

UNIT 9 STRUCTURE : DEFINITION, PURPOSE, CHARACTERISTICS AND FUNCTIONS

Structure

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9.0 OBJECTIVES

After reading this Unit, you will be able to:

- define the subject area;
- know the basic structure of Technical Communication and its various types;
- grasp the principle characteristics and functions; and
- select a suitable theme for further study/research.

9.1 INTRODUCTION

The urge to communicate thoughts and feelings in human beings has been there since time immemorial. The earliest mode of communication was in the form of gestures, symbols and some geometrical patterns. In general, communication may be defined as transfer of a cluster of transactional functions of body and mind of one individual to another. The communication is said to possess the following characteristics: intention of communicator, nature of communication, emphasis on action, measurability of action, comparability of intention, and measured action.

During the Second World War the Royal Airforce Officers of the Allied Forces felt the need for a manual which gives the various parts of aircrafts used in warfare and the various techniques by which these parts could be maintained. Thus, an aircraft maintenance manual was produced, which was quite different from normal forms of communication. Since the manual was specific to technical details, it came to be known as technical manual. Later on many such technical manuals for other equipment or products were produced, giving rise to a new field of communication known as 'Technical Writing'. Later on with the introduction of computers in the communication channels, a new term, 'Technical Communication' was introduced to all forms of technical presentation.

How important is the technical communication? How much time is spent by organizations on technical communication? Many surveys have been conducted to find out answers to these questions. The American Society of Engineering Education approached some 4057 engineering professionals to find out which academic subjects are most needed for engineering careers in industry. The professionals listed, in all, 38 subjects as most important, and when they were asked to prioritize



the subject headings, they placed technical writing at number two position followed by public speaking at number 4, working with individuals at 6, working with groups at 7, and talking with people at 9, and so on. Surprisingly technical subjects were relegated to very low positions.

In another survey some distinguished engineers and experienced businessmen were asked how important was Technical Communication to them, and their replies are shown in Table I.

Table 1: Responses of Distinguished Engineers and Experienced Businessmen to the Importance of Technical Communication in Their Professional Career*

	Distinguished engineers	Experienced business men
Total number of respondents	245	837
Critically important, %	45	30
Very important, %	51	44
Somewhat important, %	4	23
Minimally important, %	-	3

* Davis R M, Technical Writing : Who needs it? *Engng Education*, (November 1977), 209-11.

9.2 DEFINITION

Communication, in general, is the transmission of a message by the use of effective language to achieve a predetermined objective. Technical communication is the transmission of commercial, industrial, or scientific facts or news to the intended user to achieve a pre-determined aim.

In simple terms, technical communication is a form of communicating a message within the boundaries of a particular technical field. In other words, technical communication is reporting complex technical information by someone for someone else to understand. Technical communication is a highly imaginative act, shaping and synthesizing the inchoate stuff of experience with reports designed to inform and enlighten an identified user. Technical Communication is always considered as highly complex because it is a hybrid field drawing knowledge from a social science built from foundations in rhetoric, communication theory, technology transfer, linguistics, educational psychology and library and information science.

Technical communication may be viewed as both a discipline and a profession. As a discipline it concerns itself with the pursuit of knowledge and the development of theory. As a profession it meets the needs of individuals through the application of knowledge and theory.

9.3 TYPES OF TECHNICAL COMMUNICATION

Technical communication may be classified as Oral, Non-verbal, Written and Electronic.

9.3.1 Oral Communication

In recent years there is an increasing awareness of the importance of oral communication. Oral presentation of technical data appears to have higher impact on the intended audience than the other forms. In a survey conducted in 1980 to rank the types of technical communication, according to their importance it was noted that oral communication stands far above the other forms of technical communication.

Oral communication is a technique by which an individual communicates his ideas to a single person or a larger group about a subject/theme which may interest him /them. It is a physical activity. Oral communication goes in the form of phone-calls, informal conversations, committee board meetings, brainstorming sessions, public

addresses, keynote speeches, panel discussion, oral presentations in workshops/conferences/symposia, and talks in radio and television.

Those who specialize in oral communication must keep the following points in view :

- i) Limited time span - listeners have limited attention span and the maximum tolerance limit appears to be between 60 and 90 minutes.
- ii) Selection of a suitable theme/topic that is relevant and that which attracts the audience.
- iii) Analysis of audience
- iv) Organization and presentation of information
- v) Selection of appropriate visual aids
- vi) Development of personal and distinct speaking style
- vii) Preparation of answers for questions likely to arise from the audience
- viii) Delivery.

Audience may be of the following types:

- i) Managers: Managers play three roles, namely, interpersonal, informational and decisional, simultaneously. They have very limited time. Therefore, oral presentations must be very brief stating the objectives, present status and options available;
- ii) Non-specialist: They lack the technical knowledge. For such an audience a communicator must use simple language providing conventional mode of presentation, an overview of the theme at the beginning, some background information, definitions for new terms, examples, analogies, statistical figures to drive home important points, and illustrations wherever needed;
- iii) Peers: These are the people who know much more than a oral presenter. For such an audience, standard technical terms, conventional format and standard forms of reasoning and argumentation are used. Main points are made clear and accessible, taking care not to over state facts and claims. Emphasis is laid on data and their display in standard ways, using graphs, tables, equations, or other appropriate forms.
- iv) Mixed audience : They consist of both specialists and non-specialists. Structure your speech in such a way that even the most ignorant of the audience can understand all parts of your speech. Background information and final conclusions are given at the beginning and the narrative and technical aspects are dealt with later in the speech .
- v) International audience : These are persons of different nationalities whose language is other than English. For such an audience long and complicated sentences are avoided, idiomatic language is not used and the speech is made culture-specific with suitable examples drawn from different cultures.

While preparing a speech, organize all facts in a logical sequence in mind. Arrange all visual aids according to the facts to be presented. Before presenting a speech, analyse the objective - teach, persuade, stimulate or entertain. Analyse your audience - total number present, their background, experience and knowledge through their reaction and inference, sex, age and status -and analyse the environment - size of the room, seating arrangement, lighting and acoustics, facilities provided (audio and visual) and time available.

Psychologists have shown that the strength and memorability of a message can be increased simply by separating it in different forms. Hence, a combination of words and illustrations improves the effectiveness of communication. A visual form can present a compact summary of the main points of a text. Visual aids are employed when (i) words alone would be either impossible or quite insufficient in describing a concept or an object, (ii) an important point is to be understood more clearly, (iii) large amount of data are to be presented in more digestible form and (iv) something is to be described or clarified. Effectiveness of oral presentation depends on the visual aid used. For selecting a suitable visual aid, the following questions are always asked: Is it easy to prepare? Can it be altered easily during presentation? Will it draw the attention of the audience? Will it allow the presentations to be made at an appropriate speed? How much information can it convey? What will be the size of audience for whom it can be used? How reliable it is? Can the audience keep it for future reference? Keeping in view the above questions, seven types of visual aids are normally chosen in oral presentations.





They are overhead transparencies (foils), slides, flip charts, chalkboard, hand-outs, three-dimensional objects, and computer screen projection.

9.3.2 Non-verbal Communication

It is a mode of communicating information which the communicator is not aware of. These are like Body motion, personal appearance, intonation, use of space and distance, expression of the eyes, etc. constitute what is called visible code or non-verbal communication. According to a study, 45% of the message is conveyed orally and 55% silently. Whether non-verbal communication has really any important role to play in oral presentations is now a subject of discussion the world over. One school of thought believes that it has little role to play while those engaged in mass communication research feel that non-verbal communication is as important as any other modes of communication.

Personal appearance is the first thing that influences the impact of communication. One's appearance puts the audience to develop an assessment of the speaker in their subconscious mind. The rapport or the informality which the speaker intends to develop with his audience is somewhat controlled by general physical appearance.

Posture is the next important element. It is the manner in which a communicator stands, sits and walks while making an oral presentation. Posture reveals the personality of the speaker-whether he is dynamic, alert, nervous, lacks self-confidence, etc.

Gestures of oral communicator create a greater impact on the audience. Synchronization of gestures with oral delivery enhances the reputation of the speaker. A well-timed gesture enables a speaker to bring in the impact which he desires to have on his audience.

Facial expressions, such as a smile, a frown, tightening of the jaws, etc. convey unspoken message to the listeners. A pleasing expression accompanied by proper intonation improves the image of the speaker.

Eye contact is perhaps the most important element of non-verbal communication. Eye contact enables a speaker to evaluate the moods of his audience, while the audience is spell-bound by the charming movement of the eyeballs of the speaker.

Distancing in space is yet another factor which influences the non-verbal communication. The maximum safe distance between the communicator and the last row of audience in a lecture hall is 30 ft for an effective communication. Space distancing is culture-specific, and therefore maximum safe-distance may go beyond 30 ft.

9.3.3 Written Communication

This is the commonest and most popular kind of technical communication. It is that which sets a permanent record of technologies to the user. It sets an unusually high value of objectivity, accuracy and restraint. It is intended for users who have some special interest in the subject.

Written reports appear in the form of research papers, technical articles, books/monographs, symposia proceedings, patents, thesis/dissertations and many forms of trade literature.

9.3.4 Electronic Communication

Advances in the field of electronics and telecommunication have resulted in the development of many electronic devices, such as computers, electronic mail, telex and fax machines, desktop publishers, CD-ROM disks, and videotext machines. Almost all of them are now put to effective use in technical communication.

With the advent of computers, the whole concept of technical communication has been drastically modified. Technical communicators can now play with the computers to convey ideas that can never be represented by other means. Not only the technical data and information can be stored in a computer, but they can be enhanced through imagination and skill. Electronic technical communication facilitates insight and discovery in computer graphics to convey information from

numerical communicating ideas, offers a method of seeing the unseen, uses data in a visual form, stimulates models that describe real systems in a precise and complete way, helps scientists to test hypothesis within minutes, and is very interactive.

Desktop publishing has now drawn the attention of technical communicators. Desktop publishing provides high-quality designed document by eliminating designing and type-setting gives the writer control of the final appearance of the document in a way that is not possible if a designer or some one else does the formatting, reduces the cost and time of printing, and permits the user to try alternate ways of formatting the document.

Another closely related computer-mediated system is the CD-ROM disk, which enables a communicator to not only store large volumes of data but also interact at random to retrieve the required data from the disk.

Although computer-based systems have many advantages, yet their use is limited by the following difficulties: The user has to familiarize with special commands and codes in each software package; empty and blinking computer screen increases users' impatience; small screen limits the text which the users can see; the ease of making small changes may allow the writer to indulge in stylistic editing rather than making basic organisational changes; and needs large scale financial investment.

9.4 STRUCTURE OF TECHNICAL, COMMUNICATION

Structurally technical communication may be classified as horizontal and vertical. In horizontal structure a range of general technical communication forms is introduced - object descriptions, process descriptions, proposal writing, and so on; essential rhetorical strategies for effective communication and the techniques by which these strategies are to be applied in technical writings.

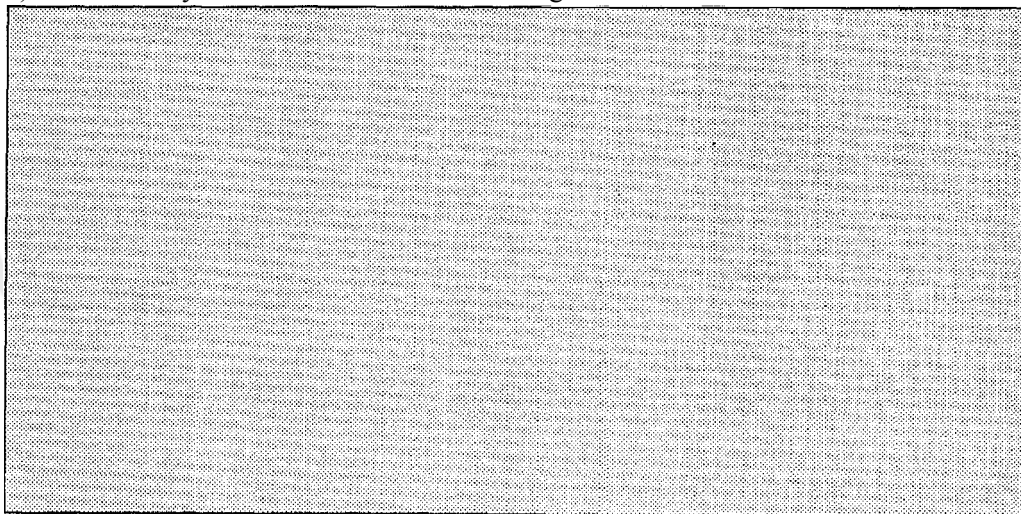
Vertical technical communication deals with an extensive study of at least one specific form of technical communication, with particular reference to context, arrangement, and style.

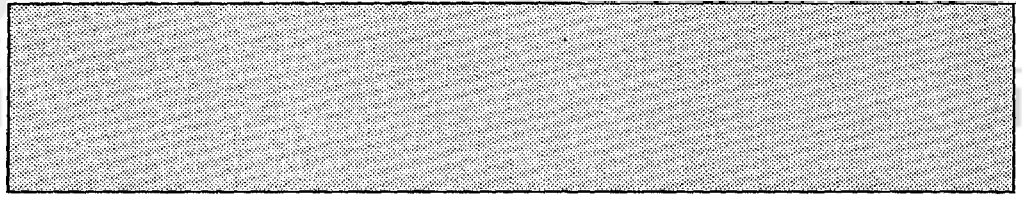
Self Check Exercise

- 3) Differentiate between 'Technical Communication' and 'Technological Communication' which one is more useful to be adopted.
- 4) Electronic media have greater influence on Technical Communication. Justify this statement

Note:

- i) Write your answer in the space given below.
- ii) Check your answers with the answers given at the end of this Unit.





9.5 CHARACTERISTICS

- i) Technical Communication deals with various scientific and technical subjects.
- ii) It is characterized by scientific and technical vocabulary, graphic and audiovisual aids, and different contentional forms.
- iii) Technical communication is exclusively meant for specific audience who has some interest in that technical field.
- iv) Both the communicator and the reader have some technical knowledge.
- v) It is a discipline as well as a profession.
- vi) It is an integrated field based on knowledge derived from diverse fields.
- vii) It can be simple and elaborate.
- viii) It defines the problem, plans, tests, implements and evaluates the solution.
- ix) It is meticulous, accurate, precise, comprehensive, and direct in the style of presentation.
- x) It has sound organization of ideas and high value of objectivity.
- xi) It is devoid of stiff and pompous language and needless technical jargons.

9.6 SOCIAL AND ETHICAL ASPECTS OF TECHNICAL COMMUNICATION

In the last few years newsmedia have reported many accidents such as nuclear meltdown at Chernobyl, the Bhopal gas tragedy, and so on. The follow-up investigations have brought into focus one major point, that is, lack of better technical communication. If assembly instructions or operating manuals are not clearly understood by the users, such accidents are likely to repeat in future. According to Gregory Clark "Technical Communication is not a simple process of conveying information rather it is a process of social interaction. Ethical Technical Communication mediates conflict between those who have it and those who need it, helping people develop the shared knowledge that will meet their common needs".

Technical Communication has now become international, transcending geographical, occupational, cultural, and linguistic boundaries. The entire Technical Communication is carried out in one language, English. Since English is spoken in different countries differently, the problems of miscommunication arise. Therefore, serious attention needs to be paid to language of Technical Communication.

9.7 FUNCTIONS

The principal function of technical communication is its utility. Common aim is to solve problems which involve the management and organization of specialized information, where the information is used for practical purposes. Secondly, Technical Communication helps arriving at the estimation and length of a project, anticipating problems and the possible solutions, and a deeper understanding of copyright laws. Thirdly, Technical Communication provides ample scope for research in various modes of communication. Fourthly, it helps to produce broad syllabi for both short-term and long-term courses in technical communication.

9.8 RESEARCH IN TECHNICAL COMMUNICATION

Many users often lament that there is inadequate scholarly research conducted on the three sub disciplines of Technical Communication i.e., theoretical, pedagogical and professional.



Even the little research that goes on at present is often repetitious, unmethodical and trivial. It is largely intuitive, lacks theoretical framework, and aims at finding ad hoc solutions in market place. Even in the professional area, which offers wider scope for research, the research activities are woefully below standards.

9.9 SUMMARY

This Unit has discussed in detail the concept of technical communication. Technical Communication has been categorized into oral, non-verbal, written and Electronic. Structurally technical communication has been classified as horizontal which deals in a range of general technical communication forms are considered and vertical structure in which deals with an extensive study of a particular form of technical communication.

The Unit also discusses the characteristics, functions of technical communication, social and ethical aspect and research in Technical Communication.

9.10 ANSWERS TO SELF CHECK EXERCISES

1) General communication is the transfer of a cluster of transactional functions of body and mind of one individual to another. Whereas technical communication implies application of computers in the communication channels for its technical presentation.

2) Synonymous use of technical communication and technical writing was permitted till the world war II, as technical communication was confined to producing technical manuals for craftsmen.

Now Technical Communication is an all-embracing term which includes oral, non-verbal, written and electronic communication. Technical writing is only a part of Technical Communication which represents the written form of Technical Communication.

3) Yes. Technical communication is that area of communication which deals with various scientific and technical subjects to the intended audience to achieve a pre-determined goal, whereas technological communication transmits only commercial and industrial facts and news to the public at large. Technological communication is one aspect of Technical Communication. It is always better to use technical communication in all communication activities.

4) Before the introduction of electronic devices like the computer, a technical communicator had to adopt laborious and time consuming techniques to collect, collate and write articles on any technical subject. He had to spend a lot of time and energy even in locating the sources of information and later on obtaining copies of them for his use. Now with the use of electronic media he can sit in his house and obtain all the relevant information with a touch of a key. He can recall, manipulate, modify, text-edit, compose and mix it with graphic features and produce a readily reproducible document. All these activities can be performed within a day. I-Ie can also record his repackaged data in suitable forms for reference and recall. He can contact anyone in any part of the world within minutes to get clarification on certain facts or to seek further information from the authors themselves. The only criticism leveled against electronic media is the cost, but this factor is ruled out when compared with time and energy spent on gathering and collecting data.

9.11 KEY WORDS

Communication : It is transmission of a message by the use of effective language to achieve a predetermined objective.

Technical Communication : It is the transmission of commercial, industrial, or scientific facts or news to the intended user to achieve a predetermined aim.



**Technological :
Communication**

It is the transmission of commercial and industrial facts and
News to the public at large

9.13 REFERENCES AND FURTHER READING

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UNIT 10 COLLECTION, ORGANISATION AND PRESENTATION OF DATA INCLUDING ILLUSTRATIONS

Structure

- 10.0 Objectives
- 10.1 Introduction
- 10.2 Collection of Data
- 10.3 Organisation of Data
- 10.4 Presentation of Data
- 10.5 Style of Presentation
 - 10.5.1 The Text
 - 10.5.2 Tables
 - 10.5.3 Illustrations
 - 10.5.4 Role of Appendix in a Report
 - 10.5.5 Objectives of the 'Introduction' in a Report
- 10.6 Summary
- 10.7 Answers to Self Check Exercises
- 10.8 Key Words
- 10.9 References and Further Reading
- Appendices

10.0 OBJECTIVES

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

- the purpose of a technical communication;
- how to prepare a draft;
- where to look for information that one needs;
- how to organize data;
- the stages of presentation of data; and
- how to plan tables, charts and other illustrations.

10.1 INTRODUCTION

The written presentation is the form of an article in a journal, a short-communication, a technical report, a conference report, a dissertation, on a monograph. In these presentations, the main objectives to inform the reader without necessarily knowing beforehand what will be the desired response. In all such general attempts a technical writer must consciously attempt to describe the response that he wants in terms of a concrete reader activity.

A technical communicator is expected to consider the following points before he makes a presentation:

- Right perspective
- Clinical analysis of his reader
- his own motivation or sense of purpose.
- i). is the reader informed or uninformed of the subject?
- ii). does the reader have a specialized vocabulary of the subject area or not?
- iii). is the reader a single person group
- iv). is he a peer, a superior, a subordinate, or public at large?



- Reader-response

- Statement of objectives (Purpose)
- Selection of single basic thought, reinforced by psychological and physical factors

- (i) highly reactive
 - (ii) moderate in response,
 - (iii) indifferent,
 - (iv) potentiality of evoking response.
- What should my message accomplish?

An idea or a single thought is generally supported by

- i). testimony,
- ii). reasoning,
- iii). emotion,
- iv). sensory reinforcement,
- v). analogy,
- vi). illustration and example,
- vii). statistics and facts,
- viii). demonstration,
- ix). action,
- x). restatement, and
- xi). units of expression.

- Collection of information
- Presentation of ideas
- Evaluation of audience-response

After deciding objective and target audience, a technical communicator looks for source of information containing the data he wants. Here, he is confronted by huge and voluminous data which he is to collate, organize and present.

10.2 COLLECTION OF DATA

The sources of data fall into four categories:

- Oral or informal
- Ephemeral
- Non-scientific
- Formal

Collection of data begins at home; an idea or a thought is generated by the reactions of family members or friends in the neighborhood. Ideas are also generated or reinforced during morning walks, air/train/bus travel, at market places, canteen and other public places. Common official channels like in-box documents, personal files, meeting records, etc. provide ample data to support the idea.

Ephemeral sources of data include press-releases; newspaper reports; prospectuses; publicity brochures, pamphlets, booklets and leaflets; radio and TV commercials, audio-tapes, video-tapes, cassettes, and so on.

Non-scientific sources are trade journals, newsletters, public speeches, magazines, and so on.

Formal sources of information can be classified into electronic and printed material. The electronic sources of information are the online databases or information networks on line services:

(LOCKHEED DIALOG, MEDLINE, NASA/RECON, ESRIN/RECON, INIS, AGRIS, CARIS, DEVSIS, IFIS, and so on), SDI services (CA condensates, NTIS, COMPENDIX, INSPEC, VINITI And so on). Magnetic tapes (BA Previews, FAO, INIS, MARC, MEDLAR, SCI source citation data, SPINES, STAR, etc.), CD-ROM discs (current contents, etc.), microfilms, microfiches, and printed cassettes.

The printed sources of information include:

- encyclopedias/Handbooks/Dictionaries



- monographs/Theses/Disserations
- books
- periodicals (technical)
- abstracting and indexing journals
- bibliographies
- current awareness/alert journals
- directories/year books
- manuals
- patents
- standards/specifications
- designs/drawings
- symposia/Conference proceedings
- datasheets
- vendor Catalogues
- atlases
- gazetteers

10.3 ORGANIZATION OF DATA

Organization of data is given more importance than the collection of data because it forms the basic foundation from which facts and figures are collated and slanted to produce a technical presentation. It is generally advised to maintain a convenient file recording to avoid the loss of good ideas. The data may be organized as follows:

- i) Make one single entry for every source of reference consulted on a sheet of
- ii) paper or a catalogue/abstracting card. Such an arrangement will facilitate
- iii) easy reference, quick sorting and proper outlining.
- iv) Clearly follow international practice of source notation for accurate crediting.
- v) Record quotations/extracts as they are in order to avoid plagiarism and maintain accuracy.
- vi) Classify the collected data according to plans of action and store them in a catalogue cabinet or a personal computer for easy retrieval.
- vii) After collection of relevant data reorganize it in such a way that one idea is
- viii) represented by a single sentence or a note giving an abstract of salient points.

Self Check Exercise

- 1) What are the basic patterns of report organization? Can you see advantages and shortcomings in these patterns? Discuss.

Note:

- i) Write your answer in the space given below.
- ii) Check your answer with the answers given at the end of this Unit.



10.4 PRESENTATION OF DATA

The data collected, classified and collated are presented in textual form along with appropriate Tables and illustrations. The stages of presentation of data are shown in Fig.1. While presenting the data, a list of significant facts to be reported in a technical report must be prepared in the descending order of importance to the reader. A framework or an outline of

ideas to be presented is to be constructed. From the framework prepare a basic draft that is (i) informative and concise, (ii) logically organized, (iii) free from departmental or other jargons, (iv) free from mechanical errors, (v) readable, and (vi) accurate depiction of statistical data, wherever appropriate. Presentation of data in tabular, graphic, chart and other forms is to be planned at this stage. Selection of photographs to explain certain information like the description of an equipment or an apparatus must also be made at this stage.

Using the text, charts, and photographs a first preliminary draft is prepared.

This draft is re-evaluated by thorough editing. The first draft is given in appendix I.

A second draft is then prepared and is sent for peer evaluation which can be done internally within an organization or by outside expert(s). Before peer-evaluation, the draft should be prepared according to the prescribed format. A description of general format for all types of presentation is shown in appendix 2.

The manuscript is revised in the light of suggestions of the peers and the final draft is prepared for publication. The final draft may be sent to a DTP unit or stored in a floppy disk for use in various forms of reporting.

10.5 TYPE OF PRESENTATION

10.5.1 The Text

- It should be strictly impersonal.
- Text should have an introductory paragraph that clearly indicates the subject of the section.
- In each paragraph, a single topic should be discussed.
- In presenting a conclusion drawn from several facts, it is advisable to summarise all facts first and state the conclusions in the last.
- Simple and direct English should be used.
- Long and complicated sentences should be avoided.
- As far as possible the text should be written in active voice, direct voice and present tense.
- Jargons, gobbledygooks, redundancies, etc. should be avoided,
- Grammar, syntax, punctuation marks, and spellings should be checked.
- Salient facts may be presented using bullets, icons, or special typography.

10.5.2 Tables

Tabular presentation of data makes descriptions and comparisons vivid and facilitates comprehension of data. However, facts presented in Tables should supplement and not duplicate, the information provided in text or figures. Since the essential function of the Tables is to enable a reader to compare statistical data, too many items or too many details should not be included to make them complicated; rather the material should be divided and presented in two or more Tables. A title should be given for each Table. Standard symbols and abbreviations may be used to save space. Figures in columns are usually the right-hand digit. Fractions are expressed as decimals. Inclusion of structural formula within the Tables should be avoided. Tables should be mentioned in the text by their numbers, and not by the terms 'above', 'below', 'following', etc. The Tables should be typed on separate sheets of paper and should be arranged in the same order in which they appear in the text.

The general principle of construction of tables is that the first vertical column (known as stub) gives the independent variable like time, equipment, or the object being compared, or properties, or characteristics, and other columns denote dependent variables like



temperature, pressure, cost data, performance data, etc. Sometimes a Table may be spread over two different pages in print, with a footnote 'continue' written at the bottom of each page of the table.

10.5.3 Illustrations

The practice of communicating information through pictures first came into existence in the 18th century when statistical graphs were extensively used.

The basis for deciding whether to use an illustration is the amount of information to be communicated. The information density is measured by data density index which is the amount of information packed in square inch of space. Illustrations should be used to present only dominant features and conclusions.

Illustrations appear in two forms: (i) line drawings, and (ii) photographs. Line drawings are presented in the form of line graphs, bar graphs, pie graphs, drawings, flow-charts, and polygonal figures representing structural formulae of chemical compounds (Appendix 4).

Line graphs should be used to show: trends and not actual amounts; a series of data having many successive values; many series of data on the same graph; data covering long periods of time; frequency distributions; estimates; forecasts and; interpolation; or extrapolations.

Bar graphs are used for comparing quantities by showing bars of varying lengths (either horizontal or vertical) which are proportionate to the qualities they represent. They are used when comparisons of magnitude or size are made; differences in one item at different points in time; differences between items at one point in time.

Pie graphs are employed to show the relationship between parts of a whole, (like per cent representation) where each segment of the pie represents one part. The labels of segments are given outside the segments.

Drawings should be used for describing a process, an equipment, or an apparatus. Parts of drawings are neatly labelled by Arabic numbers and explained number-wise in a separate legend box.

Flow-charts are used to represent (i) organizational chart, (ii) stages of processing of manuscripts in an editorial office, (iii) stages of manufacture in a manufacturing plant, and (iv) processing stages in a technological package.

Hexagonal figures are generally used for representing chemical structural formulae. Structural diagrams are shown as Scheme I, Scheme III etc.

General graphs showing infrared, ultraviolet, NMR spectra, DTA curves, etc. are prepared only if they pertain to new compounds and are essential to the discussion.

Line drawings are made with Indian ink on white drawing board (preferably Bristol board), cellophane sheet or tracing cloth. The optimum size of illustrations are kept at 2-3 times the reduced size. The line drawings should be numbered serially in Arabic numerals, suitable captions, should be provided. In the text they should be arranged according to the serial order in which they are cited; for example Fig. 1, Fig. 2, etc.

Photographs are used to bring beauty and aesthetics to an article. Photographs should be produced in glossy prints, 1.5 to 3 times larger than the reproduction size planned. Photomicrographs and electron micrographs should contain magnifications. Concluded in the caption, another way to indicate magnification is to insert a scale in the illustrations itself at a suitable place.

All photographs should carry suitable captions.

10.5.4 Role of Appendix in a Report

An appendix is a tacked section, which provides supplementary information that supports



the of body of the report but has no logical place within the body of the report. Possible contents include questionnaires, working papers, summary titles, additional references, other reports, and so on.

An appendix does not include charts, graphs, sketches, and tables.

10.5.5 Objectives of the “Introduction” in a Report

Introduction orients the reader to the problem discussed. It gives the origin of the report, purpose, scope, sources and methods of data collection, limitations, historical background, definitions and a report preview.

Just what graphic aids are needed to communicate a report story, however, is not easy to determine. Much depends on the overall plan of the writer.

In the first arrangement complete text is supplemented by graphic aids.

In the second arrangement, specially used in popular types of reports, short summary reports, helped by an abundance of clear graphic aids, do this job best.

Self Check Exercise

- 2) Define talking captions.
- 3) Distinguish between the two basic types of Tables. Discuss the use of each.

Note:

- i) Write your answers in the space given below.
- ii) Check your answers with the answers given at the end of this Unit.

10.6 SUMMARY

In this Unit, various stages of preparation by a writer of technical document are described. Before attempting to write a technical document, a communicator is advised to keep the following points in mind. (i) right perspective, (ii) theme or topic, (iii) identification and analysis of audience/readers, (iv) purpose or set of objectives to be realised through the document, and (v) presentation of data in an appropriate form. The communicator is the lead to various sources of technical information - how to collect,



collate and organize it. The communicator is then introduced to the various stages of preparation of the document, style and format of the document, and the various types graphic aids that go to make the document more illustrative and aesthetic.

10.7 ANSWERS TO SELF CHECK EXERCISES

1. Although basic patterns of report organization are many, generally they are grouped into logical (indirect) and psychological (direct pattern). Some have suggested a third pattern, namely chronological arrangement. But the third pattern can be easily fitted into any of the two other basic patterns. Although the emphasis at this stage of report preparation is on the selection of a sequence for the whole of the report, these patterns may be followed in any writing unit, be it sentence, paragraph, major section, or the whole.

In logical arrangement, the findings are presented in inductive order, from the known to the unknown. There is an introduction orienting the reader to the problem, presentation of facts and analyses, interpretation and conclusions. In some cases recommendations are included.

In the psychological pattern, the subject matter is presented in deductive fashion. Conclusions, summaries, or recommendations come first, followed by facts and analyses they are drawn from.

In the chronological arrangement, the findings are presented in the order in which they happened. It is limited to problems that are of a historical nature or in some other way a relation to time. The time pattern followed may be from past to present, from present to past, and so on.

2. While preparing a broad outline of the report, a writer selects a series of words to represent an idea or concept. The series appear as short sentences like the caption of an illustration. If the sentences are short with not more than 2 or 3 words which do nothing more than to identify the topic of discussion, then it is known as talking caption.

Talking caption, besides identifying the subject matter, indicates what is said about the subject.

Ex. Introduction

Authorization *Operation analyses of armor unit*

Purpose A. Recent lag in overall output

Sources B. Increase in cost of operation

Preview C. Inability to deliver necessary steam

3. Two basic types are general purpose Tables and special purpose Tables. The former are arrangements of a broad area of data collected. They are repositories of detailed statistical data and have no special analytical purpose.

Special purpose ones are prepared for a special purpose.

Usually they consist of data carefully drawn from the general-purpose tables. Only those data pertinent to the writer's analysis are selected, and sometimes these data are rearranged or regrouped to better illustrate their special purpose.

10.8 KEY WORDS

Written Document : It is the final form in which a document is produced. It may be a technical article, a short-communication, a conference report, a dissertation, a monograph, a book, and any form of trade literature



Right Perspective	:	Motivation or sense of purpose of the communicator, as well as that of audience.
Audience Analysis	:	Grouping of audience into highly educative, non-technical, mixed type, international, or single group, or public at large.
Audience response	:	Identification of response of readership as highly reactive, indifferent moderate in response, and potentiality of evoking response.
Theme/topic Selection	:	Selection of single idea/thought for discussion through testimony, reasoning, emotion, sensory reinforcement, analogy, illustration, example, facts and figures, and restatement.
Sources of Information	:	The types of documents from where data are collected. They are oral, ephemeral, non-scientific and formal.

10.9 REFERENCE AND FURTHER READING

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Appendices

Appendix 1

A Check List for Evaluating the First Draft of a Technical Report

- 1) Do you have a good title? Is it short but informative?
- 2) Have you stated clearly and specifically what the investigation and the report are to accomplish?
- 3) Have you stated clearly and fully the outcome of the investigation? What is actually accomplished?
- 4) Have you clearly and fully described the methods, materials and equipment used while conducting the investigation?
- 5) Have you put into the report all that are required?
- 6) Is your report readily understandable by the intended users?
- 7) Are your paragraphs clear, well organized and of reasonable length?
- 8) Is your prose style clear and readable?
- 9) Have you included all mechanical and prose elements that your report needs?
- 10) Have you inserted documentary reference numbers in your text?
- 11) Have you made proper re tables and figures in the text and sufficiently discussed them?
- 12) Are all parts and pages of the manuscript in the correct order?
- 13) Is the format of the typed of printed report be functional, clear and attractive?
- 14) Does your manuscript satisfy style specifications?
- 15) Have you included required notices, distribution lists, and identifying code numbers?
- 16) Do you have written permission to reproduce extended quotations or other matter under copyright?
- 17) Have you proof read your manuscript for matters both large & small?
- 18) While you are composing the manuscript did you have any doubts and misgivings that you should now check out?

Appendix 2

A General Format for All Types of Technical Presentation

- 1) Title suggests the contents of the report.
- 2) Table of contents lists all the division and sub division headings of the report.
- 3) Abstract, not part of the paper, is an adjunct intended to convey briefly the content of the paper.
- 4) Introduction contains the objectives.
- 5) Body consists of detailed answers to questions in the introduction.
- 6) Conclusions and recommendations interpret the answers found in the body of the report.
- 7) Summary reviews the whole report briefly.
- 8) Acknowledgements list the help received in performing the work being reported.
- 9) References or bibliography should contain a numbered list of publications mentioned or quoted in the report.
- 10) Tables and figures are used to present important aspects.
- 11) Appendixes contain extended information on special points mentioned in the report.
- 12) Index classifies the subject matter of the report in the alphabetical order.



Appendix-3

Examples of Gobbledygook, Redundancies, Common Errors, Roundabout Phrases

Gobbledygook : At this juncture, the above mentioned procedure should be utilized.

Correct : The plan which was discussed should be used now.

Redundant : It is absolutely essential in this day and age to completely eliminate bigotry and prejudice.

Correct : It is necessary now to eliminate bigotry.

Some common errors

- 1) The *temperature* is not *obtained* with a *thermometer*, but *measured* with it.
- 2) A *curve* is not a *straight* line, but a *graph* is.
- 3) If a mixture contains *50 per cent* alcohol, then the *percentage of alcohol* is 50%.
- 4) A logarithmic graph is not a 'log graph'.
- 5) Experiments are *conducted* but not *made*.
- 6) Temperatures are *maintained* constant, but never *kept* constant.
- 7) The temperatures are plotted *against* pressures, but not *versus* pressure.
- 8) An equation in a sentence is written at the end.
- 9) No sentence begins with a numeral.

Roundabout phrases

concise expression

1. A great deal of	much
2. A majority of	most
3. Accounted for the fact that	
4. As a result of	
5. Based on the fact that	
6. Due to the fact	
7. In view of the fact	
8. for the reason that	Because
9. On account of	
10. As a result	
11. For this reason	so, therefore
12. At the present time	
13. At this time	now
14. As soon as	
15. At which time	when
16. By way of	by, to, with under
17. By means of	
18. In accordance with	
19. Through the use of	always
20. At all times	soon
21. At an early date	during
22. At the time	know
23. Be acquired with	ended
24. came to know	short, quick
25. Brief in duration	for. to
26. For the purpose of	
27. In a manner similar to	like
28. In the nature of	
29. In favour of	for, to
30. In reference to	on, about
31. In relation to	
32. on the part of	from, of
33. Preparatory to	before
34. Prior to	
35. Provided that	if
36. In the majority of instances	usually
37. More than ordinary	special, unusual, except
38. A small percentage of	
39. A small fraction of	little of, few of
40. With reference to	on, about
41. With regard to	
42. With the result that	so that
43. To the extent that	as far as
44. Until such time as	until
45. By chemical means	chemically



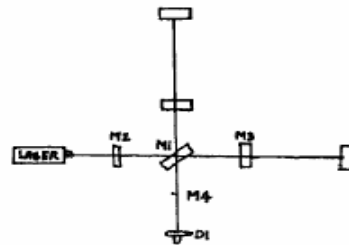
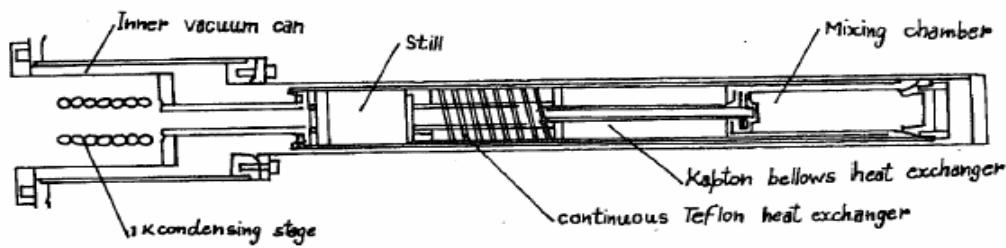
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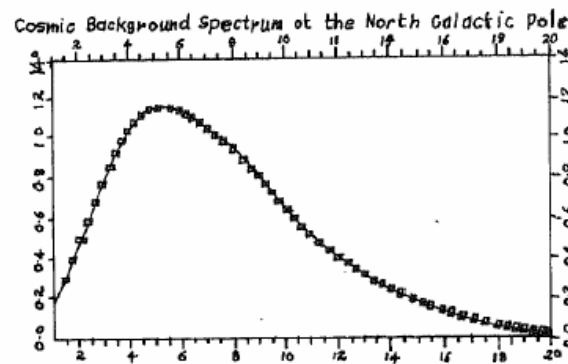
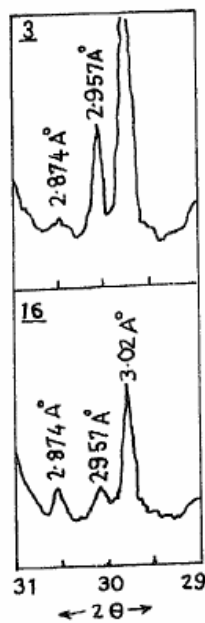
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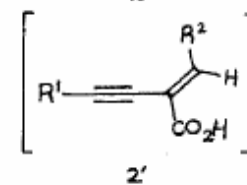
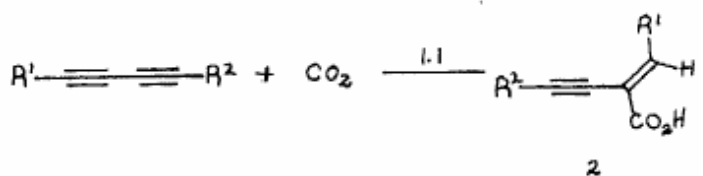
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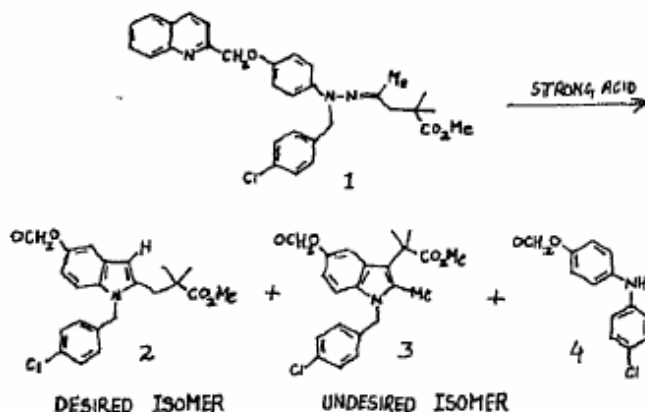
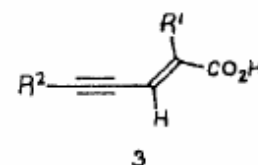
Drawings



Simple Graphs



+

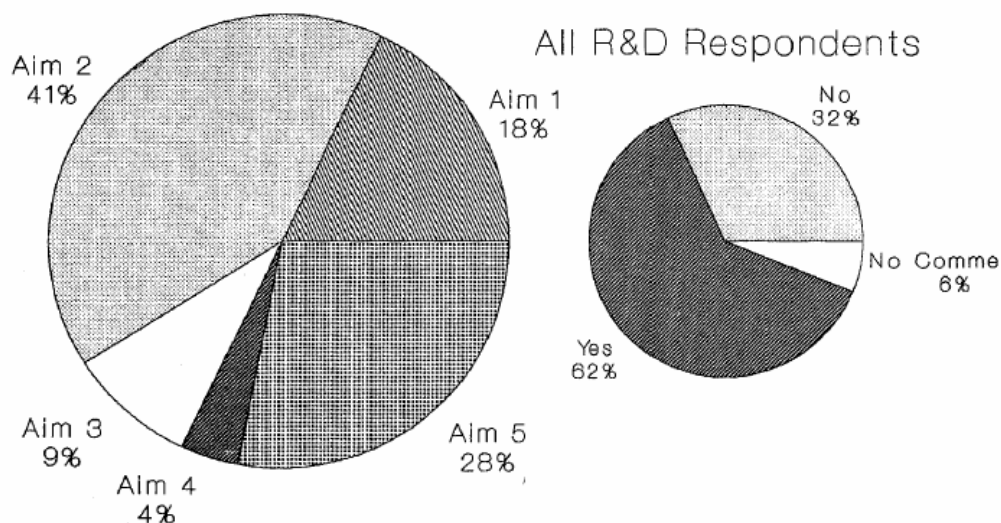


Scheme 1 Reagents : $F_2 + H_2O + MeCN \rightarrow HOF + MeCN$

R	Yield (%)	R	Yield (%)
4-Ac	95	2-NH ₂	85 [1,2-(O ₂ N) ₂ C ₆ H]
2-CO ₂ Me	100	4-NHAc	80
4-NO ₂	95	4-CO ₂ H	80
2-OMe	82	3-OH	71



Structural Diagrams



Pie Graphs



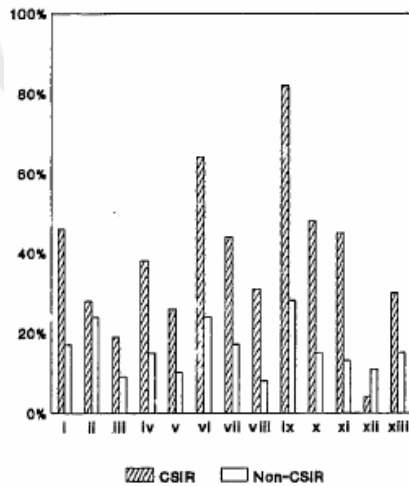
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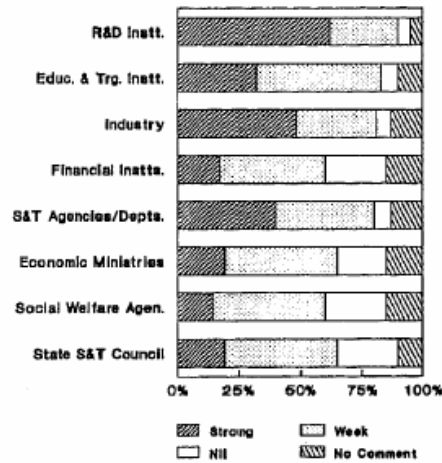
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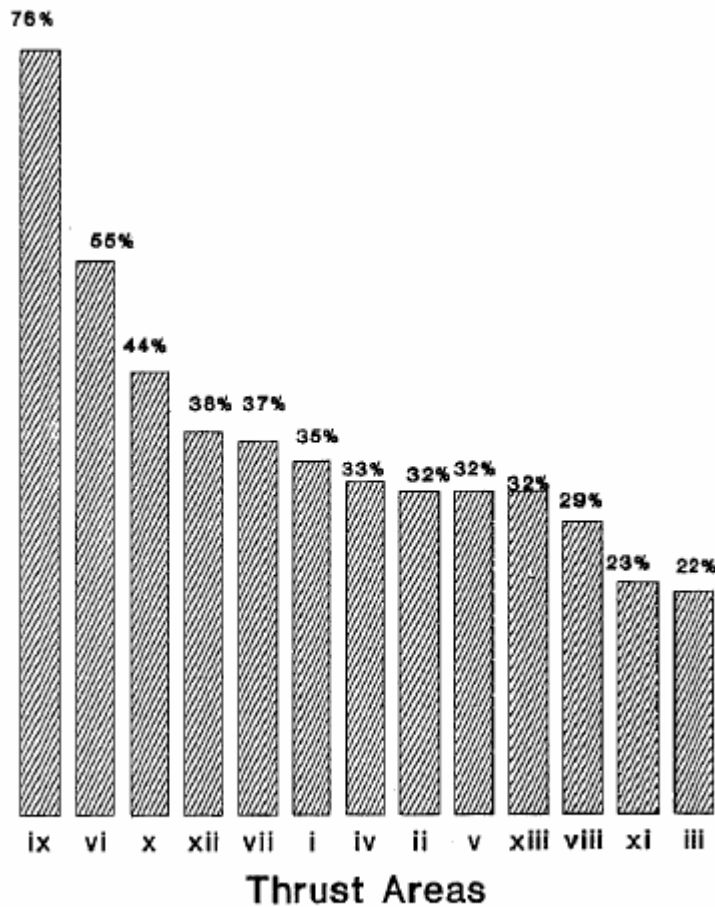
All R&D Respondents



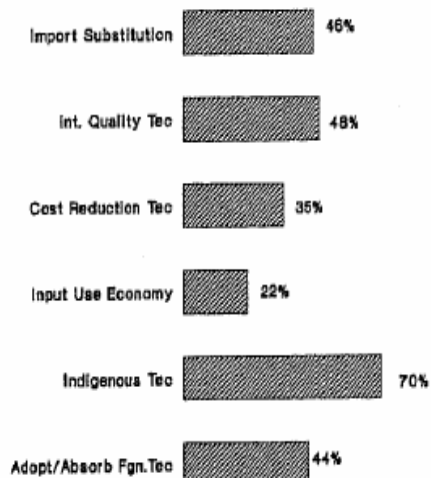
All R&D Respondents



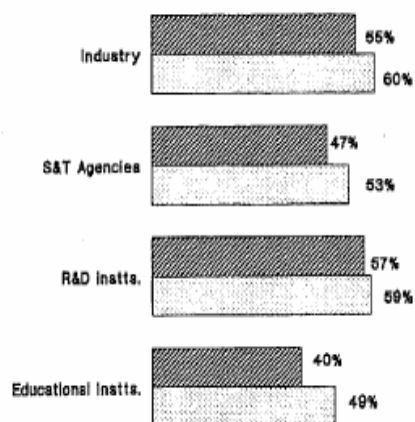
All R&D Respondents



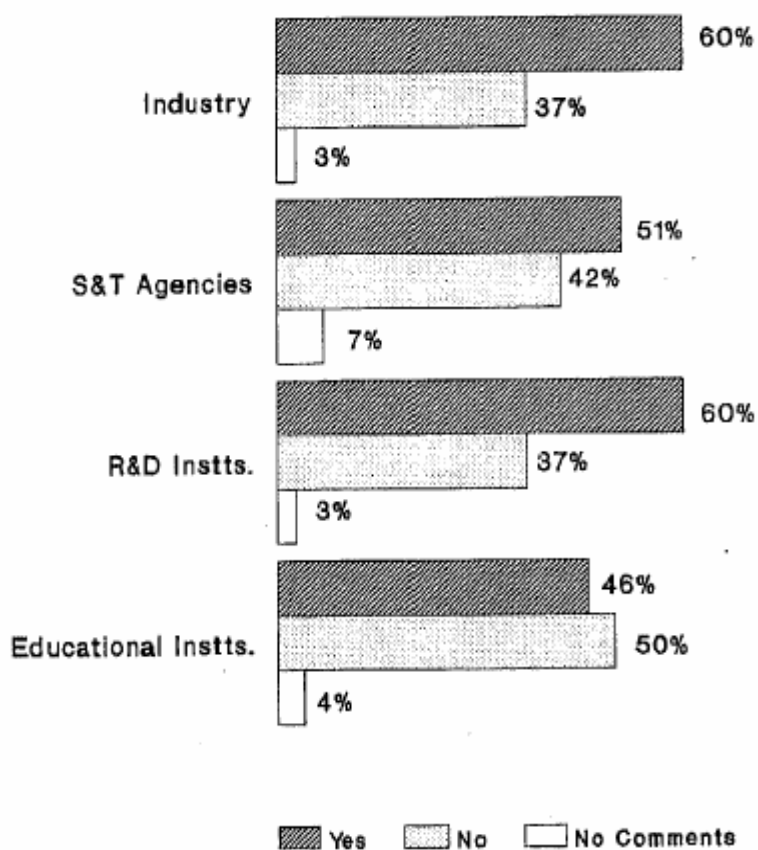
Bar Graphs



All R&D Respondents



Category-Wise R&D Respondents



All R&D Respondents

Bar Graphs

UNIT 11 CASE STUDIES

Structure

- 11.0 Objectives
- 11.1 Introduction
- 11.2 Technical Reports
 - 11.2.1 Need
 - 11.2.2 Characteristics
 - 11.2.3 Types
 - 11.2.4 Functions
 - 11.2.5 Structural Components of Reports
- 11.3 Review Articles
 - 11.3.1 Types
 - 11.3.2 Characteristics
 - 11.3.3 Functions
 - 11.3.4 Uses
 - 11.3.5 Preparation of Review Articles
- 11.4 Dissertations
 - 11.4.1 Characteristics
 - 11.4.2 Preparation of Dissertations
- 11.5 Inhouse Bulletins
 - 11.5.1 Types
 - 11.5.2 Salient Features
 - 11.5.3 Functions
 - 11.5.4 Preparation of Inhouse Bulletins
- 11.6 Short Communications
 - 11.6.1 Preparation of Short Communications
- 11.7 Summary
- 11.8 Answers to Self Check Exercises
- 11.9 Key Words
- 11.10 References and Further Reading
- Appendices

11.0 OBJECTIVES

After reading this Unit, you will be able to:

- understand different types of technical communications; and
- know their functions and characteristics and their preparation.

11.1 INTRODUCTION

Case studies are simple or elaborate form of communication containing a variety of data. They are an empirical enquiry that investigates a contemporary phenomenon within its real-life context when the boundaries between phenomenon and context are not clearly identified. Case studies are undertaken when many pointed questions are asked; they make use of multiple sources of information to answer these questions. They gather descriptive information about the theme/ a phenomenon of interest.

In technical communication case studies are presented in a variety of forms. The common and most popular among them are technical article in a journal, a short-communication, a dissertation, and house bulletins.

11.2 TECHNICAL REPORTS

The term 'report' is derived from the Latin verb *reportare*, which means to bear or bring back. A report is a means to disseminate information.



A technical report is a kind of written document that presents technical data as objectively as possible in a simple, direct, concise and precise manner. The data may be numerical, techniques, technologies, procedures, standard specifications, designs, and so on. A technical report may be a letter, an article, a research paper, an operational manual, a news bulletin, a company brochure, a book-review and so on.

11.2.1 Need

Questions may arise as to the importance of technical reports. The single purpose of a technical report is to convey a set of facts from the author to a reader. A professional writer may ask himself the following questions before attempting to write a report: (i) who will read my message? (readers - informed or uninformed?), (ii) what my message will accomplish? (purpose), (iii) what language should I use? (Style), (iv) what emphasis should I give? (tone), and (v) what exactly I am supposed to write? (message). Professional writers may be a scientist a technologist, a consultant, a company employee, a government servant or a member of the general public.

Readers may be (i) share-holders who want to analyse the market trends, (ii) financiers who want to know where to and how much to invest in a venture, (iii) managers who want to plan and monitor work, (iv) contractors who want to know global trends and geographical dispersions, (v) regulatory authorities who want to keep check on illegal or extralegal activities, (vi) laborers who wish to know management policies, labour laws, etc., (vii) R&D institutes who want to highlight their activities, (viii) plant managers who want to have details of production processes/techniques, and (ix) entrepreneurs who want to establish industries.

11.2.2 Characteristics

A good quality technical report

- is concise and precise
- has clarity of facts
- states facts
- has total objectivity
- is easily readable and understandable by the targeted reader
- is tailor-made for a specific reader
- provides solution to specific and limited problem
- contains new and useful information
- follows a prescribed reporting format
- is capable of verification
- avoids judgments, opinions and arguments
- is written in simple, formal, impersonal and effective language
- is devoid of tricks, jargons, colloquialisms, etc.

11.2.3 Types

Technical reports may be classified as:

Oral reports : These are oral presentations made at seminar/symposium, board of directors meetings, launching of new products into the market and so on.

Technical articles : These are original research articles, and short notes and digests in periodicals that deal with science and technology. These articles may be overview of some select subject fields, new procedures/techniques or modified version of existing ones, patent analyses, comparative studies, statistical analyses, and so on.

Correspondence : It is a common type by which a preliminary discussion is initiated between the generators and users of technologies.

Memorandum : Documents meant for intersectional communication in an organisation. There will be as many memoranda as there are topics to be discussed. A memorandum is generally used for communicating and recording facts, stating policies, identifying problems and solutions, and finally expressing professional evaluations, opinions and judgments. A memorandum is issued between superiors



and sub-ordinates, or among colleagues. It is brief, gets to the point quickly, and it is always timely.

Memoranda are (i) informative explaining facts, (ii) directive giving a series of instructions to a subordinate or to anyone in a firm, (iii) records of meetings, (iv) administrative stating a policy, professional advice, and opinions on a given subject (Appendix 1).

Proposals : These are action-oriented reports which not only explain the existing problem but also give future plan of action and methods of its implementation. A proposal contains analyses of procedure, equipment and cost, capabilities of existing facilities, personnel needs, and a time-schedule for accomplishing the work. Proposals are professionally credible, technically sound and partially theoretical. Proposals may be external, a response to another firm's request for a solution or internal conveying ideas/suggestions for improvement (Appendix 2).

Status reports : These are written to contain specified topics for a select and definite group of readers; hence it is very timely. A status report states overall subject areas or problems for enquiry and breaks it down into component areas on problems. In the end, conclusions are given, which lead to a future course of action and a spring-board for the introduction of succeeding status reports. Status reports are also known as preliminary reports, interim reports, progress reports (daily, weekly, monthly, quarterly, yearly and so on), special reports, state-of-the-art, financial, and legal reports (Appendix 3).

Action reports : These reports indicate the action taken on policy matters or professional advice. They are variously known as (i) design reports - construction, installation of equipment, new products, and new layouts, (ii) changes or make alternations in design, (iii) instructional reports - job instructions, process specifications, and how-to do guidelines; (iv) work orders - shop orders, written authorization for jobs to be done, etc. (v) proposals - suggestion for courses of action to be taken, and (vi) standards and specifications.

Action reports are also known by such names as survey reports, process reports, trip reports, investigative reports, failure reports, accident reports, test reports, and confirmation reports.

Feasibility reports : These reports discuss the practicality of a new project, new product, development of a new programme, purchase of a new equipment/plant and machinery, or a relocation of a factory site in physical and economic terms. They consider the suitability of the project from the viewpoint of those who are affected. A feasibility report generally includes explanation of the problem, present standards on criteria, subject-items to be analysed, examination of the scope of analysis, presentation and interpretation of the data, and conclusions and recommendations.

Manuals : A manual is a written guide or a reference material which is used for training, assembling machines, operating machinery or equipment, and repairing and serving products and equipment. Manuals generally contain precise definitions, descriptions of mechanisms, step-by-step instructions, and analyses of processes. Manuals are classified as (1) instructional, (ii) operational, (iii) procedure, (iv) service, (v) training, and (vi) installation and maintenance.

Accomplishment Reports : These are a medium of expression through which a technical man expresses his accomplishment to others - These reports are variously known as application survey, market survey, operation survey, call report, design report, preliminary evaluation, suggested procedure, sales service, terminal, trip report, and so on.

Information reports: These are very general reports prepared for specific occasions/jobs. These include booklets, pamphlets, brochures, prospectuses, press release, information leaflets, trade catalogues, etc.

11.2.4 Functions

The reports perform three main functions: (i) to inform the readers/users, (ii) to initiate action which forms a basis for arriving at a decision, and (iii) to record for future use, or to maintain the history of a job or an organisation for meeting legal requirements.



11.2.5 Structural Components of Reports

All reports have the following components: title, table of contents, abstract, introduction, main body, conclusions and recommendations, acknowledgements, bibliography, tables and illustrations, appendices, and index. Some give summary at the end instead of an abstract.

Self Check Exercises

- 1) Define 'Technical Reports'. Why is it necessary to publish a technical report?
- 2) Outline important characteristics of a technical report.
- 3) Discuss briefly various types of reports.
- 4) Suppose you want to set-up a manufacturing plant in India. What type of reports you will ask for and why?
- 5) A good proposal enables one to win half the battle for formal approval and sanction of funds. Justify this statement.
- 6) Write a proposal for starting computer facility in your institution.

Note

- i) Write your answers in the space given below.
- ii) Check your answers with the answers given at the end of this Unit.



11.3 REVIEW ARTICLES

A review article is a comprehensive and authoritative written presentation published in a journal, a monograph, a treatise, a book, an encyclopedia or in conference proceedings, giving an overview of the developments taken in one subject area within a certain limited period (may be in the preceding five years). It is written by subject specialists whose contributions are well recognised. Therefore, review article may be

- Merely a descriptive bibliography of all papers on a subject, ordered by code categories, such as experimental, theoretical, etc.
- speculative, very close to primary literature and to current controversies.
- a promoter or popularizer of some particular theory/scientist over a wider range of
- potentially relevant evidence than would normally be allowed in an ordinary primary paper.
- a careful compilation of experimental data, critically assessed and reduced to standard form of reference.
- an account of mathematical technique, bringing together and expounding implicit axioms, theorems, and potentially useful formulae.
- didactic meant for the beginners in the subject.
- a clear disposition of what is well known in a language intelligible to outsiders.

11.3.1 Types

A review article can be :

- Historical
- Descriptive-giving the state-of-the-art of a subject area, trends in a specific area of R&D activity, or an overview of a broad subject field.



- Critical - It may be evaluative, expert comments, analytical
- Popular
- Bibliographic - Informative or indicative
- Review alerts - It draws the attention of readers to the developments taking place or introduction of new and emerging subject areas.

11.3.2 Characteristics

A review article has following characteristics:

- No original research work is reported
- Title shows that the item is a review
- Contains several references
- Title or abstract contains one of the following terms:
- Review, progress, survey, overview, advances, trends state-of-the-art
- Generally appears in serials devoted entirely to reviews or in the section of reviews in primary periodicals.
- It is indexed as reviews by secondary services.

11.3.3 Functions

The functions of a review article can be summarized into four groups: current awareness, tutorial, bibliographic, and general.

11.3.4 Uses

A review article helps the public at large to get an insight into scientific progress made on a specific topic. It promotes scientist-to-scientist communication within a subject area or an inter-disciplinary area. It aids policy makers and planners to fix national priorities and to grant financial aid to programmes that come within the purview of national priorities. It helps R & D institutions to formulate their own policies and programmes of research. It alerts advance centres to introduce study programmes in new and upcoming areas of research.

11.3.5 Preparation of Review Articles

Since review articles are written by subject-specialists, careful selection of review writers assumes top priority in the preparation of reviews.

A good review writer must have a strong grasp and thorough knowledge of subject, be well informed, have broad insights and perspectives, speak with authority derived from the proficiency in the field, have prestige in his own field of specialisation, and above all be a good and competent writer.

Any capable review writer carefully selects a suitable topic/theme/subject. While doing so he examines whether the subject area is too broad or too narrow as also the intended purpose of writing a review article. Having satisfied himself, he chooses the type of review article to be written. Later on he undertakes an intense literature survey bearing in mind the authenticity and correctness of references consulted. He analyses the references and selects those which have relevance to the topic chosen. He collects, collates, and organizes information and finally decides on the main and sub-divisions of the review. Then a preliminary draft is prepared giving a broad framework containing the information according to the pattern set by the writer and references at specific points to which reference applies. Then a re-assessment of the basic draft is made by addressing the following questions: Does it include a description presenting a statement or subject? Are all facts presented impartially? biased? If so, where are the distortions? Is the organisation of ideas clear, intelligible and the presentation logical and coherent? Are all important points covered and emphasized? Does it give full coverage of the topic? Are there any gaps in the presentation? Will it be credible to the reader? Will it kindle curiosity and generate discussion and debate?

After assessing the basic draft, the article is rewritten to make it more comprehensive, paying specific attention to style of presentation, grammar, and syntax. The



information to be presented as tables and illustrations is eliminated from the body. Tables and figures are carefully planned and prepared.

A second draft is prepared in the standard format, incorporating references to tables, figures and citations at the appropriate places in the text. This draft is once again critically re-examined and appropriate changes are made.

The article is finalised keeping in view the style of presentation recommended by a journal to which the article is to be sent for publication. Four copies of the article are prepared, three to be sent to the editor of the journal and one to be retained. The final draft is also stored in a standard size of a floppy disk to be used in computer-based publications.

Self Check Exercises

- 7) What do you understand by the term, 'Review article'?
- 8) Why is a review article important in S&T literature?
- 9) Classify a review article and list some of its important characteristics.
- 10) Explain the important functions of a review article.

Note:

- i) Write your answers in the space given below.
- ii) Check your answers with the answers given at the end of this Unit.



11.4 DISSERTATIONS

A dissertation is a formal presentation of results *of* deeper, more comprehensive, mature and professional research undertaken on a chosen topic. It demonstrates a student's ability to make use of appropriate research procedures, to organise primary and secondary information into a meaningful whole, and to present the results in acceptable form.

The terms 'Dissertation' and 'Thesis' are used synonymously in foreign universities, whereas in India a dissertation is a part of study in postgraduate degree courses, and a thesis is the outcome of a research work undertaken independently over a stipulated limited period. In the case of thesis, the format, style and conditions of research are generally specified by universities. In dissertations the choice *of* topic is left to the students.

11.4.1 Characteristics

A dissertation:

- deals with some aspect of a subject not previously treated.
- is an important source *of* original information.
- is prepared independently without any formal help from guides/supervisors.
- is not limited in length.
- has limited objectives which can be fulfilled within time-limits, wherever such limits are prescribed.
- forms an important source for locating reviews and bibliographies.

11.4.2 Preparation of Dissertations

Since the topics for dissertations are chosen by students themselves, initial discussion with class-mates, research scholars and members of the faculty of the institution where the student undertakes research is essential to ascertain the topic chosen has not been dealt with. Later a preliminary survey of literature on the topic is made to find out the possibility of original contribution to the concerned area or knowledge. Then a proposal is prepared outlining the exact topic and its importance, major problems which it may likely to solve, limitations of investigation, sources of information, contents, bibliography, time-schedules, and all hypotheses which a student may verify in a specific order *of* priority. Later on an action plan is worked out incorporating basic instructions for executing various items and sequencing them in the order of importance.

Then the data are collected, collated, interpreted and organised into introduction, main body of text and conclusions. The points to be borne in mind while gathering data are mentioned in Appendix 4. A basic draft is prepared, checked and re-checked; a first draft is then prepared by including tables, illustrations and references at the appropriate places in the text; the first draft is then sent for peer-evaluation any member of the faculty or an outside expert, and a final draft is prepared for submission to the appropriate authority.

The main body *of* the dissertation should present arguments based on the results of exploration, discoveries, experiments, analysis, or synthesis, or all those activities which constituted the research and led to the conclusions.

**Self Check Exercise**

11) What is a dissertation? What are its important characteristics?

Note:

- i) Write your answer in the space given below.
- ii) Check your answer with the answers given at the end of this Unit.

11.5 INHOUSE BULLETINS

Inhouse bulletins are a medium of dissemination of news and activities of an organisation for the benefit of members of staff of that organisation or the public at large. The organisation may be an international body like any agency of United Nations, a corporate organisation, an individual institute/organisation, and an association/a society. If the inhouse bulletins are exclusively meant for the inmates of an organisation, the term 'for limited circulation' is introduced on the top portion of the first page of the bulletin.

11.5.1 Types

Different types of inhouse bulletin are recognised, but all of them fall under three broad categories:

- Socio-cultural
- Technical
- Hybrid

Socio-cultural bulletins give news of general nature, such as cultural, sports and social activities, human interest stories, short biographies of personnel, and so on. Technical bulletins report only events/developments pertaining to science and technology. These bulletins report what the organisation does and how it does through its employees. Technical news reports everything that is discovered about the Nature, any fundamental discovery about how things work and why so. They also contain information about practical applications of discoveries/ inventions emanating from an organisation. Hybrid bulletins are a blend of news about policies and programmes, and future plans of action, technical news and socio-cultural activities.

Inhouse bulletins serve as a public relations medium- and hence are not priced. However, in recent years technical bulletins are supplied on nominal cost in order to restrict their use to the actual users.

11.5.2 Salient Features

Inhouse bulletins/newsletters reassemble daily newspapers in its information content and basic structure.

They have the following salient characteristics:



- contain a mast on its first page which is 2-3 inches in height and which carries the title of the newsletter as well as a logo of the organisation
- appear in three sizes: royal octavo (6 x 8 in.) demi quarto (8 x 1 in.) and crown quarto (7-1/2 x 10 in.)
- carry generally 8, 16 or 24 pages per issue and in some extreme may be 40 pages.
- contain different types of columns, each for a news story, feature story, personality story, background story, capsule story, and situationer story.
- are generally published fortnightly or monthly.
In some cases they are also published as weekly bulletins.
- contain news items arranged in 2,3 or 4 columns per page; some contain only a single column.

11.5.3 Functions

The basic aim of any inhouse bulletin/newsletter is to stimulate intellectual curiosity of the public in the activities/events of an organisation and to encourage participation. Inhouse bulletins help in:

- satisfying information-needs of the public who has invested money,
- boosting national pride,
- publicizing accomplishments of an organisation and its employees,
- propagating changes brought about by science, technology and engineering,
- educating about new scientific/technical achievements,
- updating one's knowledge,
- stimulating a desire to pursue research which directly benefits science itself in the most creative way,
- establishing links between specialists in different disciplines.
- creating a linkage among S&T personnel, policy-makers, industrialists and financial agencies,
- keeping elected representatives of political system informed about the new and latest developments, and
- educating the industrial entrepreneur on the implications of scientific/technological discoveries.

11.5.4 Preparation of Inhouse Bulletins

Generally all news bulletins are published by the public relations or publication department of an organisation. The bulletins are prepared by persons who have sufficient knowledge in the subject as well as in journalism.

The publication department receives or collects all news items from other constituent institutes/ departments. From the information available news digests are prepared within 900 words. Analogies and word pictures are used to describe the often invisible, remote and unknown experiences in scientific/technological research with a common human experience. Not more than three basic points are included in each news digest. Unusual and difficult technical terms are properly defined and explained. Lastly the entire information is presented in simple, clear, concise and communicative language.

11.6 SHORT COMMUNICATIONS

Research is a disciplined enquiry into a problem. It may be a critical examination of materials hitherto not dealt with, a reexamination of traditional materials by new techniques, or new discoveries. The results of such critical inquiry are sometimes reported in the form of short articles known as 'short communications'. Short communications are generally published in primary research periodicals which publish original research contributions.

Short communications generally report work of topical interest, novelty in procedures and techniques, designs of apparatus, and interpretation of known knowledge, which are likely to stimulate other research workers in the field and which need to be brought to the attention of research workers expeditiously.



Short communications generally contain the following components: Title, names and addresses of the authors, a brief abstract, reference to previous work, and a brief description of the present work. The text is supported by tables and illustrations wherever appropriate.

11.6.1 Preparation

Short communications are prepared in the same way as a research paper, but it is of shorter length, not exceeding 1-2 printed pages. It is compiled in a comprehensive and logical manner, taking data from the "Laboratory Notebooks" maintained for research work.

Self Check Exercise

12) Why are short communications important ?

Note:

- i) Write your answer in the space given below.
- ii) Check your answer with the answers given at the end of this Unit.

11.7 SUMMARY

In this Unit, you are explained the broad definition of case studies, and the common forms in which they appear are presented. You are introduced to the definition, characteristics, types, functions, and patterns of technical reports. You are also told why the technical reports are necessary. You are made to understand the meaning of dissertations and theses, how they are distinguished in Indian context, the salient features and the ways and means by which they can be presented. You are told about importance of inhouse bulletins, their salient characteristics, functions, and their preparation. Under 'review articles', you are taught what review articles are, why are they essential, and their main features, functions and uses; you are also taught how to prepare review articles. You have been informed about the importance of short communication and what purpose they serve in technical communication.

11.8 ANSWERS TO SELF CHECK EXERCISES

- 1) Technical Report is a written document presenting technical data in a simple, direct, concise and precise manner. A technical report convey a set of facts from the author to a reader.
- 2) Important characteristics of a technical report are clarity of facts, concise and precise, easily readable and understandable by the targetted readers. And it should provide solution to specific and limited problem.
- 3) Various types of reports are: Oral reports-These are oral presentations made at meetings; Status reports - states overall subject areas or problems for enquiry and breaks it down into component areas or problems; Action report indicates the action taken on policy matters or professional advice;



Feasibility reports - discuss the practicality of a new project, new product, development of a new programme, purchase of a new equipment or a relocation of a factory site in physical and economic terms.

4) Three types of technical report are necessary:

a) Memorandum is used to highlight the topic in brief for those whom it is addressed.

b) Feasibility report to discuss the practicality of the project. This report will throw light on the explanation of the problem, present standards on setting up manufacturing plants, collection, analysis and presentation of all relevant data, and conclusions and recommendations.

c) Proposal is then put forward to the appropriate authority explaining the scope, existing scenario and future plans of action and method of their implementation.

5) Proposals are action-oriented reports which attempt to provide solutions to problems raised within an organization or submitted by an agency to another agency for providing solutions. Proposals contain three important elements, namely, technicals, managerial and financial parameters which make them more important. The financial element assumes greater importance because any agency trying to solve a problem would like to achieve its objectives at optimum costs. A proposal also presents both the positive and negative sides of the problem, thereby enabling the user either to accept in to or totally reject it. A proposal which gives comprehensive analyses of procedures, equipment, existing capabilities, personnel needs, cost, and a detailed time-targetted schedules is at once accepted and passed for providing funds. The professional and technical creditability attached to a proposal is yet another attraction to the fund-givers.

6) The proposal should have the following outlines:

a) Statement of problem

b) Whether computer facility is already available

c) Definition of computer and a brief outline of different types of computer system

d) Functions of organization and its future plans of growth

e) Choice and selection of computer system for meeting organizational objectives

f) Description, cost and vendor selection

g) Personnel required-existing and future, training of personnel, etc.

h) Procedures to acquire computers

i) Time schedules to complete installation

j) Expert assessment on the performance.

7) Review article is a comprehensive and authoritative written presentation giving an overview of the developments taken in one subject area within a certain limited period.

8) A review article is important in S&T literature, it helps to get an insight into scientific progress made on a specific topic. It aids policy formulation and programmes of research. It alerts advance centres to introduce study programmes in new and upcoming areas of research.

9) A review article may be classified as historical; descriptive - giving the state-of-the-art of a subject area; critical - evaluating and analysing the subject area; popular; bibliographic; and review alert - drawing attention on the developments or introduction of new and emerging areas. Important characteristics of a review article are, it does not produce original research work; contains several references; and reports progress, overview and trends in the subject area.

10) The important functions of a review article are to provide current awareness in the subject area, latest trend and new emerging area; give detail bibliographic references to the readers and describe the state-of-the-art of a subject area.

11) A dissertation is a formal presentation of results of deeper, more comprehensive, mature and professional research undertaken on a selected topic. The important characteristics of a dissertation are it deals with some aspects of a subject not previously treated; it is an important source of original information; and it gives the systematic review of a subject area.



- 12) Short communications are very important because they allow the results of any critical inquiry to be quickly communicated to the intended readers. When the topic is so important, or procedures/techniques are so new, designs of apparatus are so modified, or new knowledge is so important that an investigator has to bypass the normal waiting time for publication of results of his report, then he resorts to short communication so that the results of his investigation are brought to the attention of other research workers expeditiously.

11.9 KEY WORDS

Bibliography	:	i)	Serves as a guide to original research
		ii)	Links all references on a subject at one place
		iii)	Helps in retrospective literature search
		iv)	Builds bibliography of bibliographies
Current Awareness	:	i)	Selectively cites relevant literature of high quality
		ii)	Alerts users on new developments and trends
		iii)	Avoids repetition and duplication of research report.
Journal	:		Acts as an intermediate link in the evolution of Information
Review	:	i)	Primary literature analysed, synthesized and integrated
		ii)	Primary literature further compacted and repackaged for specific category of users.
		iii)	Serve as records of evaluated and integrated knowledge for assimilation and use by students, scientists and other scholars.
		iv)	Encourage cross-fertilisation of ideas.
		v)	Promote linking of unrelated yet relevant fields of research.

11.10 REFERENCES AND FURTHER READING

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Appendices



Appendix 1 : A Sample Specimen of Memorandum

MEMORANDUM

TO : J.D. Bi, Director, Accounts Department
FROM : P.S. Sharma, Secretary, Accounts Department
SUBJECT : Replacing Copy Machine
DATE : May 9, 1991

Since we are experiencing difficulties with our Atlas copy machine. I have investigated the feasibility of renting a new copier. The Atlas costs Rs.311.00 per month to rent. It does not make two-sided copies. In the past 30 days we have needed seven service calls costing a minimum of Rs.30.00 a call. In April we were without copy capability for three days while a part was being located by the service representative.

Our criteria for a new machine include:

- low cost (below Rs.400 a month)
- two-side print capability
- various paper quality capability
- reduction capability
- immediate delivery

Only two copy machines are available within our price range.

Table 1 : Compares Features of Brand X and Brand Y Copy Machines

Brand	Rental cost per month (Rs.)	Capabilities	Limitations
X	316.00	• One step operation • for two-sided print • Any paper • Reductions • Immediate delivery	• Rs.35.00 base service fee • Reputation for request breakdowns
Y	389.00	• One step operation for two-sided print • Any paper • One-size reductions • Immediate delivery	• Rs.75.00 base service • Reputation for slow delivery

Both machines meet our criteria, the Brand Y one-size reductions are suitable. In order to assess the disadvantages, I surveyed five departments which use the X or Y copiers to determine the number of service calls required in one year period. Table 2 shows the departments and number of service calls required for each:

Table 2 : Service Calls for Brand X and Y Copy Machines in One Year Period

Department	Brand	# of calls
Personal	X	11
Payroll	Y	2
Data Processing	X	25
Records	X	7
Purchasing	Y	0

Both Brands appear to be more reliable than our Atlas copy machine. Although Brand Y charges more (Rs.75.00) for a base service fee than Brand X (Rs.35.00), the survey data suggests that Brand Y is the more reliable machine.



Therefore, I recommended that we rent a Brand Y copy machine which will give us a two-side print capability which we do not presently have as well as meet all other criteria.

May I have your authorization by Friday to negotiate a Brand Y rental ?

JW: eg.

Appendix 2 : A Sample Specimen of a Proposal

PROPOSAL TO PURCHASE ROLLAWAY FILES FOR AERIAL PHOTOGRAPHS

Prepared for

V. Singh
Assistant Director
Ace Aerial Photography
New Delhi

by
R. Gupta
Laboratory Technician

January 10, 1989

MEMORANDUM

TO : V. Singh, Asst. Director
FROM : R. Gupta, Laboratory Technician
SUBJECT : Proposal to Purchase Rollaway File Unit
DATE : January 10, 1991

Enclosed is a proposal to purchase two, 2-drawer Esselte rollaway file units for aerial photographs. Adoption of the proposal will economies operating expenses and increase office efficiency.

Ms. Sunita, purchasing department was instrumental in obtaining the costs of available rollaway files. May I hear from you about this proposal by Friday?

R.G:eg

Enclosure

PROPOSAL

Therefore, I propose the purchase of two rollaway file units. Table 2 shows the costs and features of three types of rollaway files:

**Table 2 : Comparative Rollaway File Unit**

State Model	Features	Dimensions (Rs.)	Cost
	H W D		
	24' desk side unit	28¼ 13 24¼	107.00
	Sliding cover Steel storage shelf		
	Rubber ball bearing casters		
	24' two drawer unit Suspension bottom drawer	30¼ 15 24	231.00
	Sliding cover with lock		
	Rubber ball bearing casters		
	locking brake		
	18" desk side unit	28¼ 13 18¼	99.25
	Sliding cover with lock Steel storage shelf		
	Rubber ball bearing casters		

recommend the Tu-Dror units at Rs.231.00 each or Rs.462.00 for two. Four owners are necessary to fit existing photographs and to allow space for the estimated volume of 1991 photograph.

ADVANTAGES

1. Purchase of the file units will result in a cost reduction of Rs.1486.00 for the first year and Rs. 1948.00 thereafter. Table 3 shows the time and wages involved in searches using the file unit system:

Table 3 : Time and Wages for Searches - New System

Time Frame	# of Searches conducted	Required Search Time (3 min ea)	Cost of Searches (Rs.600 per hour wage)
Daily	3	9 min	0.90
Weekly	15	45 min	4.50
Monthly	60	3 hr	18.00
Quarterly	180	9 hr	54.00
Yearly	720	36 hr	212.00

2. Clients will be satisfied that it takes the technician less time to search for aerial photographs which will be in coded order.
3. The space that is used for aerial photograph boxes will be available for other supplies.

ACTION

1. The tiles should be purchased by February, 1991.
2. The three laboratory technicians will require one month for coding and filing existing photographs. Work is generally slow in February.
3. I will assume the authority for purchase order and directing file duties.



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ABSTRACT

The present system of storing aerial photographs is inefficient and costly. The laboratory technicians must locate photographs for realtors, engineers and other clients who desire dated copies and glossies. The Company is spending Rs.2160.00 a year on the search procedure, and the searches are disrupting the efficiency of the laboratory technicians. I propose the purchase of two 24" Esselte Tu-Dror rollaway file units for Rs.462.00. Required search time will be reduced by 324 hours per year. The file unit system will save the Company Rs.1586.00 a year following initial purchase, and Rs.1940.00 each year thereafter.

SUBJECT

The purchase of two rollaway files for aerial photographs.

OBJECTIVE

To improve search efficiency and to resolve operation costs.

PROBLEM

Presently, the aerial photographs are stored on the second floor in the east wing in boxes in no sequential order. When an engineer, realtor, or other client requires an aerial photograph on file, technician must search through the boxes to locate the photograph. Table 1 shows the time and wages expended in searches under the present system:

Table 1: Time and Wages for Searches of Aerial Photographs

Time Frame	#of Searches conducted	Required Search Time (30 min ea) Rs.	Cost of Searches (Rs.6.00 per hr wage)
Daily	3	1 hr 30 min	9.00
Weekly	15	9 hr	54.00
Monthly	60	30 hr	180.00
Quarterly	180	90 hr	540.00
Yearly	720	360 hr	2160.00

The department is spending Rs.2160.00 a year for employee time to search for aerial photographs. In addition to the unnecessary cost, employees are frustrated by the inefficient storage, and clients are impatient.

APPENDIX 3: A SAMPLE SPECIMEN OF STATUS REPORT

Case Studies



Status Report on
Science and Technology
in India 1988

Publications & Information Directorate
(Council of Scientific & Industrial Research)
New Delhi
(September 1988)



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APPENDIX 4 : CHECKLIST FOR PREPARING DISSERTATIONS

1. *Selection of topic for investigation*
 - Current interest in the subject chosen is still present; it is also present in closely related fields.
 - There is a gap in knowledge that the work on the topic chosen could help to fill.
 - It may help to resolve a controversy.
 - It is possible to focus on a small enough segment of the topic to make a project.
 - It can lead to a way to study the topic that will allow conclusions to be drawn with substantial objectivity.
 - It allows data collection approach (test, interview, questionnaire, etc.).
 - There is a large body of literature available and its search is manageable.
 - There are ways and means available to surmount large problems that are faced while working on this topic.
 - It has a good acceptability in the school of study.
 - Financial assistance is available, if asked for.
 - Easy accessibility to databases.
 - It enables to state clearly the objectives, scope, purpose, procedures and limitations of the study. It does not call for any new skills to be acquired.
2. *Topics employing a research question or hypothesis*
 - Do you have acceptable statements of research questions or hypotheses?
 - How will you answer the questions or test the hypotheses?
 - Will your dissertation be a contribution if the conclusions do not support the hypotheses or fail to answer the questions?
 - Have subsidiary questions or hypotheses been identified that deserve study along with major ones ?
 - Are there alternative questions as hypotheses that might explain the findings anticipated ?
3. *Topics requiring interviews for data collection*
 - What style or type of interview best suited to the objectives of the study ?
 - Does an interview protocol exist that fits the purposes of the investigation ? Has it been pilot tested ?
 - How will the data be recorded and collated for optimum speed, accuracy, and reliability ?
 - How will matters of confidentiality and permissions to be handled?
 - How will the bias in the interviewer and the respondent be minimized or Measured?
4. *Topics for using a questionnaire approach*
 - What form of questionnaire will be most productive for this kind of study ? Has it been pretested?
 - How will the items relate specifically to the purposes of the investigation ?
 - Why is it the test of choice for data collection ?
 - How will you evoke response to it ?
 - How will you validate/analyse the responses ?
 - Are the quantitative analyses appropriate to the kinds of data collected ?
 - What level of confidence will be accepted as significant? Why ?
 - Are there computer programmes that will save time, energy and money ?
 - What national interpretations need to be given to the findings to make them meaningful ?
5. *Topics staking use of existing data from other sources*
 - Are the data relevant ? Reliable and valid ? Complete ?
 - Are there limitations on the present or future availability or utilization of the data ?
 - Why is it better to use these data than to collect fresh ones ?
 - What obligations to other sources go along with publications based on these data ?
6. *Topics involving tests and testing in data gathering*
 - Are the tests the most valid and reliable and obtainable?
 - Do the tests discriminate against significant groups in the sample?
 - Do the tests provide direct measures of the key variable in the study?
 - How will confidentiality be preserved ?
 - What interpretations will be needed to make the test results meaningful in relation to the purposes of the investigation ?