

## OPTIMISING SPECIALIST MILITARY TRAINING ADVICE WITHIN THE PROCUREMENT CYCLE

**Dr David Swift, Lt Col Cliff Martindill and Maj Chris Allender**  
**Development, Projects & Research Group,**  
**Training Support Branch,**  
**HQ AG (Personnel and Training Command),**  
**Wiltshire, United Kingdom.**

### ABSTRACT

For 30 years, the British Army has employed the Systems Approach to Training (SAT) as a means of quality assuring its most important and expensive activity undertaken to ensure operational success - training. However, while the academic principles underpinning SAT remain sound, the supporting procedures and organisational infrastructure were developed before the widespread procurement and use of synthetic training environments to which they are difficult to apply.

The result was that the military's own training *specialists* were often denied a voice within the procurement cycle until too late. While many training equipments remain elegant pieces of engineering, they are frequently over complex, fielded too late to support the initial deployment of the operational equipment and, above all, badly designed from an instructional point of view.

In an initial attempt to rectify this situation, Training Support Branch developed guidelines for Training Needs Analysis (TNA), in which TNA is understood to be a special case of SAT. The guidelines provide a framework within which TNAs may be managed and quality assured. Variants of TNA procedures were developed independently by the Royal Navy and Royal Air Force at about the same time and have since been harmonised to reflect a tri-Service view.

The effectiveness of the TNA procedures would still, however, be sub-optimal until adequately supported by elements of the organisational infrastructure of the procurement system. This paper describes the results of a study undertaken by the authors to address this issue. The proposed solution integrates the complementary concerns of the procurement system, Integrated Logistics Support and Human Factors Integration ('MANPRINT').

### ABOUT THE AUTHORS

**Dr David Swift C. Psychol., AFBPsS, MRaES** is the Principal Psychologist of DP&RG.

**Lt Col Cliff Martindill MA MEd MSc FIPD AGC (ETS)** is the Chief Training Development Officer, DP&RG.

**Maj Chris Allender BEd (Hons) MEd (Ed Tech) MIPD AGC (ETS)** is the Officer Commanding Projects Group of DP&RG.

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## INTRODUCTION

1. Dramatic increases in both the sophistication of, and reliance upon, training technology since the early 1990s have highlighted the need for military training support specialists to have more timely and substantial input to the specification and procurement of such technology, if the latter are to fulfil their potential. In response to this requirement, relevant organisations within the British Armed Forces have augmented their mandated training support procedures and have recommended complementary developments in the wider organisational infrastructure within which they are applied. These augmented mandated training support procedures developed for the Army are the subject of this paper.

## TRAINING SUPPORT IN THE BRITISH ARMY

2. Within the British Army, 'training support' is formally defined as

'...the advice, guidance and assistance given to the Army to train *effectively*, *efficiently* and *economically* in order to fulfil its operational role. It ensures the systematic development, application and evaluation of training techniques and methods, providing Army training with both *quality control* and *quality assurance*.' (AGAI, 1994 – emphasis added)

3. Since 1968, the provision of training support has been informed by the Systems Approach to Training (SAT). Close variants of SAT, the basic features of which are summarised in Figure 1, are employed by the Royal Navy and the Royal Air Force and

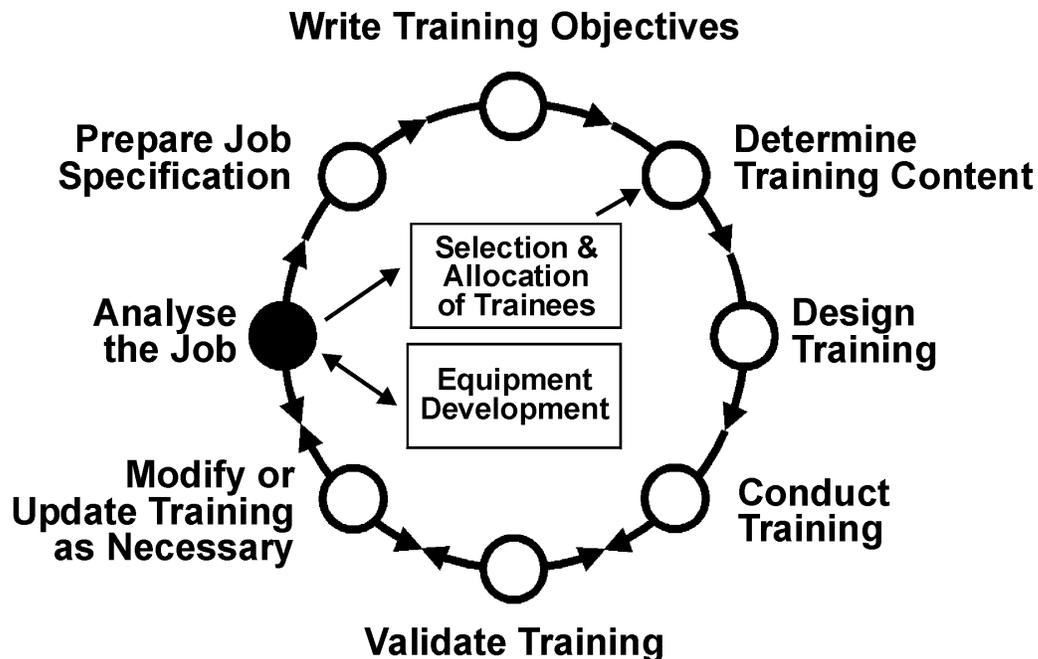


Figure 1. The Systems Approach to Training (SAT)

indeed, by the Armed Forces of a number of other nations.

4. Each heading in the SAT diagram is elaborated by means of an Army pamphlet which describes a set of endorsed procedures. Responsibility for initially articulating SAT procedures and, if necessary, amending or augmenting them, resides with Training Support Branch. The principles and procedures of SAT are taught to all future instructing staff and other interested parties by postgraduate qualified military training support specialists – Training Development Officers (TDOs) – working within the Army School of Training Support (ASTS). Each Arm or Service has a Training Development Team (TDT), comprising between three and forty persons of whom at least one is a TDO.

5. While the principles informing SAT have withstood the test of time, the procedures themselves were formulated with classroom instruction and field exercise application (using operational equipments) primarily in mind. These procedures proved difficult to apply within the procurement system where concerns lay mainly with the specification of dedicated training equipments. The result was that many training equipments were poorly specified and/or arrived too late to support the operational equipment.

6. By the late 1980s, Development, Projects and Research Group, DP&RG (then and until April 1996, Consultancy and Development Wing of ASTS) was developing an ad hoc complementary set of procedures, known as Training Needs Analysis (TNA), in an attempt to overcome such problems. The perceived utility of the new approach led to TNA being made mandatory for all training equipment procurements in excess of £50K (NAO,

1992). To facilitate further the application of TNA, DP&RG formalised TNA procedures in the form of a generic 'how to' guide intended for use only by TDOs (ASTS, 1993). Useful though the first TNA guide was, the procedures were perceived to be too prescriptive for some applications and, to the non-specialist, remained opaque. At the same time, the rapidly increasing scale of training equipment procurement precluded TDOs at contemporary establishment levels from actually conducting all the TNAs that would be needed: guidance on the management of contracted-out TNAs was clearly also required. Accordingly, a second version of the TNA guide was developed to address these emerging concerns (ASTS, 1996). Due to the roughly parallel nature of developments made in the other two Services, a Tri-Service Training Support Working Group (TSTSWG) was formed in February 1997 with a view to exploring commonality and scope for harmonisation of any further developments. A draft tri-Service TNA Guide was produced in March 1998 .

7. In order to explain the rationale behind both the current issue of the tri-Service TNA guide and our plans for its further development and use within procurement projects, it is first necessary briefly to describe relevant features of the British procurement system.

## **THE BRITISH PROCUREMENT SYSTEM**

8. The elements of the British procurement system are sufficiently ramified as to present an initially baffling picture – particularly when one tries to understand how they interact. This point has been effectively made by Kincaid (1994) who produced a 'simplified' influence diagram of the Procurement Cycle, as shown in Figure 2.

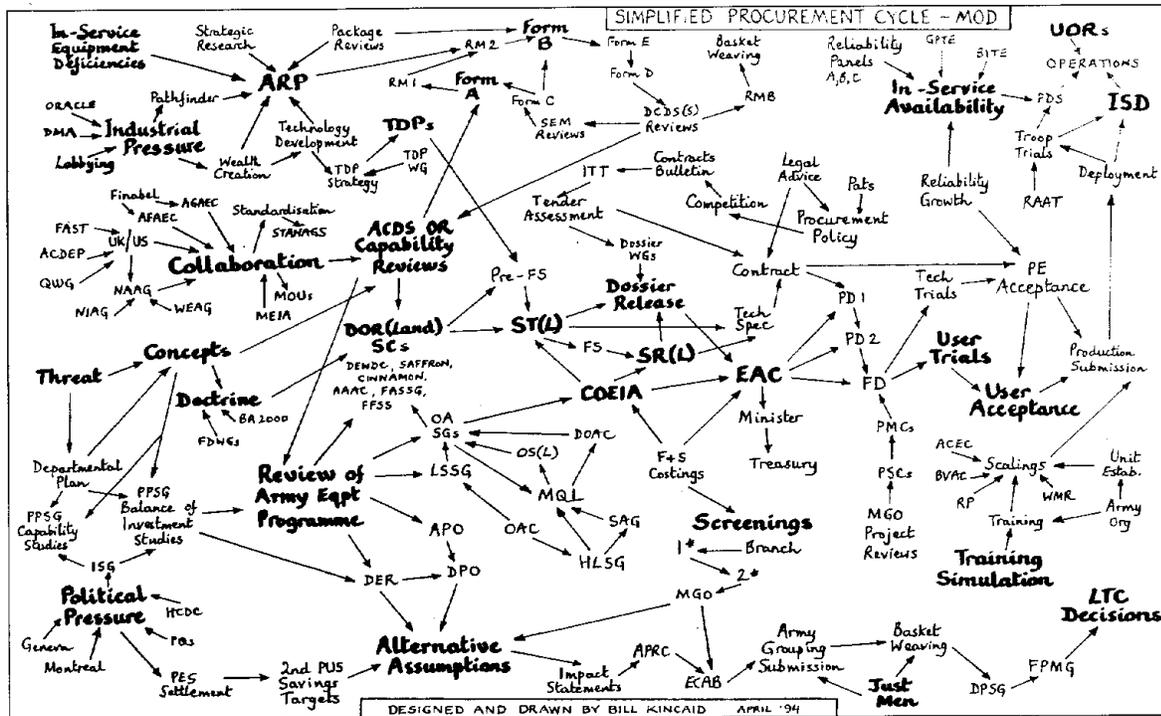


Figure 2. Kincaid's 'Simplified Procurement Cycle – MoD'

9. Fortunately, there are conventionalised approaches to understanding the underlying processes which are more accessible. Thus, the Procurement Cycle (so named because it is rare for an operational equipment to be entirely without precedent or precursor) is characterised by a number of discreet

approval stages, with the level of approval and frequency of submissions to the approval authorities being dependent upon cost, sensitivity of the project and procurement strategy. The current Full Procurement Cycle is shown at Figure 3.

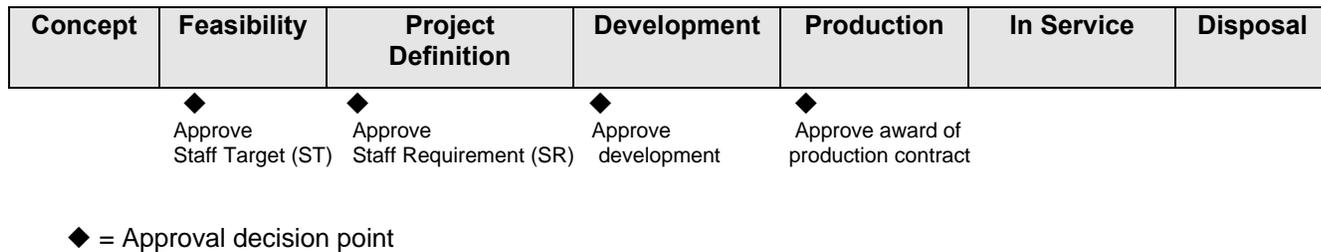


Figure 3. Diagram showing the Full Procurement Cycle

10. The key stages in the procurement cycle can be summarized as follows:

a. Concept. This provides an outline description of the proposed equipment. Concept formulation is the responsibility

of the relevant Operational Requirements Branch. It takes into consideration input from the user, doctrinal organisations, procurement and operational staffs, even though the concept may originate from Arms and Service Directorates. The

output is a Statement of the Operational Need which informs preliminary studies and/or Staff Targets/Staff Requirements (q.v).

b. Staff Target (ST). The ST sets out in broad terms the function and desired performance of the new equipment.

c. Feasibility Study (FS). The FS assesses the feasibility of meeting the ST in terms of technology, cost and time. It considers a number of solutions and specifically identifies those available within current technology.

d. Staff Requirement (SR). The SR is a detailed statement of the function and performance required.

e. Project Definition (PD). PD comprises a full examination of the technical difficulties of meeting the SR. It produces detailed and reliable estimates of cost of development and reliable information about production cost and timescales. An additional stage of PD ("further PD") may sometimes be appropriate, if major uncertainties remain at the end of PD.

f. Full Development (FD). Development of the equipment's design to a stage at which production can begin.

g. Production. The manufacture of the equipment and delivery to the user.

11. The Full Procurement Cycle may be modified according to the procurement strategy that is approved. The current main alternatives are: Commercial-Off-The-Shelf (COTS), where there is only very limited or no development, Enhanced-COTS (E-COTS), in which significant development will be required, a mature requirement for which a staff Target and Feasibility Study are not required, or a Public Private Partnership (PPP) where both the capital assets and service are leased from a commercial contractor.

12. Movement through the procurement cycle, whether full or modified, is achieved by a dossier of seven documents being developed and approved iteratively (the

Dossier Process). The dossier is prepared by a Dossier Working Group (DWG) and approval is granted by an Equipment Approvals Committee (EAC) or their delegated authorities. Each of the seven sections of the dossier is strictly page capped and addresses the following subjects:

a. Section 1. Covering Paper - 3 pages.

b. Section 2. Requirement Definition - 8 pages.

c. Section 3. Combined Operational Effectiveness and Investment Appraisal (COEIA) - 10 pages.

d. Section 4. Procurement Strategy - 9 pages.

e. Section 5. Programme Baseline - 4 pages.

f. Section 6. Support Strategy - 5 pages.

g. Section 7. Project Validity and Affordability - 1 page.

13. It is considered important that only Section 6 of the Dossier includes a treatment of training, but that is restricted to maintainer training as part of the Support Strategy and not operator training. Arguably, training is an essential element of meeting the requirement (Section 2).

14. One of the key challenges in dealing with integration of TNA in the procurement system is the resolution of organisational responsibilities. A list of key 'stakeholders' in TNA in the procurement of Army equipments would include at least ten different organisations. Crucially, however, Training Support Branch acknowledges in addition to the Dossier System, two further stakeholder *processes* which overlap with TNA itself and offer potential as 'force multipliers', namely, Integrated Logistic Support (ILS) and Human Factors Integration (HFI – formerly known as 'MANPRINT' in its initial Army specific application). Each of these US pioneered

initiatives were introduced during adoption of procurement reforms and both are tri-Service and mandatory.

## **INTEGRATED LOGISTIC SUPPORT**

15. ILS was originally developed and applied in the USA some 20 years ago and introduced into the UK approximately 10 years ago. The Attack Helicopter was one of the first major procurements for the British Army which was subject to ILS. ILS comprises a set of studies and procedures to ensure supportability from conception to disposal for new equipments. It seeks to ensure value for money and represents a significant break from previous approaches in that ILS considers whole life costs of projects. The standard for ILS is laid down formally in Defence Standards (DEF STAN 00-60) which defines ILS in the following way:

‘A disciplined management approach, affecting both customer and industry, aimed at optimising Life Cycle Costs. It includes elements influencing equipment design and determining support requirements to achieve supportable and supported equipment.’

16. ILS is mandatory for all equipment projects. ILS aspects of each eligible project are normally managed by an ILS Manager (ILSM), who may have numerous projects running concurrently. The formal planning document for the integration of the activities concerned with logistics is the ILS Plan (ILSP). This is kept current throughout the life of the project. It sets out the concept of operational support, provides a detailed ILS programme and results in the necessary ILS information required for sound decisions to be made in the system development and production. At the heart of ILS is Logistic Support Analysis (LSA). LSA is the principal tool of ILS and is the primary means by which the objectives of ILS are achieved. These activities consist of a series of analytical tasks which:

- a. Cause logistic support considerations to influence the design of the equipment.
- b. Identify support issues, readiness requirements and cost drivers as early as possible in the equipment life cycle.
- c. Define logistic support resource requirements for the life of the equipment.
- d. Develop a logistic support database called the Logistic Support Analysis Record (LSAR) for use in the through-life equipment support management of the equipment.

The LSAR is intended to provide a complete audit trail.

## **HUMAN FACTORS INTEGRATION**

17. Human Factors Integration (HFI) originated as a US Army management and technical programme using the acronym MANPRINT (MANpower and PeRsonnel INTeGration). The UK committed to MANPRINT in 1988 and renamed it HFI when applied in a tri-Service context. HFI seeks to ensure that, from their inception, project teams adequately address six interrelated Human Factors ‘domains’, namely, Manpower, Personnel, Training, Human Factors Engineering, System Safety, and Health Hazards, in order to enhance overall system performance and capability, both in operation and maintenance, of manned equipments.

18. In theory, HFI and ILS are complementary initiatives. ILS addresses the reliability, availability and maintainability of equipment, together with support and technical training. With the exception of the logistic aspects of manpower, manning and training, ILS does not cover the six domains of HFI.

## TRAINING NEEDS ANALYSIS

19. In light of these considerations, the Army's TNA process was developed according to a number of critical "design principles":

- a. The need to maximise *concurrency* with the procurement cycle and with the work of other specialists, especially ergonomists, during the development phase of any operational equipment.
- b. The need to provide guidance on the *management* of the conduct of a TNA, especially where contracted out.
- c. The need to make both the conduct and the management (quality control and quality assurance) of the TNA *iterative*.
- d. The need to place the emphasis upon *products* (deliverables), not processes.
- e. The need to ensure that, although a projective study, TNAs examine the *whole life cycle* consequences of training solution implementation.
- f. The need formally to delineate considerations of training effectiveness from those of cost effectiveness.

These principles were intended to maximize the scope for integrating TNA with the

procurement system without compromising either, and most have been carried forward in the draft tri-Service TNA Guide.

20. The purpose of a TNA is to identify the needs which arise as a result of the introduction into service of a new or changed equipment, to identify and evaluate options which would meet those needs and to recommend the most cost-effective option. The process identifies appropriate training equipments and methods and may be applied to all levels of training. The TNA process is summarised by Figure 4.

## DESCRIPTION/RATIONALE OF TNA

21. **Phase 1 - Scoping Study.** This should be carried out by MOD personnel through a Training Support Steering Group (TSSG). It is based on information from the ST and aims to make a preliminary assessment of the outline training requirement and possible training solutions. The report should provide the baseline from which the more detailed Phase 2 TNA activity will develop. It is necessary for early identification of training equipment requiring long lead times and the possible need for consideration of embedded training. It also provides an outline training specification for inclusion in Invitations To Tender (ITT) and ILS documentation.

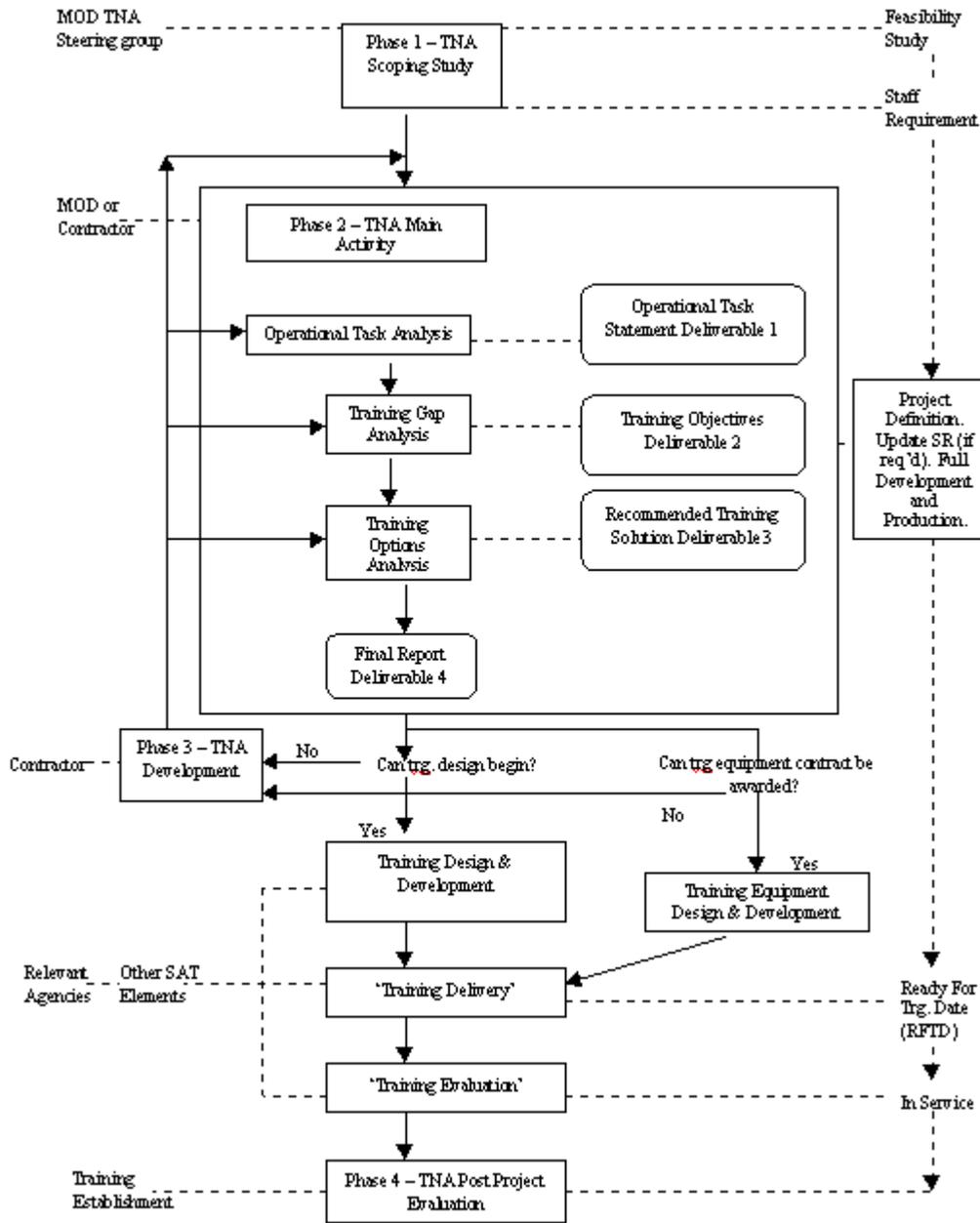


Figure 4. The TNA Process.

22. **Phase 2 - TNA.** It is in Phase 2 that the bulk of the TNA activity is undertaken and can be conducted by MOD personnel or contracted out. Phase 2 builds on the information from the Scoping Study as data becomes available, to provide a much more detailed analysis of the training requirements and solutions, to a level where training design can begin. Phase 2 involves the following activities, producing associated

deliverables, which are then incorporated into a Final Report:

- a. **Task Analysis.** A Task Analysis produces a task inventory specifying the duties and tasks to be performed by each group of personnel when operating and maintaining the planned Operator Equipment (OE) and the conditions under which they are performed.

This Operational Performance Standard (OPS) helps to define the output standard for the training and should be of sufficient detail to determine the fidelity of the training equipment required.

b. **Training Gap Analysis.** Training Gap Analysis is the identification of the training need by comparing pre-existing skills, knowledge and attitudes with those specified in the task inventory. This process produces Training Objectives (TOs), detailing the required performances to meet the OPS, the conditions for their execution and the standards to which they must be performed.

c. **Training Methods and Media Analysis (TMMA).** The TMMA evaluates the most cost effective ways to satisfy the training needs, as described by the TOs. This involves identifying a range of possible options and estimating their effectiveness in achieving each TO. The product of a TMMA is a Combined Training Effectiveness and Investment Appraisal (CTEIA), costing different options and providing justification for the recommended strategy. Sometimes, however, the Scoping Study may already have specified the requirement for certain methods and equipment, based on current training policy and similar training strategies. In this case the TMMA becomes a process of matching TOs to the different media that will be available.

d. **Final Report.** The Final Report is a complete specification of the full training strategy. It should include the content of the initial Scoping Study together with all the deliverables of the TNA that were not available at the outset. The document must be produced before training design can begin and should be released to whoever is going to conduct this task. This is usually a contractor in collaboration with Service Subject Matter Experts (SMEs).

23. **Phase 3 - TNA Update.** Once a contract has been awarded, and before training design can begin, the contractor will need to update and develop the final phase

2 TNA report. This is because new information will become available and some of the old information may no longer be valid. Changes to assumptions, budgets, OE or training equipment configuration and the inclusion of Logistic Support Analysis (LSA) data are all factors that will necessitate an update.

24. **Phase 4 – Post Project Evaluation (PPE).** The PPE is a review of the effectiveness and efficiency of the resultant training and of the objectives of the TNA, to determine the extent to which they have been met. The PPE should be carried out, on behalf of the Integrated Logistic Support Manager (ILSM), by the training establishment responsible for the training between 9 and 12 months after the Ready for Training Date (RFTD). PPE is audited by the appropriate Service training organisation: (Royal Naval School of Education and Training Technology (RNSETT), Development Projects and Research Group or Arms and Services Training Development Teams or RAF Training Development Support Unit (TDSU).

25. **Integration of TNA in Procurement.** Whilst the TNA guide allows those concerned to understand clearly what is being attempted and the rationale behind the process, the TSTSWG accepts that, if it is fully to meet its objective, then greater detail and guidance will need to be included within the guide to integrate it within the procurement cycle. The Army led on a study (TNA/ ILS Integration Study) which reported in the same month as the completion of the drafted Tri Service TNA guide and addressed the form in which such integration might take. Before a discussion of the TNA ILS Integration Study, it is necessary to look at the recent developments in the procurement system which have a bearing on it. Production of a Tri -Service TNA guide took 18 months and during this period, a number of developments occurred which have a bearing on the course the TNA/ILS study took and these will now be described.

26. The procurement system is likely to be modified in the near future in ways which are relevant to the remainder of this paper. To elaborate, as part of the 1998 Strategic Defence Review (SDR), a revised approvals process has been proposed. The core of the new model will be a single EAC approval point at the end of an 'Assessment' phase which would equate approximately to FS and the early stages of PD as currently construed.

27. A new process for capturing and specifying the requirement is also being developed. This will result in the introduction of multi-disciplinary Requirements Working Groups (RWG) being formed within a project-based organisation based around Integrated Project Teams (IPTs). The IPTs will include all key internal stakeholders as full members and will replace the current largely functional organisations. The composition and capability areas for IPTs have yet to be decided.

28. Whilst ILS ensures that logistic support considerations influence equipment design and resource requirements are specified, this process falls short of adequately addressing training issues, because training is not a core logistic concern, and TNA is not included in ILS. HFI includes training as a domain but, again, does not address TNA specifically, and, more significantly, does not influence beyond and equipment's In Service date (ISD). Both ILS and HFI whilst developing their respective coverage of TNA, were claiming they could subsume it. However, whilst still accepting that they are legitimate stakeholder processes with some degree of overlap with TNA process itself, neither adequately addresses the requirement for TNA.

29. Options were therefore considered which included doing nothing to alter the situation and thus relying on ILS and HFI adequately covering TNA eventually, subsuming TNA within ILS, subsuming TNA within HFI, or integrating TNA with HFI, ILS and Dossier System.

30. It became clear that by altering the emphasis of our work from actually doing TNAs to Quality Assuring contractor TNAs, it would be possible to give satisfactory

coverage to new equipment procurement projects. Quality Control and Quality Assurance of contracted out TNAs by DP&RG usually takes the following sequential form:

Drafting of TNA TORs for inclusion within the Invitation To Tender (ITT) document.

Selection of approved bidders (if the contract is to be let by competitive tender).

Guidance on the selection of the winning bid.

Guidance on the approval of TNA deliverables.

Guidance on staffing aspects of the implementation of the TNA recommendations.

#### **TNA/ILS INTEGRATION STUDY**

31. The findings of this study fall into four key areas:

a. Requirement for TNA in the Procurement Cycle. The value of and requirement for TNA are now widely accepted and established as part of the procurement process, and there has been, increasingly, a tri-Service approach to ensuring that this remains so. Problems can be solved by articulation of ownership by AG.

b. Procedures and Documentation. Formalised procedures and supporting documentation are essential. ILS compatible training documentation has been developed and provides a valuable basis for further development of generic materials with tri-Service application.

c. Integrated Project Management. The key to integrating TNA with the Procurement Cycle is to be found in establishing the relationships between the Dossier System, ILS and Human Factors Integration (HFI) and the place of TNA therein. Integrated Project Management is clearly the way forward and provides a means of ensuring key

stakeholder involvement throughout the process.

d. Resources. The requirement for all procurement projects to include a TNA and for the Quality Assurance of contracted out analyses to be carried out

by military Training Support specialists is likely to have resource implications for HQ AG and Training Development Teams. This issue needs to be addressed, together with the associated supporting training provision for those involved with all aspects of TNA.

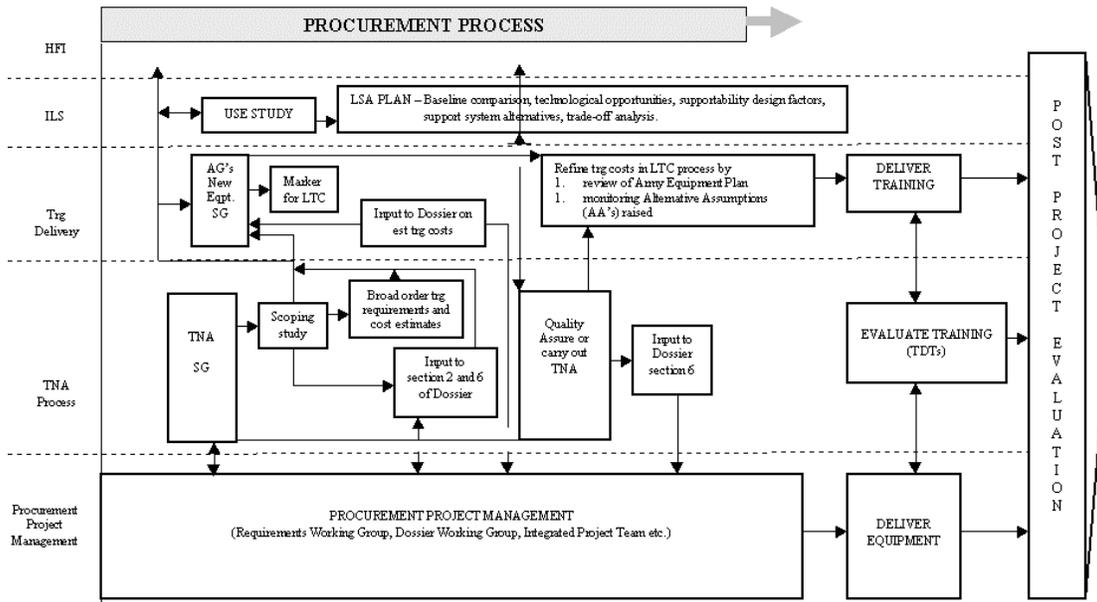


Fig 5 Integration of TNA in Procurement Cycle

32. Whilst the TNA process should normally be integrated with HFI, ILS and the Dossier System, it should also be capable of being implemented autonomously, as decided on a project by project basis. Figure 5 shows how the iterative TNA process could support the overall project management of the equipment, including the requisite development of the Long Term Costing (LTC) line for training delivery.

33. This study did not consider the role of TNA within non-ILS, non-equipment-based projects or software intensive projects or projects relating to the development of simulators for which the requirement is not prompted by the acquisition of specific new prime equipments (e.g. Combined Arms Tactical Trainer). These are important areas which will require detailed examination.

**CONCLUSION**

34. Concerns regarding the adequacy of

training provision in procurement projects are now widely shared. This is probably due to a recognition that, with the increasing emphasis and reliance on sophisticated training devices, any shortcomings are likely severely to compromise operational effectiveness. The nature of the problem is the lack of early identification of the training requirement for the introduction of all new equipments.

35. A major element in the solution of the problem is an increased involvement of training specialists in the procurement process. The mechanism for ensuring adequate training provision appear to be in place and working in more recent projects, but are not guaranteed. Relatively modest amendments to the procurement system, but with associated resource implications, will achieve resolution of the problem, in relation to equipment-based projects.

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