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# Introduction

Training Needs Analysis (TNA) is the name given to the systematic process of analysing training requirements, identifying possible training solutions to meet these requirements, and recommending the most appropriate solution for the organisation. TNA can be viewed as a subset of the processes in what is known as Systems Approach to Training (SAT), from which the term TNA was originally derived.

In the context of UK Ministry of Defence (MOD) TNA is a structured analysis of a perceived training requirement arising as a result of a new, modified or upgraded Platform, Equipment, Service, System or System of Systems (known collectively and hereon in as a Product), or as a result of a doctrinal change, organisational change, or changes to policy, UK/International regulations, directives or legislation, that has a direct or indirect impact on the MOD.

The principle Policy and Guidance used by the Ministry of Defence for all TNA is JSP 822 Defence Direction and Guidance for Training and Education JSP 822 Pt 2 V3.3 Aug 20, otherwise known as Defence Systems Approach to Training (DSAT). JSP 822 states,

*“The training and education of our people to deliver Defence outputs is a key activity. JSP 822 is the authoritative policy that directs and guides Defence people to ensure that our training and our education are appropriate, efficient, effective and, most importantly, safe. Underpinning all training and education activities is the Defence Systems Approach to Training (DSAT). It is the system that must be used by those who are involved in the Analysis, Design, Delivery, Assurance, Management and Governance of Defence training.”*

Whilst the terms ‘training’ and ‘education’ are used in their own right in JSP 822, the term ‘training’ is sometimes used to avoid repetition. In these instances, the term ‘training’ encompasses any training, education, learning or development, in an individual, team and collective training context.

For the purpose of this document the term ‘MOD’ includes all serving regular and reserve military personnel, cadet forces (where applicable), all MOD civil servants and also where applicable dependents of both military service and civil service personnel.

There is a Glossary of Abbreviations and Acronyms which can be found at [Annex A.](#_Annex_B._Glossary) In addition to the Glossary of Abbreviations and Acronyms, a list of Standards and Guidance can be found at [Annex G](#_Annex_G._Standards), all the Standards and Guidance will be made available to all Analysts.

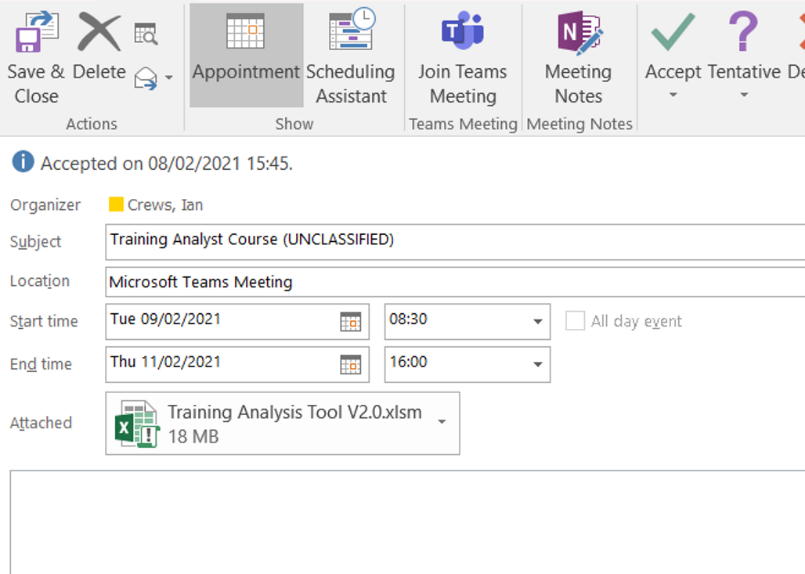
## Initial Opening and Saving of the Training Analysis Tool

The Training Analysis Tool is a Password Protected, Macro-Enabled Excel Workbook.

To open and save the Training Analysis Tool carry out the following steps.

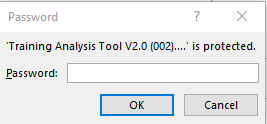
**Step 1**

You will receive an email with the Training Analysis Tool as an attachment



**Step 2**

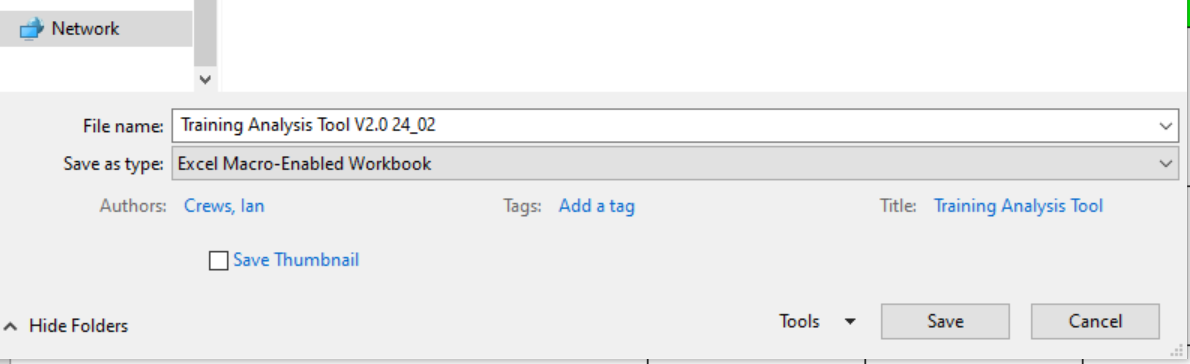
Double click on the Training Analysis Tool icon and a password request will appear



Type in the password you were provided with in your email

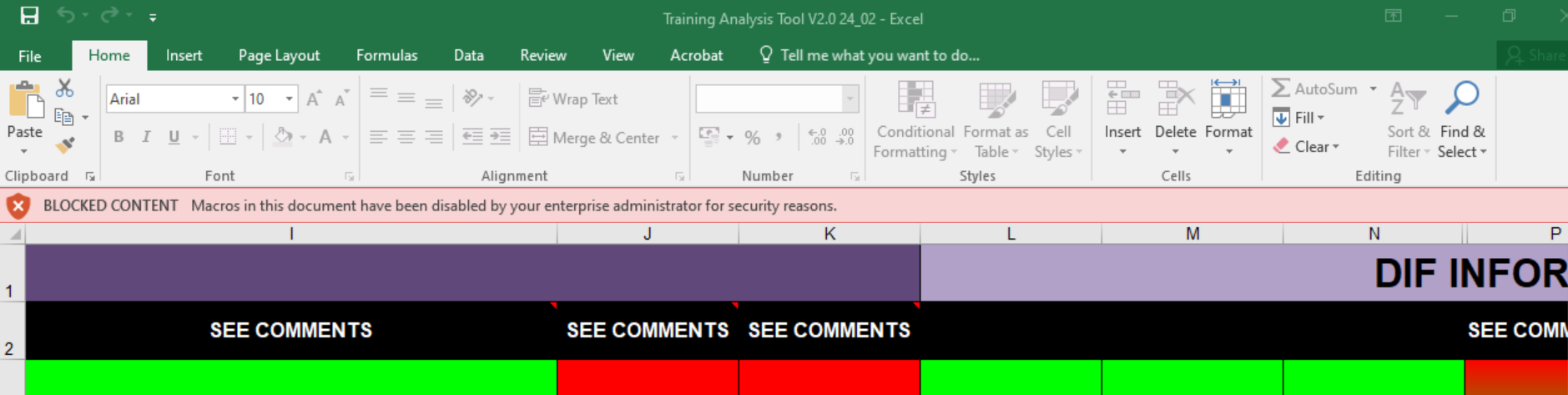
**Step 3**

Save the file to your computer under a new name



**Step 4**

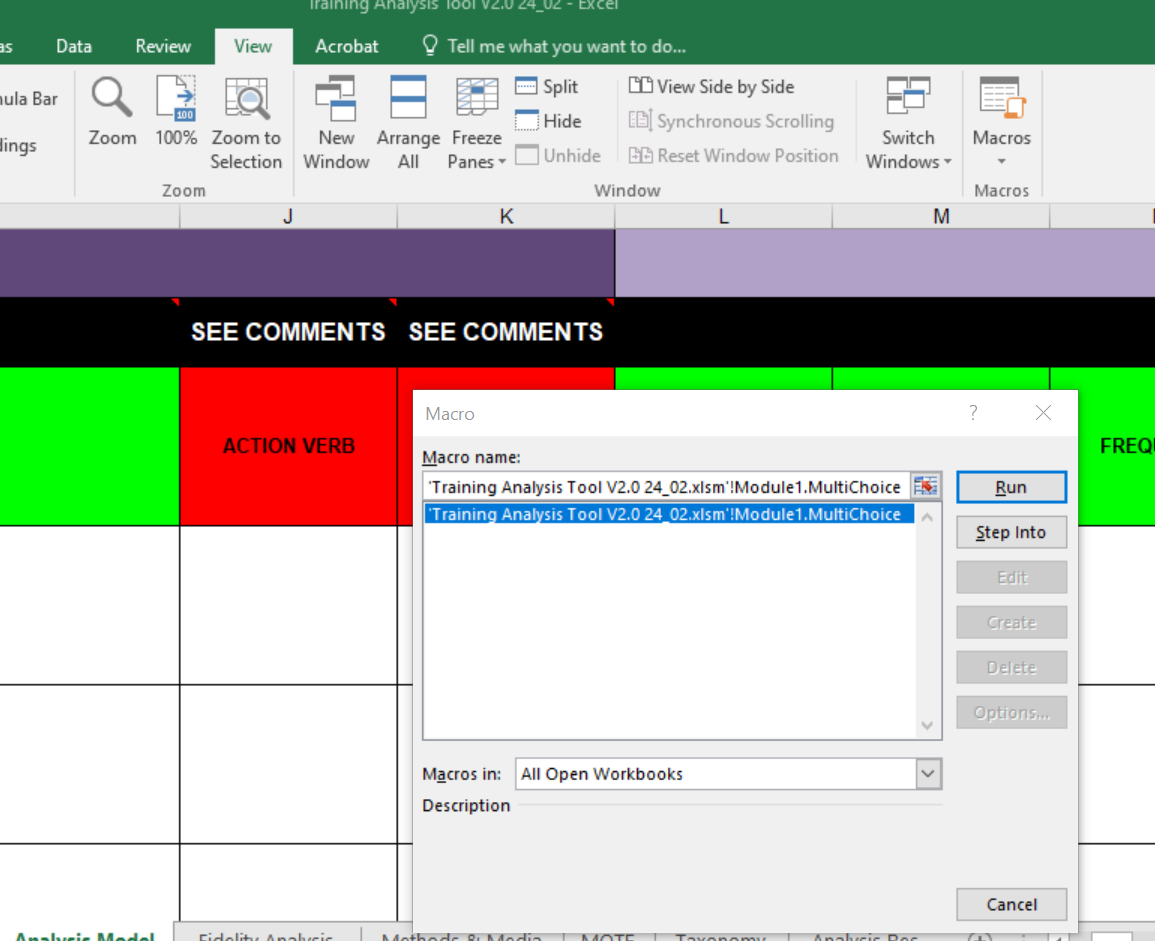
You will now see the Blocked Content Ribbon



This will prevent the inbuilt functionality from working, to overcome this follow Step 5

**Step 5**

Select **View** and then **Macros** and then **View Macros**, then **Cancel.**

****

1

3

2

Full macro functionality will now be present.

# The Training Analysis Tool

The Training Analysis Tool has been developed over a number of years and continues to evolve.

It should be remembered that it is only a “Tool,” it does not replace the mind of the Training Analyst, rather it is there to enable you to gather, process and make sense of a variety of information and data to make informed decisions.

The Training Analysis Tool enables a Training Analyst to:

* + Conduct a structured and detailed analysis of training requirements arising as a result of equipment acquisition, doctrinal change, organisational change or changes to legislation.
  + Carry out a Role (Task) Analysis (RA) to provide the evidence of a job/task to establish the performance, conditions and standards required for all jobholders affected by any new or changed requirement in order to produce an updated or new Role Performance Statement (RPS).
  + Carry out a Difficulty, Importance & Frequency (DIF) Analysis to ascertain, upgrade or downgrade a DIF Category, which will be in the final RPS (a point to note, it is only the Role Owner who can authorise the DIF Category), you as the Analyst can only question a DIF category with your designated SME, you cannot assign a DIF Category on your own.
  + Carry out an Initial Knowledge, Skills & Attitudes (KSA) Analysis which in turn will automatically generate an Indicative Level of Learning, this is something you will discuss with your SME, it can be changed on your recommendation in consultation with the SME.
  + Carry out a Training Gap Analysis (TGA) to identify the additional training requirements of the affected job holders by determining the training gap between the performance required by the RPS identified within the Task Analysis and any existing training performance, conditions and standards including Knowledge, Skills and Attitudes (KSA).
  + Carry out a preliminary Training Options Analysis to include Fidelity Analysis (if Fidelity Analysis is applicable…and it is not an automatic requirement).
  + Carry out a preliminary Methods & Media (M&M) Analysis to identify the methods and media suitable for the particular type of training in order to generate the 3 options you will need for your final Training Needs Analysis Report. The detailed M&M Analysis is carried out in Element 2 Design stage of DSAT.
  + Carry out a Method of Training Effectiveness (MOTE) Comparison to derive an objective measure of a training medium’s effectiveness in satisfying a set of training requirements in collaboration with a panel of suitable Subject Matter Experts (SMEs) to reduce the subjectivity in the MOTE.

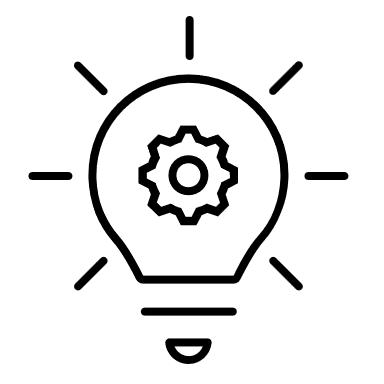
The Training Analysis Tool is simple to use and whilst linear in design, is versatile enough for you to move through it as you see fit using your knowledge, experience and intuition.

The key to using this model is to knowing when to ask the right questions at the right time.

As this guide takes you through the use of the Training Analysis Tool, explanations of certain key areas will be amplified, in all there are 40 columns in the Analysis Model Tab which contain the following headings.

| Letter | Heading |
| --- | --- |
| A | ROLE |
| B | DUTY |
| C | JOB NUMBER |
| D | TASK NUMBER |
| E | SUB-TASK NUMBER |
| F | TASK ELEMENT NUMBER |
| G | PERFORMANCE |
| H | CONDITIONS |
| I | STANDARDS |
| J | IS THIS STILL EXTANT |
| K | WHAT LEVEL OF CHANGE IS REQUIRED |
| L | ACTION VERB |
| M | MISSING VERBS |
| N | DIFFICULTY |
| O | IMPORTANCE |
| P | FREQUENCY |
| Q | MERGE |
| R | DIF CATEGORY |
| S | DIF DESCRIPTION |
| T | TAGGING |
| U | FTS |
| V | KNOWLEDGE LEVEL REQUIRED |
| W | SKILL LEVEL REQUIRED |
| X | ATTITUDE LEVEL REQUIRED |
| Y | MERGE |
| Z | KSA CATEGORY |
| AA | INDICATIVE LEVEL OF LEARNING |
| AB | ACHIEVED THROUGH |
| AC | CAN BE ACHIEVED BY |
| AD | CAN THIS (TO, EO) BE FULLY SATISFIED WITH EXISTING ASSETS? |
| AE | IF NO TO PREVIOUS QUESTION CAN THIS (TO, EO) BE COMPLETED TO AN ACCEPTABLE LEVEL BY DOING NOTHING? |
| AF | IS THERE ANY SUPPORT & GUIDANCE PROVIDED TO ENABLE THE (TO, EO) TO BE COMPLETED EFFECTIVELY? |
| AG | IF TRAINING, SUPPORT & GUIDANCE IS PROVIDED IN WHAT FORM IS IT? |
| AH | IF FORMAL TRAINING IS IN PLACE CAN YOU PROVIDE THE NAME OF THE TRAINING? |
| AI | WHAT IS THE TOTAL DURATION IN PERIODS? |
| AJ | DOES THE EXISTING TRAINING, SUPPORT & GUIDANCE FULLY SATISFY THE TOS AND EOS? |
| AK | CAN THE EXISTING TRAINING, SUPPORT & GUIDANCE BE ACCESSED AND REVIEWED? |
| AL | IF NO TO THE PREVIOUS QUESTION CAN YOU PLEASE STATE WHY? |
| AM | IS ASSESSMENT OR TESTING OF THE TO OR ANY PART THEREOF REQUIRED? |
| AN | IF ASSESSMENT OR TESTING OF THE TO OR ANY PART THEREOF IS REQUIRED IN WHAT FORM SHOULD IT TAKE? |
| AO | ASSESSMENT OR TESTING METHOD |
| AP | ADDITIONAL ASSESSMENT OR TESTING METHOD (OPTIONAL) |
| AQ | DIF CATEGORY |
| AR | KSA LEVEL |

### Table 1. Training Analysis Tool Column Headings



**You do not have to complete all 40 columns, it will be totally dependent on the complexity of the requirement and the results of the Scoping Exercise, use only what you need to meet the requirement**

Using the Training Analysis Tool in its entirety you will be able to carry out:

* Using the Analysis Model Tab
  + Task, Sub Task and Task Element Analysis (including Conditions & Standards)
  + Difficulty, Importance & Frequency (DIF) Analysis
  + Initial Knowledge, Skills & Attitudes (KSA) Analysis
  + Training Gap Analysis (TGA)
  + Assessment & Testing Analysis
* Training Options Analysis (TOA)
  + Fidelity Analysis
* Methods & Media Analysis (M&M)
* Methods of Training Effectiveness Comparison Analysis

All of the content you generate in the Training Analysis Tool, can be copied into a Word Document to form the basis of your eventual Training Needs Analysis Report.

## Training Analysis Tool Colour Coding

The Training Analysis Tool is also made up of a combination of predetermined formulas and VBA coding (Macros), all of which are password protected and the column headings are in RED.

Those columns in GREEN are not password protected and are combination of FREE TEXT or DROP DOWN MENU LISTS for you to utilise.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| STANDARDS | ACTION  VERB | MISSING VERBS | DIFFICULTY | IMPORTANCE | FREQUENCY | DIF  CATEGORY |

In addition and as you use the Training Analysis Tool certain cells have been Conditionally Formatted such that when you make a particular selection form a drop down menu, or copy information into certain cells they may change colour, these will be explained in the Practitioner Guide as you progress through it, suffice to say the Conditionally Formatted cells are visual triggers for you the Analyst to either respond or to revisit at a later date.

# DSAT Process & the Acquisition Cycle

DSAT is a process that comprises activities relating to the training **Analysis, Design, Delivery** and **Assurance** of all Defence training, both individually and collectively, across the Whole Force.

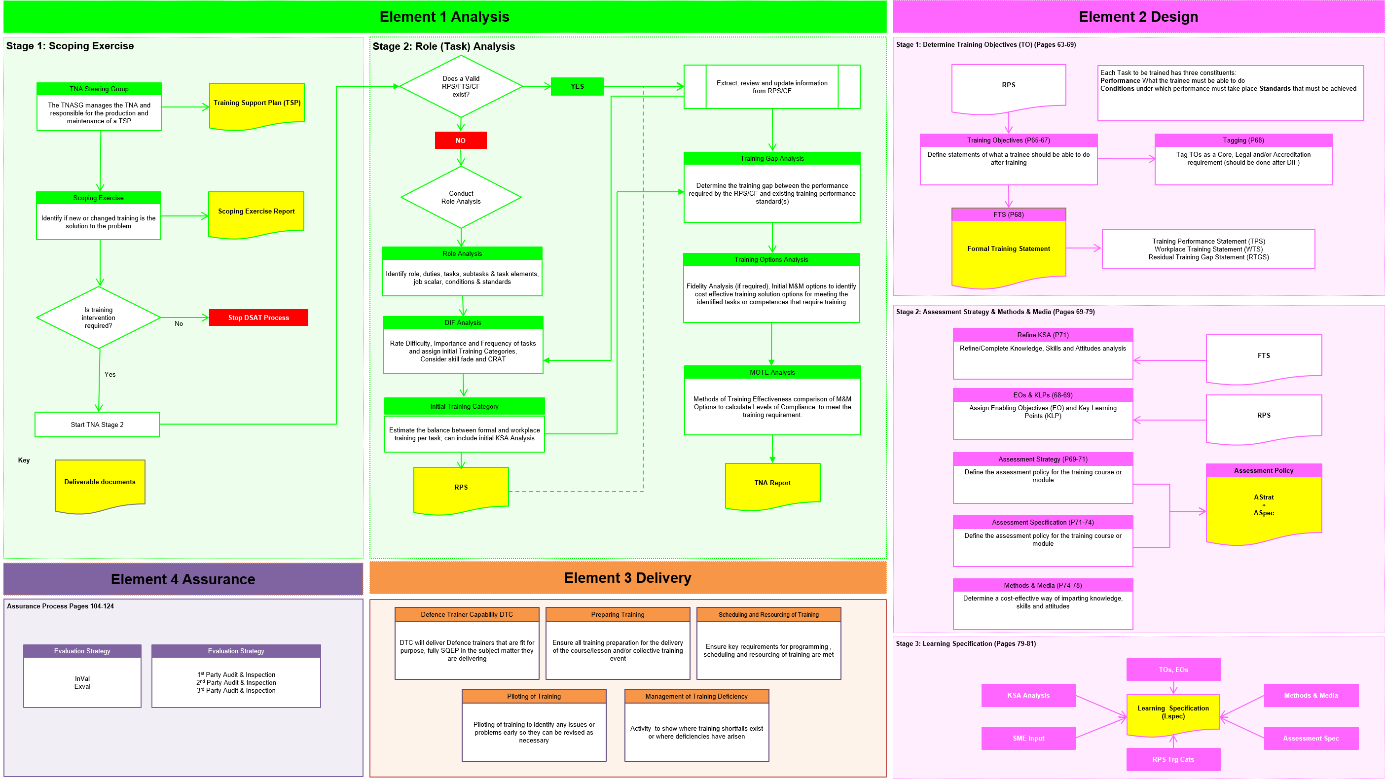
In the context of JSP 822, ‘training’ encompasses any training, education, learning or development, both individual and collective, that is designed to meet the needs of a Training Requirements Authority (TRA)

DSAT ensures that the training of personnel contributes directly to Defence outputs and mitigates the risk that it may fail to do so.

When applied correctly, DSAT will deliver training that is:

* Appropriate to the training need
* Cost-effective
* Accountable
* Safe
* Risk-focussed

The DSAT Process and the four elements are illustrated in Figure 1 below (a larger version can be found at [Annex D](#_Annex_D._DSAT)).



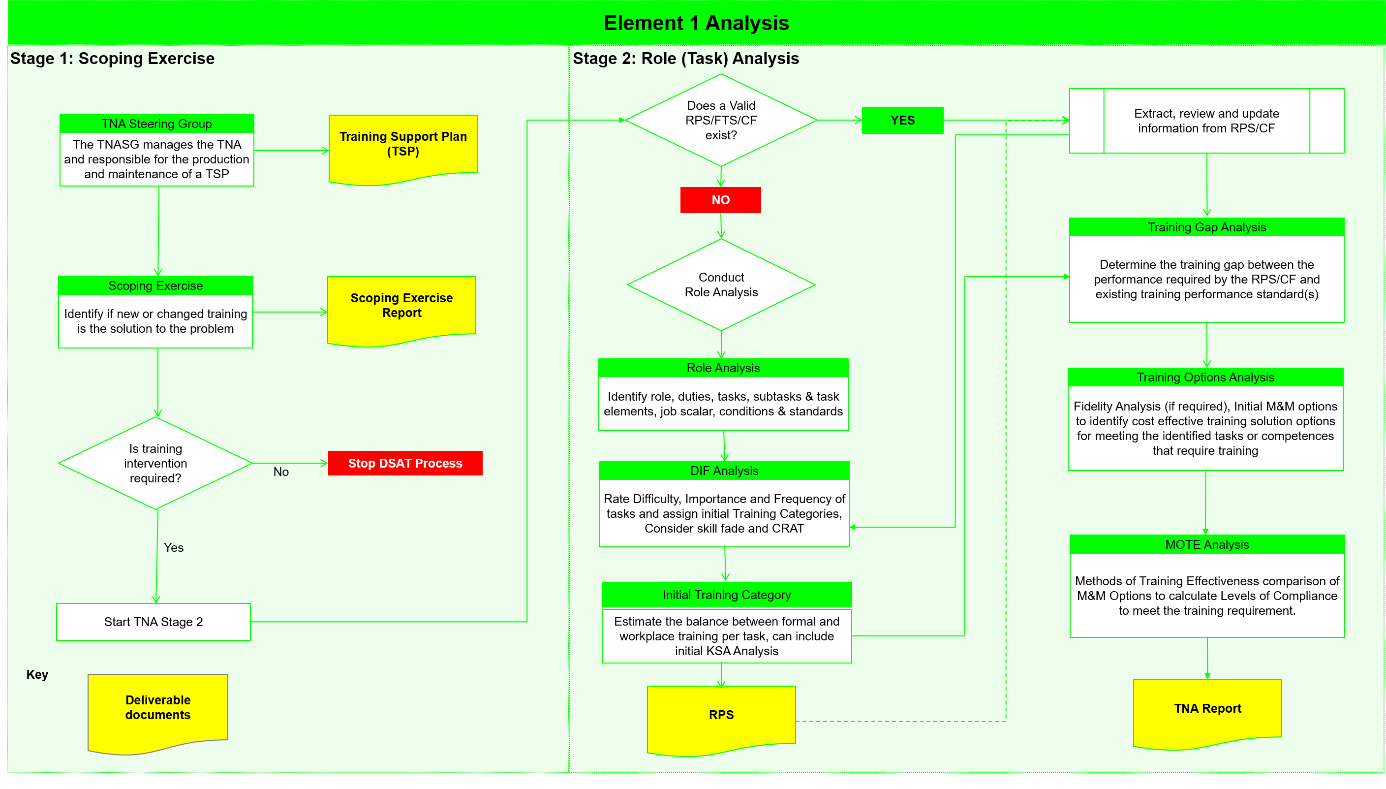
### Figure 1. DSAT on a Page

There is a fifth element which the Management Training System (MTS) this is currently known as Training Management Information Systems (TMIS). This system is in the process of being replaced with Defence Learning Management Capability (DLMC), however, neither TMIS nor DLMC will be covered in this guide.

The only element that will be covered in this guide will be **Element 1 Analysis**, for Individual Training subsequent guides will be produced for the other elements in due course.

## Element 1 Analysis

Figure 2 below illustrates the process of Element 1 Analysis as defined in DSAT and comprises of 2 stages, Stage 1. Scoping Exercise and Stage 2 Role (Task) Analysis, which will be covered in more detail



### Figure 2. Element 1 Analysis

## DSAT in the context of the Acquisition Cycle

DSAT was originally borne out of the need to address increasing levels of complexity of military equipment and its procurement in the mid 1970’s.

Today’s modern military operate in an even more technologically challenging environment and DSAT has evolved to meet that challenge.

The MOD uses a highly mature process to acquire military capability which is known as Acquisition. The Acquisition process is based on a six phase lifecycle known as CADMID or CADMIT.

The six phases are, Concept, Assessment, Demonstration, Manufacture, In-Service, Disposal (or Terminate) CADMIT is used mainly for services acquisition)).

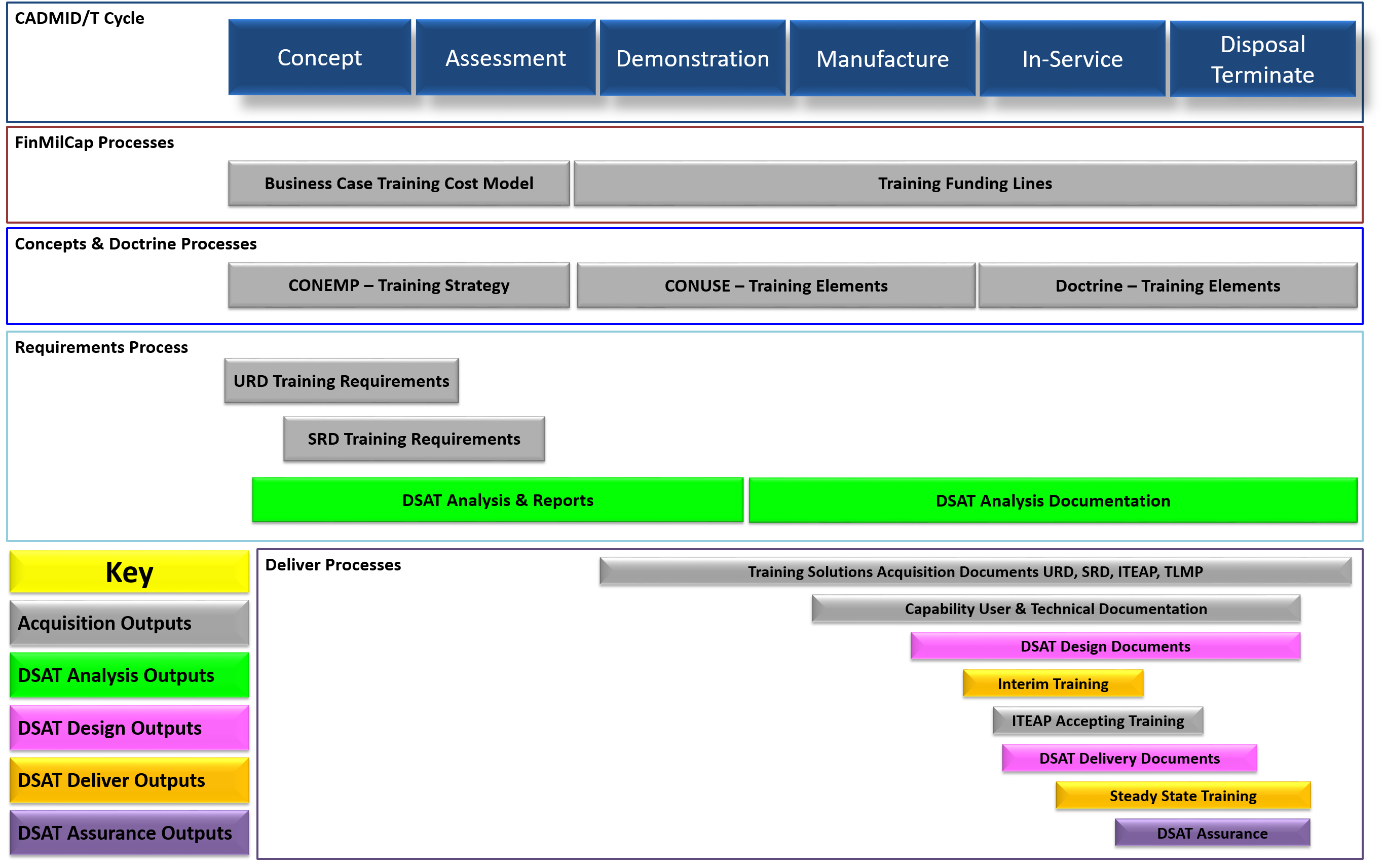
Whilst the Acquisition cycle is linear in approach with a clear start to the process (Concept) and a clear end (Disposal), what happens throughout is both fluid and dynamic with processes, documents and outputs often utilised more than once as a Product, is developed during each stage. This cycle is driven by the requirements and any changes in technology, legislation, guidance or operational capability that the Product is required to deliver.

## DSAT Proportionality and Interaction with CADMID/T

Each of the six phases involves executing the plan agreed in the previous phase, reviewing the outcome, and planning for the remaining phases. These phases have a typically linear progression; however each life cycle phase constantly informs all phases in the cycle.

The relationship between each phase shows movement both ways throughout the application of the process; this reflects how constant review and adjustments to a Product, require the application of previous stages again; for example, although the Disposal phase relates to how a Product is disposed of at the end of its life, the thought behind that disposal plan should be considered at the Concept phase and constantly updated throughout each subsequent phase.

As an overlay Figure 3 below illustrates how the training 4 main elements of DSAT (**Analysis, Design, Delivery and Assurance**) fit into the CADMID/T cycle and what processes and outputs, including DSAT documentation, are required and when.

****

### Figure 3. DSAT Processes within the Acquisition Cycle

As can be seen, in theory the DSAT process starts at the Concept phase of the Acquisition cycle, however in practice it is not always the case, especially when dealing with multiple and highly complex Products.

# Stage 1. The Scoping Exercise

Prior to any form of analysis activity taking place there is a formal process of setting up the governance structure, this in DSAT terminology is known as the Training Needs Analysis Steering Group (TNASG).

The TNASG is in place to manage and ensure validity and assurance of the DSAT process, the TNA is (or should be) governed by a dedicated steering group representing all stakeholders. However, TNA governance must also be ‘fit for purpose’ and appropriate to the need, with more resources and controls required to support a large and complex training requirement, than a small one. A dedicated steering group working to an agreed TNA methodology should manage every TNA.

The owner of the requirement should chair the TNASG, supported by the relevant stakeholders who can provide technical, end user, quality and defence expertise.

## The Role of the TNASG

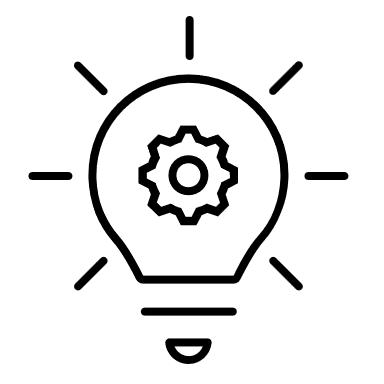
The TNASG is responsible for ensuring that the training requirements are identified and fully met. It should therefore perform the following tasks, which should form the basis for its Terms of References (ToRs):

* + Develop and maintain a Training Support Plan.
  + Quality assure all TNA activities, particularly the (Stage 1) Scoping Exercise.
  + Brief potential contractors and act as a point of contact for any requests for information or subject matter expertise.
  + Co-ordinate the activities of all contributors to the TNA.
  + Review and co-ordinate amendments to TNA outputs.
  + Endorse proposals affecting the TNA process or that amend outputs.
  + Endorse the most cost-effective training solution recommendation.
  + Assist in the design and delivery of the chosen training solution.

## The TNASG Composition

In a Military context TNASG membership will include a combination of the following representatives:

* + Training Requirements Authority (TRA). The complexity and size of the training requirement will dictate the level of involvement of the TRA and whether responsibilities are delegated. Training policy and training support representatives from the TRA should direct the TNA Scoping Exercise and the TRA will normally nominate the chair of the TNASG. Depending upon the risk assessment, the TRA may then delegate its representation to others, such as the TDA.
  + Training Delivery Authority (TDA). The TDA will need to be represented at the TNASG as it is responsible for the design stages of the DSAT process and will likely be closely tied to the Training Provider.
  + Training Provider. It is not vital for the Training Provider to be represented at the early stages of TNA, unless a specific Training Provider is obvious from the outset. In that case, it is sensible to include the Training Provider in the TNASG.
  + Formation Command. The Formation Command is the final end user of the new capability. The Formation Command therefore should be represented as it will be integral to achieving the balance of training between that delivered by the Training Provider and the remainder by the Formation Command in the workplace.
  + Defence Equipment & Support (DE&S). Where the training need is derived from new equipment or a service being brought into service by DE&S, representation from the Project Teams, or equivalent, is key to ensuring that the training requirement meets the technical needs of the new capability.
  + Manning Authority. The identification of manpower appointments/posts/billets affected by a new Defence capability, as well as training throughput to man it, are key aspects of the scoping exercise and RA/TCTA. The involvement of the relevant Manning Authority is therefore critical to the validity of the TNA and important in ensuring that the issues that overlap between personnel/manning and training are fully integrated and understood by all parties from the outset.
  + Training SME. If and where necessary, a training management SME should be represented in order to advise the chair on TNA management and methodology, ensure that the TNASG is representative of all stakeholders, compliant with the DSAT process, and that an audit trail exists.
  + Other members. Membership can be extended as needed to include any other interested parties, including those representing the Defence Lines of Development (DLOD) including Equipment, Personnel, Information, Concepts and Doctrine, Organisation, Infrastructure and Logistics, Interoperability (Training is also a DLOD) and any other specialist in legal or security staffs as well and technical specialist Subject Matter Experts (SME)



**The Role & Composition of the TNASG will vary in proportion to the requirement**

## Scoping Activity

Having agreed that there is a training need, a search of existing training activities is to be conducted to ascertain if training, already designed or in development could satisfy, or partly satisfy, the need.

The scoping activity should also outline the aim, constraint, assumptions, proposed methodology and timescales, and provide an estimate of the resources required for the subsequent analysis and design stages, and derive a strategy and tentative solution for meeting the need for a training intervention.

As this investigation progresses, decisions about how to apply the DSAT process should be made.

The scoping exercise should also cover a list of the resources required to complete the subsequent activities and an agreement as to which organisation(s) will provide them.

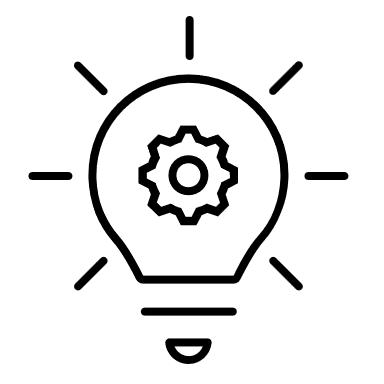
## Information and Data Sources

The success of any TNA is dependent on the availability and efficacy of existing information and data. This is very important as it affects the overall timeline of the whole analysis, which will have been estimated during the bid phase and the subsequent winning of the contract.

Normally a DSAT scoping exercise does not have to be a long and protracted exercise or document and should be able to utilise existing information and data from a variety of sources provided by the TNASG as illustrated (but not limited to) in Table 3 below.

| Information and Data Sources |
| --- |
| Statement of Trained Requirement (SOTR) |
| Statement Of Trained Task (SOTT) |
| Associated Training Deficiency reports |
| Existing Role Performance Statements (RPS) or Competence Frameworks (CF) |
| Existing Formal Training Statement (FTS) including |
| Training Performance Statement (TPS) Documentation |
| Workplace Training Statement (WTS) Documentation |
| Residual Gap Training Statement (RTGS) Documentation |
| If using CF, are there existing Job Specifications, Descriptions? |
| CONUSE |
| CONEMP |
| CONOPS |
| Doctrine |
| Employment Books of Reference (BRs) |
| Joint Service Publications (JSPs) |
| Existing InVal data |
| Existing ExVal data |
| Existing 1st, 2nd and 3rd Party Audit Data |
| Access to all current non Interactive Courseware (ICW) both complete and in development |
| Access to all current MOD owned or procured ICW both complete and in development |
| Original Equipment Manufacturer (OEM) documentation |
| Access to 3rd Party Training Provider Content |
| Access to synthetic environments and or equipment if and where necessary |
| Previous TNA (Direct and Indirect) Studies |
| Financial and in particular budgetary information |
| Facilities and Equipment information such as infrastructure required to host, integrate, operate and maintain training |
| Availability, capabilities and limitations of resources required to support the eventual training solution |
| Data and information to effect a detailed cost benefits analysis and return on investment |

### Table 2. Information and Data Sources



**Information & Data Sources are fundamental to any TNA, again depending on the size and complexity of the TNA will determine the sources you require, and these should be available from day 1 of the task.**

## The Scoping Report

The scoping exercise should produce a report detailing what is appropriate to the training need and, importantly, make early training solution recommendations, the report may include some of the following headings:

| Scoping Report Headings |
| --- |
| Summary of New or Changed Requirement |
| Influences Concerning Policy |
| Referenced Previous Associated Studies |
| Potential Training Services Likely To Be Considered |
| TNA Methodology |
| Estimate of Resource Allocation and an Agreement as to Which Organisation(s) will Provide Them |
| Terms Of Reference |
| TNA Plan |
| Training Audience (and Throughput) Description |
| Identification of Personal Characteristics |
| Training Audience (Individuals, Team And Sub-Team, Collective) |
| Social and Demographic Characteristics |
| Subject-Matter Competence |
| Existing Competences |
| Pre-Requisites Analysis |
| Training Throughput Estimates |
| Constraints Analysis to Include Policy, Cost, Time, Safety, Legal, Resource |
| Risk, Assumptions, Issues, Dependencies and Opportunities (RAIDO) Register |
| Training Authorisation Document |

### Table 3. Scoping Report Headings

Training solution recommendations should be examined by the relevant stakeholders at the TNASG who, taking into account time and resources, will decide the most appropriate way of taking the requirement forward.

Where a training solution is recommended and agreed at the TNASG, a plan for subsequent analysis and design activities should be produced.

If a training solution is not recommended, the DSAT process should be halted at this point. However, a response to the question, *‘what should we do to address these deficiencies’* should be given as the problem may not have anything to do with training and may require:

* + A revision of procedures and/or improvements to management and supervision.
  + Production of role/task aides and/or the reallocation of tasks.
  + Changes in the approach to personnel selection.
  + Acquisition of equipment.
  + Manning incentives, such as pay and civilian qualifications.

Once the scoping exercise is complete, a Training Authorisation Document TrAD should be raised. This is done by the Training Requirements Authority (TRA) in conjunction with the Training Delivery Authority (TDA) and Training Provider, if appropriate, by completing those elements of the TrAD that are applicable to this stage in the DSAT process Element 1, and Stage 1 is now complete.

# Stage 2. Role (Task) Analysis

Role (Task) Analysis (RA) is the process of investigating and examining the specific roles of the Target Audience identified and approved in the Scoping Report (SR) but now in much more detail, in order to identify all the component duties and tasks, the conditions under which the role is performed, and the standards needed to be achieved when performing the role.

Prior to starting the RA the analyst should review the SR and identify any important information that has changed from any previous analytical work completed.

The introduction of new capabilities, and the replacement of or upgrades to equipment often affect a cross-section of personnel fulfilling different roles; usually the context, and hence implications, for the different role holders vary considerably.

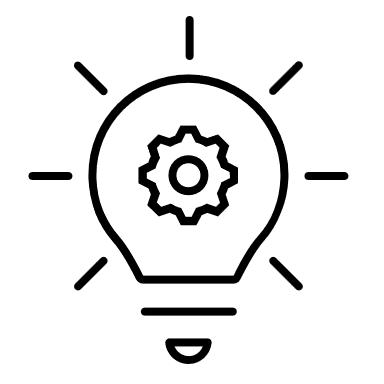
The identification of primary, secondary and tertiary impacts on each role in the target audience is an important factor in making decisions concerning where the RA activity is focused.

Where the target audience identified in the SR includes more than one distinct group, a description of each group and their context should be produced at the outset of RA (unless already produced during the SR, in which case the descriptions should be reviewed and validated), by considering the following:

* + Higher level context, including strategic context, operational doctrine and if applicable team and collective scenarios, to answer the question, what is the overall purpose of the role?
  + External context, including wider environment and conditions, for both individual and team and collective, and number of people fulfilling the role to answer the question, what external factors affect performance of the role?
  + Internal context, such as organisational structures, role dependencies, relationships and responsibilities, and the training audience, throughput and selection processes to answer the question, what internal factors affect performance of the role?

## Role Performance Statements (RPS)

The whole purpose of a conducting a RA in the context of DSAT is to revise and update where necessary (if available) or produce a Role Performance Statement (RPS) an example of which can be found in [Annex B](#_Annex_B._Example).



**One of the flaws in many MOD RPS is that the language used often does not match the level of performance required. This leads to subsequent undertraining or overtraining and ultimately poor training.**

**Many think they understand Bloom’s Taxonomy, but in reality it is often applied very poorly.** [**Bloom’s Revised 2 Dimensional Taxonomy**](#_Bloom’s_Revised_2) **provides an explanation of how to use the taxonomy in this Training Analysis Tool.**

At its most basic level a RPS defines what a military person should be able do in both war and peace, under what conditions and to what standards as can be seen in Table 4 below, and it is the Performance component of the RPS that drives the Task Analysis.

|  |  |  |
| --- | --- | --- |
| **Performance** | **Conditions** | **Standards** |
| *(Performance Statement)* | *(Conditions statement)* | *(Standards statement)* |
| What the Role holder should be able to DO in the Role.... | With WHAT and WHERE.... | And HOW well. |
| *Use an observable and measurable action verb.* | *Specify all the conditions and circumstances in which the Role is to be performed* | *Specify the standards to be achieved for the performance in the Role.* |

### Table 4. Major Components of an RPS

## Writing Performance Statements

A critical part of either reviewing, modifying or creating from new a RPS is that the Task, Sub-Task and Task Element information needs to make sense and that it uses the correct language, one of the greatest failings of many TNA, is that the language doesn’t match the expectation of the requirement output for the role.

The Performance Statement, the first of the three components of any Task, is a clear, concise statement of the performance required. It represents a logical and complete part of a Duty within a Job, and is observable and measurable. A properly constructed Performance Statement answers definitively the question *‘what does the role holder have to do?’*

A (Performance) Task, Sub-Task or Task Element is a single statement that should contain an **Action Verb**, an **Object** and (if applicable) a **Necessary Qualifier** as illustrated below.

The choice of Action Verb for each level of a Task, Sub-Task and Task Element statement is critical as it determines the category (whether it is Knowledge, Skill or Attitudinal) and the level of Performance required.

|  |  |  |
| --- | --- | --- |
| **Element** | **Example** | **Description** |
| **Action Verb** | Check | Describes what action is being done The first word is a statement Only one action verb is used |
| **Object** | Performance of Port and Starboard Diesel Generators | Identifies what is being acted on Usually, only one object is used in the statement |
| **Necessary Qualifier (not always required)** | Using Combustion Analysis and Vibration Analysis | Distinguishes the activity (only used if required to distinguish between other similar activities). |

### Table 5. Action Verb, Object & Necessary Qualifier

Action Verbs such as ‘know’ or ‘understand’ **do not** adequately define an action on the part of the individual(s) and are neither observable or measurable, on the other hand ‘Diagnose’, ‘Assess’, ‘Select’, ‘Modify’, ‘Create’ are much more readily witnessed and can be assessed more easily. Table 7 below, illustrates examples of good and poor practice in task statement writing.

|  |  |
| --- | --- |
| **Good Practice** | **Example and Comments** |
| Only use one action verb per statement | A single statement must describe an observable and if required measurable activity  **Good Example – Control the Task Analysis Process  Poor Example – Plan, Organise, Manage and Control the Task Analysis Process**  A single statement should be built around a single action verb; it is not a list of sub-tasks |
| Always consider the output of the activity in action verb selection | The output of the activity can indicate best action verb to use  **Good Example – Produce a Draft Master Task List**  **Poor Example – Produce a Comprehensive and Detailed Task, Sub-Task and Task Element List** |
| Focus on action, not knowledge | Critical and underpinning knowledge requirements will be captured at a later stage  **Good Example – Advise all Analysts on the Key Areas of Task Analysis**  **Poor Example – Demonstrate a Thorough Knowledge of Every Aspect of Task Analysis** |

### Table 6. Good and Poor Practice & Examples

Often the Task, Sub-Task or Task Element statement (before including Conditions or Standards) is necessary and useful in its own right (i.e. when producing associated elements such as a Role Scalar).

However, the analysis of a Task (and its Sub-Task and Task Elements) is only complete when all the components of the RPS are present.

In RA, the content of Tasks may develop or be refined as the information available matures; this is very likely to happen in long and complex Acquisition projects as they progress through the CADMID cycle.

Where all or part of any component of a Task is not yet known, the ‘known unknown’ information should be indicated and the Task(s) should be identified clearly as being ‘draft’ or ‘provisional’.

## Specifying Conditions

Conditions statements describe the situation under which the action specified in the Performance Statement must be completed. Conditions statements are often written in terms of what will be ‘given’ (available to) or ‘denied’ (not available to) the individual(s) while performing the required Task and in what environment the Task will be performed. Conditions should reflect the work situation as accurately as possible, but include only those factors that influence job performance. An exhaustive list of every trivial condition is not necessary and detracts from the value of the RPS.

Since the Conditions may be critical in determining future Training Gaps, informing training design and helping to justify resources, they should be documented as accurately and closely as possible to the actual conditions in the workplace.

Each Task and Sub-Task must therefore have a full Conditions statement clearly linked to its Performance Statement (not a key to a list of Conditions located elsewhere).

It is recognised that Sub-Tasks will usually (although not always) share identical Conditions to their parent Task, in such cases it is not necessary to repeat the full Conditions statement; instead, having checked and confirmed the commonality, a positive statement linking to the Conditions of the parent Task may be made (e.g. for Sub-Task 1.3.1: “Conditions as per Task 1.3”).

The table below illustrates examples of the use of various types of Conditions. These are not exhaustive, neither should all of these be analysed for every duty.

| **Type of Condition** | **Description** | **Examples** |
| --- | --- | --- |
| **Environment** | The location, sea-state, internal climate, vessel state, threat, time, etc. under which the performance will be carried out where this is integral to the performance of the Task. | Whilst Critical. In the Full power and half power states. Whilst in Single Loop. After loss of Chilled Water. Surfaced / Dived. |
| **Tools and Equipment** | Tools, equipment, clothing, replacement parts, etc. that are either provided or denied to the service member while carrying out the performance. | Using Warfare Electronic Chart Display and Information System (WECDIS). Given a multimeter and a torch. |
| **Supervision** | Level / degree of supervision that will be provided to, or required of, the service member during performance. | Under direction of the Manoeuvring Room Supervisor. Supervising a junior technician. |
| **Job aids, reference manuals and materials** | Documentation that is either provided or denied to the service member while carrying out the performance. | Given a procedural checklist.  Without reference to written Standard Operating Procedures (SOPs). With access to Technical manuals. |
| **Assistance** | Assistance (if any) that will be provided to the service member during performance. | Assisted by the Machinery Space Supervisor. |
| **Special physical and psychological demands** | The psychological, physical and social factors associated with Task performance. | In a confined workspace. In a noisy distracting area. For a prolonged period with little opportunity for sleep. Wearing EBS. Wearing full firefighting personal protective equipment and breathing apparatus. |
| **Cues** | The reason(s) why Task performance is initiated by the service member or for performing it in a certain way. Can involve stimulation of one or more of the senses. | Immediately, on hearing the general alarm. When piped to the scene of the incident. As ordered by the MRS |
| **Limitations** | Describes limitations (security, safety or legislative) to the range of performance. | In sea states not exceeding sea state 5. |

### Table 7. Example of Conditions

## Specifying Standards

Standards statements indicate the required level of performance by describing how and how well the performance statement must be completed.

Valid standards are based on actual job/workplace requirements that are both specific and clearly written.

Standards statements indicate the acceptable level of performance to all concerned including, designers, developers, trainers and trainees, they provide direction for the scope and limits of the training. Standards statements are used to:

* + Define the desired level of performance from an end user perspective.
  + Identify individuals who can satisfactorily perform the Task and those who cannot.
  + Indicate to designers and trainers the level of proficiency which trainees must eventually attain.

Accurate Standards are a necessary condition for the subsequent design of relevant and valid assessments. It is therefore imperative that Standards statements reflect actual Duty requirements, they must be neither arbitrarily demanding nor too easy. If Standards are too demanding, they may reflect an unrealistic ideal, and generate unnecessary training costs. If Standards are too easy, trainees may not achieve the required capability to carry out their Duty responsibilities.

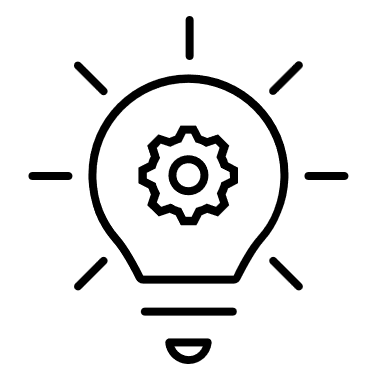
Standards are analysed and recorded specifically at the Task and Sub-Task levels. Sets of ‘generic blanket’ Standards covering all eventualities is not acceptable practice. Three types of Standards can be used, as described in the table below:

| **Type of Standard** | **Description** | **Use when** | **Examples** |
| --- | --- | --- | --- |
| Product Standards | Provides description of acceptable result of performance.  If the product standard is detailed in another publication this should be precisely referenced | Only one specific product is acceptable.  Quality or product is not substantially affected by process.  Finished product is observable | Break out EBS Mask and plug into the nearest PCL Coupling, fit mask ensuring that head straps are centralised.  Check mask for correct seal.  In accordance SOP. 315. 2. EBS line-up and  SOP. 315. 3 normal operation |
| Process Standards | Explains the sequence of Sub-Tasks and Task Elements to be performed in the process, when the sequence or procedure is critical to successful performance.  If the process standard is detailed in another publication this should be precisely referenced. | Only one process is approved.  Failure to use process could cause danger and or damage to personnel and or equipment.  A process is observable and measurable, but a product is not. | All power is shut off; (then)  All safety guards are installed; (then)  All bushings and armatures are lubricated. In accordance with Article in Use (AinU) accounting procedures within JSP 886, Part 8, Vol 4. |
| Combination of Product and Process Standards | Lists sub-Tasks and a description of the acceptable product when both process and product are important measures of success. | Both process and product are important Failure to use correct process could cause danger / damage to personnel / equipment Process and product are observable and measurable | All faults are located. All defective components are replaced.  Repaired equipment operates in accordance with manufacturer’s specifications as listed in BR203-Operating Parameters for Short Range Radar, Ch. 7 Pages 1-12. |

### Table 8. Types of Standards

## Referencing Standards within other Documents

Where auditable official publications detail relevant Standards it is valuable to refer to these in the D-PS; this prevents contradictions and keeps the D-PS to a workable size. When referring to other publications, analysts are to consider the purpose of the D-PS as the basis of subsequent work to develop training: the guiding principle should be to assist the next user of the document to find the information relevant to the Standard(s) quickly and easily. Therefore:

* + While it may be convenient to the analyst to use a key to refer to a ‘master list’ of reference publications, this can be very inconvenient and difficult for a training designer or other user to follow and use and therefore this is considered poor practice.
  + The analyst is expected to check any reference publication(s) cited in Standards to confirm that a relevant Process, Product or Combination Standard is actually present within the document.
  + Judgement must be applied in the level of detail given in each reference. For example, JSP 440 is a very large document comprising 8 multi-section Parts and Supplements. Stating “in accordance with JSP 440” therefore gives the next user an unacceptable burden to trace the detail of the Standard. As a baseline expectation, the relevant Publication, Volume/Part and Chapter(s) should normally be specified in every Standard.
  + Publications referenced within Standards should be chosen to avoid variability: i.e. ‘in accordance with Unit Standing Orders’ leaves open the possibility of variation between Standing Orders of different units, and therefore should be avoided.

Be aware that the responsibility for setting the Conditions and Standards in a RPS is the responsibility of the MOD SME and ultimately the RPS Owner.

A RPS is a legally binding document and is used in a Court of Law for reasons such as Criminal, Negligence and Duty of Care case

## Compiling Information and Data for Performance Statements

In order to produce an acceptable RPS, there is a lot of work involved especially in Task Analysis. There is more about writing Performance Statements in the section [Task, Sub-Task and Task Element Statements](#_Task,_Sub-Task_and).

During the SE stage you should have been provided with access to a variety of information and data ([see Information and Data Sources](#_Information_and_Data)) and in order to begin identifying the Role, Duties, Tasks, Sub-Tasks and Task Elements, any and all applicable documentation should be consulted.

Also at the outset you should have access to Subject Matter Experts (SMEs) who you can and should call upon and maximise, they are normally the most valuable source of RA information and data, the most appropriate SMEs are likely to be drawn from existing jobholders (good performers), line managers, trade managers, technical specialists (internal and external) and manufacturers.

In some equipment acquisition scenarios, the manufacturer or users outside of defence may be the only sources of information. Analysts should not be wholly reliant on others to provide them with SME contacts; they should be proactive in seeking, identifying and engaging with as many SMEs as necessary to provide a balanced opinion of issues and potential training options.

Analysts are expected and required to consult with the customer/sponsor at the earliest possible opportunity if they have any concerns that the information available is insufficient in quantity or maturity to allow RA of sufficient quality to be completed in the time provided.

Conducting any TNA can, on the one hand be a very simple and uncomplicated process, but on the other, it can be complicated, complex, intricate and multi-faceted.

As an Analyst, you may be faced with a TNA that has little or no existing information or data and you are starting from a blank canvas, or you could be overwhelmed with a plethora of information and data of various efficacy and validity. In the case of the latter, it is your job to filter and extract the most valuable information and data and centralise it for your use.

One of the tools you will have at your disposal is the Training Analysis Tool.

# Task Analysis

For the purpose of clarity DSAT states that a Task is defined as:

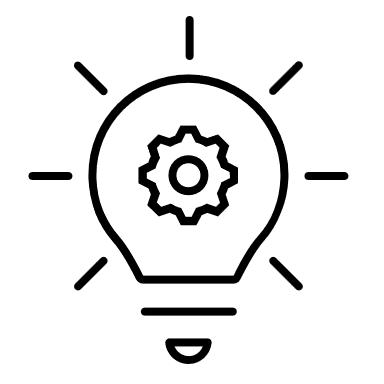
* + A Specific Action
  + Performed by an Individual
  + Recognised by a Definite Beginning and an End
  + Performed for a Relatively Short period of Time (could be hours but rarely days).
  + It is Observable and Measurable

This should always be at the forefront of your mind when either reviewing or creating Task information for a RPS.

In either instance you will begin by populating the Training Analysis Tool with information relative to the Role(s) and Duties you will be analysing and the associated Tasks, Sub-Tasks and Task Elements within that Role.

This is, without exception, the single most important part of the Training Analysis Tool, for without this information you have nothing to analyse!

Table. 9 below provides an illustration of a Task which has been added into the Training Analysis Tool and depending on the source of information you will either copy and paste (special, selecting values) the content into to associated column cells or you will have to write it in yourself.



**Regardless of visible errors such as spelling, grammar or punctuation the information you copy into the Training Analysis Tool must be as is.**

**You may be using an existing RPS or equivalent, therefore it is an EXTANT document and cannot be changed at this point in time.**

**Any changes will be done as part of the Analysis.**

This is the first interaction you will have with the Training Analysis Tool, where you either import existing information or write your own from scratch, either way the process and format is the same.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **ROLE** | **DUTY** | **JOB NUMBER** | **TASK** | **SUB TASK** | **TASK ELEMENT** | **PERFORMANCE** | **CONDITIONS** | **STANDARDS** |
| Forward Marine Engineering Junior Rate | Lower Deck Roundsman | ME(S)/03Q Fwd ME | 1 |  |  | Operate Ship Systems | As a Royal Naval Rating / Leading Hand / Petty Officer / Chief Petty Officer.  Unless otherwise stated all performances are conducted at anchor, in harbour, dock, shiplift, and throughout the world, in all weather and sea states, all CBRNDC states, during night or day, in times of peace, conflict or war.  A Lower Deck Roundsman sentry is to be detailed from the Fwd Duty Watch of Weapons, Fwd Marine Engineering or Seaman branches with the exception of when in plant state A and the transition between plant state A and B, where a fully qualified panel operator is required.  The LDT will almost invariably be the first person to become aware of any irregular, abnormal or potential hazardous situations developing within the forward end of the submarine.  The correct performance of this duty, together with that of the UDT / quartermaster is essential for the security and safety of the submarine.  He is not to leave the Control Room.  Given scenario, tools, equipment, instruction, reference material, levels of supervision, number and level of subordinates as required or directed by the OOD | In accordance with QRRN, RN Diversity and Equality policy, JSP 375 MOD Health and Safety Handbook, Departmental and Unit Standing Orders, Law of Armed of Conflict.  Doctrine iaw current DCI/DIN/RNTMs, relevant BRs/other publications and policy directives.  All actions undertaken are to be in the best interests of the Service and demonstrate appropriate CLM competencies, Character, Attitude and Effectiveness commensurate with Rate / Rank (as detailed in the Leading Hand (First Superior Officer) / (Senior Rate OPS).  Only ratings that have qualified as submariners, have completed the Lower Deck Roundsman Task Book and carried out continuation training can conduct the duties as Lower Deck Roundsman.  He is to have an in depth knowledge of all EOP actions in the event of an emergency.   Without error, in the correct sequence as ordered by the OOD.  Conducting continuous panel rounds, reporting any irregularities verbally to the OOD immediately.  Repeating all orders.  In accordance with Captain's Standing Orders, SSOs, SOPs and EOPs |
|  |  |  |  | 1.1 |  | Oprate The Ballast System | As for Task 1 | As for Task 1 |
|  |  |  |  |  | 1.1.1 | Operate The System Valves | As for Task 1 | As for Task 1 |
|  |  |  |  |  | 1.1.2 | Operate The System Pumps | As for Task 1 | As for Task 1 |
|  |  |  |  |  | 1.1.3 | Monitor The System | As for Task 1 | As for Task 1 |
|  |  |  |  | 1.2 |  | Operate The Trim System | Given access to electro meters on panel and the fwd. surveillance system | As for Task 1 |
|  |  |  |  |  | 1.2.1 | Line Up Trim System | As for Task 1 | As for Task 1 |
|  |  |  |  |  | 1.2.2 | Operate Trim Pumps | As for Task 1 | As for Task 1 |
|  |  |  |  |  | 1.2.3 | Revert System To Normal Line Up | As for Task 1 | As for Task 1 |
|  |  |  |  | 1.3 |  | Operate Hp Gas Systems | Maintaining system pressures within Command tolerances. Given liaison with the EOOW for compressor requirements and access to electro meters on the panel and the fwd. surveillance system. | Verbally reporting when tolerances are breached. |

### Table 9. Task, Sub-Task and Task Element Contents

Having copied or entered all the Task, Sub-Task and Task Element information into the Training Analysis Tool and verified that it is the most up to date information with the SME, you can now begin to address any issues with the information and the first question you should ask yourself is

“Does this information make sense?”

You as the Training Analyst are not looking at this from a TECHNICAL perspective (that is what your SME is for), you are looking at this from a TRAINING ANALYST perspective and the information before you in the context of [Role Performance Statements (RPS)](#_Role_Performance_Statements).

## Action Verb Analysis

In Table 10 above you will have seen the two **RED**, column headings entitled **Action Verb** and **Missing**.

If you are importing large amounts of Task, Sub-Task and Task Element information into the Training Analysis tool, let’s say for example 2000 rows (is not uncommon), the amount of time to go through each line initially to check the Action Verb, the Object and if applicable the Necessary Qualifier would be significant, but as we have already said the Action Verb is the critical component.

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
| **TASK NUMBER** | **SUB-TASK NUMBER** | **TASK ELEMENT NUMBER** | **PERFORMANCE** | **CONDITIONS** | **STANDARDS** | **ACTION VERB** | **MISSING VERBS** |
| 1 |  |  | Operate Ship Systems | As a Royal Naval Rating / Leading Hand / Petty Officer / Chief Petty Officer.  Unless otherwise stated all performances are conducted at anchor, in harbour, dock, shiplift, and throughout the world, in all weather and sea states, all CBRNDC states, during night or day, in times of peace, conflict or war.  A Lower Deck Roundsman sentry is to be detailed from the Fwd Duty Watch of  Weapons, Fwd Marine Engineering or Seaman branches with the exception of when in plant state A and the transition between plant state A and B, where a fully qualified panel operator is required.  The LDT will almost invariably be the first person to become aware of any irregular, abnormal or potential hazardous situations developing within the forward end of the submarine.  The correct performance of this duty, together with that of the UDT / quartermaster is essential for the security and safety of the submarine.  He is not to leave the Control Room.  Given scenario, tools, equipment, instruction, reference material, levels of supervision, number and level of subordinates as required or directed by the OOD | In accordance with QRRN, RN Diversity and Equality policy, JSP 375 MOD Health and Safety Handbook, Departmental and Unit Standing Orders, Law of Armed of Conflict.  Doctrine iaw current DCI/DIN/RNTMs, relevant BRs/other publications and policy directives.  All actions undertaken are to be in the best interests of the Service and demonstrate appropriate CLM competencies, Character, Attitude and Effectiveness commensurate with Rate / Rank (as detailed in the Leading Hand (First Superior Officer) / (Senior Rate OPS).  Only ratings that have qualified as submariners, have completed the Lower Deck Roundsman Task Book and carried out continuation training can conduct the duties as Lower Deck Roundsman.  He is to have an in depth knowledge of all EOP actions in the event of an emergency.   Without error, in the correct sequence as ordered by the OOD.  Conducting continuous panel rounds, reporting any irregularities verbally to the OOD immediately.  Repeating all orders.  In accordance with Captain's Standing Orders, SSOs, SOPs and EOPs | Operate |  |
|  | 1.1 |  | Oprate The Ballast System | As for Task 1 | As for Task 1 | Oprate | MISSING |
|  |  | 1.1.1 | Operate The System Valves | As for Task 1 | As for Task 1 | Operate |  |
|  |  | 1.1.2 | Operate The System Pumps | As for Task 1 | As for Task 1 | Operate |  |
|  |  | 1.1.3 | Monitor The System | As for Task 1 | As for Task 1 | Monitor |  |
|  | 1.2 |  | Operate The Trim System | Given access to electro meters on panel and the fwd. surveillance system | As for Task 1 | Operate |  |
|  |  | 1.2.1 | Line Up Trim System | As for Task 1 | As for Task 1 | Line | MISSING |
|  |  | 1.2.2 | Operate Trim Pumps | As for Task 1 | As for Task 1 | Operate |  |
|  |  | 1.2.3 | Revert System To Normal Line Up | As for Task 1 | As for Task 1 | Revert | MISSING |
|  | 1.3 |  | Operate Hp Gas Systems | Maintaining system pressures within Command tolerances. Given liaison with the EOOW for compressor requirements and access to electro meters on the panel and the fwd. surveillance system. | **Verbally reporting when tolerances are breached.** | Operate |  |

### Table 10. Action Verb Analysis

What the Training Analysis Tool does (and does very well) is that in the Action Verb column it picks up the first word in each statement and compares it with a pre-defined and approved Taxonomy Matrix of Action Verbs, which are aligned to Bloom’s Taxonomy of Learning Domains of Knowledge, Skills and Attitudes and further to the different levels in each category. The Taxonomy contains over 600 Action Verbs and illustrated an example of which you can see below.

|  |  |  |
| --- | --- | --- |
| **KNOWLEDGE** | **SKILLS** | **ATTITUDE** |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Remember** | **Understanding** | **Apply** | **Analysing** | **Evaluating** | **Creating** | **Imitation** | **Manipulation** | **Precision** | **Articulation** | **Naturalisation** | **Receiving** | **Responding** | **Valuing** | **Organising & Conceptualising** | **Characterising** |
| Acquire | Account-for | Acknowledge | Analyse | Advise | Abstract | Accumulate | Assist | Accept | Accomplish | Construct | Agree | Acclaim | Accept | Adhere | Approach |
| Appoint | Add | Activate | Appraise | Allocate | Animate | Apportion | Attend | Act | Administer | Invent | Ask | Aid | Challenge | Balance | Arrive |
| Define | Approximate | Alphabetise | Assign | Assume (duties) | Argue | Circulate | Build | Adapt | Aggregate | Lead | Assume | Answer | Confront | Counterbalance | Believe |
| Enrol | Articulate | Amend | Attribute | Award | Assemble | Copy | Circulate | Adjust | Calibrate | Manage | Be-Aware | Answer | Debate | Defend | Influence |
| Enter | Associate | Annotate | Audit | Contrast | Assess | Diffuse | Close | Align | Communicate | Programme | Feel | Cite | Discuss | Determine | Judge |
| Enumerate | Attest | Approve | Balance | Contrast | Budget | Dispatch | Copy | Alter | Compound | Project-manage | Give | Comply | Explain | Encourage | Propose |
| Index | Authenticate | Arrange | Blueprint | Counsel | Categorize | Dispense | Dismantle | Apply | Conduct | Superintend | Hear | Concentrate | Follow-through | Generalise | Revise |
| Inscribe | Catalogue | Ascertain | Breadboard | Criticise | Code | Disperse | Dispatch | Carry-out | Develop | Supervise | Identify | Concur | Form | Inspire | View |
| Label | Certify | Assure | Break-down | Critique | Collate | Dispose (of) | Display | Change | Enforce | Follow | Point-to | Conform | Incentivise | Relate |  |
| List | Classify | Attain | Calculate | Decide | Combine | Disseminate | Divide | Collect | Fabricate | Get | Read | Co-operate | Invite | Rescue |  |
| Match | Comprehend | Authorise | Categorise | Delegate | Compile | Distribute | Do | Confine | Hold | Listen | Receive | Engage | Join | Synthesise |  |
| Measure | Confirm | Avoid | Censor | Determine | Compose | Divide | Duplicate | Contribute | Impart | Match | Reply | Explore | Participate | Unify |  |
| Meet | Describe | Back up | Characterise | Evaluate | Cope | Forward | Effect | Control | Improve | Notice | Retain | Greet | Persuade | Weigh |  |

In the context of Table 10 above you will see below the first word from the Task, Sub-Task and Task Element statement is listed in the Action Verb column, this word is cross referenced in the Taxonomy Matrix, if it is in the Matrix, the Missing Verbs column remains blank, if it is not, then it is marked as Missing, so how does this help you and what do you do about it?

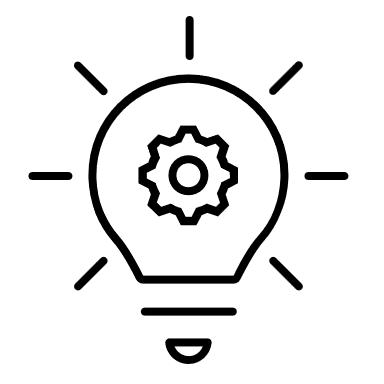
|  |  |
| --- | --- |
| **ACTION VERB** | **MISSING VERBS** |
| Operate |  |
| Oprate | MISSING |
| Operate |  |
| Operate |  |
| Monitor |  |
| Operate |  |
| Line | MISSING |
| Operate |  |
| Revert | MISSING |
| Operate |  |

### Table 11. Action Verbs & Missing Verbs

It enables you to revisit the statement where the Action Verb is missing and check what the statement says and if it makes sense in the context of the level (e.g. Task, Sub-Task or Task Element).

I the case of Table 9 above, we have three missing Action Verbs and immediately you can see the first **Oprate** is a simple spelling error, which can be corrected without seeking permission.

The second missing word is **Line** and is both a Verb and a Noun but is not in the Taxonomy.



**A useful tip is to go to the Taxonomy of Verbs tab in the Training Analysis Tool select Find and type in the word, it will identify all the words with Line in it**

The question you need to answer is, does the Performance Statement contextually make sense e.g. **“Line up Trim System**,**”** the answer is yes it does, but Line up in the Verb selection is only identifying the first word, but what you have is what is known as a Compound Verb two separate words meaning one action.

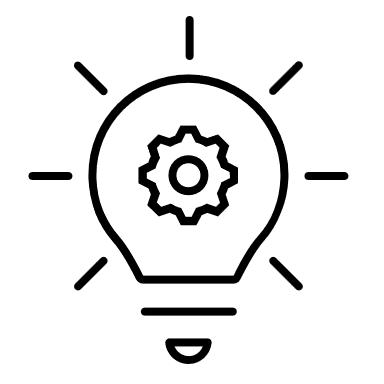
It is clear that **Line up**, should be in the Taxonomy, the next question to ask is in what Domain and at what Level, this is a conversation you have with your SME. Also to get **Line up** recognised in the Taxonomy the two words will need to be connected with a Hyphen as illustrated **Line-up**. In this instance (with the SME agreement) Line-up is added to the Skills Domain and is at Level 3 Precision.

The final missing verb is **Revert** and the context is **“Revert System to Normal Line up”** (note Line up appears again, but it is not the Action Verb so can remain as is). Again the same rule applies, first **Revert** is not in the Taxonomy, so is there an alternative or does **Revert** also need to be added to the Taxonomy?

In this case a search of the Taxonomy reveals there are three alternatives in the form of **“Go-back, Reverse and Return.”** All are in the Skills Domain and are at Level 3 Precision.

In consultation with your SME, are any of the alternatives acceptable, as a Training Analyst the advice would be to suggest **“Return,”** if this is acceptable then the Verb in the Performance Statement is changed, if none are acceptable the request for **Revert**  to be added to the Taxonomy is listed.

All such conversations and suggested changes must be recorded, as it is the Role Owner who is the final arbiter in accepting any changes.



**Remember If you are importing existing (and approved information and data) and there are, missing or unrecognised Action Verbs, you can only make suggestions to the client, you cannot implement a change (except for spelling mistakes) without talking the client through the errors and suggesting amendments, using your knowledge and experience.**

## RPS Numbering Systems and Role Scalars (RS)

As previously mentioned Tasks, Sub-Tasks or Task Elements are numbered. If you are importing an existing RPS into the Training Analysis Tool it is vital that you retain the existing numbering system as this document is associated with the MOD Training Management Information System (TMIS) and cross references with other DSAT documentation such as the Formal Training Statement (FTS).

Role Scalars (RS) are particularly useful tools for visualising the structure to a Role that may not be immediately apparent in real life and can:

* + Illustrate the relationship and interdependence of the various parts of the Role and where impact of a failure to perform any particular task can be determined.
  + Highlight areas of commonality and difference between closely related Roles, thus indicating where rational restructuring could take place.
  + Illustrate tasks to be performed with new equipment, related to existing Roles, and thus help assess the impact of new equipment.
  + Assist in the production of a RPS and subsequent development of Training Objectives (TOs).

RS also have disadvantages that should be considered in that:

* + They only display the Task, Sub-Task and Task Elements relative to a Role and Duties required
  + They do not contain the Standards and Conditions required and appear to give all Task, Sub-Task and Task Elements equal status.
  + An important consideration in developing the structure of a Role is the aim to describe what the Role holder does, or should be capable of doing, and not what they need to know.
  + Determining the knowledge that is required to successfully perform a task happens during the Knowledge Skills and Attitudes (KSA) Analysis (described later).
  + RS cannot in themselves be used to design training and should be supported by a full RPS. However, they are a vital step in the production of required outputs of an RPS and TOs.

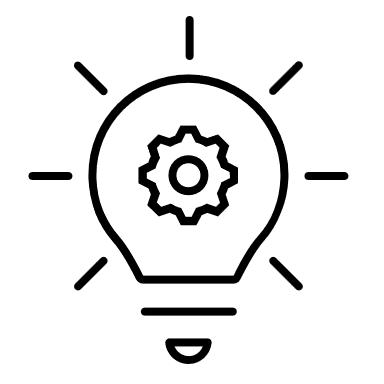
Illustrations of a RS can be found in Figure 5 below, it should be noted that these illustrations are simple ones, the reality is that that a RS can be extremely complex and hugely time consuming and should only be produced if there is an absolute requirement to do so.

### Figure 5. Role Scalar (RS).

# Difficulty, Importance, Frequency (DIF) Analysis

DIF Analysis is a **subjective** and **opinion based methodology** to analyse role information through the Difficulty, Importance and Frequency of Tasks and Sub-Tasks, with the aim of enabling early training decisions, such as the generation of Initial Training Categories and provide an indication of the priority and standard to be applied to the training

DIF Analysis does not determine the levels of training (e.g. Operator, Maintainer, Supervisor or Awareness Practitioner or Expert) nor does it determine the delivery Methods or Media.



**Whilst it states in DSAT that DIF Analysis provides an indication of the priority and standard to be applied to the training, the word ‘standard’ should not be confused with the ‘level’ of training required, which is determined by the Action Verb and your interpretation of it..**

At the most basic level DIF Analysis uses a pre-determined algorithm, however whilst you as an Analyst can, using your knowledge and experience make a judgement call on the DIF of Tasks and Sub-Tasks, it is your responsibility to ensure that the DIF Analysis includes multiple participants with a minimum requirement of SME but also anyone who has direct accountability and responsibility for the Tasks, to make their own judgements.

Prior to conducting a DIF Analysis and as part of your Scoping Exercise (SE), you will need to have in place the approved criteria under which Tasks and Sub-Tasks can be assessed for DIF.

An illustration of DIF criteria can be seen in the table below, this is a standard set of criteria but you must ensure the criteria you use is fit for purpose and approved by the TNASG for your requirement.

| **DIF** | **Very** | **Moderate** | **Low** |
| --- | --- | --- | --- |
| **Difficulty** | The task requires a high level of intellect and or precision to conduct task.  It is a complex task requiring the ability to assimilate information from multiple sources.  The task will be performed under extremely challenging conditions.  The task is physically arduous. | The task requires a moderate level of intellect required to conduct task.  The task is of moderate complexity requiring ability to handle information from single or few sources.  The task will be performed under difficult conditions.  The task requires some physical rigour. | The task requires little or no significant intellectual ability to conduct task.  The task is not complex.  The task will be performed under benign conditions.  The task requires routine physical demands.  The task can be performed at lower standards with no impact on safety. |
| **Importance** | Critical to success of operations.  Critical enabler in delivering desired effect.  Carries high risk of death or serious injury if not performed correctly.  Could result in serious damage to equipment or infrastructure if not conducted correctly.  Could compromise Top Secret or Secret material if not conducted correctly.  Could jeopardise ability to interoperate if not performed correctly.  Failure would have significant ramifications.  Legally required to conduct task correctly. | Contributes to success of operations.  Contributes to delivery of desired effect.  Carries moderate risk of serious injury if not performed correctly.  Could result in minor damage to equipment or infrastructure if not performed correctly.  Could compromise confidential material if not conducted correctly.  Could hinder ability to fully interoperate if not conducted correctly.  Failure could have further ramifications.  Policy guidelines to conduct task. | Has little impact on success of operations.  Has little impact on delivery of desired effect.  Carries some risk of minor injury.  Unlikely to result in damage to equipment or infrastructure.  No significant risk to security. Will not impact ability to interoperate.  Failure will have limited impact.  No policy or legal directions required. |
| **Frequency** | The task is performed frequently daily, weekly or more than once per month. | The task is performed moderately frequently monthly or more than once every three months. | The task is performed infrequently once every three months or less often. |

### Table 12. Illustrative DIF Assessment Criteria

Having your approved DIF assessment criteria in place, those involved in the DIF Analysis will also require the DIF Algorithm, illustrated in the table below to assign a provisional category to the Task or Sub-Task.

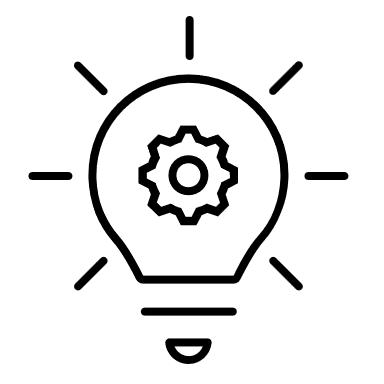
| Difficulty | Importance | Frequency | Provisional Training  Category |
| --- | --- | --- | --- |
| Very Difficult | Very Important | Very Frequent | 2 |
| Moderately Frequent | 1 |
| Infrequent | 1 |
| Moderately Important | Very Frequent | 2 |
| Moderately Frequent | 2 |
| Infrequent | 1 |
| Low Importance | Very Frequent | 3 |
| Moderately Frequent | 3 |
| Infrequent | 2 |
| Moderately Difficult | Very Important | Very Frequent | 2 |
| Moderately Frequent | 2 |
| Infrequent | 2 |
| Moderately Important | Very Frequent | 3 |
| Moderately Frequent | 2 |
| Infrequent | 2 |
| Low Importance | Very Frequent | 3 |
| Moderately Frequent | 4 |
| Infrequent | 5 |
| Low Difficulty | Very Important | Very Frequent | 3 |
| Moderately Frequent | 3 |
| Infrequent | 2 |
| Moderately Important | Very Frequent | 3 |
| Moderately Frequent | 4 |
| Infrequent | 4 |
| Low Importance | Very Frequent | 5 |
| Moderately Frequent | 6 |
| Infrequent | 6 |

### Table 13. DIF Algorithm

The DIF Criteria and Algorithm are two parts to the DIF Analysis, as you can see the DIF Algorithm is numbered from 1 to 6 in terms of Provisional Training Categories, these categories are defined in the table below.

|  |  |
| --- | --- |
| **Training Category** | **Definition** |
| 1 | By the end of the training activity the trainees will have performed the whole task several times, to the full Role Standard, and under realistic scenarios and conditions in which the physical, functional and environmental fidelities were accurately reproduced. The trainee will be able to perform the task competently, immediately on arrival in the workplace. |
| 2 | By the end of the training activity the trainee will have performed the whole task at least once to full Role Standards, under realistic physical, functional and environmental conditions and in a realistic scenario. The trainee should be able to perform the task on arrival in the workplace. |
| 3 | By the end of the training activity the trainee will have performed the whole task in a training environment to a lesser Standard than required in the Role (safety Standards to be met in full). |
| 4 | By the end of the training activity the trainee will have demonstrated an adequate level of underpinning Knowledge and principles required but will not have applied it to develop the Skills required to perform the task. |
| 5 | All training delivered in, or under the auspices of, the workplace. |
| 6 | Trainees do not require any training. |

### Table 14. DIF Training Category Criteria



**The DIF Training Category Criteria is as defined in DSAT, it is a standard set of criteria that cannot be changed.**

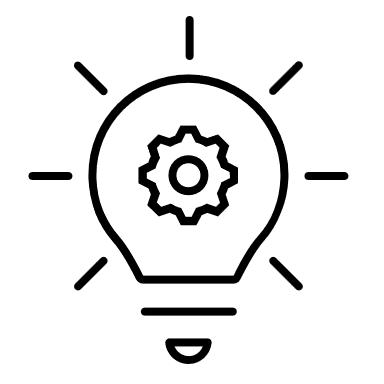
**However, if you were carrying out an analysis outside DSAT and wished to use DIF, then you could create your own (subject to client approval) Training Category Criteria**

In a perfect scenario you as the Analyst would run a facilitated workshop to go through your DIF Analysis but this may not be practicable, and therefore you need to provide those participating in the DIF Analysis with a clear brief of what is required.

There will be other factors that may influence the training categories, resulting in an increase or decrease in category.

Other criteria that may influence the training categories may include (but not be limited to):

* + How many people perform the task, this may determine the need for training and the priority given?
  + How much time is spent on the task which can sometimes be more important than frequency?
  + Realism and Safety. These considerations may make it impossible to conduct any training.
  + The degree of supervision in the workplace. If the task is closely supervised the training category may be reduced since the supervisor can detect errors during performance and then correct them.
  + Time interval between training and first performing the task. The training standards may deliberately be higher than the required standard in terms of timing or accuracy to avoid knowledge or skills fade.
  + Legislation, Regulations and Government policy. Regardless of the training category, a task may have to be included in training if those trained are to be authorised to carry out the task.
  + Legally Mandated Accreditation. The inclusion of training for a task originally allocated a low category may be critical for obtaining legally mandated accreditation, which is a mandated requirement of that Role.



**In rare cases there may be a need to carry out DIF Analysis down to Task Element level where it is deemed that certain Task Elements are safety critical or pose a Threat to Life otherwise DIF Analysis should only be applied to Task and Sub-Task level**

## Inherited DIF Categories

In all probability you will inherit pre-determined DIF Categories from existing RPS, whilst this is acceptable, there are 27 different permutations of DIF criteria, so for arguments sake on a particular Task you have inherited a DIF Category of 3 but what version of 3 is it? The table below provides you with 7 different options.

|  |  |  |  |
| --- | --- | --- | --- |
| Difficulty | Importance | Frequency | Category |
| V | L | V | 3 |
| V | L | M | 3 |
| M | M | V | 3 |
| M | L | V | 3 |
| L | V | V | 3 |
| L | V | M | 3 |
| L | M | V | 3 |

If you encounter this you will need to reverse engineer the DIF Analysis with the SME to come up with the correct combination, the reason for this is that it will have a bearing on any subsequent Training Design.

A completed DIF Analysis can be viewed in Table 15 below, for ease of viewing, only the Task, Sub-Task and Task Element information is visible from the Training Analysis Tool.

There may be occasion where the DIF Analysis may be set as in the illustration in Table 15, but a decision has been made to upgrade or downgrade the DIF Category, the cell with number in it can be overwritten **but**, you will lose the formula that drives the algorithm in that cell.

If it is overwritten and it is either a higher or lower DIF Category, the same principle will apply and you will need to reverse engineer the number to determine the DIF criteria.

Once a DIF Analysis has been completed it is the sole responsibility of the Role Owner of the RPS to approve the overall DIF Category, based on the completed DIF Analysis.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TASK NUMBER** | **SUB-TASK NUMBER** | **TASK ELEMENT NUMBER** | **PERFORMANCE** | **DIFFICULTY** | **IMPORTANCE** | **FREQUENCY** | **DIF CATEGORY** | **DIF DESCRIPTION** |
| 1 |  |  | Operate Ship Systems |  |  |  |  |  |
|  | 1.1 |  | Operate The Ballast System | M | M | V | 3 | By the end of the formal training course the trainee will have performed the whole task in a training environment to a lesser standard than required in the job (safety standards to be met in full). |
|  |  | 1.1.1 | Operate The System Valves |  |  |  |  |  |
|  |  | 1.1.2 | Operate The System Pumps |  |  |  |  |  |
|  |  | 1.1.3 | Monitor The System |  |  |  |  |  |
|  | 1.2 |  | Operate The Trim System | M | M | V | 3 | By the end of the formal training course the trainee will have performed the whole task in a training environment to a lesser standard than required in the job (safety standards to be met in full). |
|  |  | 1.2.1 | Line-up Trim System |  |  |  |  |  |
|  |  | 1.2.2 | Operate Trim Pumps |  |  |  |  |  |
|  |  | 1.2.3 | Reverse System To Normal Line Up |  |  |  |  |  |
|  | 1.3 |  | Operate Hp Gas Systems | M | M | V | 3 | By the end of the formal training course the trainee will have performed the whole task in a training environment to a lesser standard than required in the job (safety standards to be met in full). |

### Table 15. DIF Results

# Knowledge, Skill and Attitude (KSA) Analysis

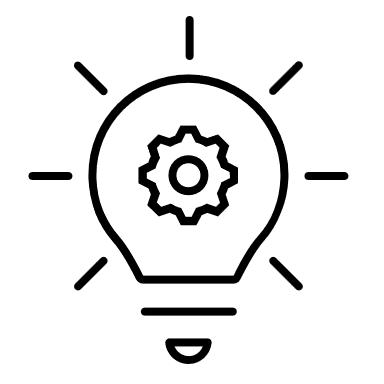
KSA Analysis is the systematic analysis of Performance, Conditions and Standards in order to identify the necessary KSA required to perform a Role.

A KSA Analysis moves on from what the Role holder does (captured in the Role Scalar), to identifying the specific KSA required to successfully perform the Task.

The results of a KSA Analysis contribute to the generation of Training Objectives (TOs) and Enabling Objectives (EOs), judgement of the most cost effective Training Options and the selection of the most appropriate training Methods & Media (in Element 2 Design).

Judgement should be applied to ensure large swathes of trivial KSA are not listed and that KSA are identified with a suitable level of precision to enable the development of performable TOs and EOs.

For example: claiming a necessary procedural skill as ‘Apply Basic Mathematics’ is too imprecise, whereas ‘Apply Ohms Law’ or ‘Resolve Speed/Distance/Time Problems’ is more precise and hence far more useful for TO and EO development.



**Performance Statements and the choice of Action Verb are the starting point from which KSA Analysis begins.**

**Conditions and Standards are also factors, however using your judgment the Training Analysis Tool can provisionally pre-select both the Indicative Level of Learning and suggest the Methods of learning for the Task as a whole.**

## KSA Categories

In general and for broader understating, KSA can be divided into the following categories and sub-categories, combinations of which may apply to each RPS task being analysed.

Underpinning Knowledge. The Knowledge required for successful Task completion should be categorised as:

* + Factual Knowledge. The basic elements that performers must know to be acquainted with a discipline or solve problems in it, which could include knowledge of:
    1. Terminology
    2. Specific details and elements.
  + Conceptual Knowledge. The interrelationships among the elements within a larger structure that enable them to function together, which could include knowledge of:
    1. Classifications and categories
    2. Principles and generalisations
    3. Theories, models and structures
  + Procedural Knowledge. Knowing how to do something; methods of inquiry, and criteria for using skills, algorithms, techniques and methods, which could include knowledge of:
    1. Subject-specific skills and algorithms
    2. Subject-specific techniques and methods
    3. Criteria for determining when to use appropriate procedures.

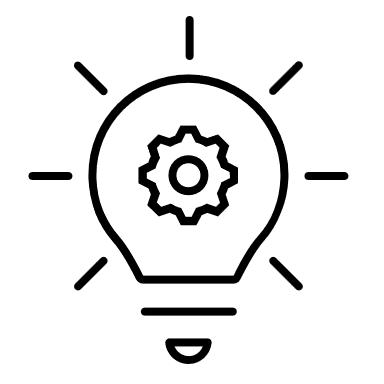
Underpinning Skills. The Skills required for successful Task completion should be categorised as:

* + Physical Skills. Organised and coordinated patterns of mental and/or physical activity. Physical skills may be built up gradually by repeated training or practice and can include:
    1. Accurate, coordinated physical movements
    2. Consistent in physical actions
    3. Smooth, fluid and rapid physical actions.
  + Perceptive Skills. Using the senses to obtain cues that guide performance, which could include:
    1. Developing a mental image of an environment
    2. Developing an awareness of an environment through physical sensation
    3. Developing visual recognition/proficiency.
  + Procedural Skills. Using physical and practical skills in order to accomplish a specific and well characterised technical task.
  + Complex Response Skills. The skilful performance of motor acts that involve complex movement patterns. Proficiency is indicated by a quick, accurate and highly coordinated performance, requiring a minimum of energy.
  + Adaptation Skills. Skills are well developed and the individual can modify movement patterns to fit special requirements:
    1. Responds effectively to unexpected experiences
    2. Modifies instruction to meet needs of learners
    3. Perform a task with a machine that it was not originally intended for that purpose.
  + Origination Skills. Creating new movement patterns to fit a particular situation or specific problems:
    1. Learning outcomes emphasise creativity based upon highly developed skills
    2. Constructs a new set or pattern of movements organised around a novel theory or concept
    3. Develops a new and comprehensive training program.

Underpinning Attitudes. The attitudes required for successful task completion should be categorised as:

* + Openness to experience and willingness to hear.
  + Willingness to react and participate actively.
  + Ability to attach values and express personal opinions.
  + Ability to reconcile internal conflicts and develop value system.

## Initial KSA Analysis using the Training Analysis Tool



**This process of Initial KSA Analysis using the Training Analysis Tool is not a conventional approach.**

**The results of an Initial KSA Analysis will help with the generation of TOs and EOs and the selection of the most appropriate training Methods & Media, during Element 2 (Design).**

The table below, requires you to select answer (from menu options) 5 questions, (those in **Green**) this in turn will automatically generate provisional KSA Analysis results for you, which you can discuss with the relevant SME, or other Stakeholders as to their validity and subsequent approval. An explanation of each of the Training Analysis Tool KSA Elements follows.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Tagging** | **FTS** | **Knowledge Level Required** | **Skill Level Required** | **Attitude Level Required** | **KSA Category** | **Indicative Level of Learning** | **Achieved Through** | **Can be Achieved by** |

### Table 16. Training Analysis Tool KSA Elements

**Tagging** is a means of identifying eventual TOs as either a **Core** (training) requirement, a **Legal** requirement and or and **Accreditation** requirement denoted using by using the letters **C**, **L**, and or **A**, or any combination thereof. This tagging also appears against the Task in the eventual RPS.

A **Formal Training Statement** (**FTS**) details the totality of the training that must be achieved to meet the requirements articulated in the RPS. The FTS comprises:

* + Training Performance Statement (TPS) details those TOs required to be attained by trainees in a formal training environment
  + Workplace Training Statement (WTS) details those TOs to be attained by trainees in a workplace setting or under working conditions
  + Residual Training Gap Statement (RTGS) is a gap where an element of the RPS cannot be allocated a training activity which can be for a number of reasons such as (but not limited to):
    1. No capability in the present or near future
    2. No equipment
    3. Lack of resources
    4. New equipment as yet undefined

Before explaining the next three parts of the Training Analysis Tool for KSA Analysis, it is worthwhile mentioning **Bloom’s Taxonomy of Learning Objectives**, which is still widely acknowledged and used in all Training Analysis and Design.

## Bloom’s Taxonomy

In order to conduct an effective KSA Analysis it is important for a Training Analyst not only to be able to distinguish between KSA but also be able to analyse Lower and Higher levels of Knowledge, Skills and Attitudes but also look at a Task or Sub Task and be able to look at the combination of KSA to assign the correct level of KSA, Table 17 below will in part help you do this.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **Level** | **Low** | | **Medium** | | **High** | |
| **1** | **2** | **3** | **4** | **5** | **6** |
| **Knowledge** | Remembering | Understanding | Applying | Analysing | Evaluating | Creating |
| **Skills** | Imitation | Manipulation | Precision | Articulation | Naturalisation | |
| **Attitude** | Receiving | Responding | Valuing | Organising & Conceptualising | Characterising | |

### Table 17. Bloom’s Taxonomy

One of the mistakes that many Training Analysts, Designers, Developers and those Delivering Training make is to treat a KSA domain and level in isolation.

Using an example in Table 17 above would be the use of “**Applying**.” As can be seen it is positioned in the Knowledge domain and at Level 3.

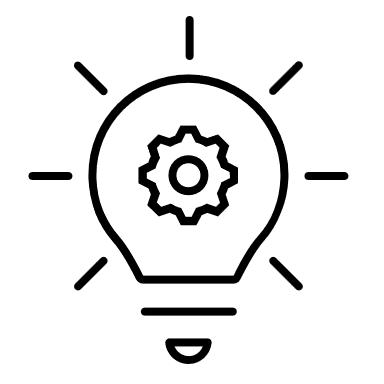
The literal definition of “**Applying**,” is ‘the action of putting something into operation.’

But in order to ‘*put something into operation*’ through “**Applying**,” has the following been considered:

* + How much Remembering and Understanding is required and already known to achieve “Applying”
  + What degree of Precision is required and will the individual also need to use Manipulation
  + Is the behaviour required consistent and stable enough to make the Value clearly identifiable?

If we now choose the verb “**Manage**,” and ask ourselves where it fits in Bloom’s Taxonomy there will be a difference of opinion, but for the purposes of the Training Analysis Tool and the Taxonomy of Verbs it sits in **Naturalisation**. The reason for this is that to “**Manage**,” ‘*is to handle or direct in a multi-faceted context with a degree of skill,’* **Manage is a Transitive Verb**.**[[1]](#footnote-1)**

So in the context of a KSA Analysis for a Task or Sub-Task that uses the Action Verb “**Manage**,” and using the same principles of “**Apply**,” will require you to consider, Remembering, Understanding, Applying, Analysing, Evaluating as well as Imitation, Manipulation, Precision and Articulation and, Receiving, Responding, Valuing, Organising & Conceptualising and Characterising, in other words the entire Taxonomy less for Creating.



**It is absolutely vital that you as a Training Analyst do not think in a one dimensional way when conducting your KSA Analysis and you should also advise anyone else involved in KSA Analysis too.**

Going back to [**Table 16. Training Analysis Tool KSA Elements**](#_Table_14._Analysis) and conducting your KSA Analysis there are now three questions for you to consider, then answer, those answers will be based on your judgement, and cognisance of the DIF category and what has been previously in said this section, under the following 3 columns of:

* + What level of Knowledge is required
  + What level of Skill is required
  + What level of Attitude is required

Using [**Table 17. Bloom’s Taxonomy**](#_Table_17._Bloom’s)your choice is selecting between Low, Medium or High, for Knowledge, Skills and Attitude for your Task or Sub-Task, which then automatically calculates, the following:

* + KSA Category is similar to the DIF Algorithm where the KSA Category is calculated on the choices you make in Knowledge, Skills and Attitude, this then suggests 8 different levels of Indicative Levels of Learning
  + Indicative Levels of Learning is not in DSAT, but has been developed as part of the Training Analysis Tool there are 8 levels of learning which are described below

|  |  |  |  |
| --- | --- | --- | --- |
| Level | Description | Achieved  Through | Achieved by |
| 1 | Identify, remember and recall various sources of information, facts, instructions, processes, procedures, rules and definitions where applicable, from a combination of verbal, written and graphic communication | Facts Procedures Processes | Asynchronous Learning Electronic Performance Support System Interactive Electronic Technical Manuals (IETM) |
| 2 | Construct understanding and its implication from various sources of information, facts, instructions, processes, procedures, rules and definitions from a combination of verbal, written and graphic communication. | Facts Procedures Processes Rationale | Synchronous Learning Flipped Learning |
| 3 | Observe, learn and carry out actions through verbal and/or written and graphic communication with consistency, without deviation and under supervision where required | Procedures Processes Tasks Equipment Technical Exercises | Synchronous Learning Flipped Learning |
| 4 | Carry out actions and participate in activities that express interest in outcomes, enthusiasm for action, question and probe ideas, suggest interpretation | Procedures Processes Tasks Equipment Technical Exercises | Synchronous Learning Flipped Mastery Simulation |
| 5 | Apply the required and appropriate skills and techniques in a given task or combination of tasks either as an individual or as part of a group/team and use partial or full supervision where necessary | Analysis Tasks Equipment Technical Exercises | Synchronous Learning Flipped Mastery Simulation |
| 6 | Break down and/or distinguish information, actions, instructions, processes, procedures and rules into components to determine and articulate how the parts relate to one another and/or how they interrelate, in an overall structure or purpose | Facts Procedures Processes Rationale Analysis | ICW Level 3  Flipped Mastery  Synchronous Learning  Practical Simulation  Augmented Reality |
| 7 | Make evaluation-based judgments using established information, facts, actions, instructions, processes, procedures, rules and standards through checking, comparing, critiquing and recommending solutions | Rationale Analysis Evaluation Assessment | Masterclass Coaching In-Tray Exercise |
| 8 | Construct from existing or create from new; information, actions, instructions, processes, procedures, rules or standards into a modified or new pattern or structure through generating, planning, or producing to form a coherent or unique new whole | Rationale Analysis Evaluation Construct | Masterclass Coaching In-Tray Exercise |

### Table 18. Indicative Levels of Learning and how they are Achieved

Whilst these have been automatically generated, they are not set in stone, they do however provide you, the Analyst with a discussion point with the various stakeholders as to their validity, as they begin to inform both your Training Options and subsequently your Methods & Media selection. In the Training Analysis Tool, illustrated below an example is provided.

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TASK NUMBER** | **SUB-TASK NUMBER** | **TASK ELEMENT NUMBER** | **PERFORMANCE** | **TAGGING** | **FTS** | **KNOWLEDGE LEVEL REQUIRED** | **SKILL LEVEL REQUIRED** | **ATTITUDE LEVEL REQUIRED** | **KSA CATEGORY** | **INDICATIVE LEVEL OF LEARNING** | **ACHIEVED THROUGH** | **CAN BE ACHIEVED BY** |
| 1 |  |  | Operate Ship Systems | C | TPS | Medium | High | Medium | 6 | Break down and/or distinguish information, actions, instructions, processes, procedures and rules into components to determine and articulate how the parts relate to one another and/or how they interrelate, in an overall structure or purpose | Facts Procedures Processes Rationale Analysis | ICW Level 3 Flipped Mastery Synchronous Learning Practical Simulation Augmented Reality |
|  | 1.1 |  | Operate The Ballast System |  |  |  |  |  |  |  |  |  |
|  |  | 1.1.1 | Operate The System Valves |  |  |  |  |  |  |  |  |  |
|  |  | 1.1.2 | Operate The System Pumps |  |  |  |  |  |  |  |  |  |
|  |  | 1.1.3 | Monitor The System |  |  |  |  |  |  |  |  |  |
|  | 1.2 |  | Operate The Trim System |  |  |  |  |  |  |  |  |  |
|  |  | 1.2.1 | Line-up Trim System |  |  |  |  |  |  |  |  |  |
|  |  | 1.2.2 | Operate Trim Pumps |  |  |  |  |  |  |  |  |  |
|  |  | 1.2.3 | Reverse System To Normal Line Up |  |  |  |  |  |  |  |  |  |
|  | 1.3 |  | Operate Hp Gas Systems |  |  |  |  |  |  |  |  |  |

### Table 19. Initial KSA Analysis

The columns entitled **Achieved Through and Achieved by –** just as the Indicative Level of Learning is generated automatically, so too is how the learning can be achieved effectively, this part of the KSA Analysis, works out the relationship between the KSA Levels you chose and Bloom’s Taxonomy to provide you with suggested central focus of how the training should be designed, so for instance:

The Overall **Task** in the example above is to “**Operate Ship Systems**,” which is deemed KSA Level 6 which translates to:

* + Break down and/or distinguish information, actions, instructions, processes, procedures and rules into components to determine and articulate how the parts relate to one another and/or how they interrelate, in an overall structure or purpose

The KSA Algorithm, calculates that this can be **Achieved Through** any combination of:

* + Analysis, Tasks, Equipment, Technical and Exercises,

This provides a central focus of how this could be best **Achieved by** using any combination of:

* + Interactive CourseWare (ICW) Level 3, Flipped Mastery, Synchronous Learning, Practical Simulation, Augmented Reality

As with the Indicative Level of Learning this is not set in stone, but should be taken in the round, and discussed with your stakeholders.

# Training Gap Analysis (TGA)

The purpose of the TGA is to identify the KSA that an individual needs but doesn’t necessarily have yet to carry out their job or to perform certain tasks and to identify the new or additional training, support and guidance required.

This analysis also enables you, the Analyst to identify and review existing training, support and guidance content that needs to be either removed or updated.

Accurate identification of Training Gaps is dependent on having both a valid RPS and valid Training Objectives (TOs) for the extant training solution(s).

Before starting to derive any Training Gaps, the Analyst must consult the Training Delivery Authority (TDA) and, or Training Providers who have custody of the TOs in scope to determine the validity of those TOs for serving as the basis of further TGA and inform the client of their findings.

If any extant TOs are deemed to be invalid or deficient in conforming to standards required of TOs, further consultation with the analysis sponsor/customer is essential to determine the way ahead.

The TGA process will be covered in two parts.

## TGA Part 1

The approach to TGA, using the Training Analysis Tool whilst slightly different to DSAT is a far more comprehensive.

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **CAN THIS (TO, EO) BE FULLY SATISFIED WITH EXISTING ASSETS?** | **IF NO TO PREVIOUS QUESTION CAN THIS (TO, EO) BE COMPLETED TO AN ACCEPTABLE LEVEL BY DOING NOTHING?** | **IS THERE ANY SUPPORT & GUIDANCE PROVIDED TO ENABLE THE (TO, EO) TO BE COMPLETED EFFECTIVELY?** | **IF TRAINING, SUPPORT & GUIDANCE IS PROVIDED IN WHAT FORM IS IT?** | **IF FORMAL TRAINING IS IN PLACE CAN YOU PROVIDE THE NAME OF THE TRAINING?** | **WHAT IS THE TOTAL DURATION IN PERIODS?** |

### Table 20. Training Analysis Tool TGA Part 1

Your TGA should always be conducted with SME, and, or Training Delivery Specialists to elicit the responses you require along with access to all extant training, support and guidance, (something that should have been provided as part of the SE). The first question in your TGA is:

* + CAN THIS (TO, EO) BE FULLY SATISFIED WITH EXISTING ASSETS[[2]](#footnote-2)?

The purpose of this question is to ascertain if there are existing assets that can **fully satisfy** (the use of Fully Satisfy is important the proposed TO, EO. In the Training Analysis Tool there are four responses to choose from.

|  |
| --- |
| Yes |
| No |
| Partially |
| Unknown |

* + If the answer is No, you provisionally have a Training Gap, but this is only the first part of your questioning, any of the other responses, Yes, Partially or Unknown allow you to investigate further.
  + IF NO TO PREVIOUS QUESTION CAN THIS (TO, EO) BE COMPLETED TO AN ACCEPTABLE LEVEL BY DOING NOTHING?
  + It is perfectly reasonable to ask if the TO, EO can be completed by doing nothing, too often, Tasks and Sub-Tasks and their respective TOs and EOs can suffer from Cognitive Overload[[3]](#footnote-3) where there is a disproportionate amount of information relative to the task. Again there are four responses

|  |
| --- |
| Yes |
| No |
| Partially |
| Unknown |

* + Again, if No is the response it reinforces the Training Gap, just as the other three responses Yes, Partially or Unknown allow you to investigate further.
  + The next question to be addressed, IS THERE ANY SUPPORT & GUIDANCE PROVIDED TO ENABLE THE (TO, EO) TO BE COMPLETED EFFECTIVELY?
  + In today’s modern workplace environment, “Training,” isn’t necessarily a panacea to solving a Training Gap, indeed providing effective support and guidance at the point of need is now seen as the most effective form of learning in the workplace, so asking the question is relevant and once again the same responses are in place to respond with the same outcomes, however, if the answer is Yes, or Partially the next question is to identify the sources.

|  |
| --- |
| Yes |
| No |
| Partially |
| Unknown |

* + IF TRAINING, SUPPORT & GUIDANCE IS PROVIDED IN WHAT FORM IS IT? In asking this question and in the Training Analysis Tool, you can elicit a lot of information.

The Training Analysis Tool for this question in particular enables you to capture multiple options of training, support & guidance, this is achieved through a simple (macro-enabled menu list) allowing you to select as many training, support & guidance options as is provided for the TO or EO, the list of options is shown below.

| Training, Support & Guidance Options | |
| --- | --- |
| Assignment | Gamification |
| Asynchronous Learning | Interactive Electronic Technical Manual (IETM) |
| Audio | In-Tray Exercise |
| Augmented AI | Lecture |
| Augmented Reality | Masterclass |
| Case Study | Mentoring |
| Classroom Instructor Led Training | OEM Manuals |
| Coaching | On-the-Job Training |
| Conference | Practical Instructor Led Training |
| Debate | Presentation |
| Discussion | Role Play |
| EBook | Seminar |
| Embedded | Simulation |
| Emulation | Synchronous Learning |
| EPSS | Synthetic Learning Content |
| Equipment | Teleconference |
| Exercises | Tutoring |
| Facilitation | Video |
| Flash Cards | VR Based Training Content |
| Flipped Learning | Webinar |
| Flipped Mastery | Work Book |
| Forum | Workshop |

### Table 21. Training, Support & Guidance Options Menu

As an illustration the result of this multi choice multi option menu is below.

|  |
| --- |
| **If training, support & guidance is provided in what form is it?** |
| Classroom Instructor Led Training, Interactive Electronic Technical Manual (IETM), Exercises, Practical Instructor Led Training, Work Book, OEM Manuals |

This approach enables you to capture all the various training, support & guidance that is provided in a quick, simple and efficient manner.

Assuming you have captured various training, support & guidance, it now needs to be identified, which brings you onto your next question.

* + IF FORMAL TRAINING IS IN PLACE CAN YOU PROVIDE THE NAME OF THE TRAINING?

Having established the various training, support & guidance by type and method, the next is to identify it and its source.

As a TA one of the sensitivities you need to cognisant of is the providers of any extant training content, especially external 3rd party providers.

If you are involved in a DSAT process for the MOD, any extant training “should be owned by the MOD,” but this is often a very grey area and the question of access to third party materials can be complicated.

This issue is not for you as an Analyst to solve it is for the TNASG to resolve, and this will be covered in part 2 of the TGA shortly.

That said, you should seek to establish the name of the course or training content and where necessary the provider of that content, and finally in this part, as well as the name of any existing formal training content you will need to establish

* + WHAT IS THE TOTAL DURATION IN PERIODS?

Although not strictly part of the TGA, finding out total duration of the identified training content is something you need to establish as it will be required in Training Options, Methods & Media Options, Methods of Training Effectiveness and Cost Benefits Analyses.

The metric you should use for this is the number of periods, whether it is Instructor Led Training, Practical Training, On-the-Job Training, ELearning etc.

Conventional thinking is that a lesson period is between 40 and 45 minutes

When establishing the number of periods you should only do so for the whole of the TO and at this stage not try and break the periods down to EO level this is for simplicity and efficiency.

**Table 22** below provides an illustration of a completed TGA Part 1

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TASK NUMBER** | **SUB-TASK NUMBER** | **TASK ELEMENT NUMBER** | **PERFORMANCE** | **CAN THIS (TO, EO) BE FULLY SATISFIED WITH EXISTING ASSETS?** | **CAN THIS (TO, EO) BE COMPLETED TO AN ACCEPTABLE LEVEL BY DOING NOTHING?** | **IS THERE ANY SUPPORT & GUIDANCE PROVIDED TO ENABLE THE (TO, EO) TO BE COMPLETED EFFECTIVELY?** | **IF TRAINING, SUPPORT & GUIDANCE IS PROVIDED IN WHAT FORM IS IT?** | **IF FORMAL TRAINING IS IN PLACE CAN YOU PROVIDE THE NAME OF THE TRAINING?** | **WHAT IS THE TOTAL DURATION IN PERIODS?** |
| 1 |  |  | Operate Ship Systems | Partially | No | Yes | Classroom Instructor Led Training, Equipment, Interactive Electronic Technical Manual (IETM), Practical Instructor Led Training, On-the-Job Training | Course 1  Course 2  Course 3 | Course 1 - 45 Periods  Course 2 - 45 Periods  Course 3 - 135 Periods |
|  | 1.1 |  | Operate The Ballast System |  |  |  |  |  |  |
|  |  | 1.1.1 | Operate The System Valves |  |  |  |  |  |  |
|  |  | 1.1.2 | Operate The System Pumps |  |  |  |  |  |  |
|  |  | 1.1.3 | Monitor The System |  |  |  |  |  |  |
|  | 1.2 |  | Operate The Trim System |  |  |  |  |  |  |
|  |  | 1.2.1 | Line-up Trim System |  |  |  |  |  |  |
|  |  | 1.2.2 | Operate Trim Pumps |  |  |  |  |  |  |
|  |  | 1.2.3 | Reverse System To Normal Line Up |  |  |  |  |  |  |
|  | 1.3 |  | Operate HP Gas Systems |  |  |  |  |  |  |

### Table 22. TGA Part 1 Example

## Training Analysis Tool TGA Part 2

Part 2 of the TGA follows a similar pattern to Part 1, insomuch that it should be conducted with SME, and, or Training Delivery Specialists to elicit the responses you require.

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **DOES THE EXISTING TRAINING, SUPPORT & GUIDANCE FULLY SATISFY THE TOs AND EOs?** | **CAN THE EXISTING TRAINING, SUPPORT & GUIDANCE BE ACCESSED AND REVIEWED?** | **IF NO TO THE PREVIOUS QUESTION CAN YOU PLEASE STATE WHY?** | **IS ASSESSMENT OR TESTING OF THE TO OR ANY PART THEREOF REQUIRED?** | **IF ASSESSMENT OR TESTING OF THE TO OR ANY PART THEREOF IS REQUIRED IN WHAT FORM SHOULD IT TAKE?** | **ASSESSMENT OR  TESTING METHOD** | **ADDITIONAL ASSESSMENT  OR TESTING METHOD (OPTIONAL)** | **DIF CATEGORY** | **KSA LEVEL** |

### Table 23. Training Analysis Tool TGA Part 2

Having established that training, support & guidance exists, there is no-one better positioned than Training Delivery Specialists or SME to assess the efficacy of the content, the questioning follows the same process as TGA Part 1.

* + DOES THE EXISTING TRAINING, SUPPORT & GUIDANCE FULLY SATISFY THE TOs AND EOs? There are four choices of:

|  |
| --- |
| Yes |
| No |
| Partially |
| Unknown |

However, in asking this question, it provides you the opportunity dig deeper and investigate the reasons behind any of their responses, these need to be attributable and need to be included in your final report.

You should not take the opinion of a single source at face value as validation is important, if a great deal of money has been spent on a previous training solution only for it to be stated as unfit for purpose, the reasons have to be validated.

* + CAN THE EXISTING TRAINING, SUPPORT & GUIDANCE BE ACCESSED AND REVIEWED?

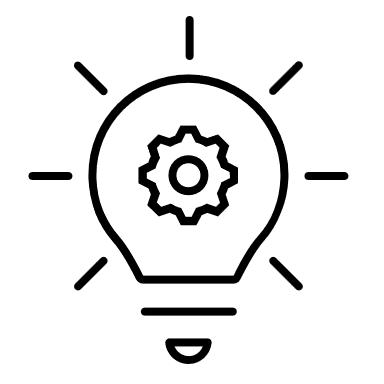
This may seem a simple question to ask at face value, but it is one that can raise issues that you as the Training Analyst need to address.

You cannot assume that you will have unfettered access to everything you need to undertake your Analysis, there may be a variety of reasons for NOT being able to access & review extant content such as; commercial, security, intellectual property rights, licencing arrangements, technology

The point is that you need to ask the question to establish the answer especially in relation to the next question

* + IF NO TO THE PREVIOUS QUESTION CAN YOU PLEASE STATE WHY?

Being told you cannot access certain content to review it is not a problem, as long as you record the reasons why for governance purposes, see the note below.



**As a reminder a RPS is a legally binding document that can be and has been used in a Court of Law for Criminal, Negligence and Duty of Care cases.**

**If the training provided was deemed to be a contributing factor and in part was due to not having access to certain content, you have will have recorded this in your findings.**

The next part of TGA Part 2 is all about Assessment & Testing, of which the first question is:

* + IS ASSESSMENT OR TESTING OF THE TO OR ANY PART THEREOF REQUIRED?

Part of the TGA is to establish if Assessment or Testing of the TO is required, it is a simple Yes or No answer, but answering No can be called into question further.

* + IF ASSESSMENT OR TESTING OF THE TO OR ANY PART THEREOF IS REQUIRED IN WHAT FORM SHOULD IT TAKE?

If the response to Assessment or Testing is Yes there are four choices as listed below with further amplification

| Type | Description |
| --- | --- |
| Formative | Formative assessment is an integral part of training. It does not contribute to the final mark given for course/module/lesson; instead it contributes to learning through providing feedback. Effective formative feedback will affect what the student and the trainer does next. |
| Summative | Summative assessment demonstrates the extent of a learner's success in meeting the assessment criteria used to gauge the intended learning outcomes of a course/module/lesson, and which contributes to the final mark given for the module. It is normally, though not always, used at the end of a unit of training. Summative assessment is used to quantify achievement, to reward achievement. For all these reasons the validity and reliability of summative assessment are of the greatest importance. Summative assessment can provide information that has formative/diagnostic value. |
| Formative & Summative | A combination of both above |
| Accreditation | Development and progression for a military person in particular and ultimately their transition to a civilian environment is a fact of life and a key component of the military covenant, this is a complex part of assessment and if required will involve many different stakeholders |

### Table 24. Types of Assessment

Accreditation is included as it is a requirement for certain Tasks, Sub-Tasks and Task Elements to be accredited and therefore has to be considered. The next two columns in the Analysis is Assessment or Testing Methods.

Previous experience has shown capturing more than one assessment method has been required, the choices you have are:

| Assessment Methods | Description |
| --- | --- |
| Theory (Written) | Used mainly in academic, accreditation or advance learning environments where essay based responses are required to demonstrate knowledge and articulation of a syllabus or subject |
| Theory (Oral) | Used similar to Written Theory, but with Oral assessment methods, it’s the ability to articulate verbally and coherently partsof a syllabusor a subject |
| Practical | Used to demonstrate confidence and competence in handling, setting-up, operating and maintaining with emphasis on safety |
| Quiz (Informal) | Used in Formative Assessment as a means of reinforcing learning |
| Mixed Theory & Practical | A combination of methods where required |
| Pre-Test | A well-trodden path that measures the existing knowledge of a subject, prior to undertaking the course |
| Post Test | Post testing used in conjunction with pre-testing can be used to measure the % of knowledge and skills gain as a result of the learning undertaken |
| Authentic or Work-Integrated Assessment | Authentic or work-integrated assessment is an assessment where the tasks and conditions are more closely aligned to what student’s would experience within their employment. This form of assessment method is designed to develop student’s skills and competence alongside academic development. |
| Diagnostic Assessment | Diagnostic assessment is intended to improve the learner’s experience and their level of achievement. However, diagnostic assessment looks backwards rather than forwards. It assesses what the learner already knows and/or the nature of difficulties that the learner might have, which, if undiagnosed, might limit their engagement in new learning. It is often used before training or when a problem arises. |
| Dynamic Assessment | Dynamic assessment measures what the student achieves when given training in an unfamiliar subject. An example might be the assessment of how much basic maths relative to their role is learnt in a short block of training to students who have limited prior knowledge of basic maths. It can be useful to assess potential for specific learning in the absence of relevant prior attainment, or to assess general learning potential for students who have a difficulty in the example of basic maths. Dynamic assessment is often used in advance of the main body of training. |
| Synoptic Assessment | Synoptic assessment encourages students to combine elements of their learning from different parts of a course and to show their accumulated knowledge and understanding of a topic or subject area. A synoptic assessment normally enables students to show their ability to integrate and apply their skills, knowledge and understanding with breadth and depth in the subject. It can help to assess a student's capability of applying the knowledge and understanding gained in one part of a course to increase their understanding in other parts of the course, or across the course as a whole. Synoptic assessment can be part of other forms of assessment. |

### Table 25. Assessment Methods

As previously mentioned part of the TGA is to establish if Assessment or Testing of the TO is required, but answering No can be called into question further.

When undertaking TNA there can be discrepancies between what the Tasks or Sub-Tasks are required to achieve and the relative importance of the TO or EO when it comes to ensuring that in TGA, it is afforded the right level of Assessment or Testing.

This is something that is not in the DSAT process, but rather based on many years’ experience of conducting DSAT TNA, where at the conclusion of TGA, when the Assessment Criteria has been applied you can check with the SME or Training Delivery Specialists that it is commensurate with the pre-selected **DIF and KSA Level**.

Having completed this series of questions, you will now have a list of TOs and EOs where a Training Gap has been confirmed, which you can now take forward into your Training Options Analysis (TOA).

It should be pointed out that you when you conduct your TOA it is for all the TOs and EOs and not just those where the Training Gap has been established.

**Table 26** below provides an illustration of a completed TGA Part 2

|  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **TASK NUMBER** | **SUB-TASK NUMBER** | **TASK ELEMENT NUMBER** | **PERFORMANCE** | **DOES THE EXISTING TRAINING, SUPPORT & GUIDANCE FULLY SATISFY THE TOS AND EOS?** | **CAN THE EXISTING TRAINING, SUPPORT & GUIDANCE BE ACCESSED AND REVIEWED?** | **IF OTHER THAN YES TO THE PREVIOUS QUESTION CAN YOU PLEASE STATE WHY?** | **IS ASSESSMENT OR TESTING OF THE TO OR ANY PART THEREOF REQUIRED?** | **IF ASSESSMENT OR TESTING OF THE TO OR ANY PART THEREOF IS REQUIRED IN WHAT FORM SHOULD IT TAKE?** | **ASSESSMENT OR  TESTING METHOD** | **ADDITIONAL ASSESSMENT  OR TESTING METHOD (OPTIONAL)** | **DIF CATEGORY** | **KSA LEVEL** |
| 1 |  |  | Operate Ship Systems | No | Partially | Some of the content is only accessible if a person is DV cleared.  The content is owned and controlled by an external 3rd Party provider with strict caveats for access | Yes | Formative & Summative | Mixed Theory & Practical |  |  | 6 |
|  | 1.1 |  | Operate The Ballast System |  |  |  | Yes | Formative & Summative | Mixed Theory & Practical |  | 3 |  |
|  |  | 1.1.1 | Operate The System Valves |  |  |  |  |  |  |  |  |  |
|  |  | 1.1.2 | Operate The System Pumps |  |  |  |  |  |  |  |  |  |
|  |  | 1.1.3 | Monitor The System |  |  |  |  |  |  |  |  |  |
|  | 1.2 |  | Operate The Trim System |  |  |  | Yes | Formative & Summative | Practical |  | 3 |  |
|  |  | 1.2.1 | Line-up Trim System |  |  |  |  |  |  |  |  |  |
|  |  | 1.2.2 | Operate Trim Pumps |  |  |  |  |  |  |  |  |  |
|  |  | 1.2.3 | Reverse System To Normal Line Up |  |  |  |  |  |  |  |  |  |
|  | 1.3 |  | Operate Hp Gas Systems |  |  |  | Yes | Formative & Summative | Theory (Oral) |  | 3 |  |

### Table 26. TGA Part 2 Example

# Training Options Analysis (TOA)

A TOA is a process to consider each relevant performance objective in the RPS to assess the extent to which the training environment should replicate the workplace (real) environment to enable training to be effective, this is also known as the **Fidelity Analysis**, where the implications of locations and environment for training and Methods & Media options are considered.

When undertaking your TOA and Fidelity Analysis it should be remembered that the training environment and the implications of location for a training solution may well require analysis at this stage.

## Critical Consideration Factors

Constraints on training resources and the availability of real equipment for training may force the emphasis towards **Workplace Training**. The same would be true if it is not possible to replicate critical RPS Conditions in training establishments or via distributed training.

Alternatively expensive and scarce training equipment or qualified trainers may only be available in [some] training establishments.

It is therefore important to determine an estimate of where the balance between training to be delivered in a training establishment and workplace training will fall in relation to exactly what the Training Requirements Authority (TRA) requires, tempered by that which is deliverable and can only be achieved by consultation with the TRA and the Training Provider, who will have knowledge of existing training and current training facilities and resources.

This will later result in the allocation of TOs to a Training Performance Statements (TPS), Workplace Training Statements (WTS), or, where no training will take place due to the Performance, Conditions and Standards to a Residual Training Gap Statement (RTGS).

The output from the TOA could require an amendment to the Initial Training Categories or recommendations that take account of both DIF Analysis results and the impact of all other Role, training and resource factors.

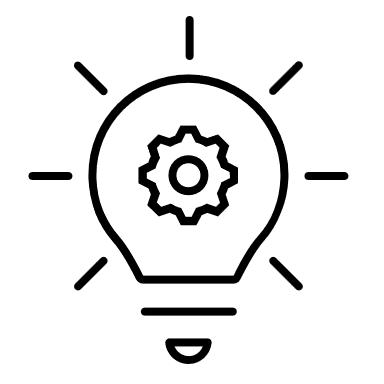
The Training Analysis Tool, enables you carry-out a Fidelity Analysis from the information you have derived from your TGA.

## Fidelity Analysis

Decisions made during Fidelity Analysis can have a significant impact on the nature and cost of training solutions, as fidelity can be a significant cost driver.

It is important not to ‘**gold plate**’ fidelity requirements, but instead determine the most appropriate and practicable level of fidelity that is essential to achieve the desired training effect and to adequately prepare trainees for their future Roles.

Fidelity Analysis should be undertaken at Task Level only, however, depending on the complexity of the capability involved, it may, in a small number of cases be necessary to articulate fidelity requirements at a Sub-Task level in the event that Sub-Tasks do not share the same fidelity requirement profile as their parent Task.



**If a Role (or more specifically the Tasks and Sub-Tasks) conducted in the workplace environment (the real world) must be done at 100%, and the training environment can only replicate the workplace environment to 80%, then that is the fidelity to which the training requirement matches the role requirement.**

**It is not to be confused with TGA, as fidelity is about replicating the totality of the real environment in training; rather than seeking the gap between existing training and new changed training requirements.**

## Fidelity Categories

There is a very specific DSAT defined process with predefined categories for Fidelity Analysis as illustrated below.

| **Fidelity Categories** | **Description** |
| --- | --- |
| **Physical Fidelity** | Physical fidelity analysis assesses the need to familiarize trainees with the visual, spatial and tactile characteristics of equipment, consoles, compartments, platforms and threats (including applicable reference manuals, Standing and Emergency Operating Procedures and so forth). |
| Layout | Position of the controls etc., relative to each other. |
| Look | Shape, colour, luminescence and size of interface. |
| Feel | Feel and movement of the interface during use. |
| **Functional Fidelity** | Functional fidelity analysis assesses the need to provide trainees with exposure to equipment functionality, doctrinal procedures, and maintenance routines which are required to be exploited in order to deliver the desired military effect. |
|  |  |
| Format | Format of data displayed or action taken. |
| Content | Information displayed or heard, frequency, text colour etc. |
| Response | Data change rate and display response times. |
| **Environmental Fidelity** | Environmental fidelity analysis assesses the need to prepare or ‘acclimatize’ trainees for the conditions they will be operating under, and simulate some of the conditions that can hinder Performance. It can be easy to ‘gold plate’ environmental fidelity requirements beyond what is essential to provide the necessary cues, stimuli and responses, but high levels of environmental fidelity may be necessary for exposing trainees to complex operating environments and ‘fog of war’ type issues. |
| Sound | Background noise, conversation and sympathetic resonance. |
| Motion | Incidental movement of the system, equipment or platform. |
| Ambience | Heat, light, smell, smoke, humidity etc. |
| Geographic Features | Geographic features. Effects on sensors, infrastructure, SOPs etc. |
| **Tactical and Cultural Fidelity** | Tactical and cultural fidelity assesses requirements that enable individuals and teams to ‘train as they intend to operate’. Exposing trainees to the types of units, threats, allies (including neutral or ‘white’ forces), cultural issues and geographical locations that they will experience on operations, can also be used for mission rehearsal training or tactical development. Modern training technology, particularly simulation, enables accurate representations to be included in training quickly and cheaply. |
| Threats | Enemy characteristics (number, tactics, equipment etc.). |
| Allies/Neutrals | Allied and neutral forces characteristics (number, tactics, equipment, culture etc.). |
| Conflict Character and Location | Type of operation, presence of media and / or Very Important Persons (VIPs), cultural / religious behaviours, historical implications, infrastructure and building implications etc. |
| Team Interactions | Command and Control (C2) relationships, communications, situational awareness. |

### Table 27. DSAT Fidelity Categories

As a Training Analyst when you conduct a Fidelity Analysis the simple rule of thumb is to consider:

* + Physical – the workspace in which the trainee is situated and its characteristics
  + Functional – how the trainee can interact with the environment
  + Context – the scenario and tasks to which the trainee is being exposed
  + Psychological – the demands placed on and characteristics of the trainee
  + Social – interpersonal interactions within the training environment)
  + Other considerations – exercise control, performance measurement and feedback

## Levels of Fidelity

There are 4 levels against which each of the Fidelity Categories (as defined in Table 23 above) can be measured for each Task (or Sub-Task where applicable), these are illustrated below.

| **Score** | **Replication** | **Replication Impact** |
| --- | --- | --- |
| 0 | Not Applicable | Has no impact on training |
| 1 | Not Important | Little impact would be made on training except to add realism |
| 2 | Moderately Important | Significant impact on the training The task contains some elements which require exact replication |
| 3 | Very Important | Exact replication is essential to training |

### Table 28. DSAT Fidelity Levels

Whilst the illustrated **Fidelity Categories and Levels** above may seem simple and quite straight forward, simply marking a Task for instance in Physical Fidelity **2** (Moderately Important), gives no meaningful guidance to designers of the eventual training solution.

Analysts conducting Fidelity Analysis (in collaboration with their relative SME or Training Delivery Specialists) should also include a **JUSTIFICATION** of the fidelity requirements for each performance criteria, as will be illustrated next.

## Fidelity Analysis in the Training Analysis Tool

Fidelity Analysis in the Training Analysis Tool is in two parts, the list of Row Headings can be seen below. All the Task and Sub-Task information is carried through to the Fidelity Analysis Tab, the Row Headers in **RED** cannot be altered and are locked out as all this information has been approved by the TNASG. The Fidelity Analysis Row Headers are in **GREEN**, allowing you to edit in these columns and rows.

|  |  |
| --- | --- |
| **TASK NUMBER** | **PHYSICAL** |
| **SUB-TASK NUMBER** | **LAYOUT** |
| **TASK ELEMENT NUMBER** | **LOOK** |
| **PERFORMANCE** | **FEEL** |
| **ACTION VERB** | **JUSTIFICATION** |
| **CONDITIONS** | **FUNCTIONAL** |
| **STANDARDS** | **FORMAT** |
| **ACHIEVED THROUGH** | **CONTENT** |
| **CAN BE ACHIEVED BY** | **RESPONSE** |
| **CAN THIS (TO, EO) BE FULLY SATISFIED WITH EXISTING ASSETS?** | **JUSTIFICATION** |
| **IF TRAINING, SUPPORT & GUIDANCE IS PROVIDED IN WHAT FORM IS IT?** | **ENVIRONMENTAL** |
|  | **SOUND** |
|  | **MOTION** |
|  | **AMBIENCE** |
|  | **GEOGRAPHICAL** |
|  | **JUSTIFICATION** |
|  | **TACTICAL/CULTURAL** |
|  | **THREATS** |
|  | **ALLIES/NEUTRALS** |
|  | **CONFLICT CHARACTER/LOCATION** |
|  | **TEAM INTERACTIONS** |
|  | **JUSTIFICATION** |

### Table 28. Training Analysis Tool Fidelity Content

The next illustration only uses part of the Task Information, which, will be explained.

When conducting a Fidelity Analysis and in order to make an informed judgement of the Fidelity Category and Level of Fidelity (with your SME and or Training Delivery Specialist) there is certain information that is essential, so in the example below, in the Training Analysis Tool the Task information contains the Conditions under which the Task must be carried out and the Standards to be used. The (approved) Indicative Level of Learning is also included to aid the decision making as is existing Training, Support & Guidance.

| TASK  NUMBER | SUB-TASK  NUMBER | TASK ELEMENT NUMBER | PERFORMANCE | ACTION  VERB | CONDITIONS | STANDARDS | ACHIEVED  THROUGH | CAN BE ACHIEVED BY | CAN THIS (TO, EO)  BE FULLY SATISFIED  WITH EXISTING ASSETS? | IF TRAINING, SUPPORT & GUIDANCE IS PROVIDED IN WHAT FORM IS IT? |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|
| 1 |  |  | Operate Ship Systems | Operate | As a Royal Naval Rating / Leading Hand / Petty Officer / Chief Petty Officer.  Unless otherwise stated all performances are conducted at anchor, in harbour, dock, shiplift, and throughout the world, in all weather and sea states, all CBRNDC states, during night or day, in times of peace, conflict or war.  A Lower Deck Roundsman sentry is to be detailed from the Fwd Duty Watch of Weapons, Fwd Marine Engineering or Seaman branches with the exception of when in plant state A and the transition between plant state A and B, where a fully qualified panel operator is required.  The LDT will almost invariably be the first person to become aware of any irregular, abnormal or potential hazardous situations developing within the forward end of the submarine.  The correct performance of this duty, together with that of the UDT / quartermaster is essential for the security and safety of the submarine.  He is not to leave the Control Room.  Given scenario, tools, equipment, instruction, reference material, levels of supervision, number and level of subordinates as required or directed by the OOD | In accordance with QRRN, RN Diversity and Equality policy, JSP 375 MOD Health and Safety Handbook, Departmental and Unit Standing Orders, Law of Armed of Conflict.  Doctrine iaw current DCI/DIN/RNTMs, relevant BRs/other publications and policy directives.  All actions undertaken are to be in the best interests of the Service and demonstrate appropriate CLM competencies, Character, Attitude and Effectiveness commensurate with Rate / Rank (as detailed in the Leading Hand (First Superior Officer) / (Senior Rate OPS).  Only ratings that have qualified as submariners, have completed the Lower Deck Roundsman Task Book and carried out continuation training can conduct the duties as Lower Deck Roundsman.  He is to have an in depth knowledge of all EOP actions in the event of an emergency.   Without error, in the correct sequence as ordered by the OOD.  Conducting continuous panel rounds, reporting any irregularities verbally to the OOD immediately.  Repeating all orders.  In accordance with Captain's Standing Orders, SSOs, SOPs and EOPs | Facts Procedures Processes Rationale Analysis | ICW Level 3 Flipped Mastery Synchronous Learning Practical Simulation Augmented Reality | Partially | Classroom Instructor Led Training, Equipment, Interactive Electronic Technical Manual (IETM), Practical Instructor Led Training, On-the-Job Training |

### Table 29. Task Information for Fidelity Analysis

Continuing the example from Table 29 Task Information, the Fidelity Analysis in this instance has only been produced at Task Level, but has taken into account all the Sub-Tasks associated with it.

As can be seen from, the Fidelity Analysis of the Task indicates predominately Level 2 for Physical, Functional and Environmental and so is classified as Moderately Important with Significant Impact on the training as the Task contains some elements which require exact replication and the justification is related to the Conditions.

|  |  |  |  |
| --- | --- | --- | --- |
| PHYSICAL | FUNCTIONAL | ENVIRONMENTAL | TACTICAL/CULTURAL |

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| LAYOUT | LOOK | FEEL | JUSTIFICATION | FORMAT | CONTENT | RESPONSE | JUSTIFICATION | SOUND | MOTION | AMBIENCE | GEOGRAPHICAL | JUSTIFICATION | THREATS | ALLIES NEUTRALS | CONFLICT CHARACTER LOCATION | TEAM | JUSTIFICATION |
| 2 | 1 | 2 | This Task and associated Sub-Tasks can be undertaken in confined and restricted spaces, possibly at night or in total darkness, under abnormal and/or emergency conditions and therefore require a high degree of replication | 2 | 2 | 1 | For exactly the same reasons in Physical Fidelity | 2 | 2 | 2 | 2 | To be considered if operating under emergency conditions | 0 | 0 | 0 | 1 | No impact on the training solution |

### Table 30. Fidelity Analysis for the Task of “Operate Ship Systems”

# Methods & Media (M&M) Options

Having completed the Fidelity Requirements of the Tasks & Sub-Tasks accordingly, you can now consider the M&M Options to determine the most appropriate and effective blend of training M&M that provides the most cost-effective and efficient way of imparting the required KSA.

It should be remembered that you as the Training Analyst are responsible for M&M at an Initial Level and you do so along with your SME and Training Delivery Specialists.

If you have not conducted M&M options before:

* + Methods are the strategies or techniques used to impart the required KSA.
  + Media are the tools and means used to apply the Methods selected.

The detailed Methods & Media Options forms part of Element 2 Design (Stage 2) in DSAT and is conducted by the Design Team in 3 stages which are:

* + Stage 1 – Training Objectives (TOs)
  + Stage 2 – Assessment Strategy (AStrat)
  + Stage 3 – Learning Specification (LSpec)

One of the key decision points of a DSAT TNA is to determine the level of interactivity that the eventual solution provides.

By definition, interactivity involves two way communication between the courseware and a user.

M&M options identified during this stage will depend upon a number of considerations including (but not limited to) in no particular order:

* + The requirements identified by the KSA Analysis
  + Target Training Audience Size & Description
  + Characteristics of Trainers
  + Differing levels of Digital Literacy
  + Cost Effectiveness
  + Training Efficiency
  + Availability of Resources
  + Type of Training
  + Throughput (SOTR).

An estimation of the relative training effectiveness of each training Media option to bridge the training gaps as determined in the TGA is required.

Choosing 3 indicative options now is important, as they form and inform the Methods of Training Effectiveness (MOTE) comparison and eventually the Cost Benefit Analysis (CBA) work later.

The Training Analysis Tool enables the Training Analyst in collaboration with the SME and or Training Delivery Specialists to consider various Methods & Media that may partially or fully meet the training requirement, which will then be further investigated in Element 2, Stage 2 of Design. Within the M&M Element of the Training Analysis Tool you will be able to select from a list of Methods and Media options illustrated below.

|  |
| --- |
| Methods & Media Options |
| ICW Level 1 |
| ICW Level 2 |
| ICW Level 3 |
| ICW Level 4 |
| Audio |
| Augmented Reality |
| EBook |
| Emulation |
| EPSS |
| Flash Cards |
| Gamification |
| Interactive Electronic Technical Manuals (IETM) |
| ISO BS Standards |
| JSPs |
| OEM Manuals |
| Simulation |
| Standard Operating Procedures (SOPs) |
| Synthetic Learning Content |
| Video |
| Virtual Reality |
| Assignment |
| Asynchronous Learning |
| Classroom Instructor Led Training |
| Coaching |
| Exercises |
| Facilitation |
| Flipped Learning |
| Flipped Mastery |
| Forum |
| Game Based Learning |
| Lecture |
| Masterclass |
| Mentoring |
| On-the-Job Training |
| Practical Instructor Led Training |
| Synchronous Learning |
| Workshop |

### Table 31. Methods & Media Options

In the Methods & Media Tab of the Training Analysis Tool, there is a variety of information, but for explanation purposes, the table below focuses on only the options and justification.

## Methods & Media Options Selection

It is not unreasonable to have more than one delivery method or media, in the case of the Training Analysis Tool, in each of your options you can choose as many M&M as you wish, dependent on what is appropriate and proportionate to meet the TO as a whole. In the example below, two options have been selected for the Task of Operating Ships Systems as well as justifications for each option, even where an option is Not Applicable (N/A), you must complete a justification for it

It is this process and level of detail that will help inform the Design Element of DSAT and help refine the Methods & Media options into a viable solution.

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| PERFORMANCE | OPTION 1 | JUSTIFICATION | OPTION 2 | JUSTIFICATION | OPTION 3 | JUSTIFICATION |
| Operate Ship Systems | ICW Level 2, Simulation, Interactive Electronic Technical Manual (IETM), Asynchronous Learning, Flipped Mastery | Operating Ships Systems are well documented as well as tried and trusted standard practice, there is no higher level maintenance or supervisory tasks to be completed | ICW Level 3, Practical Instructor Led Training, On-the-Job Training, Exercises | The same as Option 1 but simulations can be built into ICW Level 3 and reinforced by practical application and on the job training and spaced practice | N/A | A third option is not required for this task  Options 1 & 2 cover this Task sufficiently |
| Operate The Ballast System |  |  |  |  |  |  |
| Operate The System Valves |  |  |  |  |  |  |
| Operate The System Pumps |  |  |  |  |  |  |
| Monitor The System |  |  |  |  |  |  |
| Operate The Trim System |  |  |  |  |  |  |
| Line-up Trim System |  |  |  |  |  |  |
| Operate Trim Pumps |  |  |  |  |  |  |
| Reverse System To Normal Line-Up |  |  |  |  |  |  |
| Operate HP Gas Systems |  |  |  |  |  |  |

### Table 32. Methods & Media Options for Training Objective

## Measure of Training Effectiveness (MOTE)

The MOTE seeks to derive an objective measure of a training medium’s effectiveness in satisfying a set of training requirements. It is fundamental that this is a direct measure of effectiveness for each task rather than a calculated score derived from weighted combinations of a number of component factors.

Collecting scores from a panel of suitable SMEs significantly reduces subjectivity in the MOTE. SMEs should be accepted as such by the TNASG to ensure the validity of any assessment.

The SMEs involved in the TOA form a MOTE assessment panel that reports to, and is accountable to, the TNASG. It is stressed that authority still rests with the TNASG who will ultimately be responsible for judging the accuracy and validity of the analysis.

In MOTE where the term ‘Option’ is used, it is important that the Training Analyst is aware that an ‘Option’ consists not solely of one media or method, but of a suite of media and methods.

It is essential that a single media is not discarded simply because it performs poorly when its effectiveness is judged in a stand-alone mode.

The media discarded may well be the most effective for certain training requirements without off-setting the cost parameters too much.

There is a pre-defined model to carry out this task and depending on the complexity of the requirement will determine the number of SMEs and or Training Specialists approved by the TNASG to be involved in scoring the MOTE. There are 6 MOTE Categories, which are:

* + Meeting the RPS
  + Usability \*
  + Flexibility \*
  + Fidelity
  + Assessment \*
  + Training Management \*

See explanation below for those categories marked with an **\***

A number of factors can potentially affect the training effectiveness of a particular selected media option. Typical factors that might be considered are illustrated as an example in the table below.

At the outset of the MOTE analysis the factors to be considered should be listed and prioritised in terms of importance. The list of factors and associated criteria should be given to the MOTE assessment panel and explained to the assessors to ensure consistent assessments.

| **MOTE Categories** | **Criteria** |
| --- | --- |
| Meeting the RPS | Ability to meet training priority Ability to meet Role Performance Conditions & Standards |
| Fidelity | Ability to meet physical, functional and environmental fidelity requirements |
| Assessment Issues **\*** | Validity & Reliability of assessment Degree of student feedback and monitoring Degree of Instructor Control |
| Usability issues **\*** | Ability to adapt to/meet learner styles Media Skills and Instructor Training required Acceptability of training media |
| Flexibility **\*** | Ability to add extra facilities Ability to modify courseware to adapt to changed operational or learner requirements Capability to interface and or integrate with other equipment and media Ability to store and play back scenarios |
| Training Management Issues **\*** | Ease of providing information for planning and administration Quality Control No of Instructors required  No of Support Staff required Class sizes |

### Table 33. MOTE Categories and Criteria

It should be noted that whilst those MOTE Categories marked with an **\*** (Usability, Flexibility, Assessment and Training Management) do not affect the effectiveness of the training in its true definition they will influence the long term effectiveness of any training solution, and hence it’s Through Life Cost.

Meeting the RPS in the immediate case is determined by how well people are prepared by the training.

If the training solutions are to be assessed solely on their ability to meet the RPS, without consideration of flexibility or long term viability or risk, then the MOTE Categories marked (**\***), should not be included.

An alternative approach is to consider those marked with an (**\***) as non-scoring items but to consider their impact within the text.

|  |  |  |  |
| --- | --- | --- | --- |
| Score | Effectiveness | Definition | Additional Criteria |
| 0.0 | 0% | Option totally unsuitable |  |
| 0.1 |
| 0.2 | 25% | Option has extremely limited effectiveness | Major shortcomings |
| 0.3 |
| 0.4 | 50% | Option has limited effectiveness | Significant shortcomings |
| 0.5 |
| 0.6 | 75% | Option is reasonably effective | Some minor or a single major shortcoming |
| 0.7 | Option is almost effective | Minor shortcomings |
| 0.8 | 100% | Option is just effective | The minimum to meet the entire need |
| 0.9 | >100% | Option provides more than bare minimum | Some additional benefit |
| 1.0 | >>100% | Option provides significantly more than bare minimum | Significant additional benefit |

### Table 34. MOTE Scoring Criteria

The list of MOTE scoring criteria above is used to arrive at an assessment of the overall effectiveness of each option. Scores are to be given in a range of between 0 and 1 in increments of 0.1.

Table 35 below provides an illustration of the MOTE Assessment for the two M&M Options in Table 32 above

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **OPTION 1** | SCORER  1 | SCORER  2 | SCORER  3 | SCORER  4 | SCORER  5 | ADD WEIGHTING FACTOR | COMBINED WEIGHTED SCORE | COMPLIANCE | RANGE |  |  |
| **ICW Level 2, Simulation, Interactive Electronic Technical Manual (IETM), Asynchronous Learning, Flipped Mastery** | | | | | | | | | |  |
| Meeting the RPS | 0.70 | 0.80 | 0.90 | 1.00 |  | 10.00 | 8.50 | Compliant | 0.3 |  | **0.78** |
| Usability |  |  |  |  |  |  |  | Compliant | 0.0 |  |
| Flexibility |  |  |  |  |  |  |  | Compliant | 0.0 |  | **Non Compliant** |
| Fidelity | 0.60 | 0.90 | 0.70 | 0.70 |  | 7.00 | 5.08 | Non Compliant | 0.3 |  |
| Assessment | 0.80 | 0.80 | 0.60 | 0.70 |  | 4.00 | 2.90 | Non Compliant | 0.2 |  |  |
| Training Management |  |  |  |  |  |  |  | Compliant | 0.0 |  |  |

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **OPTION 2** | SCORER  1 | SCORER  2 | SCORER  3 | SCORER  4 | SCORER  5 | ADD WEIGHTING FACTOR | COMBINED WEIGHTED SCORE | COMPLIANCE | RANGE |  |  |
| **ICW Level 3, Practical Instructor Led Training, On-the-Job Training, Exercises** | | | | | | | | | |  |  |
| Meeting the RPS | 0.80 | 0.90 | 0.80 | 0.80 |  | 10.00 | 8.25 | Compliant | 0.1 |  | **0.86** | |
| Usability |  |  |  |  |  |  |  | Compliant | 0.0 |  |
| Flexibility |  |  |  |  |  |  |  | Compliant | 0.0 |  | **Compliant** | |
| Fidelity | 1.00 | 0.90 | 0.90 | 0.90 |  | 7.00 | 6.48 | Compliant | 0.1 |  |
| Assessment | 0.80 | 1.00 | 0.70 | 0.80 |  | 4.00 | 3.30 | Compliant | 0.3 |  |  |
| Training Management |  |  |  |  |  |  |  | Compliant | 0.0 |  |  |

### Table 35. MOTE Assessment Results

In the examples above a score of 0.8 indicates an option meets the requirements of the criteria other scores will typically be assessed bearing in mind this critical boundary.

Marks of 0.5 and below should be accompanied by amplifying comments recorded to indicate where the critical areas of deficiency are perceived this is important for identifying any subsequent training gap.

Scores of greater than 0.8 have been allowed in order to discriminate between similar options and to allow for those which provide benefits in addition to the minimum requirement.

Any score of greater than 0.8 should be accompanied by amplifying comments to indicate where the additional benefits are perceived to exist.

It should be borne in mind at all times that the score principally relates to training effectiveness i.e. the ability of the option to meet the RPS.

As such the coarse assessment of effectiveness will be directly associated with meeting the RPS and Fidelity requirements, with consideration of the other main factors allowing fine adjustment of the score.

Where the range of scoring is greater than 0.2 it should be discussed and a record made of the reason for the divergence. It may be there is a misunderstanding or misapplication of the marking guidelines, an individual’s score may be amended.

In the example above whilst the assessment states that Meeting the RPS is Compliant, the remainder do not and there is clear divergence and the ICW solution as a whole is Non-Compliant, if this remains the case after review, it is still the case that final approval still rests with the TNASG who will ultimately be responsible for judging the accuracy and validity of the analysis.

If the ICW3 were subsequently amended and deemed compliant, the results would feed into a Cost Benefits Analysis during Element 2 Design (Stage 2) this will not be covered in the guidance but can be found in [Annex F](#_Annex_F._Cost).

# Training Needs Analysis (TNA) Report

The TNA Report specifies the training requirement and recommends a training solution through the evaluation of options.

It should include the resources required to design and support the training. Training Needs Reports should collate all the information from the scoping exercise and analyses stages, adding an Implementation Plan and TNE strategy.

It should also include a description of the TNA methodology in terms of the data gathering and analysis techniques and clearly reference the data sources consulted.

The TNA can then be written up as a Training Needs Report that provides or supports detailed user and system requirements. The report should include:

* + Identification of the Performance requirement with a RPS for each Role as identified in the RA
  + Identification of the training requirement from the results of the TGA
  + An RPS for the Role(s) affected by the recommended training solution with recommended training categories and supportive notes to amplify specific requirements to be included as appropriate to assist designers with the production of the FTS (during Element 2, Design, 2).
  + An implementation plan, including where responsibilities lie (e.g. conversion training, date of new legislation and/or policy change, and design). At this stage the draft TOs/CTOs endorsed by the TNASG should be available and expressed as Performance, Conditions and Standards to enable implementation by the design team. Any recommendation regarding estimation of resources, timings and assessments should be clearly referenced to aid the design team.
  + Input to inform or refine the SOTR (for formal endorsement), to focus and direct the design stages.
  + Training Needs Evaluation Strategy (Element 4 Assurance)
  + The TNASG endorsed training solution, resulting from the Cost Benefit Analysis (CBA) and final selection using the Options Evaluation.
  + Fidelity requirements and associated risks, assumptions, constraints should be included in the Report.

# Annex A. Glossary

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| **Abbreviation/Acronym** | **Meaning** |
| --- | --- |
| **A** |  |
| AOF | Acquisition Operating Framework |
| APs | Air Publications |
| ASpec | Assessment Specification |
| AStrat | Assessment Strategy |
| **B** |  |
| BARS | Behaviourally Anchored Rating Scales |
| BC | Business Case |
| BRs | Books of Reference |
| **C** |  |
| CAS | Continuous Attitude Survey |
| CBA | Cost Benefit Analysis |
| CDT | Compulsory Drugs Test |
| CEB | Customer Executive Board |
| CI | Continuous Improvement |
| CIF | Common Inspection Framework |
| CONEMP | Concept of Employment |
| CONOPS | Concept of Operations |
| CONUSE | Concept of Use |
| CPD | Continuing Professional Development |
| CRA | Commander’s Risk Assessment |
| CRAT | Competence Retention Analysis Technique |
| CRL | Catering, Retail and Leisure |
| CT | Collective Training |
| CTO | Collective Training Objective |
| **D** |  |
| DAOR | Discharge As Of Right |
| DCTS | Defence Centre of Training Support |
| DCYP | Directorate of Children and Young People |
| DE&S | Defence Equipment and Support |
| DELC | Defence Technology Enhanced Learning Centre |
| DIF Analysis | Difficulty, Importance, Frequency Analysis |
| DJCTEC | Defence Joint Collective Training and Exercise Committee |
| DLE | Defence Learning Environment |
| DLMC | Defence Learning and Management Capability |
| DLoD | Defence Line of Development |
| DPTB | Defence People and Training Board |
| DSAT | Defence Systems Approach to Training |
| DT | Distributed Training |
| DTC | Defence Trainer Capability |
| DTEC | Defence Training and Education Capability |
| DTM | Defence Trainer Manager |
| DTS | Defence Trainer Supervisor |
| DU 18 | Discharge U18 |
| DWT | Defence Workplace Trainer |
| **E** |  |
| EA | Environment Analysis |
| EA 10 | Equality Act 10 |
| EDI | Equality, Diversion and Inclusion |
| ELC | Enhanced Learning Credits |
| EO | Enabling Objective |
| ExVal | External Validation |
| **F** |  |
| FA | Fidelity Analysis |
| FEHE | Further Education and Higher Education Scheme |
| FLC | Front Line Commands |
| FS | Functional Skills |
| FTS | Formal Training Statement |
| **G** |  |
| GTS | Gains to Trained Strength |
| **H** |  |
| HFI | Human Factors Integration |
| HM | Human - Machine |
| HoP | Head of Profession |
| HQ | Headquarters |
| HTA | Hierarchical Task Analysis |
| **I** |  |
| iDSC | Interim Defence Simulation Centre |
| InVal | Internal Validation |
| **J** |  |
| JA | Job Analysis |
| JCSSG | Joint Commitments Strategic Steering Group |
| JCTWG | Joint Collective Training Working Group |
| JFHQ | Joint Force Headquarters |
| Job Spec | Job Specification |
| JSP | Joint Service Publication |
| JTF | Joint Task Force |
| **K** |  |
| KLPs | Key Learning Points |
| KSA | Knowledge, Skills and Attitudes |
| **L** |  |
| LSpec | Learning Specification |
| **M** |  |
| MDAL | Master Data Assumption List |
| MG | Main Gate |
| MMST | Methods & Media Selection Tool |
| MOD | Ministry of Defence |
| MTS | Management of Training System |
| **N** |  |
| NA | Needs Analysis |
| NATO | North Atlantic Treaty Organisation |
| **O** |  |
| OA | Overlay Analysis |
| OCS | Officer Cadet (Training) Survey |
| OGDs | Other Government Departments |
| OJE | On the Job Experience |
| OJT | On the Job Training |
| **P** |  |
| PDR | Personal Development Record |
| PGE | Postgraduate Education |
| **Q** |  |
| QA | Quality Assurance |
| QIP | Quality Improvement Plan |
| QMS | Quality Management Standard |
| **R** |  |
| RA | Role Analysis |
| RFTD | Ready for Training Date |
| Role PS | Role Performance Statement |
| RT | Remedial Training |
| RTGS | Residual Training Gap Statement |
| RTS | Recruit Training Survey |
| **S** |  |
| SAR | Self-Assessment Report |
| SCD | Supervisory Care Directive |
| SCs | Service Commands |
| SE | Scoping Exercise |
| SLC | Standard Learning Credit |
| SME | Subject Matter Expert |
| SOP | Standard Operating Procedure |
| SOR | Statement of Requirement |
| SOTR | Statement of Trained Requirement |
| SOTT | Statement of Training Task |
| SpLD | Specific Learning Difficulties |
| SpLD | Specific Learning Difficulties |
| SS | Single Service |
| **T** |  |
| TACOS | Terms and Conditions of Service |
| TAD | Target Audience Descriptor |
| TAFMIS | Training Administration and Financial Management Information System |
| TCTA | Team/Collective Task Analysis |
| TDA | Training Delivery Authority |
| Team PS | Team Performance Statement |
| TESRRR | Training, Education, Skills, Recruiting and Resettlement |
| TESRRR PAG | Training, Education, Skills, Recruitment and Resettlement (TESRRR) Policy and Assurance Group |
| TGA | Training Gap Analysis |
| TLCM | Through Life Capability Management |
| TM | Training Management |
| TNA | Training Needs Analysis |
| TNASG | Training Needs Analysis Steering Group |
| TNE | Training Needs Evaluation |
| TO | Training Objectives |
| TOA | Training Options Analysis |
| ToRs | Terms of Reference |
| TPA | Target Population Analysis |
| TPS | Training Performance Statement |
| TQM | Training Quality Manual |
| TRA | Training Requirements Authority |
| TrAD | Training Authorisation Document |
| TRE | Training Resource Estimate |
| TSP | Training Support Plan |
| **U** |  |
| UOR | Urgent Operational Requirement |
| URD | User Requirement Document |
| UTS | Untrained Strength |
| **V** |  |
| VLE | Virtual Learning Environment |
| **W** |  |
| WpT | Workplace Training |
| WTS | Workplace Training Statement |

# Annex B. Example RPS

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|  |  |  |  |
| --- | --- | --- | --- |
| **OFFICIAL** | | | |
| **ROLE** | Forward Marine Engineering Junior Rate | **JOB NUMBER** | ME(S)/03Q Fwd ME |
| **DUTY** | Lower Deck Roundsman | **DUTY NUMBER** | N/A |
| **TRA** | Navy Pers-BM War GS SO2 | **RPS REFERENCE** | 76/09 |
|  |  | **ISSUE STATUS** | Version 3.0 |

| **DUTY** | **JOB NUMBER** | **TASK** | **SUB TASK** | **TASK ELEMENT** | **PERFORMANCE** | **CONDITIONS** | **STANDARDS** | **TRG CAT** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Lower Deck Roundsman | ME(S)/03Q Fwd ME | 1 |  |  | Operate Ship Systems | As a Royal Naval Rating / Leading Hand / Petty Officer / Chief Petty Officer.  Unless otherwise stated all performances are conducted at anchor, in harbour, dock, shiplift, and throughout the world, in all weather and sea states, all CBRNDC states, during night or day, in times of peace, conflict or war.  A Lower Deck Roundsman sentry is to be detailed from the Fwd Duty Watch of Weapons, Fwd Marine Engineering or Seaman branches with the exception of when in plant state A and the transition between plant state A and B, where a fully qualified panel operator is required.  The LDT will almost invariably be the first person to become aware of any irregular, abnormal or potential hazardous situations developing within the forward end of the submarine.  The correct performance of this duty, together with that of the UDT / quartermaster is essential for the security and safety of the submarine.  He is not to leave the Control Room.   Given scenario, tools, equipment, instruction, reference material, levels of supervision, number and level of subordinates as required or directed by the OOD | In accordance with QRRN, RN Diversity and Equality policy, JSP 375 MOD Health and Safety Handbook, Departmental and Unit Standing Orders, Law of Armed of Conflict.  Doctrine iaw current DCI/DIN/RNTMs, relevant BRs/other publications and policy directives.  All actions undertaken are to be in the best interests of the Service and demonstrate appropriate CLM competencies, Character, Attitude and Effectiveness commensurate with Rate / Rank (as detailed in the Leading Hand (First Superior Officer) / (Senior Rate OPS).  Only ratings that have qualified as submariners, have completed the Lower Deck Roundsman Task Book and carried out continuation training can conduct the duties as Lower Deck Roundsman.  He is to have an in depth knowledge of all EOP actions in the event of an emergency.   Without error, in the correct sequence as ordered by the OOD.  Conducting continuous panel rounds, reporting any irregularities verbally to the OOD immediately.  Repeating all orders.  In accordance with Captain's Standing Orders, SSOs, SOPs and EOPs |  |
|  |  |  | 1.1 |  | Oprate The Ballast System | As for Task 1 | As for Task 1 |  |
|  |  |  |  | 1.1.1 | Operate The System Valves | As for Task 1 | As for Task 1 | 3 |
|  |  |  |  | 1.1.2 | Operate The System Pumps | As for Task 1 | As for Task 1 |  |
|  |  |  |  | 1.1.3 | Monitor The System | As for Task 1 | As for Task 1 |  |
|  |  |  | 1.2 |  | Operate The Trim System | Given access to electro meters on panel and the fwd. surveillance system | As for Task 1 | 3 |
|  |  |  |  | 1.2.1 | Line Up Trim System | As for Task 1 | As for Task 1 |  |
|  |  |  |  | 1.2.2 | Operate Trim Pumps | As for Task 1 | As for Task 1 |  |
|  |  |  |  | 1.2.3 | Revert System To Normal Line Up | As for Task 1 | As for Task 1 |  |
|  |  |  | 1.3 |  | Operate Hp Gas Systems | Maintaining system pressures within Command tolerances. Given liaison with the EOOW for compressor requirements and access to electro meters on the panel and the fwd. surveillance system. | Verbally reporting when tolerances are breached. | 3 |

# Annex C. Successful Analysis

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## The Tools of a Training Analyst

There are many tools in a Training Analyst toolkit, but the most important tools include but are not limited to:

Knowledge, Communication, Attitude, Perception, Anticipation, Adaptability, Creativity, Inquisitiveness, Problem Solving, Decision Making, Facilitation, Interpretation, Collaboration, Flexibility, Commitment, Engagement

## Analysis Approach

Having determined the type of analysis (Competence, (Role) Task, System(s), Process, Course or Module Analysis) you are going to be conducting, and, before you start your race to gather information and/or data, you need to decide what it is you are seeking to find out and, therefore, what kind of information and/or data you require to analyse, otherwise you can end up with a mass of information and/or data that is of no practical use.

Embarking on a structured programme of information and/or data gathering and collection without fully realising what the information and/or data is to be used for may lead you to "failing to answer the exam question," and subsequently not addressing the actual requirement(s).

Once you have determined what it is you are analysing and what information and/or data you require, the next step is to identify:

* + What is available?
  + Is it readily accessible (ideally in electronic and editable format).
  + How relevant is it
  + How up to date is it
  + Can I use it
  + What more do I need
  + Can I get what I need relatively easily?

The answer to the last two points lie in the research methods you use, of which there are two common research methods they are Qualitative and Quantitative research, which are explained in more detail below.

Qualitative Research

Qualitative research is a method that focuses on obtaining information and data through open ended and conversational communication.

This method of research in basic terms is not only about finding out "what" people think but also "why" they think so.

Take this case in point, you own a small but steady retail outlet that caters for both males and females, growth is important to you but something is not quite working.

From limited observation you conclude that the ratio of males to females coming into your store is significantly less, even though your product range is highly thought of, so there are two or three basic questions you need to ask and answer:

* + Who do I ask (if I ask my regulars, I might dissuade them from coming back)
  + What do I ask
  + How do I ask the questions
  + What responses will give me the best answers

One method to determine why males are not visiting the shop is to conduct detailed interview of potential customers.

For example, using random sampling and interviewing both males and females visiting the nearby shops you eventually establish that your retail outlet:

* + Has a disproportionate number of items in the window targeted at females
  + Male items in the window look as if they are there just to fill space
  + Layout on entering the shop is heavily skewed to female customers, with most male items at the rear of the shop
  + Male items displays do not have the same attention and profile of your female items

The result was that both males and females agreed that what they saw looking into the shop window was the initial trigger for their interest, hence the lack of male footfall unless they were accompanying the female.

Both males and females also agreed that once in the shop, there were no triggers to pique the interest of the males.

Qualitative research is based on the disciplines of social sciences like psychology, sociology, and anthropology. Therefore, the qualitative research methods allow for in-depth and further probing and questioning of respondents based on their responses, where the interviewer/researcher also tries to understand their motivation and feelings. Understanding how your audience takes decisions can help derive conclusions in analysis.

## Types of Qualitative Research

Qualitative research methods are designed in a manner that help reveal the behaviour and perception of a target audience with reference to a particular topic.

There are different types of qualitative research methods such as in-depth interviews, focus groups, ethnographic research, content analysis, case study research.

The results of qualitative methods are more descriptive and the inferences can be drawn quite easily from the data that is obtained.

In today's world it is more complicated and it is difficult to understand what people think and perceive. Online qualitative research methods make it easier to understand that as it is more communicative and descriptive.

The following are the qualitative research methods that are more frequently used:

One to One Interviews

Conducting in-depth interviews is one of the most common qualitative research methods. It is a personal interview that is carried out with one respondent at a time. Using a conversational approach invites the opportunity to obtain in depth details from the respondent.

One of the advantages of this method is that it provides a great opportunity to gather precise data about what people believe and what their motivations are.

If the researcher is experienced asking the right questions can help collect meaningful data. If they should need more information the researchers should question techniques (such as funnel questioning) that will help them collect more information?

These interviews can be performed face to face or on phone and usually can last between half an hour to two hours or even more. When the in-depth interview is conducted face to face it gives a better opportunity to read the body language of the respondents and match the responses.

Focus groups

A focus group is also one of the commonly used qualitative research methods, used in data collection. A focus group usually includes a limited number of respondents (6-10) from within your target market.

The main aim of the focus group is to find answers to the "why" "what" and "how" questions. One advantage of focus groups is, you don't necessarily need to interact with the group in person. Nowadays focus groups can be sent an online survey on various devices and responses can be collected at the click of a button.

Focus groups are an expensive method as compared to the other online qualitative research methods. Typically they are used to explain complex processes. This method is very useful when it comes to market research on new products and testing new concepts.

Ethnographic research:

Ethnographic research is the most in-depth observational method that studies people in their naturally occurring environment.

This method requires the researchers to adapt to the target audiences' environments which could be anywhere from an organization to a city or any remote location. Here geographical constraints can be an issue while collecting data.

This research design aims to understand the cultures, challenges, motivations, and settings that occur. Instead of relying on interviews and discussions, you experience the natural settings first hand.

This type of research method can last from a few days to a few years, as it involves in-depth observation and collecting data on those grounds. It's a challenging and a time-consuming method and solely depends on the expertise of the researcher to be able to analyse, observe and infer the data.

Case Study

The case study method has evolved over the past few years and developed into a valuable research method. As the name suggests it is used for explaining an organization or an entity.

This type of research method is used within a number of areas like education, social sciences and similar. This method may look difficult to operate, however, it is one of the simplest ways of conducting research as it involves a deep dive and thorough understanding of the data collection methods and inferring the data.

Record keeping

This method makes use of the already existing reliable documents and similar sources of information as the data source. This data can be used in new research. This is similar to going to a library. There one can go over books and other reference material to collect relevant data that can likely be used in the research.

Qualitative Observation

Qualitative Observation is a process of research that uses subjective methodologies to gather systematic information or data. Since, the focus on qualitative observation is the research process of using subjective methodologies to gather information or data. Qualitative observation is primarily used to equate quality differences.

Qualitative observation deals with the 5 major senses and their functioning, namely sight, smell, touch, taste, and hearing. This doesn't involve measurements or numbers but instead characteristics.

When to use Qualitative Research

Qualitative research techniques are used when you need to capture accurate, in-depth insights, including factual information and data the following list include (but is not limited to) when you would use qualitative research techniques:

* + Developing a new product or generating an idea
  + Studying a product/brand or service to strengthen it
  + To understand reasons for strengths and weaknesses
  + Understanding situational behaviour
  + To study the reactions of your audience to change management
  + Exploring demographics, audience segments and groups
  + Gathering perception data of a communication strategy
  + To observe, process, tasks and activities

## Quantitative Research

In contrast to qualitative research quantitative research is everything about figures and numbers. Researchers often rely on quantitative data when they intend to quantify attributes, attitudes, behaviours, and other defined variables with a motive to either back or oppose the hypothesis of a specific phenomenon by contextualizing the data obtained via surveying or interviewing the study sample.

As an Analyst, you do have the option to opt quantitative data collection using online or traditional data collection methods. However, you will need computational, statistical, and mathematical tools to derive results from the collected quantitative data.

Methods for Quantitative Data Collection

A data that can be counted or expressed in numerical constitute the quantitative data. It is commonly used to study the events or levels of concurrence. And is collected through a structured questionnaire asking questions starting with "how much" or "how many." As the quantitative data is numerical, it represents both definitive and objective data. Furthermore, quantitative information is much sorted for statistical and mathematical analysis, making it possible to illustrate it in the form of charts and graphs.

Discrete and continuous are the two major categories of quantitative data where discreet data have finite numbers and the constant data values falling on a continuum possessing the possibility to have fractions or decimals. If research is conducted to find out the number of vehicles owned by the American household, then we get a whole number, which is an excellent example of discrete data. When research is limited to the study of physical measurements of the population like height, weight, age, or distance, then the result is an excellent example of continuous data.

Any traditional or online data collection method that helps in gathering numerical data is a proven method of collecting quantitative data.

Probability sampling

A definitive method of sampling carried out by utilizing some form of random selection and enabling researchers to make a probability statement based on data collected at random from the targeted demographic. One of the best things about probability sampling is it allows researchers to collect the data from representatives of the population they are interested in studying. Besides, the data is collected randomly from the selected sample rules out the possibility of sampling bias.

There are three significant types of probability sampling

Simple random sampling: More often, the targeted demographic is chosen for inclusion in the sample.

Systematic random sampling: Any of the targeted demographic would be included in the sample, but only the first unit for inclusion in the sample is selected randomly, rest are selected in the ordered fashion as if one out of every ten people on the list.

Stratified random sampling: It allows selecting each unit from a particular group of the targeted audience while creating a sample. It is useful when the researchers are selective about including a specific set of people in the sample, i.e., only males or females, managers or executives, people working within a particular industry.

Interviews

Interviewing people is a standard method used for data collection. However, the interviews conducted to collect quantitative data are more structured, wherein the researchers ask only a standard set of questionnaires and nothing more than that.

There are three major types of interviews conducted for data collection

Telephone interviews: For years, telephone interviews ruled the charts of data collection methods. However, nowadays, there is a significant rise in conducting video interviews using the internet, Skype, or similar online video calling platforms.

Face-to-face interviews: It is a proven technique to collect data directly from the participants. It helps in acquiring quality data as it provides a scope to ask detailed questions and probing further to collect rich and informative data. Literacy requirements of the participant are irrelevant as F2F interviews offer ample opportunities to collect non-verbal data through observation or to explore complex and unknown issues. Although it can be an expensive and time-consuming method, the response rates for F2F interviews are often higher.

Computer-Assisted Personal Interviewing (CAPI): It is nothing but a similar setup of the face-to-face interview where the interviewer carries a desktop or laptop along with him at the time of interview to upload the data obtained from the interview directly into the database. CAPI saves a lot of time in updating and processing the data and also makes the entire process paperless as the interviewer does not carry a bunch of papers and questionnaires.

Surveys and Questionnaires

Surveys or questionnaires created using online survey software are playing a pivotal role in online data collection be is quantitative or qualitative research. The surveys are designed in a manner to legitimize the behaviour and trust of the respondents. More often, checklists and rating scale type of questions make the bulk of quantitative surveys as it helps in simplifying and quantifying the attitude or behaviour of the respondents.

There are two significant types of survey questionnaires used to collect online data for quantitative market research.

Web-based questionnaire: This is one of the ruling and most trusted methods for internet-based research or online research. In a web-based questionnaire, the receive an email containing the survey link, clicking on which takes the respondent to a secure online survey tool from where he/she can take the survey or fill in the survey questionnaire. Being a cost-efficient, quicker, and having a wider reach, web-based surveys are more preferred by the researchers. The primary benefit of a web-based questionnaire is flexibility; respondents are free to take the survey in their free time using either a desktop, laptop, tablet, or mobile.

Mail Questionnaire: In a mail questionnaire, the survey is mailed out to a host of the sample population, enabling the researcher to connect with a wide range of audiences. The mail questionnaire typically consists of a packet containing a cover sheet that introduces the audience about the type of research and reason why it is being conducted along with a prepaid return to collect data online. Although the mail questionnaire has a higher churn rate compared to other quantitative data collection methods, adding certain perks such as reminders and incentives to complete the survey help in drastically improving the churn rate. One of the major benefits of the mail questionnaire is all the responses are anonymous, and respondents are allowed to take as much time as they want to complete the survey and be completely honest about the answer without the fear of prejudice.

Quantitative Observation

As the name suggests, it is a pretty simple and straightforward method of collecting quantitative data. In this method, researchers collect quantitative data through systematic observations by using techniques like counting the number of people present at the specific event at a particular time and a particular venue or number of people attending the event in a designated place. More often, for quantitative data collection, the researchers have a naturalistic observation approach that needs keen observation skills and senses for getting the numerical data about the "what" and not about "why" and "how."

Naturalistic observation is used to collect both types of data; qualitative and quantitative. However, structured observation is more used to collect quantitative rather than qualitative data.

Structured observation: In this type of observation method, the researcher has to make careful observations of one or more specific behaviours in a more comprehensive or structured setting compared to naturalistic or participant observation. In a structured observation, the researchers, rather than observing everything, focus only on very specific behaviours of interest. It allows them to quantify the behaviours they are observing. When the observations require a judgment on the part of the observers - it is often described as coding, which requires a clearly defining a set of target behaviours.

Document Review

Document review is a process used to collect data after reviewing the existing documents. It is an efficient and effective way of gathering data as documents are manageable and are the practical resource to get qualified data from the past. Apart from strengthening and supporting the research by providing supplementary research data document review has emerged as one of the beneficial methods to gather quantitative research data.

Three primary document types are being analysed for collecting supporting quantitative research data

Public Records: Under this document review, official, ongoing records of an organization are analysed for further research. For example, annual reports policy manuals, student activities, game activities in the university, etc.

Personal Documents: In contrast to public documents, this type of document review deals with individual personal accounts of individuals' actions, behaviour, health, physique, etc. For example, the height and weight of the students, distance students are traveling to attend the school, etc.

Physical Evidence: Physical evidence or physical documents deal with previous achievements of an individual or of an organization in terms of monetary and scalable growth.

Conclusion

Qualitative and Quantitative can be viewed as distinct and opposites, but in practice they are often combined or draw on elements from each other.

Qualitative and quantitative methods can also support each other, both through a triangulation of findings and by building on each other (e.g. findings from a qualitative study can be used to guide the questions in a survey).

The table below provides the Attributes and the methods of each approach.

|  |  |  |
| --- | --- | --- |
| Attributes | Qualitative research methods | Quantitative research methods |
| Analytical objectives | This research method focuses on describing individual experiences and beliefs. | Quantitative research method focuses on describing the characteristics of a population. |
| Types of questions asked | Open-ended questions | Closed-ended questions |
| Data collection Instrument | Use semi-structured methods such as in-depth interviews, focus groups, and participant observation | Use highly structured methods such as structured observation using questionnaires and surveys |
| Form of data produced | Descriptive data | Numerical data |
| Degree of flexibility | Participant responses affect how and which questions researchers ask next | Participant responses do not influence or determine how and which questions researchers ask next |

# Data Gathering Characteristics

Characteristics of data gathering tools that all measuring instruments should possess are:

* + Validity. A measuring instrument is valid; that is, relevant and appropriate, if it measures what it is intended to measure. In training, the most valid measuring instrument for a practical skill is a practical test. A 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 it’s other characteristics.
  + Reliability. A measuring instrument is reliable if it gives consistent results when the same entities are measured under the same conditions. 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 (i.e. test/re-test reliability). If a test, questionnaire, report form or interview is not reliable it should not be used.
  + Standardised Conditions. The conditions under which a measuring instrument is used should be standardised. If the administration of the same test on two separate occasions is likely to bias responses, due to a learning effect, then it is possible to develop an alternate form of the test. Alternate form reliability, however, would need to be demonstrated.
  + Discrimination. A measuring instrument should be sensitive enough to record differences between individuals in what is being measured. Similarly, the inability to discriminate between satisfactory and unsatisfactory training is of no use.
  + 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.

The choice of data gathering tools is crucial in determining the effectiveness of the study, influencing factors can include:

* + The reason(s) for directing data gathering to be conducted.
  + The resources allocated to the task (such as, timescale, manpower, funding).
  + Level of expertise of the analysts.
  + The size of the Target Population.
  + Numbers of Role holders and supervisors/managers.
  + Rank/experience.
  + Trades/skill levels.
  + 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.

The data gathering plan should be produced at an early stage, 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

There are several ethical considerations that need to be adhered to throughout the data collection process. 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 interviewer’s. 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:

* + 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.
  + 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.
  + 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.
  + 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.
  + 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. If there is no requirement to know who has completed a questionnaire or interview then anonymity is recommended.
  + 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

Quantitative data gathering. Quantitative data are gathered using closed questions (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 gathering. 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:

* + 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.
  + Direct observation. The data from observations consist of detailed descriptions of operators’ activities, behaviours, actions that are part of observable human experience.
  + 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 used to confirm/clarify data obtained as referenced above.

Piloting, the aims of piloting are to allow:

* + The systematic gathering of information to confirm validity of data gathering tools.
  + The identification of technical inaccuracies and faults.
  + Testing the questions. When piloting (testing) the questions these points should be borne in mind:
  + The question should involve only one idea.
  + The question should be worded as simply as possible in light of the ability of the target group.
  + The question should be as brief as possible.
  + The question should be as direct as possible.
  + The question should allow the respondent to admit lack of knowledge without loss of face.
  + The question should be positively phrased - not looking for negative response.
  + The question should not influence the response.

Piloting process. For questionnaires, when the initial construction is complete, in addition to testing the questions, the questionnaire must be piloted as follows:

* + 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.
  + The questionnaire is amended to solve problems and ambiguities found in the first stage.
  + 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.
  + 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.

Outcomes. 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:

* + 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.
  + 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.

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:

* + 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.
  + Representative operators can be used to review the responses already obtained from SME input. In addition they can also provide information on:
  + Operator reaction.
  + Ease of completion.
  + Sequence of activities.
  + Time taken to complete questionnaire.
  + Depth of response required.

Piloting pre-requisites. There are certain pre-requisites for piloting when carrying out a study:

* + High cost.
  + Large target population.
  + Complex subject matter.
  + Tasks of a critical nature.

Choice of data gathering techniques

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. In all cases the data gathering method should be fit for purpose and developed by suitably qualified and experienced personnel.

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, are resource intensive and require piloting and pre-testing to ensure that they are collecting the right types of information. Questionnaires do not always allow great flexibility, may not be completed by the recipient, and response rates are not always as high as the team doing the analysis would wish.

Interview. Data can be gathered from Role holders 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.

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.

Document research. When conducting a study it may be necessary to consult documents such as interim reports from on-going related studies, exercise reports, operational reports, current training documentation, doctrine and policy documents and manufacturer’s manuals.

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 Role 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 Role that could present problems to the non-expert. This method can also be used to analyse findings (e.g. from questionnaires).

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 Role 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 Role.

Questionnaires. Questionnaires can gather qualitative and quantitative information and are very useful in both InVal and ExVal. 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 looks all the tasks conducted, addressing:

* + Do the operators carry out the tasks for which they were trained?
  + How well were the operators trained for these tasks?
  + Do the operators carry out any other tasks for which they were not trained?

Constructing a questionnaire. When producing a questionnaire these points should be borne in mind:

* + 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 could make a difference to the results of the project.
  + Presentation. The questionnaire should look well prepared and be easy to complete.
  + Instructions. Instructions on how to complete the questions should be simple, clear and concise.
  + Language. The language used in questions asking for criticisms should be impersonal and permit the expression of frank replies.
  + Questions. Questions should be:
  + As short as comprehensive coverage allows and must be relevant to the information required.
  + In a logical sequence. Questions relating to a specific subject should be placed together.
  + 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. Filtering of questions is recommended.
  + Capable of being answered. Respondents must be capable of answering the questions and have adequate knowledge/experience to provide meaningful responses.
  + Confidentiality. Respondents 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.
  + Clarification. Provide a contact name and telephone number for any queries. Include a date for completion and return of the questionnaire.
  + Details. One part of the questionnaire from which the analyst can obtain useful data is the element 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 earlier) by not including clearly attributable details in the personal details. However, if anonymity is quoted it must be honoured. Questions over confidentiality cannot only taint the study but may also negate the chance for further open and honest dialogue.
  + 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:
  + 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?
  + 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?’
  + 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’.
  + Loaded questions. These are similar to leading questions but tend to have an emotional overtone, for example ‘Have you stopped cheating in tests?’ and ‘Which aspects of your training were irrelevant?’
  + 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.
  + 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 negate the opportunity for further open and objective dialogue.

Advantages and disadvantages of questionnaires. When gathering data using written questionnaires analysts must be aware of the respective advantages and disadvantages:

* + Advantages:
  + Relatively cheap way of data collection.
  + Large target population.
  + Largely objective although there could be bias in analysis of qualitative responses.
  + Potential to automate data entry and analysis.
  + Can be anonymous.
  + Questions can be asked in a consistent manner.
  + Disadvantages:
  + No guarantee of respondent identity.
  + Response rate may be low.
  + Impersonal - difficult to establish a rapport with respondent.
  + May be limited by length.
  + Investment needed to develop and pilot the questionnaire.

Interviews

Purpose. An interview 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:

* + Remind the interviewer of the areas that must be covered.
  + Provide a framework for the interview and ensure that data are collected in a systematic and standardised way.

Interviews can be structured, semi-structured or unstructured (open ended); this refers to the degree to which the interviewer follows prescribed questions or deviates using prompts to gain further information from the interviewee. Generally, the more structured the interview, the more comparisons can be drawn between responses. However, unstructured interviews can provide richer data and may be useful if the interviewer has only a limited knowledge about the subject matter of the interview.

Interviews involve going outside the immediate training organisation to interview 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.

The interview schedule. 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:

* + The amount/level of background information to be provided.
  + The amount of prompting allowed.
  + 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. However, there should be sufficient space to record open responses.

General techniques of interviewing. 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.

Role of the interviewer. 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:

* + Rapport. In order to establish good contact with the interviewee, the interviewer needs to:
  + Decide the purpose of the interview and what is to be gained from it.
  + Decide the questions to be asked during the interview.
  + Ensure that any information, reports or data required to back-up the interview are readily available.

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.

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.

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.

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.

* + The interviewer(s) should introduce themselves fully.
  + The interviewee should be told the reason for the interview.

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’.

* + Content. The interviewer can elicit facts efficiently only if they ask the right sort of questions and pose them in an appropriate manner. The main points to note are:
  + Do not read out facts. Repeating information that is already available in forms or publications wastes time and can antagonise the interviewee.
  + Use appropriate language level. The interviewer should make sure the interviewee understands the questions using the most appropriate vocabulary for the interview.
  + 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.
  + Avoid leading questions. Avoid questions that hint at the answer expected; some interviewees will tend to give the answer they think is wanted.
  + 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.
  + 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.
  + Use open 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.
  + Control. To ensure that the interview flows smoothly from topic to topic and control is retained, the interviewer should attempt to:
  + 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.
  + 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.
  + 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.
  + 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.
  + 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:
  + Be prepared to adapt themselves to the natural flow of the interview
  + Follow up leads as necessary.
  + Ensure that, in the end, all the information required has been obtained that is needed.
  + Recording Responses. 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.
  + 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 to fit in with their preconceived ideas. It is also important to avoid biasing the replies 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”.
  + 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.
  + 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.

Interviewing techniques checklist. The following list is a summary of points to consider when conducting an interview as part of the data gathering process.

* + Contact:
  + Be prepared: ‘read in and ready’.
  + Ensure a suitable environment.
  + In time and enough time.
  + Introduce yourself (if necessary).
  + Be pleasant but not too amiable.
  + Make sure the interviewee knows the object of the interview.
  + Reduce tension.
  + Start with an ‘easy to talk about’ topic.
  + Content:
  + Do not read out facts from forms.
  + Use the appropriate language level and adjust as necessary.
  + Ask one question at a time.
  + Avoid leading questions.
  + Avoid trick questions.
  + Make use of comparative questions.
  + Use indirect open questions.
  + Distinguish between skill and enthusiasm.
  + Explore the reasons for statements.
  + Control:
  + Avoid interrupting the interviewee.
  + Use pauses widely.
  + Handle delicate issues carefully and as opportunity occurs.
  + Summarise from time to time.
  + Be flexible rather than rigid.
  + Use open, probing then linked questions.
  + Follow leads given by the interviewee.
  + Keep a balance between the points of your plan.
  + Make notes.
  + Beware of bias.
  + Avoid ridicule.
  + Give the interviewee chance to add points at the end.
  + Answer interviewees’ questions and thank them.

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 pocket-dictating machine may be useful but permission must be gained to use one. Recording interviews can also inhibit interviewees.

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. A successful interview is dependent upon:

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

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 below) to record the strength of opinions given. Interviewers and those analysing the data need to be trained if similar opinions are to be rated by different individuals. Once achieved, information obtained from different interviewers can be compared:

* + Advantages:
  + Easier to tailor to the audience. The interviewer can select only those questions that are relevant to a particular situation. This is particularly important when the Role in question is unusual and it would be time-consuming, costly and unacceptably bulky to produce a detailed questionnaire to cover all possibilities.
  + The interview can be conducted with reasonable speed (depending on circumstances).
  + 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.
  + Personal contact can reinforce commitment to study and raise response rate.
  + The interviewer can check that the respondent has understood technical expressions and terms which have been used in the 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.
  + Disadvantages:
  + Time intensive - not only the interview itself, but the analysis of data it produces.
  + Data may be of complex nature requiring structured/thematic analysis.
  + Requires experienced personnel to conduct the interview.
  + Lack of objectivity, further to which the relationship between interviewer and respondent can become confrontational limiting transmission of objective information.
  + Can be influenced by perception - there may be bias for, as well as against, a particular topic.

Observations

Requirements. Observation involves watching, recording and analysing. Observing a particular activity is influenced by the fact that human perception is highly subjective. 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.

Coding. The observation may be unstructured, with the person who is observing being as open-minded as possible and using his or her judgement 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 Role. Unstructured observations should be avoided. Use pre-determined criteria to increase the reliability and validity of the data collected.

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:

* + Advantages:
  + Direct experience can be utilised.
  + Real time analysis.
  + Can be done without co-operation of operator.
  + Whole situation of activity is included.
  + Activity is placed in context - aids understanding.
  + Disadvantages:
  + May lack objectivity - influenced by perception.
  + Potential blizzard of information.
  + False performance - operators aware of being observed.
  + Time intensive.

Reports/logs

Training reports. These should cover an ex-trainee’s Role 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:

* + Open-ended reports. 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 a 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 officers’ freedom of expression, although this can be mitigated by provision of room for open-ended comments.
  + Equipment reports. These can be used to identify equipment malfunctions which may have training implications.
  + Post Exercise Reports (PXRs). These can be used to highlight the application of skills acquired during training in a realistic environment
  + Work records. A study of the tasks carried out can give a reasonably accurate picture of the performance and the standards involved in a Role. 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
  + Log books. 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.

Analysing Collected Data

Quantitative and qualitative data analysis. Quantitative data by their very nature lend themselves to statistical analysis. However, with qualitative data there may be trends (patterns, themes) present, which could go unnoticed. 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. 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

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.

Triangulation of data. 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.

Information sources. Collecting data can be gained from a number of different points of view: the Role holders (ex-trainees), the Role holders’ supervisors/line managers and the participant observer. The Role holders can reflect on the adequacy of the training they received, the line managers can comment on their performance when carrying out their Role. The observer can collect first-hand data of the Role holders conducting the Role tasks. Comparing these sources of information enables a more accurate and unbiased method of data gathering.

Data combination. The combination of different data gathering techniques to investigate a particular issue usually is a combination of both qualitative and quantitative methods:

* + 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.
  + 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.
  + Triangulation of target population. This concerns 3 or more types of target population. For example, the ex-trainees, their immediate line managers/supervisors, commanding officers and trainers. If similar findings are produced it is highly likely that an objective picture has been achieved.

Data Coding

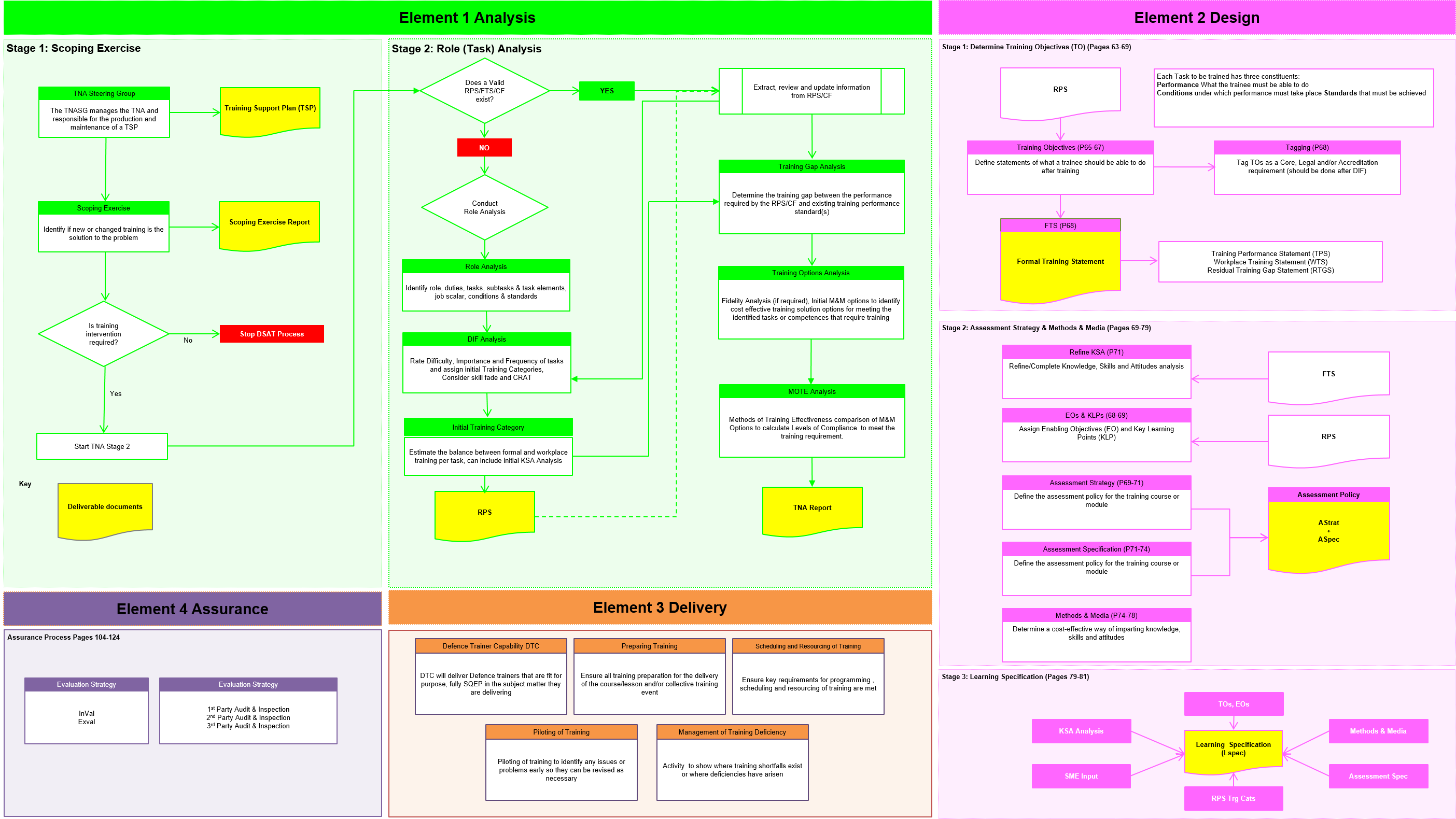
Requirement. Some form of coding (grouping, classification) is required before analysis can begin identifying themes:

* + All information needs to be read thoroughly to obtain a clear picture of the main issues.
  + Themes/patterns/trends need to be identified and clearly highlighted.
  + Repeated instances of these themes need to be recorded in the form of ‘tallys’.

These ‘tallies can then be recorded as numerical responses allowing follow-on statistical analysis to take place.

# Annex D. DSAT Process

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# Annex E. The TEL Ruleset

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Rule 1 Define User Needs[[4]](#footnote-4)

TEL development is to follow a flexible method which allows regular review between all stakeholders (such as managers, developers, sponsors, trainers, trainees etc.) and draws on experience and innovation through the TEL Knowledge Hub. Project leads should understand the needs of the users and wider stakeholder requirements and examine a range of potential solutions to meet these needs. Furthermore, new TEL developments or procurements must clearly show a (documented) effort to meet wider Defence needs as well as sC or role-specific requirements. Value for Money (VfM), capacity and capability must always be preeminent when delivering a new TEL solution and should be articulated with the perceived benefits of the new TEL solution in the business case.

Rule 2 Make Things Accessible**[[5]](#footnote-5)**

New TEL should be accessible for users and by extension, training designers and managers. Consideration should be given to Specific Learning Difficulties, wider disabilities and Digital Literacy of those using and developing training by means of TEL. Additionally, attention should be made towards the potential training and upskilling of trainers and wider support staff on new TEL.

Rule 3 Be Open and use Open Source**[[6]](#footnote-6)**

If reuse of extant TEL and associated software is not possible, analysis of available license-free TEL must be evident when considering new TEL requirements. Licence free software such as Open Source (code which can be changed without restrictions) and Freeware, offer the opportunity for cost-effective TEL with no on-going license fees (some Freeware is only available for personal use); however, due consideration must be given to the security of MOD data and systems.

Rule 4 make use of Open Standards**[[7]](#footnote-7)**

To inform Cabinet Office spend control process, TEL solutions should use open standards to ensure the IT works and communicates with other technology, and can easily be upgraded and expanded to meet evolving and future requirements.

Rule 5 Use Cloud First**[[8]](#footnote-8)**

If feasible, under JSP 440 and GDPR guidelines, public cloud should be considered in the first instance as per Government direction. Alternatively, if this is not feasible then sufficient justification to why the procured TEL should or could not use public cloud.

Rule 6 Make Things Secure**[[9]](#footnote-9)**

Systems and data must be within prescribed Government Security Classification policy and wider Defence Security requirements**[[10]](#footnote-10)**. Local unit ITSO and SCIDA points of contact should assist with this analysis for TEL security and associated activities including timelines.

Rule 7 Make Privacy Integral**[[11]](#footnote-11)**

Adherence to the EU General Data Protection Regulation should be an integral part of any current or new information system. Assistance through the application of Privacy Impact Assessments as part of the TEL procurement is recommended.

Rule 8 Share and Reuse Technology**[[12]](#footnote-12)**

Existing TEL is to be used if it has been previously procured or designed. Many fully accredited TEL instances have been purchased for MOD use and include the DLE and VLE**[[13]](#footnote-13)** instances as well as enterprise licenses for authoring tools and 3D simulations such as VBS3. Defence is also required to utilise extant wider Government resources, such as Civil Service Learning products for generic learning requirements and ICS catalogue for commercial hardware, software and services which are common across government.

Rule 9 Integrate and Adapt Technology**[[14]](#footnote-14)**

New TEL systems should be interoperable with existing technologies, infrastructure and organisation where possible. Good integration enables new technology to work with legacy systems, without limiting the ability to adapt to future demands or upgrade systems. Integration should allow the ability to create, share and adapt learning content and exchange data with other systems and effective planning should identify capability and process gaps. Exceptions to this can only be approved through the Defence Modelling and Simulation Coherence (DMaSC) Rules.**[[15]](#footnote-15)**

Rule 10 Make Better use of Data**[[16]](#footnote-16)**

Consideration should be given towards the minimisation of data collection and reuse of data to avoid duplication of datasets and optimise exploitation of information within Government regulations.

Rule 11 Define your Purchasing Strategy**[[17]](#footnote-17)**

The purchasing strategy must show consideration towards commercial and technology aspects and contractual limitations. Procurement of new TEL should be justified via the submission of a Business Case with approved means of In-Year funding and, importantly, future sustainment. TEL Project leads should engage with their respective HQ DES Commercial representative at the earliest opportunity to exploit current contracts and opportunities before exploring bespoke procurement, but noting the following:

* + Avoid customising off-the-shelf products and services in a way that inhibits their maintenance, upgrade or removal in future.
  + Suppliers must not provide either: systems integration, service integration or service management services, at the same time as providing a component service within that system.

Existing enabling agreements ensure that approved suppliers are used who satisfy Government or Defence requirements. These agreements are managed and reviewed to ensure that VfM and quality are maintained. If existing agreements do not meet the TEL requirement then the Acquisition System Guidance (ASG) for new contracts is to be followed, in conjunction with the TEL Ruleset, which includes the ability for projects to run their own commercial competition under the direction and guidance of an allocated DES Commercial Officer.

Rule 12 Meet the Digital Service Standard for Digital Services**[[18]](#footnote-18)**

If the TEL project or programme includes the creation of a service, then the Government’s Digital Service Standard should be adhered to. This includes the adoption of Agile procurement methods**[[19]](#footnote-19)** and the ownership of code, including intellectual property rights (IPR) should be understood and documented.

# Annex F. Cost Benefit Appraisal Guidance

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Cost Benefit Appraisal (CBA) is limited by the availability and accuracy of cost data. The method identified below gives an auditable and sufficiently objective means of discriminating between training options. This must be tempered with a critical analysis of the outcome of the CBA.

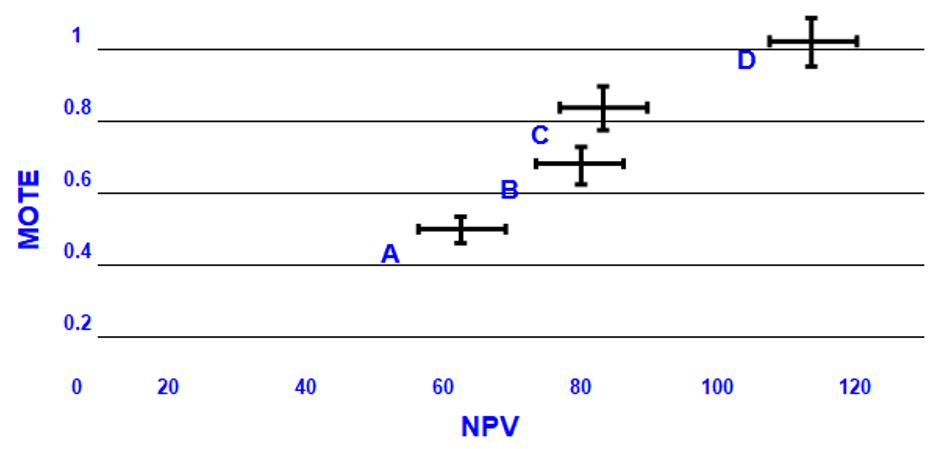
For each option the through life costs must be calculated on a consistent approach between media.

If absolute costs are not available then the costs must be derived by identical means for each option. In most cases the costs will be based on additional Through Life Costs (TLC) comprising both capital and running costs. Typically, capital costs should include new buildings, training equipment/GFE (including installation), extra computer hardware/software, courseware development and new training aids. This figure is normally a one off initial payment but there may be periodic renewable elements across the TLC.

Recurring annual running/support costs should include instructional and support staff, maintenance, overheads etc. One way of producing this figure might be to obtain the trainee day cost for a particular course; this can be multiplied by the additional course length and annual throughput to give a broad order annual support costs. It should be noted that some options might cause savings that can be offset against TLC; these should be incorporated in the figures. Further detailed guidance can be found in JSP 507 - MOD Guide to Investment Appraisal and Evaluation.

The data collected should provide a minimum cost, a most likely cost and a maximum cost. Rough Order of Magnitude (ROM) costs may be sufficient to discriminate between options; however if that is not the case it may be necessary to refine these figures further.

The CBA data can be simply and intuitively displayed as a graph of MOTE vs Net Present Value as demonstrated in Fig 5 below. The error bars in the horizontal direction represent the spread in terms of the training effectiveness scores awarded by the SMEs. The error bars in the vertical direction represent the spread in terms of ROM costs. It is important that the analyst notes that at first glance option C appears to be more expensive but provides a higher level of training effectiveness than Option B. However the case may be that Option C is more expensive but yields a lower training effectiveness score (when noting the overlap of error bars in the vertical direction) than Option B.



### Figure 5. MOTE vs NPV

Cost effectiveness can be coarsely assessed by dividing the MOTE by the Net Present Value (NPV). This can give a Max CBA, a most likely CBA and a Min CBA.

As MOTE is a number between 0 and 1, and costs are usually significant, in order to have a useful CBA measure it is usual to use a relative cost.

Dividing the cost of an option by the cost of the most expensive option derives the relative cost figure. This will give a relative cost between 0 and 1 and a useable CBA measure.

They will not be accurate and should not be included in the report as absolute figures. There are 3 cost benefit calculations are illustrated below.

MOTE Max is the maximum MOTE for the option

Cost Min is the minimum relative cost for the option

MOTE Exp is the average MOTE for the option

Cost Exp is the expected or most likely cost for the option

MOTE Min is the minimum MOTE for the option

Cost Max is the maximum relative cost for the option

Interpretation of the MOTE/CBA Data

It should be noted that the MOTE represents averaged values and so should be treated with caution.

In particular they should not be hastily used to reject options. The MOTE and CBA figures are there for guidance purposes, as an Analyst you should consider each option’s score carefully before rejecting or ranking the options as other influences might affect the ranking of options.

Care should also be taken when discriminating between options to compare on a like for like basis. Typically we might have two approaches; either to compare on level effectiveness or to compare on level cost. In the case at Fig. 5 above we might reject option B in favour of option C on the basis that their costs are broadly similar but C is more effective.

A consistent model should be applied to compare options. In the case above (Fig 5.) options A and B might be rejected as under compliant. This should not be done without consideration of how these options could be brought to compliance. In the case above the cost of making option A. compliant might be less than selecting option C.

In most cases the solution for reaching compliance might include some form of On-Job-Training (OJT), therefore careful consideration should be given to the calculation of these costs.

Several approaches of costing the impact of OJT might be used; OJT could be counted in terms of the cost of providing the OC, for example the cost of 3 days OJT for Team Training might be assessed as 3 days of running costs for the particular platform.

The cost of OJT might be calculated in terms of interruption to daily activities multiplied by capitation rates of those involved.

Another strategy might be to calculate the cost of “contracting out” the activity while the personnel are being trained. Whatever the approach, thought should be given to the particular problem and whatever method used must be acceptable to the TNASG.

In some cases the options considered might be variants of a single option. In such cases consideration of raising option effectiveness might be inappropriate as another option might be an enhanced version of the under compliant option.

It is vital that an analyst makes a case by case assessment of the options based upon the underpinning data and presents this analysis in the Training Needs Report for TNASG approval. No hard and fast rules for interpreting the data can, or should be given as the circumstances for individual projects can differ. Certain tasks might be deemed critical in which case an option which was otherwise compliant (MOTE ≥ 0.8) might be rejected as it was deficient in these areas and similarly the converse might apply. Fundamental to a satisfactory TOA is the analyst’s ability to present a coherent and reliable case.

# Annex G. Standards & Guidance

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| **Standard/Guidance** | **Title/Description** |
| --- | --- |
| JSP 822 | Defence Direction and Guidance for Training and Education Part 1 Directive |
| JSP 822 | Defence Direction and Guidance for Training and Education Part 2 Guidance |
| JSP 939 | Defence Policy for Modelling & Simulation (M&S) Part 1 Directive |
| JSP 939 | Defence Policy for Modelling & Simulation (M&S) Part 2 Guidance |
| S6000T | International Specification for Training Information |
| JSP 886 Vol 7 Part 8.01 | Training and Training Equipment |
| JSP 822 Reference Document | Guidebook of Decision Support Tools for Training Design & Delivery Introduction |
| JSP 822 Reference Document | MOD Hosting and Delivery Options |
| JSP 822 Reference Document | Cognitive and Hierarchical Task Analysis |
| JSP 822 Reference Document | Competency Framework Development |
| JSP 822 Reference Document | Fidelity Analysis |
| JSP 822 Reference Document | Live Synthetic Blend |
| JSP 822 Reference Document | Media Selection and Instructional System Decision Support Tools |
| JSP 822 Reference Document | Scheduling and Resource Management |
| JSP 822 Reference Document | Tools to Assist in Scalar Development |
| JSP 822 Reference Document | Workload Assessment and Implications for Performance |
| JSP 822 Reference Document | Contemporary Theories of Learning by Learning Theorists |
| JSP 822 Reference Document | Defence Training and Education Capability (DTEC) Vision and Strategies |
| JSP 822 Reference Document | Human Factors Guidance for Designers of Interactive 3D and Games Based Training Systems |
| JSP 822 Reference Document | Learning Technology Landscape |
| JSP 822 Reference Document | Media Selection and Instructional System Decision Support Tools |
| JSP 822 Reference Document | Competence Retention Analysis User Guide |
| JSP 822 Reference Document | Review of Training Effectiveness Measures |
| JSP 822 Reference Document | Team and Collective Training Needs Analysis (TCTNA) Methodology |
| JSP 822 Reference Document | The Long Term Ability of E-Learning to Deliver Training and Education in Support of Military Capability |
| JSP 822 Reference Document | Training Optimisation |
| JSP 822 Reference Document | Optimising the Blend of Live, Synthetic and Constructive Assets to Deliver Training and Education |
| ADL | Modernizing Learning Building the Future Learning Ecosystem |
| ADL | Advanced Distributed Learning's Total Learning Architecture |
| US DoD | TRADOC Pamphlet 350-70-6 Systems Approach to Training - Analysis |
| NATO | Bi-SC Education and Individual Training Directive (E&ITD) 075-007 |
| NATO | The NATO Alternative Analysis Handbook |
| NATO | THE NATO Advanced Distributed Learning Handbook |
| 00-60 | Part 0 Application of ILS |
| 00-60 | Annex A Glossary |
| JSP 886 Vol 7 Part 1 | ILS Policy |
| JSP 886 Vol 7 Part 2 | ILS Management |
| JSP 886 Vol 7 Part 8.11 | Quality Policy and Procedures |
| 00-600 Part 1 | Integrated Logistics Support (ILS) Requirements Part 1 |
| 00-600 Part 2 | MOD Requirements for a Supportability Case Part 2 |
| 00-600 Part 3 | Logistic Information Requirements Part 3 |

1. **A Transitive Verb is a verb that accepts one or more objects** [↑](#footnote-ref-1)
2. **Assets** are defined as All Training Content, All User Guidance, All User Support Assets [↑](#footnote-ref-2)
3. Cognitive overload is a situation where too much information results in an individual being unable to process this information. In this situation, the language processing demands of an activity go beyond the language processing limits of the individual. [↑](#footnote-ref-3)
4. <https://www.gov.uk/guidance/define-user-needs> [↑](#footnote-ref-4)
5. <https://www.gov.uk/guidance/make-things-accessible> [↑](#footnote-ref-5)
6. <https://www.gov.uk/guidance/be-open-and-use-open-source> [↑](#footnote-ref-6)
7. <https://www.gov.uk/guidance/make-use-of-open-standards> [↑](#footnote-ref-7)
8. <https://www.gov.uk/guidance/use-cloud-first> [↑](#footnote-ref-8)
9. <https://www.gov.uk/guidance/make-things-secure> [↑](#footnote-ref-9)
10. As per JSP 440 [↑](#footnote-ref-10)
11. <https://www.gov.uk/guidance/make-privacy-integral#how-to-embed-privacy-by-design> [↑](#footnote-ref-11)
12. <https://www.gov.uk/guidance/share-and-reuse-technology> [↑](#footnote-ref-12)
13. The DLE is not the only VLE in Defence. All other VLEs should be approved by sC and DTEL through the DTPWG [↑](#footnote-ref-13)
14. <https://www.gov.uk/guidance/integrate-and-adapt-technology> [↑](#footnote-ref-14)
15. Detailed in JSP 939 [↑](#footnote-ref-15)
16. <https://www.gov.uk/guidance/make-better-use-of-data> [↑](#footnote-ref-16)
17. <https://www.gov.uk/guidance/define-your-purchasing-strategy> [↑](#footnote-ref-17)
18. [https://www.gov.uk/service-manual/service-standard.](https://www.gov.uk/service-manual/service-standard) [↑](#footnote-ref-18)
19. <https://www.gov.uk/service-manual/agile-delivery> [↑](#footnote-ref-19)