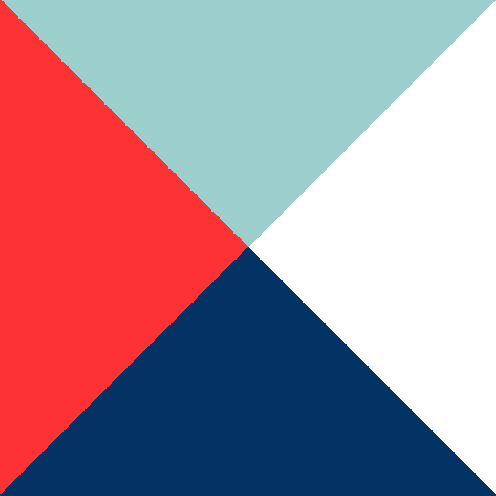
Defence Centre of Training Support Training Support Handbook

**UNCONTROLLED COPY**

Data Gathering and Analysis Techniques



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# FOREWORD

1. For the purpose of this document, the term “training”1 encompasses all Learning2, Education3 and Personal Development4 that has the objective of developing the knowledge, skills and/or attitudes of an individual toward preparing that individual for their role.
2. **Policy for the Management of Individual Training and Education in Defence.** This policy sets the framework for the management of individual training across Defence and details the key areas of Training Management (TM), Training Requirements Authority5 (TRA) and Training Delivery Authority6 (TDA) roles and Customer Executive Board (CEB) function. It is the high level policy that defines who is responsible for what in Defence Individual Training.
3. **Defence Systems Approach to Training Quality Standard (DSAT QS).** DSAT QS sets out the strategic principles to be applied to all Individual Training provided by, or on behalf of, Defence. The DSAT QS has been endorsed by the Training and Education Policy Group (TEPG) as the quality standard for the management of Individual Training across Defence. Any activity that has the objective of developing the knowledge, skills and/or attitudes of an individual for their current or future role must comply with DSAT QS.
4. **Defence Training Support Manuals (DTSMs).** The DSAT QS is underpinned and supported by DTSMs that direct its implementation. There are 6 DTSMs:

DTSM 1 - The Analysis, Design and Development of Training. DTSM 2 - The Glossary of Defence Training Terminology.

DTSM 3 - Training Needs Analysis. DTSM 4 - The Evaluation of Training.

DTSM 5 - Technology Based Training Solutions.

DTSM 6 - The Audit and Inspection of Individual Training.

1. **Defence Centre of Training Support (DCTS) Training Support Handbooks**. In order to further amplify the information contained in DTSMs and in direct support of the training delivered to Training Support specialists, DCTS has developed a series of DCTS Training Support Handbooks. These publications are provided as reference guides for Training Support practitioners to give additional detailed guidance on specific areas

1 An activity that aims to impart the specific knowledge, skills and/or inculcate appropriate attitudes required by an individual in order to perform adequately a task or job.

2 Learning is the acquisition of knowledge, skills and/or attitude.

3 Education encompasses the development of intellectual capacity, the acquisition of general supporting knowledge and inculcation of attitudes, which underpin performance, and engender understanding, commitment and ethos.

4 Personal Development is the enhancement of personal and/or professional attributes arising from a combination of training, education and experience.

5 The TRA represents the end-user of the trained output. It is the ultimate authority for the derivation and maintenance of the Operational Performance Statement (OPS) or the Learning Objectives/elements of the appropriate Competence Framework (CF), and is responsible for the evaluation of the effect of the training and education in achieving that OPS/CF (delivered both in the training school/organisation and the workplace).

6 The TDA is the organisation responsible for the provision of individual training or education, to agreed standards and in accordance with extant and funded Defence and single Service policies, on behalf of the customer(s). It is the conduit through which a Training Organisation/School is commanded/headed, resourced and administered.

relating to the training delivered by DCTS. DCTS Training Support Handbooks are available on the following topics:

Analysis Instructional Design

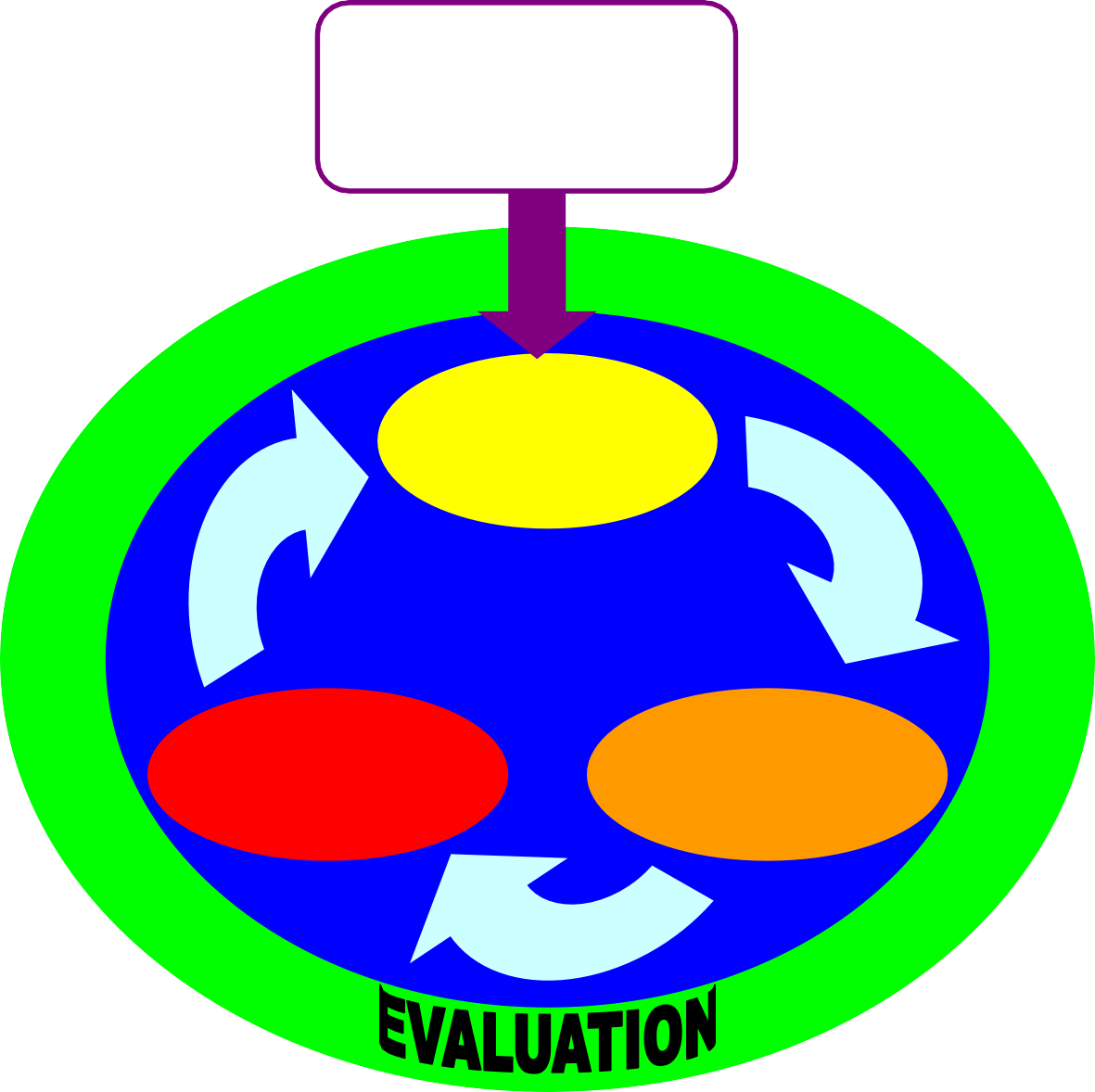
Course Programming Assessment

InVal and ExVal Training Needs Analysis

Data Gathering and Analysis Techniques Audit

# OVERVIEW OF THE DSAT PROCESS

1. The DSAT process is illustrated in Figure 1 demonstrating how the main process groups are needed for the comprehensive Analysis, Design and Development exercise. These groups are:
   1. Needs Analysis.
   2. Training Design and Development.
   3. Training Delivery.
   4. Evaluation (DTSM 4 deals with the Evaluation of Training).



Change in, or review of, operations/business triggers a perceived need for Training

**NEEDS ANALYSIS**

**TRAINING DELIVERY**

**TRAINING DESIGN & DEVELOPMENT**

Figure 1 – DSAT Process

1. **Scoping Exercise.** This exercise should be triggered when a change in business or operational practices creates a perception that either new training is required or existing training needs to change. The exercise identifies if new or changed training is the solution to the problem. Provided that training is deemed necessary then the Scoping Exercise will identify the method of and resources needed for the subsequent steps of Needs Analysis and Training Design and Development.
2. **Needs Analysis.** Following a Scoping Exercise that recommends a training solution, a Needs Analysis is required to ascertain the type and scope of the operational/business need. The Needs Analysis may, in its simplest form, be a discussion between the key stakeholders, which will ultimately result in the production of an Operational Performance Statement (OPS) or Competence Framework (CF), which is the documented agreement of the needs to be addressed. Where there is a change in the business/ operational capability that is likely to have a significant impact on the training resources required, a Training Needs Analysis (TNA) should be conducted. The conduct of TNAs is detailed in DTSM 3.
3. **Training Design and Development.** The results of the needs analysis phase inform the Training Design and Development process. This process builds on the performance objectives produced by the needs analysis phase and derives achievable Training Objectives (TOs) and training solutions. The Objectives and Solutions must be agreed between the TRA7 and the training provider. This process must yield a Formal Training Statement in sufficient detail to allow the training provider to deliver a trainee trained to the standard as close as possible to the operational/workplace performance objectives. This forms the detail of the contract between the TRA and the Training Provider.
4. **Training Delivery.** The results of the Training Design process result in training delivery, which is the process by which learning transfer to trainees/students occurs.
5. Figure 2 provides an illustrative process diagram of the analysis, design and development of training and shows how the production of the key DSAT documentation is linked to the 3 stages of Training Design.

7 The TRA represents the end-user of the trained output. It is the ultimate authority for the derivation and maintenance of the Operational Performance Statement (OPS) or the Learning Objectives/elements of the appropriate Competence Framework (CF), and is responsible for the evaluation of the effect of the training and education in achieving that OPS/CF (delivered both in the training school/organisation and the workplace).



A change in, or review of, operational/business practices triggers a perceived requirement for training.

**Scoping Report**

Is a training intervention required?

**NO**

Stop DSAT process.

**YES**

**Operational Performance Statement/ Competence Framework**

**Formal training Statement**

**Instructional Specification**

**TRAINING DELIVERY**

**EVALUATION**

Applied to all stages of the DSAT process as appropriate

**EVALUATION**

Applied to all stages of the DSAT process as appropriate

**Assessment Strategy (incorporating Assessment Specification)**

**TRAINING DESIGN & DEVELOPMENT – STAGE 3**

(Production of Training and Assessment Media)

**TRAINING DESIGN & DEVELOPMENT – STAGE 2**

**TRAINING DESIGN & DEVELOPMENT – STAGE 1**

(Determination of Training Objectives)

**NEEDS ANALYSIS**

**SCOPING EXERCISE**

Figure 2 DSAT Illustrative Process Diagram.

1. Evaluation is ‘the process of measuring the total worth of training to an organisation. It allows an organisation to monitor the impact of training and assess what has been achieved, whether it was effective and how this has contributed to the achievement of an organisation’s goals and targets.’8
2. The effectiveness and efficiency of this process will be reliant upon the following activities:
   1. **Validation**. Validation ensures that the processes and products of training meet Defence requirements. It is divided into Internal Validation (InVal) and

8 DSAT QS 002:2003

External Validation (ExVal). They will be covered in Sections 3 and 4 of this manual.

* 1. **Audit**. Audit determines the extent to which the whole training system meets the criteria set out in the DSAT QS. The auditing and inspection of individual training is covered in DTSM 6.

1. **Aims**. Evaluation should aim to ensure that training activities are focused towards the achievement of the business/operational needs of Defence. Evaluation processes and procedures should ensure that training is:
   1. Efficient and Effective.
   2. Focused - The training should be focused on operational/business goals. The trained output should be able to perform their job competently.
   3. Necessary - A requirement for training must be identified.
   4. Flexible - The training must be responsive to a change in circumstances.
   5. Appropriate - The training product should match the employment need.

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DATA GATHERING AND ANALYSIS TECHNIQUES

1. The ability of trained personnel to do the job is the key aspect to be considered when a course of training is validated. Ideally the information on job performance should be gathered by continuous observation of the whole job, but in reality this impracticable and the best that can be achieved is observation of those tasks selected as containing skills critical to the job. Other methods besides observations are therefore needed to obtain information on job performance.
2. Interviews, observations and questionnaires may be regarded as measuring instruments, since the information they provide is used as a measure of opinion/behaviour. Any measuring instrument must possess certain basic characteristics to be of use, regardless of whether the instrument is simple, such as a rule (for measuring the length of rods), or more complicated, such as a questionnaire (for measuring attitudes or opinions).

Characteristics of Data Gathering Tools

1. The characteristics that all measuring instruments should possess are as follows:
   1. Validity. A measuring instrument is valid; that is, relevant and appropriate, if it measures what it is intended to measure. It would not be valid to use a tape measure to attempt to measure the weight of a rod. Similarly, in training the most valid measuring instrument for a practical skill is a practical test, not a written test. The written test may well test whether the trainee knows what to do in a practical task, but will not test whether the trainee can actually do it. The written test is not valid because it is measuring the wrong thing. If a measuring instrument is not valid it should not be used, however effective its other characteristics.
   2. Reliability**.** A measuring instrument is reliable if it gives consistent results. A tape measure made of elastic would not be a reliable measuring instrument because it would give inconsistent results. Similarly a test or questionnaire, when administered to two very similar groups, would not be reliable unless it gave similar results. If it is a reliable measuring instrument it should also give similar results when it is administered twice to the same group at different times. If a test, questionnaire, report form or interview is not reliable it should not be used.
   3. Standard. A measuring instrument should be as standard as possible. It should be administered to different groups under the same conditions. If an instrument is not standard its reliability will be jeopardised. For example, interviewing one person outside in the pouring rain and another inside a warm office may give you different results simply because you are not using a standard environment.
   4. Discrimination. A measuring instrument should be sensitive enough to record differences between individuals in what is being measured. For example, a questionnaire that permitted only ‘yes’ or ‘no’ responses would not indicate levels of agreement or disagreement held by Job Holders9 and these might be important. Similarly, the inability to discriminate between satisfactory and unsatisfactory training is of no use.
   5. Practicability. Any assessment of training must be administratively practicable. A theoretically superb assessment system is of no use if practical limitations, such as time, cost or manpower considerations prevent it from being used.

9 For the purpose of this manual the terms ‘Job Holder’ and ‘Ex-Trainee’ are synonymous

FACTORS INFLUENCING THE CHOICE OF DATA GATHERING TOOLS

1. Data Gathering Plan. The choice of data gathering tools is crucial in determining the effectiveness of the study. Influencing factors can be identified as follows:
   1. The Sponsor’s reason(s) for directing the study to be conducted.
   2. The resources allocated to the task:
      1. Time scale.
      2. Manpower.
      3. Funding.
   3. Level of expertise of the analysts.
   4. The size of the Target Population:
      1. Numbers of Job Holders (Ex-Trainees) and Supervisors/Line Managers.
      2. Rank/experience.
      3. Trades/skill levels.
      4. Availability of Target Population/geographical influences. For example, questionnaires may be preferable to face to face interviews for a widely dispersed population in distant locations.
2. A Data Gathering Plan should be produced at an early stage in the project highlighting the tools, sources of data and resources that will be used. The relative advantages and disadvantages of the main data gathering process are discussed later in this annex.

Ethical considerations when gathering data.

1. There are several ethical considerations that need to be adhered to throughout the data collection process. If for example, a respondent has faced a ‘difficult’ phone call from their line manager as a result of answers given to a questionnaire, then this could be considered damaging to that individual and they may have cause to take further action. The respondents right to privacy and the right to refuse to answer certain questions, or to be interviewed at all, should always be respected, and no undue pressure should be brought to bear. The reason for this caution whilst undertaking data collection is not only for the interviewee’s benefit but also for the interviewers. If an interviewee believes that answering questions honestly will harm them then they are more likely to give bland, misleading and uninformative answers. Any evaluation based on such data is invalid. When conducting interviews a manner conducive to following sound ethical considerations should be followed. Examples are provided as follows:
   1. Honesty. The interviewer should portray a non-threatening manner and remain truthful and faithful to the purpose of the interview. This ensures that the interviewee also gives honest answers to any questions.
   2. Impartiality. Regardless of the analyst’s own particular viewpoint, an interview or questionnaire analysis should remain objective, valid, reliable and accurate. No attempt should be made to persuade a respondent to agree with the analyst’s perspective, for example an interviewer must be careful not to ask leading questions.
   3. Relevance. The reason for the data collection and the target population is to be made clear. The data collection tool must be objective and economic with the respondent’s time. For example an interview should be concise and focused. Rushed interviews with irrelevant questions reduce the credibility of the interviewer and the reliability of the data gathered.
   4. Confidentiality. If the data collected is to remain confidential, and the analyst has stated this, then confidentiality must be observed. If the respondent wishes to remain anonymous and if the analyst agrees then this agreement must also be observed. It may also be important that it is explained who will see the data collected and the analysis of the collected data. Such openness on the part of the analyst leads to respondents being equally open.
   5. Anonymity. Consideration needs to be given when anonymity is to be used. If follow up interviews are to be undertaken as a result of the data gathered from questionnaires then it is important to have those details of individuals filling in the questionnaire. Consequently, the reason for the lack of anonymity should be stated as part of the instruction to the questionnaire. Additionally, individuals are more likely to complete questionnaires if they know what is going to happen with the data collected and the completed questionnaires. If there is no requirement to know who has completed a questionnaire or interview then anonymity is recommended.
   6. Control of Data. The Data Protection Act (DPA) 1998 gives rights to the individuals about whom information is held and processed. They may request information about themselves, challenge it if appropriate and, in certain circumstances, claim compensation. The Act also placed obligation on those who record and use personal data (data users). They must be open about that use (through the Data Protection Commissioner) and follow sound and proper practices (The Data Protection Principles). Data can include material produced manually as well as that which is processed using automated means. Further information about the DPA is available in Joint Service Publication (JSP) 400 - Disclosure of Information. JSP 400 - Disclosure of Information supersedes JSP 406 - Guidance to the Data Protection Act 1984.

DATA GATHERING METHODS

1. Once the objective(s) of the research have been clearly stated, including the sample/population size and the quality and type of information to be received (either qualitative or quantitative data), then the process of establishing the technique to be employed to gather the data can begin. The choice of data gathering technique(s) will depend on the sample size, resource implications and many other factors.
2. Questionnaire. A questionnaire can be used to cover a large number of people at relatively low cost and the data it provides is generally easy to analyse. However, questionnaires are difficult to design, do not always allow great flexibility, and response rates are not always as high as the team doing the analysis would wish.
3. Interview. Data can be gathered from jobholders and their employers by interview. While the interview allows the personal touch to be brought to the analysis process, and its inherent flexibility, care needs to be taken to avoid bias. The process is time-consuming and data analysis can be difficult.
4. Observation. Observation of personnel carrying out their tasks can also provide useful information but it is a very labour-intensive means of acquiring data. It is usually

limited by the range of tasks being undertaken and can be misleading if the observer is unfamiliar with the task.

1. Document Research. When conducting a study it may be necessary to consult documents such interim reports from on-going related studies, exercise reports, operational reports, current training documentation, doctrine and policy documents and manufacturer’s manuals**.**
2. A Conference of Experts. This is sometimes known as a Technical Conference or Focus Group and is held when it is necessary to discuss the nature of the job with others who are experts in that particular field. In some cases this may be the only data gathering method available or needed. It produces quick results, but the problem with experts is that they tend to overlook routine aspects of a job that could present problems to the non- expert. This method can also be used to analyse findings, e.g. from questionnaires.
3. Critical Incident Technique. The Critical Incident Technique is the procedure for collecting observed incidents that have proven very important or critical to performance. It has been used extensively in civilian flight safety investigations and can be used to provide data on the relevance of training to performance of the job or task. However, this technique can be very lengthy and labour intensive when used to identify the whole spectrum of tasks that make up a particular job.
4. The active data gathering tools (use of the questionnaire, interview and observation) will be discussed in greater detail in the remaining paragraphs of this section.

QUESTIONNAIRES

1. Questionnaires sent to ex-trainees sometime after their course can provide useful information about the relevance of training. Questionnaires should be sent out on a routine basis to ex-trainees and their supervisors at an appropriate period on completion of training (normally 6-9 months). This type of questionnaire is ‘Broad Scope’ in that it looks all the tasks conducted, but is of ‘Limited Depth’, addressing the following areas:
   1. Do the operators carry out the tasks for which they were trained?
   2. How well were the operators trained for these tasks?
   3. Do the operators carry out any other tasks for which they were not trained?
2. Constructing a Questionnaire*.* When producing a questionnaire the following points should be borne in mind:
   1. Introduction/Rapport. The introduction, or covering letter, to the questionnaire is very important, because unless the full co-operation of the respondent is obtained the results are useless. To ensure willing co-operation, the questionnaire should create and maintain rapport with the respondent. The purpose of the questionnaire should be explained whether in a written introduction or by the person administering the questionnaire. It should be made clear that respondents’ opinions are valued and will make a difference to the results of the project.
   2. Presentation. The questionnaire should look well prepared and be easy to complete.
   3. Instructions. Instructions on how to complete the questions should be simple, clear and concise.
   4. Language. The language used in questions asking for criticisms should be impersonal and permit the expression of frank replies.
   5. Questions. Questions should be:
      1. As short as comprehensive coverage allows and must be relevant to the information required.
      2. In a logical sequence, questions relating to a specific subject should be placed together.
      3. Precise and specific. Vague questions will lead to vague responses due to different interpretation. If a group of questions does not apply to everyone it must be made apparent who is to answer them, others should be directed on to the next section.
      4. Capable of being answered. Respondents must be capable of answering the questions and have adequate knowledge/experience to provide meaningful responses.
   6. Confidentiality. Respondent must be reassured that the questionnaire will be treated in strict confidence and that completed questionnaires will only be seen by the analysis team and destroyed once analysis is completed.
   7. Clarification. Provide a contact name and telephone number for any queries. Include a date for completion and return of the questionnaire.
   8. Personal Details. One part of the questionnaire from which the analyst can obtain useful data is the section on personal details. In deciding what personal details are required, the analyst will be guided by the requirement of the analysis. The analyst must ensure that the questionnaire asks for all the details that will provide meaningful data for the analysis, while at the same time not asking for details that are clearly irrelevant to the analysis, as by doing so this may tend to alienate some respondents. If the analyst requires some particular detail, but considers that the respondent may not realise why it is required, the analyst must explain the reason behind asking for the information. Increasing the degree of openness of the potential response received can be achieved by offering anonymity (discussed in para 17 of this section) by not including clearly attributable details in the personal details. However, if anonymity is quoted it must be honoured. Questions over confidentiality can not only taint the study but may also negate the chance for further open and honest dialogue.
   9. Dangerous Questions. There are certain types of questions which should be regarded as ‘dangerous’, producing inaccurate and immeasurable answers, or at best, vague responses which can easily be misinterpreted:
      1. Multiple Questions. These have a variety of responses ‘Yes/Yes’ ‘Yes/No’ ‘No/Yes’ ‘No/No’ for example ‘Are you supervised at work and do you rely on manuals?
      2. Negative Questions. These are difficult to understand and it is unclear what the response means for example to answer ‘No’ to the question ‘Would you prefer not to have to account for this equipment?’ is confusing. Questions are more readily understood if phrased in the positive for example ‘Do you think you should account for this equipment?’
      3. Leading Questions. Beginning the question with words such as ‘It’s obvious that…’ can influence the respondent’s reply. In the closed question

format limiting the fields of response to ‘Very Interesting’ ‘Interesting’ and ‘Of some interest’ steers the respondent away from the response ‘Tedious’.

* + 1. Loaded Questions. These are similar to leading questions, but tend to have an emotional overtone, for example ‘Which of the following tasks do you find the most time consuming?’
    2. Prestige Bias Questions. Some questions may tempt the respondents to reply in a way that will present them in the strongest light, hence there might be a reluctance to admit that certain tasks are difficult or never carried out.

1. Anonymous Questionnaires. Making the questionnaire anonymous (not adding clearly identifiable details which can be traced) has the advantage of encouraging more candid responses, increasing the degree of openness. However, its main drawback is that it is not possible to analyse the responses further, through follow up interviews. If anonymity is promised it must be honoured. Questions over confidentiality not only taint the study, but also may negate the opportunity for further open and objective dialogue.
2. Advantages and Disadvantages of Questionnaires. When gathering data using written questionnaires analysts must be aware of the respective advantages and disadvantages:
   1. Advantages:
      1. Relatively cheap way of data collection.
      2. Large target population.
      3. Objective – no interview bias.
      4. Easy to analyse quantitative data through Optical Mark Reader.
      5. Anonymous.
   2. Disadvantages:
      1. Lack of flexibility limit depth of analysis.
      2. Response rate may be low.
      3. Impersonal - difficult to establish a rapport with respondent.
      4. Limited by length.

INTERVIEWS

1. Purpose. The interview is a fundamental tool of any data gathering process, it is not an aimless chat but a method of obtaining specific information. An interviewer must work out beforehand what information is required; otherwise, the interview will be ineffective and a waste of time. The questions should be incorporated into an interview schedule, which will:
   1. Remind the interviewer of the areas that must be covered.
   2. Provide a framework for the interview and ensure that data are collected in a systematic and standardised way.

This is referred to as the ‘Structured interview’. ‘Unstructured Interviews’ are those that follow a very vague structure where the interviewer has identified general themes that they wish to cover. The control of the direction of this type of interview lies more with the

interviewee than the interviewer; this may cause problems but can also be positive if the interviewer has only a limited knowledge about the subject matter of the interview.

1. Interviews involve going outside the immediate training organisation interviewing employing officers and ex-trainees at all levels in field units. Gaining entry to these units and access to those who are required for interview needs careful planning and proper authority. The question of the appropriate ranks of interviewer and interviewee should also be considered.
2. Advantages and Disadvantages of Interviews. Interviews have the advantage of being flexible allowing subjects not previously considered by the interviewer to be raised and explored. They can be extremely time consuming, hence they may be used to clarify issues raised from questionnaires for relatively small numbers. A structure must be developed (see Interview Schedule para 23 below) to record the strength of opinions given. Interviewers need to be trained if similar opinions are to be rated by the same interviewer. Once achieved information obtained from different interviewers can be compared:
   1. Advantages:
      1. It facilitates relevant analysis. The interviewer can select only those questions that are relevant to a particular situation. This is particularly important when the job in question is unusual and it would be time-consuming, costly and unacceptably bulky to produce a detailed postal questionnaire to cover all possibilities.
      2. Can be conducted with reasonable speed (depending on circumstances).
      3. Wide range of topics can be covered to required depth. Entirely new points of interest can arise. The interviewer can deal with these immediately and add them to the list of questions to be put to all remaining respondents.
      4. Personal contact can reinforce commitment to study and raise response rate.
      5. The interviewer can check that the respondent has understood technical expressions and terms, which have been used in the postal questionnaire. For example, a term like 'Defence Writing' is open to numerous interpretations. To one person it may mean the mechanics of writing, i.e. layout, conventions etc, while to another it concerns matters of style and content.
   2. Disadvantages:
      1. Time intensive, not only interview itself, but the analysis of data it produces.
      2. Data may be of complex nature– difficult for interviewer to analyse and formulate questions at same time.
      3. Identifying trends is not an easy activity.
      4. Lack of objectivity, further to which the relationship between interviewer and respondent can become confrontational limiting transmission of objective information.
      5. Can be influenced by perception – there may be bias for, as well as against a particular topic.

THE INTERVIEW SCHEDULE

1. The Interview Schedule can be regarded as a verbal questionnaire, but differs from the written questionnaire in that the instructions are for the interviewer, not the respondent (interviewee). The instructions should indicate:
   1. The amount/level of background information to be provided.
   2. The amount of prompting allowed.
   3. The method(s) of recording and interpreting responses.

The instructions should assist the interviewer in conducting the interview allowing them to place a mark against one of the responses already included on the sheet e.g. enabling the interviewer to place a tick against one of the responses. However, there should be sufficient space to record open responses.

General Techniques of Interviewing

1. An interview is not an interrogation but a relaxed, two way exchange with the interviewer maintaining an open and understanding attitude. The interviewer must not, however, allow the interview to pass from their control. The structure of the interview must be decided beforehand on the basis of the information required. While the interviewer must be flexible and allow the subjects to express themselves, the interviewer must be firm and maintain control.
2. The effective interviewer listens, adapts their approach to what is being said and avoids interpreting what is said to fit in with their own ideas. Interviewing is a skill that must be learned and practised. Although there is no one correct way of conducting an interview, the following guidelines may be of assistance
   1. Rapport. In order to establish good contact with the interviewee, the interviewer needs to carry out the following tasks:
      1. Decide the purpose of the interview and what is to be gained from it.
      2. Decide the questions to be asked during the interview.
      3. Ensure that any information, reports or data required to back-up the interview are readily available.
      4. Decide when the interview is to take place. Arrange a convenient time for both interviewer and interviewee so that there is no need to rush the interview.
      5. Arrange a suitable location for the interview. Avoid discomfort or distractions. A comfortable room without a telephone is ideal. Telephone interruptions can destroy the relationship built up between the interviewer and interviewee. One of the most irritating distractions is that of people ‘barging in’ during the interview. Prevent this from happening by placing an, ‘Interview In Progress – Please Do Not Enter’ notice on the door.
      6. A friendly, sympathetic, but emotionally detached relationship should be established to put the respondent at ease. This should gain their confidence and thus persuade them to talk freely and frankly about themselves.
      7. Whenever a candidate has to wait in another room before the interview, the interviewer should always escort them into the interview room. In this way contact is made in less formal surroundings than the interview room; the rapport thus established can help to smooth the way into the interview itself.
      8. The interviewer(s) should introduce themselves fully.
      9. The interviewee should be told the reason for the interview.
      10. Difficult or controversial topics at the beginning of an interview should be avoided. Allow the interviewee to get used to talking, this can be achieved by starting with an ‘easy to talk about topic’.
   2. Content. The interviewer can elicit facts efficiently only if they ask the right sort of question and pose them in an appropriate manner. The main points to note are as follows:
      1. Do Not Read Out Facts. Repeating information that is already available in forms or publications wastes time and can antagonise the interviewee.
      2. Use Appropriate Language Level. The interviewer should make sure the interviewee understands the questions using the most appropriate vocabulary for the interview.
      3. Ask One Question at a Time. Rambling, multiple questions confuse the interviewee and are difficult to answer. Keep questions simple, unambiguous and to the point.
      4. Avoid Leading Questions. Avoid questions that hint at the answer expected; some interviewees will tend to give the answer they think is wanted.
      5. Avoid Trick Questions. Trick questions that attempt to ‘catch out’ the interviewee provide little information and can endanger the contact that has been built up.
      6. Use Comparative Questions. It is easier for an interviewee to say which of two things he finds more difficult than it is for him to state how difficult something is in absolute terms.
      7. Use Indirect Questions. The interviewer should try to use questions beginning with words such as "*tell me about*...” "*how*...", "*when*...", "*why*...", rather than those which demand a simple "*yes*" or "*no*" answer.
   3. Control. To ensure that the interview flows smoothly from topic to topic and control is retained, the interviewer should attempt to observe the following guidelines:
      1. Avoid Interruptions. Interruptions can cut off the interviewee's train of thought. The interviewer should interrupt only when necessary in order to avoid digression, or to regain control.
      2. Use Pauses Wisely. Do not rush to fill any pauses that may occur in an interview with another question. Pauses give both interviewer and interviewee a chance to consider what has been said and the interviewee may spontaneously continue with further information.
      3. Handle Delicate Issues Carefully. On occasion it may be necessary to ask questions about topics which are emotionally charged or which may

cause distress or embarrassment. These topics should be left until effective rapport has been established, introduced when a natural opportunity occurs and discussed in an open, objective, but tactful way.

* + 1. Summarise. It is useful occasionally to summarise what has been covered. This helps ensure that all the relevant points are covered and that the interviewee’s statements have been understood.
    2. Be Flexible. The main advantage of the interview is its flexibility in that points can be followed up as and when they arise. This advantage will be lost if the interviewer follows a preconceived plan rigidly and without reference to what has been said. The interviewer must:
       1. Be prepared to adapt themselves to the natural flow of the interview.
       2. Follow up leads as necessary.
       3. Ensure that, in the end, all the information required has been obtained he needs.
    3. Interview Schedules. It is impossible to remember everything that was said in an interview. To avoid later distortion, interviewers must try to record responses during the interview, without breaking contact with the interviewer.
    4. Beware of Bias. The purpose of the interview is to collect information as accurately and objectively as possible. The interviewer should guard against introducing bias by interpreting the replies he gets to fit in with their preconceived ideas. It is also important to avoid biasing the replies he gets by expressing approval/censure. The interviewer must suppress their own opinions and feelings and help the flow of conversation with neutral phrases such as "*good*", "*I see*" or "*go on*".
    5. Interviewee Questions. After answering a series of questions it is reasonable to allow the interviewee to ask some of their own. These should be answered before ending the interview.
    6. Thank Interviewees. Finally, end the interview on the right note and thank the interviewee for their help and information. Remember that it may be necessary to interview them again at a later date.

1. Interviewing Techniques Checklist. The following list is a summary of points to consider when conducting an interview as part of the data gathering process.
   1. Contact.
      1. Be prepared: ‘read in and ready’.
      2. Ensure a suitable environment.
      3. In time and enough time.
      4. Introduce yourself (if necessary).
      5. Be pleasant but not too amiable.
      6. Make sure the interviewee knows the object of the interview.
      7. Reduce tension.
      8. Start with an ‘easy to talk about’ topic.
   2. Content.
      1. Do not read out facts from forms.
      2. Use the appropriate language level: adjust as necessary.
      3. Ask one question at a time
      4. Avoid leading questions.
      5. Avoid trick questions.
      6. Make use of comparative questions.
      7. Use indirect open questions.
      8. Distinguish between skill and enthusiasm.
      9. Explore the reasons for statements.
   3. Control.
      1. Avoid interrupting the interviewee.
      2. Use pauses widely.
      3. Handle delicate issues carefully and as opportunity occurs.
      4. Summarise from time to time.
      5. Be flexible rather than rigid.
      6. Use open, probing then linked questions.
      7. Follow leads given by the interviewee.
      8. Keep a balance between the points of your plan.
      9. Make notes.
      10. Beware of bias.
      11. Avoid reproof or ridicule.
      12. Give the interviewee chance to add points at the end.
      13. Answer interviewees’ questions and thank them.
2. Recording Responses. It is rarely possible to record all that a respondent says during an interview and it would be of little value in any case since all the answers would then appear to be different. What is necessary is the grouping of answers under suitable headings, so that the completed schedule will indicate clearly and concisely what the interviewee may have taken a quarter of an hour to say. It is then appropriate for the interviewer to indicate how the answer has been recorded, e.g. "*Am I right in putting you down as saying*?" This gives the respondent time to think again and for the interviewer to check that what has been said has really been understood. If the answer does not fit under an already accepted heading then it must be inserted under a new heading, which will in turn be available for all subsequent interviews. A cassette recorder (or pocket- dictating machine) may be useful, but can also inhibit interviewees. It is worth broaching the subject in advance and trying to dispel any fears the interviewee may have. Attempt to transcribe a recording is prohibitive, due to the amount of time required. It may be worth considering the use of a second team member to record responses. This will leave the interviewer free to concentrate and develop the interview.
3. A successful interview is dependent upon:

* Careful planning.
* Good questioning technique.
* Establishing an effective good rapport with the interviewee(s).

OBSERVATIONS

1. Observation involves watching, recording and analysing. Observing a particular activity is influenced by the fact that human perception is highly selective. The fact that an individual is equipped with functioning senses does not make that person a skilled observer. Different people looking at the same design or object will see different things, due in part to their interests, biases and backgrounds.
2. Coding. The observation may be unstructured, with the person who is observing being as open-minded as possible and using his or her judgment about which events are considered important. Alternatively, it may be highly structured by the use of coded schedules that guide attention to specific types of event. The categories that are selected will be those where changes are expected as a result of training, or those that are thought to be particularly important to the success of the job. Different perceptions held by different people do not necessarily preclude observation from being a valid and reliable data collection tool when used by trained and prepared observers. Coded observation schedules can be used to guide attention to specific types of event. Categories selected are those where changes are expected as a result of training, or those thought to be of particular importance to the job.
3. Advantages and Disadvantages of Observations. Observation of procedure is important in the areas of skills training and relates particularly to the areas of speed, sequencing, manual dexterity and safety. As with questionnaires and interviews, to be effective observations require formal structure in the form of an observation schedule. The advantages and disadvantages of gathering data by observation are highlighted as follows:
   1. Advantages:
      1. Direct experience can be utilised.
      2. Real time analysis.
      3. Can be done without co-operation of operator.
      4. Whole situation of activity is included.
      5. Activity is placed in context – aids understanding.
   2. Disadvantages:
      1. May lack objectivity – influenced by perception.
      2. Potential blizzard of information.
      3. May concentrate on unrepresentative individual(s).
      4. False performance - Operators aware of being observed.
      5. Time intensive.

REPORTS

1. Training Reports. These should cover an ex-trainee’s (Job Holder’s) on the job performance and should be completed by the employing officer/line manager. Reports should be structured if they are to be of value. Examples of training reports are as follows:
   1. RN: Form S3018.
   2. Army: Training Deficiency Reports.
   3. RAF: Training Improvement Form (TIF).
2. Open–ended report forms may be administratively feasible, but may suffer from lack of relevance, as the type of comment(s) required may not be clear to reporting officer. In addition to which they may lack comprehensiveness, due to limitations of space and time. They are usually fragmentary and often misguided. Report forms using rating scales are designed to direct the reporting officer’s attention to specific behaviours. This enables reports of different supervisors to be accurately quantified. The main disadvantage of this method is the restriction it places on reporting officer’s freedom of expression, although this can be mitigated by provision of room for open-ended comments.
3. Equipment Reports. These can be used to identify equipment malfunctions which may have training implications.
4. Post Exercise Reports (PXRs). These can be use to highlight the application of skills acquired during training in a realistic environment

WORK RECORDS

1. A study of the tasks carried out can give a reasonably accurate picture of the performance and the standards involved in a job. Additional records containing details of time taken, lack of skills, incidence of accidents, etc. can sometimes complement these, which can be pointers towards areas of training deficiency.

LOG BOOKS

1. The Log Book can be a valuable source of information. Its main value lies in that it allows a direct comparison to be made between what the Ex-Trainee is able to do as a result of training and what they are required to do when employed on an operational task.

PILOTING

1. Where a large-scale population is to be interviewed/canvassed by questionnaire, it will be necessary to utilise project time effectively and efficiently. Furthermore, it is necessary to ensure that the interview structure and/or questionnaire format being used will examine and deliver the requisite information. This can be achieved by piloting the design on a few members of the designated population. The aims of piloting are to allow:
   1. The systematic gathering of information to confirm validity of data gathering tools.
   2. The identification of technical inaccuracies and faults.
2. Testing the Questions. When piloting (testing) the questions the following points should be borne in mind:
   1. The question should involve only one idea.
   2. The question should be worded as simply as possible in light of the ability of the target group
   3. The question should be as brief as possible.
   4. The question as direct as possible.
   5. The question should allow the respondent to admit lack of knowledge without loss of face.
   6. The question should be positively phrased – not looking for negative response.
   7. The question should not influence the response.
3. When the initial construction is complete, in addition to testing the questions, the questionnaire must be piloted as follows:
   1. The questionnaire is completed by an individual under the close supervision and with the assistance of the designer. Any difficulties found or comments made by the person completing it should be noted. The individual chosen should be either a member of the group for whom the questionnaire is intended, or as much like the members of this group as possible. Ideally, this procedure should be carried out a number of times with different people.
   2. The questionnaire is amended to solve problems and ambiguities found in the first stage.
   3. The amended questionnaire is then completed under the same conditions that will prevail when it is eventually administered. Again, members of the group used should be as near as possible to those for whom the questionnaire is intended. The respondents should be asked for comments or criticisms after they have completed the questionnaire.
   4. The questionnaire is amended to eliminate any difficulties or ambiguities remaining. Analysis of the answers given should assist in indicating any inconsistencies in answers that may be the fault of the questionnaire.
4. Only after effective piloting can the questionnaire be considered ready for use. Even then the questionnaire will not be perfect. Answers given and comments made by those completing the questionnaire will indicate, in some cases, that further amendments are required:
   1. If the structure of the design does not need any alteration following the pilot, then information obtained from the pilot can be used as part of the population data. However, where the population is to be analysed by sampling in order to prevent any misrepresentation or confusion the data-gathering pilot should be conducted on a separate sample of the population.
   2. Once the objective(s) of the study has/have clearly been stated, including sample/population size and the quality and type of information to be received (qualitative and quantitative) the process of establishing the data gathering techniques can begin.
5. Sources of Information. When conducting a pilot careful consideration should be given as to who would be the best source of information for particular areas:
   1. Subject Matter Experts (SME) and Trainers can provide useful feedback in respect of the technical content included in the interview/questionnaire and the language used.
   2. Representative operators can be used to review the responses already obtained from SME input. In addition they can also provided information on:
      1. Operator reaction.
      2. Ease of completion.
      3. Sequence of activities.
      4. Time taken to complete questionnaire.
      5. Depth of response required.
6. Piloting Pre-Requisites. There are certain pre-requisites for piloting when carrying out a study:
   1. High cost.
   2. Large target population.
   3. Complex subject matter.
   4. Tasks of a critical nature.

ANALYSING COLLECTED DATA

TRIANGULATION OF DATA

1. Triangulation is the combination of different data gathering techniques to investigate the same issue and will usually combine both quantitative and qualitative data methods. For example, rather than simply completing a questionnaire in respect of how an individual performs a task, they might also be interviewed and observed conducting the task. The use of questionnaires together with observation, or qualitative with quantitative data gathering techniques for example, can reduce the chance of distorting the results or introducing bias within the methodology. To that end Triangulation allows greater confidence in the research results regardless of the data gathering methodologies applied
2. Collecting data can be gained from a number of different points of view: the Job Holders (Ex-Trainees), the Job Holders’ Supervisors/Line Managers and the participant observer. The Job Holders can reflect on the adequacy of the training they received, the Line Managers can comment on their performance when carrying out their job. The observer can collect first hand data of the job Holders conducting the job tasks. Comparing these sources of information enables a more accurate and unbiased method of data gathering.
3. The combination of different data gathering techniques to investigate a particular issue usually is a combination of both qualitative and quantitative methods:
   1. Triangulation of Analysts. This uses 3 or more analysts to look at the same set of data independently. If similar findings come from all analysts then it is likely that objectivity is being applied
   2. Triangulation of Data. This involves 3 or more types or sets of data and subject them to the same analytical procedures. For example, if interview notes, questionnaire responses and observation notes produce similar findings it is likely that the analytical process is being applied objectively.
   3. Triangulation of Target Population. This concerns 3 or more types of target population, e.g. the ex trainees, their immediate Line Managers/ Supervisors, Commanding Officers and Instructors. If similar findings are produced it is highly likely that an objective picture has been achieved

QUANTITATIVE DATA

1. Quantitative data are gathered using closed questions e.g. ‘yes/no or scored answers. A relatively simple easy way of processing quantitative data is through some form of frequency statement which requires the use of standardised measures so that the varying perspectives and experiences of respondents can be identified by a number of predetermined response categories. A numerical value is then assigned to each category.

QUALITATIVE DATA

1. Qualitative data can be defined as data gathered on individuals’, feelings, opinions, beliefs etc using open ended questioning. Qualitative methods allow the study of selective issues in depth and detail. Qualitative data consist of detailed textual information rather than numerical information generated by quantitative techniques. Qualitative data can be generated from 3 main types of data collections:
   1. Questionnaires/Written Documents. Document analysis in qualitative terms includes excerpts, quotations or passages from organisational records and open- ended written responses to questionnaires and surveys.
   2. Direct Observation. The data from observations consist of detailed descriptions of operators’ activities, behaviours, actions that are part of observable human experience.
   3. Interviews. The data from interviews consist of quotations from respondents about their experiences, opinions, feelings and knowledge. These aspects are elicited using open-ended questioning and can be use to confirm/clarify data obtained as per paragraphs a and b above.
2. Quantitative data by their very nature lead themselves to statistical analysis. However, with qualitative data there may be trends (patterns, themes) present, which could go unnoticed.
3. Qualitative data allow a vast amount of (potentially wide-ranging) information to be considered, allowing the respondent to provide depth of feeling over complex issues which may be difficult to elicit by purely quantitative terms alone. That said in order to obtain a full picture qualitative data should not be treated in isolation, but should be compared with quantitative data.
4. One of the problems of dealing with qualitative data is the ‘blizzard of information’ that can be reproduced. This can often be unstructured in content and resource intensive in terms of manpower and time to analyse. Such considerations need to be included during initial project management planning.
5. In analysing qualitative data the quality of the analyst must be taken into consideration, as unlike quantitative data analysis where the issues are more readily identifiable, qualitative analysis requires greater degree(s) of interpretation. Analysts must be conscious of the possibility of knee jerk reactions when confronting data for the first time

DATA CODING

1. Some form of coding (grouping, classification) is required before statistical analysis can begin identifying themes:
   1. All information needs to be read thoroughly to obtain a clear picture of the main issues.
   2. Themes/patterns/trends need to be identified and clearly highlighted.
   3. Repeated instances of these themes need to be recorded in the form of ‘Tallys’.

These ‘Tallys’ can then be recorded as numerical responses allowing follow-on statistical analysis to take place. Information can then be presented in appropriate format to highlight trends.

COMPARING OPINION

1. Opinions are important sources of information about how effective training has been in enabling the operational task (e.g. job) to be carried out. Opinions of operators and

Supervisors/Line managers can indicate weaknesses, which may not be easily recognised by observation alone. Usually opinions cannot be given numbers and compared in the same way as test scores. They are usually nominal data on which one can classify people but not rank them. This implies that one can only make frequency statements about them

- more people have expressed opinion A than opinion B. Thus, if we wish to compare the opinions of two sets of people we require analysis based on frequencies. The most useful test for frequency comparisons is the chi-squared (x²) test. The test depends upon the number of opinions falling into each category.