CHAPTER –7

Technical Information Centres
7.0 Shiyali R Ranganathan father of the library science said that a ‘library is a growing organism, meaning that knowledge and its use continue to grow all the time’ (Arunachalam, 2008). The rat-race among scientists has led to ‘indiscriminate publishing of scientific literature resulting in the almost uncontrollable explosion of scientific information. Now the slogan is not longer publish or perish, but publish and perish. Currently leading scientists all over the world are preoccupied with this problem and are devising ways and means of arresting this flood of publications’ (Sarada, 1991). Earlier the user had to visit the ‘library within the four walls to get information on a specific topic. Now in the digital environment, the user wants global information without the boundaries of any specific knowledge or any specific medium’ (Mahajan, 2002). We are living in information age. Information is ‘power, product, process and it is more than money. In these days, if the person is having right information at a right time, he can do miracles in our society. There are various ways and means of acquiring the required and right kind of information at a faster pace’ (Bhandi, 1997).

The ‘classic measures of information retrieval performance are precision and recall. Precision tells us how good the system is at filtering out non-relevant documents. Recall tells us how good the system is at finding relevant documents. Despite numerous critiques of these measures, they remain the most widely deployed in larger information retrieval problems’ (Krichel, 2007). Scientists continually
work with ‘information to move their research projects forward, but the activities involved in finding and using information and their impact on discovery are poorly understood’ (Palmer et al., 2007). Currently, citation based ‘retrieval systems have provided important search functions for researchers to find scientific publications. However, these systems mostly support basic search functions such as keyword search, author search and traditional citation search’ (Quan, and Fong, 2007).

A ‘retrieval system can be bought, but may need to be adopted to the organization or even developed and tailored by the organization itself’ (ISO:11442-4, 1993). The information explosion and information technology revolution has led to the emergence of the electronic information era. ‘Rapid advances in information processing, storage and communication technologies have revolutionized the role of World Wide libraries information services to their users. As a result libraries are facing new challenges, new competitions, new demands, new expectations, and a variety of information services’ (Rajasree and Aravinda, 2004). Information scientists are leaders in the information revolution. Value of TIC is a perennial topic, their economic value has been challenged with increasing force in recent times, ‘scientists and engineers spend 3-4 hours a day at the utmost for reading periodicals. Further, the quantum of ‘current journals read or screened by scientists and engineers is between 3 and 10 with average of 4-6 key journals covering the users’ (Chandel and Saraf, 2002)\(^{(b)}\)

Discovery and dissemination of new technology has always been a source of excitement and incalculable social benefit to the society. ‘Tremendous progress made by the mankind in the 20\(^{th}\) century is only due to research and new information. Information
society subsists on, information which is only generated by research’ (Satija, 1998). The ultimate goal of ‘information resource management is to put place mechanisms to enable the laboratory to acquire or produce the data and information it needs, of sufficient quality, accuracy and timeliness, and with minimum cost. This is accomplished by creating conditions whereby all levels of the organization came to look upon information not as a free good, but rather as a costly and valued asset that must be treated with assets, human resources, and other resources to achieve its aims. In doing so, a major shift from a preoccupation and focus on the power of the technologies to a focus on the power of the information content must occur’ (Diebold, 1979), documentation activity of a country are very much interlinked with the ‘research and developmental efforts of the country. In any developing country, since research and developmental activities themselves are dependent on governmental initiative and support, documentation and information activities too have to depend on state support, at least at the initial stages. Hence, the status of documentation in India can best be appreciated against the background of national research and developmental effort’ (Guha, 1978).

7.1 **Aim of TIC**: The mission of the ‘library as a metaphor of world’s documentary heritage is preservation of and timely access to quality information in a cost effective manner’ (Jagtar Singh, 2002). The role, of, ‘library and information professional changes from one of producing data and information to one of integrating new information technologies in providing effective information services’ (Sen, 2002). TICs aims is to provide the unified and focused strategic leadership needed to address the demands, provide strategic leadership for collaboration between publicly funded research information providers and their users to develop effective, efficient and integrated
information resource and services to support defence research. Coordinate action to propose and specify solutions to meet researchers changing needs. Act as a high level advocate for research institutions across the DRDO. Early emphasis is likely to be on improved knowledge and access to existing resources for example by developing search tools and union catalogues which give a single point of access to number of different collections. Future potential work streams include collaborative work on developing and preserving digital archives, maximizing access for professional researchers to key collectors, and working towards collaborative development of collecting to ensure access to the widest possible ran of research materials.

Information is an important aspect for organizations. The TICs are providers of information and as vehicles for learning, and changing policy matters and implementations have recognized that readers must not be left out in the emphasis upon new technology and information services/support, ‘scientists getting their research work with great efficiencies for the development of the dimensions of the defence technologies. Which is of national concern. Information is the basic feedback for the scientists, certainly they need more attention than the ordinary users of the conventional library’ (Hemant and Pant, 2004).

7.2 **Objectives Of The TIC:**

TICs are to select, acquire, store and retrieve specific information in response to users requests,

To obtain all the relevant scientific documents/periodicals, which may be of use to the interests of the laboratory,

To disseminate information in response to requests from its users,
To inform scientists, and other users on articles which may be of value to them by issuing a monthly bulletin of abstracts,

To fill the gap between information needs of users and the existence of information,

To answer specific enquiries from the information available in the laboratory,

To provide right information to the users in the right time,

To supply photocopies or translations of articles required by individuals; To be a center for reports of the scientific work of the nation, both published and un- published;

To be a channel through which the scientific work of the nation is made known and available to the rest of the laboratory.

A service provided by any information center which draws attention to information possessed, in anticipation of demand by preparing and circulating news sheets, literature surveys, reading lists, abstracts particulars of articles in current periodicals etc., which is anticipated will be of interest to potential users of the service.

As defence is worldwide important industry, relevant information may accumulate in large or smaller packages in almost every country. The information generated is more useful from elsewhere.

Rapid access to the most current information is critical to the success of research initiatives, the scientists are more concerned with the issues of

- Speedy access to the most relevant information resources
- Prompt delivery of documents and information
- More current and highly relevant on collections.

Libraries and information centers are 'primarily communication channels that perform the task of transmitting information available in varied forms and formats to pacify the divergent needs of users’
Information retrieval system is heart of the information system. The rapid production and circulation of information makes the design, which automatically manage and retrieve the right information an important issue. ‘The primary purpose of establishing a information retrieval system lies in assisting the users to efficiently acquire desired information’ (Bhaskar, 2002).

7.3 **Need For TIC:** There are three factors which ‘shape the information behaviour of different user communities and organizations with their different structures and cultures, are the frames of reference for the information needs, seeking and use of individuals. Information accessing and use are converted with and affected by the organization of information resources both in specific communities and in society in general’ (Brenda and Tomwilson, 1996). Libraries will continue to select, collect, organize, preserve and provide access to content available in variety of media. ‘Knowledge must be shared for developing new knowledge and this is a challenge for librarian to capture tacit knowledge and make it accessible to those who require it mostly’ (Vaishali, 2004). Librarians have been endeavoring to develop integrated library systems by creating the technologic landscape for supporting and enhancing end-user access to digitally recorded document surrogates and content. ‘Analysing and designing a library information system aims at enhancing patron satisfaction by providing just-in-time access to appropriate information’ (Indira, 2004). The system of TICs, try to use all possibilities to ensure scientific researchers, specialists with required information.

TICs functions as a support structures for innovation system, acquiring, preserving and making available information of a certain
areas. The main feature of a knowledge, based society is an innovative way of thinking, and shaping and reading it, life ling learning. ‘TICs are a part of the learning environment and the support system.

Information needed to meet the goals of the DRDO. Its clients were then and continue to be as desperate in both their work related information needs and their information seeking behavior as they were geographically dispersed. Realising this, Defence Research and Development Organisation, laboratories have established good library services, the libraries/TICs of DRDO are the central information agency for collection, processing and dissemination of scientific and technical information of interest to the parent laboratory’ (Rathore, 1998).

The need for information support facilitates more informed, timely, and cost effective decision, making. It is considered that identification of information needs is a pre-requisite to design and develop any information system to provide need based information services to its clientele. It has been a topic of great concern and interest to information professionals that how people seek, retrieve, and prefer to use information. Information user is happy when he gets what he has been looking for. ‘Information professionals obligation is to provide maximum satisfaction to their respective user groups and minimize time and drudgery of literature search to achieve this information requirements has to be first identified before planning services’ (Chandel and Saraf, 2002)

TIC supports better quality reporting, reduces research related costs through re use of information and facilitates cost effective online training and monitoring through continuous exposure to bet practices in information management work.
The rapid developments that have taken place in recent years, have paved the way for revolutionary changes. At the same time storage, dissemination, and analysis are testing the human ingenuity. ‘Since the amount of information is emerging day to day at tremendous speed, to find a particular information in the midst of information explosion is very difficult, and so there is an need for TIC services to be adopted’ (Kalliammal and Thamaraiselvi, 2004). TIC also contributes to;

- Facilitate quick recognition of researchers from priority clients,
- Facilitate personal work load management access to all TICs,
- Promote opportunities to strengthen subject expertise or interests,
- Promote the use of work ready electronic information,
- Facilitates more informed, timely and cost effective decision making, and improves productivity, saving money by reducing over all research time,
- Promotes team work between researchers and clients which is essential given the interdisciplinary nature of most defence related research

The information explosion, and recent development of IT have created problems in procuring, organizing and disseminating information for librarians and the actual users. The exponential growth of scientific literature is creating numerous problems. Even the biggest library system cannot afford to procure all the documents even on micro topic. No individual can retain in his memory all that he reads for his current or future interest and the traditional library tools have become considerably ineffective in providing the specific information of an individual interest. The overwhelming mass of available information and its ever increasing challenges, create really difficult problem for searching or locating information pin-pointedly and
expeditiously. ‘The quality of information rarely improves with the quality. Libraries would continue to render its services with the help of IT to respond to the needs of the readers and to procure the cost effective information sources’ (Ojha et al., 2000).

7.4 **Research and TIC** : TICs are set to transform in the way research information is collected, organized, preserved and accessed. It is not surprising to realize that man has always been interested in information, in producing it, in using it and in processing it. Now a days information is the fifth need of man ranking after air, water, food and shelter. ‘Information in one form or other has consistently been a significant element in the development of human society and it has shaped, over a long period of time into the way we think and act’ (Doraswamy, 2004).

Scientific and technological information holds the key to successful research work. The right type of information should be made available as and when required. But in practice there is always a gap between the available and the needed information.

**Information Requirements:**

1. ‘More information is required at the operational/working level than at the planning stage.
2. The higher the hierarchical level, the greater is the requirement of information about national and international developments.
3. Some information may be required during several or all steps of the management cycle.
4. Information has time dimension. It becomes outdated rapidly and new information is required to take the place of the old.
5. There is a precise need for better rather than more information’ (Bandyopadhyay, et al., 1986).
To understand the needs of researchers, to develop widest possible notional print and digital collections, and to improve access to key resources. It provides a opportunity to access research information system which is unparalleled in it support of research and knowledge transfer. The TICs will provide a unique service to DRDO researchers by actively promoting and collaborating research information to users at all levels. Research information resources are of critical importance to research activity. A wide strategy for their development is needed, and that is why the TICs have a collective commitment.

The ability of TICs, are to exchange research materials for their users on demand is a vital requirement to encourage research. As a consequence the researchers needs the TIC and the TIC needs the resources.

TICs are fundamental for research. TICs select, collect, catalogue and make available research materials to supply the needs of researcher of the organization. TICs make an essential contribution to the research community and provide long, term access to research materials in an organized way. TIC is at within the laboratory. Each laboratory handles slight differently, depending on the resources, goals and priority of the TIC within the research functions. TICs are increasingly included in to the laboratory effort to increase resources according to the research work of the parent organization.

TICs can provide researchers all the research materials, regardless of where and when and in which format they have been published. In the information society and electronic world the amount of published information has increased, the existence of Internet,
makes it much more easier to deliver pre-prints and other papers promptly to the scientific community without the need for special investment in publishing. However, by comparison with print, the durability of electronic materials and the provision of long term access to them are much more difficult to ensure.

7.5 **TIC and Changing Needs Of Users**

Current information is absolutely essential for arriving at a right decision at any stage of life. Decision based on inaccurate information is bound to be erroneous and may result in waste of time, money and energy. Appropriate information to be provided timely is therefore, required to be traced, collected and kept organized in such a manner that it can be retrieved quickly at any movement for the purpose of use. The TIC ‘plays the part of an externalized social memory for storing of information contained in documents. For timely and proper utilization of resources all ‘stores’ are required to be kept organised’ (Jayati, 2002).

As a greater number of electronic resources become available, retrieving relevant and authoritative information has become progressively more challenging and time consuming. Locating relevant information in a timely manner is critical for both the researcher and the information professional. ‘Electronic books (e-Books) are one way to enhance the digital library with global 24 hours-a-day, and 7 days-a –week access to authoritative information, and they enable users to quickly retrieve and access specific research material easily, quickly and effectively’ (Connaway, 2003). The user is the last ‘recipient of the information in the channel of communication process executed by the libraries and information centres. In this process each library should have sufficient collection,
which should have been arranged in a systematic manner so that it can be retrieved and be disseminated at the Right time, and for providing Right information at the Right time’ (John, 2004).

Information ‘need arises when user perceives gaps in their state of knowledge and ability to make sense of experience. Information needs can be cognitive, affective and situational’ (Sangavya and Muttayya, 2004). TIC must find possibilities to develop in a way that needs the changing needs of further research. The future as electronic TIC or TIC without walls, virtual TIC can seem to be remote. TICs must begin to develop the services, the collections and the functions of their in an appropriate way.

There is a growing need that the TIC uses resources in that is accountable to laboratory management, that the adoption of an integrated research role is the key to winning resources that the integration is a pre requisite to effective planning. Integration is the nurturing of an active partnership between the TIC and other departments, services is a wide range of liaison activities, which respond to the information needs of the research community.

In the 21st century the networked environment fundamentally change the whole business in which TICs are involved. The impact on the TIC activities are, information delivery and relevance to provide less rather than more, but it must be relevant information.

7.6 **TIC Services:** Information is an ‘important resource which serves as backbone to any R & D programme. Security and urgency associated with national defence demand an information set-up exclusively to meet the defence needs’ (Murthy, and Rangra, 1990).
The services of TIC are technically heterogeneous, there are thousands of different information services available for access by TIC and their users, some of them need a wide variety of access protocols, hold data in different formats respond differently to the same request and results are difficult to integrate into a single service. There are a wide variety of sources to deliver information services. The services of TIC are;

a. To develop collection of relevant sources of information in the field of Science and Technology, Defence Research to complement and supplement the total National document resources.
b. To render all appropriate and feasible information service in the field of Defence Research
c. To contribute to advancements in Defence Research including Science and Technology through research and other supporting activities
d. To adopt and to promote appropriate technologies to enhance capabilities and productivity of Defence equipment and services in the country.

Users of TICs are in opinion that they don’t need intermediaries, scientist mostly use TIC interfaces in their search for information, they need information on their topic, the resources which can be easily quickly found.

Involvement of TIC staff in wider laboratory activities has offer the effect of improving the image of TIC assuming that such involvement help to develop staff competence and better to meet user needs.

TICs are meant to effect knowledge, information literacy, democracy, social induction, local identity, life long learning and individual, well-being. The future research and development activities
In TIC will be focused on the establishment of a knowledge based information society where the exploitation of scientific research, scholarly information, human knowledge and skill is the main source of economical development and improving the quality of life.

Involvement in research and development activities, in the acquisition of scientific information and in the creation of database open up a possibility to introduce know how for promoting the economy, culture, education and science. The main goal of development strategy of educational world is the contribution of TICs to the modern resources and development activities, to the increase of the potential of knowledge. A research library does three things, i.e. ‘it provides depth of information; it keeps many books on a subject including all scholarly works, keeps one copy of most works on a permanent record, so that you can find almost everything published on a given subject’ (Beasley, 1998).

Diagram-5

**Role of TIC:**

```
TIC

<table>
<thead>
<tr>
<th>USERS</th>
<th>DOCUMENT SELECTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>DOCUMENT DELIVERY</td>
<td>INFORMATION DISSEMINATION</td>
</tr>
<tr>
<td>DISSEMINATION</td>
<td>DOCUMENT PROCESSING</td>
</tr>
<tr>
<td></td>
<td>ORGANISATION</td>
</tr>
</tbody>
</table>
```
TICs of DRDO had the highest satisfaction rating of any special library service. Scientists and Technical officers are among the highest users of TIC services. Browsing books remains the core service used. Providing information resources for everyday use by individuals, for research and to support formal and informal awareness.

Access to government and other electronically delivered information available from sources beyond the wall of the TIC,

Information, referral services and facilities which contribute to R & D activities,

Free, unfiltered and equitable access to services and resources by all the members of the laboratory,

Promote defence research,

Stimulate initiative and enhance quality of research,

Introduce and develop skills in using information technology and foster research and information seeking skills.

It has become commonplace to hear of TICs working closely with R & D personnel in providing needed information in support of the advancement of their research projects, with TICs well being linked to the economic success of the resources they do, it make sense for them to seek involvement in R & D initiatives.

TICs have a particular role to meet the information needs of their parent organization, wherever located in Research and Development laboratories, their objective are to understand, anticipate and meet the parent body information requirements.

The services and resources of TIC contribute to organizational goals and lead to

Improved quality of work

Increased productivity
The provision of information to researchers and other knowledge workers less expensively than do alternate sources and no less effectively and time reallocation for researchers by providing ready access to sources and materials thus saving time that they can more appropriately apply to their research.

The information requirement of DRDO are mission oriented, project oriented. TICs are intended to supply relevant information to scientists, program planners etc.

Scientific research demands that the knowledge of current literature should be available to the scientist, to know the developments in their subject field. Therefore, scientists adopt various methods to keep themselves abreast of the current developments these include;

- Regular perusal of journals either personal or available at TIC;
- Scanning the current bulletins which disseminate the contents of the literature;
- Maintaining contacts with the other scientists working in similar areas.

7.7 **Information Support and Need:**

Information in the field of ‘defence science is not available in abundance and accessibility to the sources of such information is also restricted. Yet, there is great demand for such information from the defence scientists. Of course, the information, requirements of defence scientists vary with their roles. Research scientists or production engineers emphasize on specific information or data relevant to the projects allotted to them’ (Bandyopadhyay, et al., 1986).
7.8 **Information Sources on INTERNET:**

The principle of one-to-one micro-communication is different from mass communication as the one-to-one communication identifies a recipient first and provides individualized information for that recipient. This ‘communication process will improve the effectiveness of communication and will be the trend for the 21\textsuperscript{St} Century’ (Lee, 2003).

Over the last few years the Internet has revolutionized the ways by which librarians can provide information sources and services to their users. With the help of the Internet, ‘librarians provide access to the various types of online information sources and services to the users, which are freely available on Internet including e-journals, e-books, online databases, Encyclopaedias, virtual libraries etc’ (Subhash and Divik, 2004). Internet resources need to be carefully compared and evaluated, selected and presented in a coherent manner if they are to be accessible and useful to research community.

7.9 **The Classified Library:** The classified library is the repository for secret and confidential documents and periodicals and unclassified limited access technical reports and documents acquired from various government agencies.

Classified library houses all tapes, videos, and lectures, conference proceedings, emphasis is on naval and military science, specific missiles, ships, aircrafts exercises and operations etc. Classified library in-charge will provide information about these and other periodicals held in the classified library. Access to the classified library requires that a security clearance.
7.10 **Resource Sharing**: Changing technological advancements ‘the shift is towards access services. This means emphasis is on what your library can access rather what your library possess. Another point of key concern is rising costs of documents and their phenomenal growth in each subject. All these issues point out towards exploring the possibilities to share our resources with other libraries and information centres and also, to have access to their resources’ (Sumati, 1999). Resource sharing becomes a vital as well as feasible device to achieve the target, especially for developing countries like India, where the Information Centres/ Libraries are suffering from the shortage of finance and resources. Hence, they think about library networks for resource sharing by forming consortium. ‘Library Consortium is a joint venture of any group of libraries to cope up the ‘information crisis’, resource sharing from its primary concept of library lending, now includes cooperative acquisition of books and subscribing periodicals, collection development sharing of bibliographical data, exchange of electronic documents and articles etc’ (Bidhan, 2002). In the present environment of information explosion, it has become practically impossible for any TIC to remain self-reliant. No TIC is able to arrange all the documents on demand. Information explosion is not confined to any particular subject and its taking place in all the fields and in every country. With ‘libraries facing manpower and monetary constraints, it is impossible to acquire all the documents in one roof and thus evolved the concept of resource sharing’ (Anjna, 2004). It is due to information explosion in ‘Science and Technology, Research and Development, Humanities, Social Sciences and almost every other fields of ‘knowledge’, libraries are facing manpower and monetary constraints. At present in Science and Technology, the number of periodicals available is more than 50,000, it is very difficult to acquire every publishers document under the same roof and thus
evolved the concept of Resource sharing and Networking’ (Soumya, 2002). Recent developments like internet and the emergence of digital libraries have forced to change the way the librarian functions at present. They have ‘to think of ‘access’ rather than simply ‘possession’ of documents.

Under these circumstances, especially DRDO can think of certain alternatives like cooperative resource management sharing of resources etc, in the networked era’ (Wakhare, 1997).

Hence, resource sharing is a method of overcoming these constraints of the individual TICs in respect of their resources by way of understanding between the TICs.

7.11 **Concept of Resource Sharing:**

Resource sharing has a long and noble tradition. Recently, it has become a focus of interest to the librarians and information professionals. ‘It is true that under-utilisation of the library collection is largely due to the users not getting the information in time. If a reader comes to know the availability of documents required by him, and also if he can get access to them quickly, it would not only optimize the use of library collection but also would effectively contribute to the S & T efforts in the country. Faster and reliable communication system and information technology has opened new vistas for resource sharing between the generators and users of information. Network provide a number of navigational tools and associated services, which could be used by libraries to access resources at remote places for browsing, searching and even downloading’ (Chandra, 2000). Some of the TICs of DRDO are sharing their resources, facilities, and services through a network called DRONA. It became possible for a few users of the TICs to
make use of the resources through a concept of resource sharing. This spirit of cooperation of sharing the resources would entail the participant TICs in a system to benefit for advancing the R & D activities of the DRDO.

The concept of resource sharing, among the TICs have become an important aspect of present day throughout the DRDO laboratories. Explosion of literature and limited budgets facing TICs towards sharing of available resources. Regional networks are playing a key role in resource sharing. Developments in the, publication industry has led to a wider range of relevant information resources. The ‘increasing use of research organizations in India to disseminate information has resulted an increase in information availability and better access to it’ (Harsha, 2005). No TIC can stand alone in this age of networking and resource sharing. The information requirements of scientists are bearing more and more diverse and complex. The Current Awareness Services and Selective Dissemination of Information services would not be much satisfactory unless share the resources with TICs.

The work culture in libraries has changed due to the growth of computer networks and the World Wide Web. The growth of interest in knowledge management has essentially been contemporary with that of intranets/extranets. ‘It is no longer sufficient for libraries to depend solely on having sufficient access to internal and external information resources but to efficiently exploit what the system actually knows-not only what it owns. The successful implementation of knowledge management is that people will share what they know and reuse the know how of others’ (Ghosh and Jambekar, 2003).

7.12 **Inter Library Loan**: All the TICs are sharing the resources by lending the required documents through inter library loan. Nearby TICs are personally availing this service, where as the distant resource
providers are utilizing the postal and other modes, but all the TICs are generally using the services of inter library loan. This service is considered to be very important resource sharing service.

Bibliographical details of document/article etc are browsed through a network DRONA, in some cases where the TIC resources are available on network, the details are communicated to concerned TIC for providing document/information on inter library loan. The resources of other TICs whose data are not available on DRONA, existence of the documents are confirmed through correspondence.

7.13 **Union Catalogue**: It is essential that each TIC personnel must know the availability of the resources, not only of own TIC but also other TICs. To facilitate this Union catalogue prepared and made available to other near by TICs. A well, prepared union catalogue serves as a major bibliography in its own right. Due to the preparation of union catalogue location of material will be easier.

7.14 **Network Of TICs**: The main problems in early operationalising the library ‘networks include retro conversion of holdings of data, non availability of suitable software for operating larger databases and online searching in a wide area network made at prices affordable by all the libraries, lack of adequate standardization and non-availability of adequate training facilities to cover all the library staff participating in the network programs’ (Murthy, 1996). Out of the 53 DRDO laboratories only DESIDOC resources are available on DRONA. Instead of using different software’s by TICs, if they use uniform format (ex. CCF), resource sharing can be more useful, as the ‘collection of CDs/DVD ROMs, increases in a library, it becomes important for the librarian to manage and share them
effectively. Benefits of sharing CD/DVD-ROMs over a network and introduces device called CD libraries/servers for sharing CD title discs over a network’ (Satish and Jayaraman, 2002).

TIC networks are the natural outgrowths of TIC automation. While computerization, places the database of a particular TIC at the immediate use. Networking of TICs place the database of other TICs at immediate disposal. Creation of DRDO TICs network seems to be a far cry in the existing condition. Yet if the DESIDOC pool that strength for the purpose TIC networking will be solved.

DRDO-TICs network can be created covering the databases available at each TIC. CCF and common bibliographic format on the lines of MARC format have to be developed for the purpose of exchange of bibliographic information among the TICs. It is an integrated information management and data processing network.

- Networking has to be implemented in a phased manner i.e.
- Computerisation of individual TIC and combined together, with regional network of TICs.
- Setting up a central host computer network at DESIDOC
- Creation of union catalogue of holdings of each TIC and central database at the host computer (i.e. DESIDOC)

7.15 **Mailing Lists** : Mailing lists are vital communication tools used by academic and research community for sharing knowledge and to discuss latest developments and related issues in specific subject area. These also serve as ‘forum for seeking technical assistance or sharing such knowledge in an informal way by cutting all the geographical barriers’ (Pujar et al., 2003).
Linkage of TICs with existing network DRONA. The whole, purpose of networking leads to resource sharing among the TICs for rendering better services. Thus if the Head of TICs join together the dream of TICs network will become a reality.

7.16 **Translations**: Translations of documents of various categories have been gaining importance as sources of information and means of information exchange. This is particularly true of scientific and technical documents. Among the factors, which have lent increasing importance to ‘translations are the need for rapid and wide exchange of information among scientists’ (IS:10454, 1983).

7.17 **Technical Information Centre’s Consortia**: TICs consortia in today’s digital age are quite different from that of library networks of yester years. The main reason is that the resources that are shared in today’s consortia environment are predominantly in electronic form such as E-Journals, E-Books, and databases. Hence, the technology and associated tools to support sharing the electronic resources are also important components for the success of any TIC consortia. ‘Though the resources are accessible on the Internet, the formats in which they are available are different for different information providers’ (Paul and Karsiddappa, 2005).

7.18 **Need for developing network for DRDO libraries**: Libraries/TICs are spread all over the country. ‘Every year DRDO libraries/TICs are spending lakhs of Rupees on the acquisition of scientific and technical documents like periodicals, books, technical reports, patents, standards and specifications, manuals, conference proceedings etc. Every library develops its collection in a specialised field. But DESIDOC being a central information agency develops its
collection with the objective of meeting the needs of the entire DRDO’.

The projects undertaken by the DRDO are generally related to the design and development of new sophisticated weapons and equipment based on the operational needs projected by the services and improvement of the reliability and performance of the procured/manufactured items according to the needs of the services. These projects need information pertaining to different disciplines for their successful completion. Thus, there is increasing demand for multidisciplinary information, which cannot be met through the collections of a single library. At present this type of need is met through letters, current awareness services, abstracting services, telephones etc., but these are time consuming processes. Further, scientists working in laboratories situated at distant places do not have direct access to the collection of information available in other libraries due to geographical barrier.

With the development of an online network for DRDO libraries resource sharing, the information needs of DRDO can be met more effectively from the available resources. This network will provide direct access to users for searching information available in different libraries and will help the libraries in providing better services at low cost. It will also help in avoiding duplication of efforts on the part of library staff for cataloguing, classification etc.

DRDO libraries are quite rich in information resources. ‘Technical coordination among libraries is being attempted manually, but now the time has come for planning and organizing an effective on-line network for achieving better coordination among the libraries
and for providing better information service at low cost by making optimum use of resources available in different libraries situated at different places’ (Saxena, Singh, and Mehta, 1986).

7.19 **Present Technology and Information Scenario:**

Many disciplines in ‘science are heavily researched, thus topics are changing in a rapid manner. Also, the literature in Science and Technology is growing at an exponential rate, therefore, it has become essential to assess the information needs of the users periodically to customize value-added services and resources’ (Rajendiran et al., 2008). Presently Science and Technology ‘librarians facing various challenges like users information behaviour, database creation and its security formulation of collection building strategy etc., to meet the challenges E-Book is boon to the Science and Technology Librarians’ (Ghosh, 2004) the rapid ‘developments in technologies necessary for developing digital libraries, the world of digital information resources has explained rapidly and exponentially, increasing number of publishers are using the internet as a global way to offer their publications to the international community of scientists and technologists’ (Jagdish, 2001) librarians ‘push to become the standard bearer for the information society, derives in significant part, from a heroic pioneering self image of an early adopter of technology among the professions’ (Mussman, 1993) information technology ‘plays an important role in electronic role in electronic message transfer, electronic data interchange (EDI), Electronic file transfer protocols, transfer of voice text ant images through ISDN, remote electronic information access and retrieval, and the enforcement of research’ (Sreenivasulu, 1999) much of the ‘information resources have been put up on networks, we have no other way except for becoming a network literate. So we should get acquainted with the ways of
connecting, searching, and obtaining, information from the info nets’ (Ashok Babu et al., 2000) information is the primary ‘commodity for any Research and Development activity. The ever changing technological developments and the ever growing number of publications in a multitude of subject fields led to a paradigm shift in library management. The developments in Information Technology have brought in new products and formats for storage, retrieval and dissemination. The CD-ROM technology, became a popular storage and retrieval mechanism’ (Moorthy and Karisiddappa, 2005) due to ‘technology revolution, there is a rapid change in the publishing media like E-Journals, CD-ROMs, Online databases, E-Books etc., everything is available in digital form that can stored and utilized effectively and efficiently, one must make best use of available technology to meet the changing needs of the users’ (Kannappanawar, 2002), information technology has ‘grown more sophisticated, librarians have grown more demanding, insisting that technology solutions have the flexibility to their libraries unique needs’ (Balas, 2002).

7.20 **Technology for Documentation and Library Services:**

Technology permits us to ‘extend the human potential to almost unlimited possibilities in dealing with information between people and machines. Today, we have enormous capability for communication because of the advancements in technology. Communication, is the accurate transfer of information from a sender to a receiver it is a two way process. To achieve good communication with some one else, one must be sure that the message transmitted has been received and clearly understood at the other end. We live in the information technology era’ (Kumar and Udaya, 1992).
It is widely assumed that technological innovation in library and information science is essentially a recent development. The reality is that, from the turn of the century to the Second world War, at least some practical idealists were very alert to the possibilities for technical inventiveness in bibliography, documentation, and library service as a cursory review will indicate. The potential of microphotography as a compact alternative to paper was increasingly recognized. Microphotography also offered a solution to another serious technological constraint of paper technology; the making and distribution of copies. Microfilm achieves compactness, easy reproduction, and transportability. These virtues were noticed by those who worried about the deficiencies of existing library technology. The Belgian documentalist Paul Otlet (1868-1944), for example, proposed the use of standardized microfiche in 1906. He saw microforms not as a replacement for the book, but rather as an expansion of the paper codex into a new differently versatile form.

In 1925 Emanuel Goldberg has demonstrated microfilm reduction equivalent to putting the entire text of the Bible fifty times over on one square inch of film, an achievement that was not surpassed for many years. This was yet another stimulus to ideas about miniaturized, compact, portable libraries. During the first half of the 20th century punch cards, edge-notched cards, and similar mechanical searching devices were developed for simple and Boolean selecting (i.e. searching for arbitrary combinations of index terms)

The intellectually constraining format of the printed codex, compared with what we should now call hypertext, was recognized, especially by Otlet, who used the phrase ‘monographic principle’ to refer to what is now called hypertext. He was, of course, greatly hindered by having to use pre-computer technology to handle links and nodes.
The UDC made explicit provision for Boolean ‘And’ searching and moved classification theory a long way towards the principles of the faceted classification that were developed further by Henry Evelyn Bliss and S.R. Ranganathan by the 1930s, an important period for classification theory.

Interest in ‘technical and technological innovation was not absent in the overlapping fields of bibliography, documentation, and library science during the period before the Second World War. Quite the reverse; one could make a good argument that the features currently assumed of the electronic library of the 21st century-compact storage, ease of reproduction, remote access to full text, hypertext, equipment capable of sophisticated searching in complex indexing systems, and other thoroughly contemporary notions-were foreseen and discussed at least in outline, by practical idealists by the time of International Congress on Documentation of 1935, before the invention of electronic digital computers’ (Buckland, 1996). Increased use of ‘tele-fascimile, audio and video conferences, conference calls, and the Internet has dramatically expanded the access of an individual to various sources of information as well as increased the level of participation in various information networks. With emerging advancements in telecommunications technology, a new paradigm has evolved. It requires a reconfiguration of libraries that places a greater emphasis and priority on access to scholarly information. Networking has become necessary in order to incorporate changing technology and communication.

The new convergence of technologies (such as desktop, video conferencing, Internet and Intranet based systems) enables organizations to reconstitute teams from historically dispersed staff,
thereby combining the productivity of team based work with the benefits of a flexible and geographically dispersed workforce.

Electronics environment can provide a considerable amount of information to libraries on user interactions and library resources and services. As the use of ‘electronic services delivered directly from outside the library becomes routine, the electronic collection of information will become a vital tool for library management’ (Hanson, and Levin, 2003) technology moves so quickly that ‘future trends rapidly become past practices. Nevertheless, three consistent trends are the emphasis on managed information, increased collaboration with vendors, and the creation of intellectual content’ (Lamont, 1999).

Considerable ‘attention has been given to the role of electronic resources in library collections. When library resources are acquired to meet immediate information needs rather than because they contribute to the consistency or completeness of the overall collection, a transition to electronic resources is assumed, with little accounting-financial or philosophical of the cost to the library collection. Having a thorough knowledge of the library’s mission and collections parameters enables the teams to create meaningful criteria for the guidance and development of research quality’ (Pettijohn and Neville, 2003).

7.2.1 **Librarian and Technology:**

Technology alone ‘will not improve the perceived value of our services to users. We need more worm librarians’ (Naylor, 2003). Library administrators have to be educated to understand that, ‘websites, technology and its associated resources must be nurtured. The use of technology requires a significant investment in time, money, and training for both staff and patrons. Staff skills and
competencies must be continually upgraded and maintained to make the best use of these technologies as well as to increase organizational capacity and communication’ (Lamont, 1999). The evolution from ‘paper to electronic resources transforms the way that information is owned, shared, and accessed. For libraries, the commodification of digital information has long-term implications for the acquisition and development of library collections. Growing demand for full-text online content that can be easily searched and remotely accessed has led libraries to depend on a host of intermediary agents and cooperatives. ‘Just a few years ago, the death of books and their replacement by e-Books was predicted. It didn’t come to pass. Likewise, there are some who are now predicting the death of the libraries. The chances are, despite rapid technological changes, libraries will survive into the foreseeable future’ (Abbott, 2003). The ‘quality of information sources has been growing with extraordinary speed during the recent years and it is only with the aid of technology, perhaps possible to a larger extent to ascertain what recorded information exists, where it can be located and what facilities are there to retrieve the derived information’ (Viswanathan, 1987). Technology in a ‘digital library has changed the roles of libraries, librarians and scholarly research. Technology has dramatically changed the native and role of the traditional libraries. Documents in digital library one maintained using technologies that require considerable human investment in developing it’ (Masnizah et al., 2005).

7.22 **E-resources of Defence Science & Technology:**

Due to advancement of Science and Technology almost all the TICs are in the possession of the following digital information resources.

**E-Books:** DRDO Policy documents; Indian Defence Technology and few defence related text books
E-Reference Books: Dictionaries, Encyclopaedias, Mechanical Engineers Handbooks etc.

E-Technical Reports: NASA, NTIS, AGARD, STAR reports.

Databases: Ei compendex (publications from around the world are indexed, including approximately 4500 journals and 2000 conference proceedings per year and SPIE, INSPEC databases etc.

IEE/IEEE Electronic Library: Contains 4,00,000 articles from 12000 publications.

AIAA Electronic Library: This includes full text research findings from 1963 to present day.

Standards: MILSTD, ASTM, GHOST, BIS, BS etc.

International Aerospace Abstracts: 40 Aeronautics and Astronautics serials abstracts are covered in this.

Metadex: Covers metallurgical science from design and fabrication. It provides coverage of the works, published literature on Science and Technology of metals.

7.23 **Role of Technical Information Centres in Technology Transfer:**

Information plays a vital role in research and development activities. For efficient and meaningful decision making, relevant information is required in the shortest possible time. Due to the emergence of multi-disciplinary subject areas like space, flight sciences, etc., proliferation of documents containing information on such and similar complex areas of knowledge, multiplicity of users of such information for differing applications and need to disseminate information at places which are not contiguous, manually operated information storage and retrieval systems are no longer able to cope up effectively and efficiently with the problems of information supply. Therefore, there is no option but to adopt a computer based
information storage and retrieval system’ (Kumar and Srivastava, 1986).

Technology is an important ‘force in achieving optimal use of resources of a country which is necessary to socio-economic development. Mere existence of technology means little unless it is exploited for the benefit of man and therefore, technology transfer is an important as the development of technology itself’ (Sangameswaran and Gopinath, 1980). In relation to Information Technology management the role of TICs can be:

1. Surveillance of the technology
   - A systematic surveillance of technology through information published in a number of media i.e. Books, Journals, Patents, Contacts with researchers
2. Surveillance of government regulation
3. Surveillance of resources
4. Surveillance of resources is a method for systematic control of major resources of current and potential interest. i.e selection of journals, selection of suppliers, Research organization, guidelines for collection of information
5. Patent Search: A patent search is an investigation among patent Literature
6. Feasibility Study: Literature survey to see if any study has been conducted elsewhere in relation to the technology feasibility.

The ‘transfer of technology is largely on information transfer process. It ranges from detailed documentation to the casual remark. It shows that a good documentation is an important factor in reducing the management input needed to transfer technology. A major limitation on the operation of satisfactory information services is that of access to the source of information. Starting with the more or less
ready availability of books, journals, reports etc’ (Chudamani and Anuradha, 1980).

In conclusion, ‘it was emphasized that the scientific revolution of the twentieth century must be accompanied by technological improvements in information science which will make knowledge generated by research readily and rapidly available to all who need to apply it for the ultimate benefit of mankind. The ongoing cybernetic revolution affects language, information and society broadly. As a strong nation requires a healthy scientific base a strong science requires an excellent communication system to convert research science in to practice’ (Sarada, 1991). Most of the ‘Countries are under developed or developing at a very slow pace, unable to pay attention to Research and Development in Science and Technology because of constraints of finance and talent. Where as advanced countries are in the rapid process of inventing new technologies’ (Chopra, 2005). It may be said that the success or failure of a technology to a larger extent, depends on the developing agency as to how well it has understood the technological objectives, how well it planned to achieve them, and how effective and efficient a manager it has chosen for the technology development. In a fast changing scenario, the rate of technological obsolescence is very high and particularly in the critical needs of the defence services where a cutthroat competition exists among the rivals to keep its cutting edge short.