquire domain specialisation for professionals?
- 10) Discuss the concept of ontology.

Note: i) Write your answers in the space given below.

ii) Check your answers with the answers given at the end of the Unit.

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16.9 SUMMARY

This Unit defines the concepts 'Professional' and 'Knowledge Professional'. Explains that Dr. S.R. Ranganathan's normative principles for library service (the Five Laws) can be conveniently adapted to form guiding principles for the Knowledge Profession – in knowledge management and services. Mentions the features of the emerging digital and knowledge-based environment and factors, particularly applications of information and communications technologies that influence knowledge access and delivery. Points out that mobilisation of human knowledge resources (specialisation, expertise and skills) is an important aspect of the activities of the knowledge professional. Various aspects of knowledge management that a knowledge professional need to be conversant with are indicated. Knowledge and skills required for designing and providing knowledge-based products. The need for rethinking about computer-mediated w is briefly discussed. Points out that different groups associated with information and 'embodied knowledge' handling claim for inclusion in the knowledge professional category. Considers how a library and information professional can transform himself/herself into a knowledge professional. Presents Dr. Michael Medland's views on preparing knowledge workers of the new millennium starting with very young school children.

16.10 ANSWERS TO SELF CHECK EXERCISES

- 1) A profession is an occupation that is practiced for the benefit of the society. It requires a long and intensive education and training, which is formal and informal. It is in a branch of knowledge or field of specialisation. Grocer, cobbler, and dyer are examples of a calling whereas manager, shoe designer and textile designer are examples of professionals.

- 2) The different types of knowledge professionals are:

Database designers, Content developers and organisers, Information/ Knowledge aggregators, Knowledge products distributors, Web page designers, and Internet service providers, etc.

3) The different Knowledge Management (KM) tools and products are:

Search engines, Natural language processing software, Document management systems, and Groupware products.

4) The functions of a Knowledge Professional (KP) are:

a) To design and develop systems and strategies for maintaining a flow of knowledge produced within and outside the organisation

b) To enable interaction among workers by organising seminars, group discussions, video conferences, etc.

5) Instilling knowledge in information products implies adding value to products and services in libraries. It would help users to derive intelligence from such products to assist in their management activities.

6) Knowledge and skills needed for content organisation include:

a) Web information architecture;

b) Internet- based information services;

c) Accessing applications;

d) Issues in content hoisting;

e) Content formats; and

f) Tools for content creation and processing.

7) The knowledge professionals should work in collaboration with other professionals in information intensive and dynamical work settings to tackle the various issues related to ICT being used in KM.

8) Developing expertise in collaborative dimensions of KM would help KP to obtain feedback of the use of existing information systems, provide knowledge base to all categories of users, and assist in knowledge discovery and innovations by applying techniques and technologies of other specialisations.

9) Different approaches for professionals to acquire domain specialisation include:

a) Producing literature guides and subject gateways;

b) Producing special classifications and thesauri; doing research on indexing and retrieving specialties;

c) Conducting empirical user studies, bibliometric studies, historical studies, document and genre studies, epistemological and critical studies, terminological studies, discourse studies of structures and institutions in scientific communication, and domain analysis, and artificial intelligence.

10) Ontology refers to the use of a common language to talk about contents in a domain. It helps to parse, represent, search, and expand the contents of a knowledge base. It helps in sharing and use of knowledge thus, helping in promoting it.

16.11 KEYWORDS

- Profession** : An occupation, a calling, or career requiring special education (e.g. in the liberal arts or sciences). A body of people in a learned occupation. [WordNet 2.0]
- Calling** : The term “Calling” refers to an activity or a set of interlinked activities for which the performer enjoys the legal and moral right to ask for payment, and if he/she asks for it, he/she must be paid, and if he/she is not paid, he/she has the right to seek redress in a court law [Bhattacharyya, 2001].
- Professional** : A professional person; a person engaged in one of the learned professions.
- A master, an authority qualified to teach (e.g. a branch of knowledge, a field of study, a subject, a discipline [WordNet 2.0]
- A professional is a trained person, having expert knowledge in a field on the basis of which he/she can provide service to the society [Mason, 1990]

16.12 REFERENCES AND FURTHER READING

[Note: Students should also use the documents cited in Units 14 and 15 of this course]

Abell, Angela (2001). *Competing with Knowledge: The Information Professional in the Knowledge Management Age*. London, UK.: Library Association Publishing.

Bhattacharyya, G. (2001). Musings on curriculum design for library and information science in the IT environment with special reference to content organisation, p. 135-144. In: *Content Organisation in the New Millennium. Papers Contributed to the Seminar on Content Organisation in the New Millennium*, Bangalore, 2-4 June 2000.

Hjorland, Birger (2002). Domain Analysis in Information Science: Eleven Approaches – Traditional as well as Innovative. *Journal of Documentation*, 58(4); 422-462.

Devaraj, Rajashekar S. and Ramesh, L.S.R.C.V. (1999). Librarianship and the Professional Model: A Sociological Tutorial and Critique. *Library Science with a Slant to Documentation and Information Studies*, 38(3); 155-164.

Gopinath, M.A. (1998). Curriculum for Digital Information Systems: A Learning Package for Library and Information Professionals. *Library Science with a Slant to Documentation and Information Studies*. 37(2); 73-78.

Gopinath, M.A. (2002) Information Professionals, Knowledge and Science Paradigm. *SRELS Journal of Information Management*, 39(1); 2002; 23-39.

Haravu, L.J. (2002). *Lectures on Knowledge Management: Paradigms, Challenges and Opportunities*. Bangalore: Sarada Ranganathan Endowment for Library Science.

Haravu, L.J. and Neelameghan, A. (2003). Text Mining and Data Mining in Knowledge Organisation and Discovery: The Making of Knowledge-based Products. *Cataloguing & Classification Quarterly*, 37 (1/2); 173-186

Mason, Richard O/ (1990). What is an Information Professional ? *Journal of Education for Library and Information Science*, 31(2); 122-130.

Soundara Rajan, V. (2000). Librarian in the Knowledge Era. *SRELS Journal of Information Management*, 37(3); 157-164.

Srivathsan, K.R. (2004) *Five Laws of Information Service and Architecting Knowledge Infrastructure for Education and Development*. (under publication) WordNet 2.0. New Jersey: Princeton University

Sharma, Jaideep (2002). Professional Needs of the Workplace – Vital Component in Professional Curriculum. *SRELS Journal of Information Management*. 39(2); 117-120

Sridhar, M.S. (1999). Skill Requirements of LIS Professionals in the New E-World. *Library Science with a Slant to Documentation and Information Studies*, 38(3); 121-129.

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