

Cranfield University

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**PROCESS MAPPING
(TRAINING NEEDS ANALYSIS)
AND BUSINESS PROCESS RE-ENGINEERING
FOR
ERP SYSTEM PROVIDERS**

**Enterprise Integration
School Of Industrial and Manufacturing Science**

MSc Thesis

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Process Mapping & Business Process Re-engineering
Training Needs Analysis for
ERP System Providers

Supervisor: Kamal Sehdev

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For the degree of Master of Research

ABSTRACT

This thesis presents the results of a collaborative research project and documents a process mapping exercise on Training Needs Analysis as utilised during the implementation of ERP projects. In the first instance, it focuses on capturing the activities involved in delivering an effectively tailored Training Needs Analysis (TNA). The documented methodology then forms a foundation for understanding the main activities within the Training Needs Analysis process and is later investigated as a means to carrying out comparative analysis in identifying opportunities for improvements.

The research then proceeds to investigate state of the art literature on the assumed role attributed to the outputs of the Training Needs Analysis process as an unframed evaluative methodology for measuring the success and or failure of planned ERP implementation projects.

Through the review of available literature, evolves an analysis on the availability and suitability of tools used for evaluating the success or failure of ERP projects or indeed the lack of such tools. The research goes further, seeking to understand the relationship between what is seen as the evaluation process for a successful ERP implementation project in relation to a successful Training Needs Analysis process, while investigating the data gathering processes utilised during the analysis.

Finally, addressing some of the unspoken and expected outcomes which may be sought or attributed to the Training Needs Analysis process, the research project concludes by analysing the AS-IS Training Needs Analysis process alongside documented best practices, before initiating subsequent process improvement

exercises and Business Process Re-engineering techniques as methodologies for recommending a more suited TO-BE framework for the Training Needs Analysis process map.

Recommending both a continuous and evolving process framework, it goes further allowing for a more structured evaluation in the results or quality of a Training Needs Analysis process which are created in-line with the opportunities for improvements identified in the evaluation phase.

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GLOSSARY

CSF: Critical Success Factors

EAM: Executive Accounts Manager

EBM: Executive Business Manager

EUT: End User Training

KTC: Knowledge Transfer Consultant

PTT: Project Team Training

ROI: Return on Investment

TNA: Training Needs Analysis

GQM: Goal Question Overview

1.0. INTRODUCTION

This chapter summarises the background to the project, the industrial collaborator, the main project outcomes and the scope of the thesis project. The chapter then proceeds to examine the report structure which has been used to present the findings of the research conducted during this project.

1.1. General

The collaborating organisation for this research project is SAP (UK) Ltd., more specifically the Knowledge Management team within the Education Division, which is in Feltham, Middlesex.

This project process maps SAP (UK's) activities as concerned with conducting Training Needs Analysis. Upon completion, the process maps will be examined to assist in gaining better understanding of the current Training Needs Analysis process and any associated outcomes. Together with available literature, the mapped processes will be used as a basis for analysis and process improvements.

1.2. Industrial Collaborator

SAP is the world's leading provider of collaborative e-business solutions. With 44,500 installations serving 10 million users at 17,500 organisations in 120 countries across the globe, SAP ranks as the world's third-largest independent software provider.

The company's headquarters is in Walldorf, Germany, with U.S. operations headquarters located in Newtown Square, PA and UK offices based in Feltham, Middlesex.

1.2.1. Brief Company History

YEAR	EVENT
1972	SAP founded 1973 & SAP R/1 solutions launched
1977	First international customers
1979	SAP R/2 solutions launched
1988	Company goes public (Frankfurt)
1992	SAP R/3 solutions launched
1996	SAP R/3 Release 3.1 is Internet-enabled
1996	Company launches new solutions for customer relationship Management and supply chain management; SAP begins developing industry-specific solutions
1998	Company is listed on the New York Stock Exchange
1999	SAP forms SAPHosting, a subsidiary dedicated to the Internet application service provider and application hosting business.
2000	SAP forms strategic alliance with Commerce One to create SAPMarkets, a subsidiary dedicated to creating and powering globally interconnected business-to-business marketplaces on the Internet.
2001	SAP acquires Top Tier and forms SAP Portals

Table 1: SAP History

1.2.2 The Company's Product Suite

SAP product suite can be grouped into one of thirteen categories as shown below.

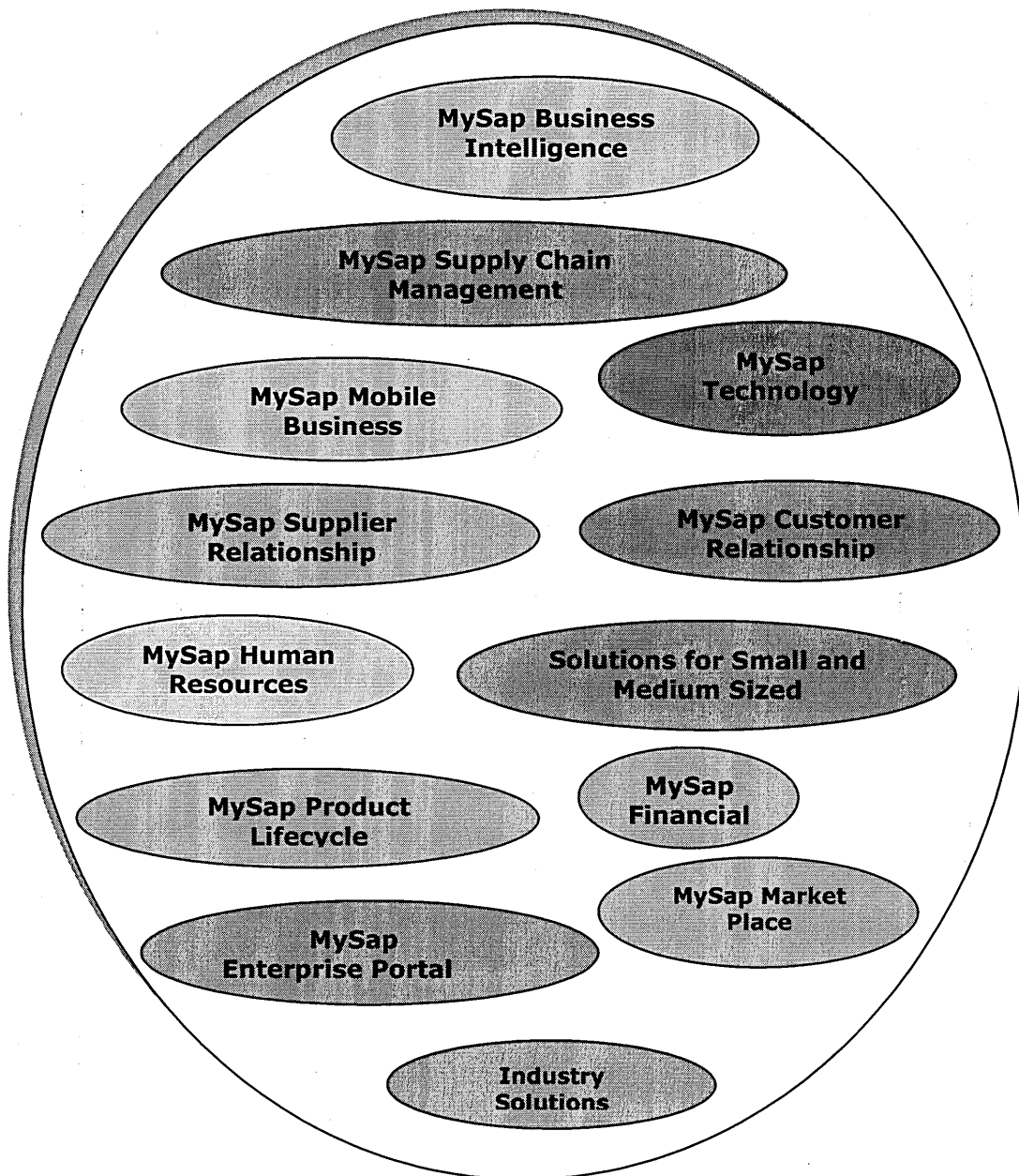


Figure 1: SAP Product Suite

1.2.3. The Corporate Organisation

There are three main divisions within the SAP UK offices; these are seen in Figure 2 below.

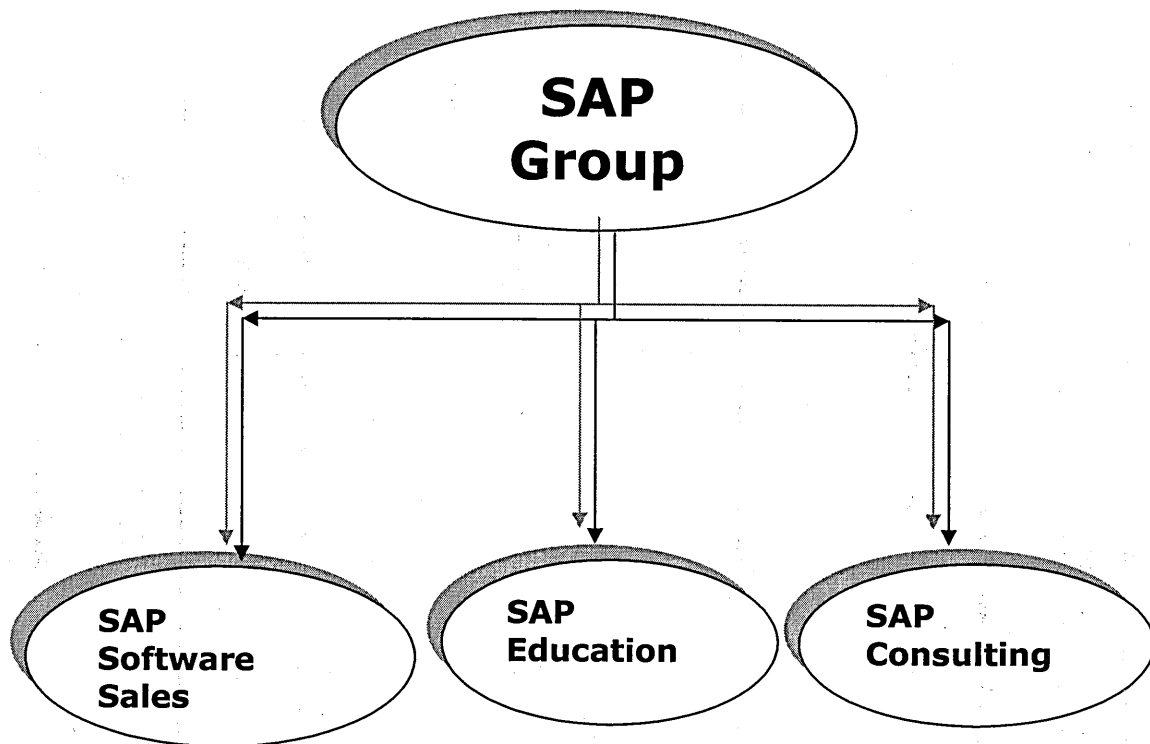


Figure 2: Managing SAP by Divisions

1.2.3.1. SAP Educational Services

SAP Education Services drives the provision of a Training Needs Analysis tool to all of SAP clients based in the UK and Ireland, with a requirement to identify client based training needs during the upgrade or implementation of the SAP product. Though available to all SAP clients, during this research it was not possible to obtain confirmation on the exact proportion of Training Needs

Analysis carried out in relation to SAP's implementation projects or to examine documentation on the impact of the TNA activities across the business. The core of the Education Service's Training Needs Analysis falls within two key processes. Dealing with two different aspects of Training Needs Analysis, they both offer tailorable services in identifying and fulfilling the training needs of SAP customers. These services are:

- SAP Project Team Training
- SAP End User Training

1.2.3.2. SAP Project Team Training

At the core of SAP training, there are more than 200 standard courses available at the end of the Project Team Training - Training Needs Analysis. These can be taken either at one of the company's 85 training centres worldwide or at the client's own site.

Available to the SAP implementation project team, this category of the Training Needs Analysis ensures the provision of comprehensive project team training for project team members of SAP Education Services clients.

In providing maximum flexibility, SAP tailors individual training required for Project Team members, which is delivered as a modular curriculum. This service made adaptable to meet the unique training needs of the project team members is tailored specifically to meet the different needs of the as required by members within the project team.

1.2.3.3. SAP End User Training

The team players within the Education Division, who contribute to the user based Training Needs Analysis processes vary, and are dependent on the nature of the SAP project at hand. The active team could consist of members from any of the groups within the Education Division including:

- Education Accounts Executives
- Knowledge Transfer Consultants
- Education Business Managers

As part of its service suite, training and Performance Solutions are now offered in four service areas, which are dedicated to supporting SAP clients throughout their business life cycle, while ensuring maximum return on investment.

The process for conducting Training Needs Analysis provides a framework for identifying and managing the interrelated processes and development of activities resulting from a required SAP End User training project. Ensuring users are competent to undertake work based activities carried out on the implemented SAP system.

1.3. Project Definition

1.3.1. Reason for the Project

Despite the benefits that can be achieved from a successful ERP system implementation, Davenport (1998) points out evidence of failure in projects related with ERP implementation. Too often project manager's focus on the technical and financial aspects of a project and neglect to take into account the non-technical issues (Esteves et al, 2001).

To solve this problem, some researchers are using a Critical Success Factor (CSFs) approach to study ERP implementations and more specifically, SAP implementation. Ward (1999) points out that Critical Success Factors are not in themselves directly manageable, stating that it is the processes that define what a management team 'Do', and that these processes can be owned, defined, measured and managed.

According to Bancroft et al (1998), training is one of the most cited Critical Success Factors (CSF) in Enterprise Resource Planning (ERP) implementation projects. To realise significant benefits from ERP systems, Wortmann (1998) states a considerable amount of training is required. In line with this, Koch (1996) points out that training in SAP implementations is ranked as one of the most vital Critical Success Factors. Hence Training Needs Analysis, as exemplified by the SAP Education Division is not as simplified as it may appear to be.

Despite this however, little has been done in relation to the operationalization of the training metrics, as training evaluation is sometimes seen to be an add-on, a luxury or even another costly element of a project consuming resource (Esteves et al, 2002).

As a result, current operational processes possess inadequate measures for assessing or documenting the success and effectiveness of the delivered training during an ERP implementation project. This is further emphasised in most organisations, which tend not to collect the information required to determine the utility of their training programme (Goldstein, 1993).

Inline with current documentation of training as a vital Critical Success Factor in ERP implementation projects, the success and or failure of ERP projects, are fast being aligned and attributed to the training provided during the implementation or upgrade of ERP systems. With the growing arguments that inadequate training is responsible for failed ERP implementation projects, Return on Investment (ROI) gained from the implementation of ERP systems it seems are being measured from the success of training activities generated from an SAP Training Needs Analysis.

The insufficiency in the training metrics it seems can be rooted to what appears to be a lack of mechanisms for the evaluation of the effectiveness of Training conducted based on an SAP Training Needs Analysis. As the exist no formal or adequate mechanisms for measuring and evaluating the success of executed training, it becomes evident that the is a need to develop a framework and methodology with which to evaluate the effectiveness and success of any training resultant from SAP's Training Needs Analysis process.

Currently, the Training Needs Analysis process, as an incubator for the recognition and execution of client training during an SAP implementation projects, provides no measure for capturing or documenting the success or failure of any recommended training carried out during the ERP implementation project. Nor does the process provide any standardised return mechanisms or indeed materials, suitable for providing continuous training based on feedback to

ensure that any areas of the project where users are identified to be weak in training can be revisited and strengthened to bring about the desired training and indeed project success. This project intends to understand current processes as utilised for conducting Training Needs Analysis (training) at SAP (UK), with a view to bringing them in line with best practice methodologies and frameworks for conducting Training Needs Analysis.

Utilising the best practice/benchmarked mechanisms as a forum and continuous cycle for evaluating and improving the success of training carried out during an SAP ERP implementation project, it aims to recommend a framework identifying issues required for evaluating the projects success.

The term Training, as used in this discussion, includes all forms of education, change management, knowledge management (including documentation, briefing, etc) and training.

1.3.2. Project Aims

The aim of the research is therefore:

“To comprehensively map the activities involved in carrying out a Training Needs Analysis within the Education department at SAP, UK”.

“To review the mapped process against best practice/benchmarks and where possible identify opportunities for improvement to bring about a re-engineered TO-BE model for conducting Training Needs Analysis.”

In terms of scope, the maps will start at point when:

- A Proposal is required, or
- An Invitation-to-Tender is requested

The map will finish at the point where the Training is achieved. The maps will therefore cover units within Education as covered by: SAP Education Business Managers, Education Accounts Executives, and Knowledge Transfer Consultants.

1.3.3. Project Objectives

The specific objectives of this project have been defined as to:

- Conduct a series of interviews with key personnel in order to extract Process knowledge. Focusing on the activities involved in conducting a Training Need Analysis, to generate an 'AS-IS' process map for the process and perform validation interviews to ensure accuracy of the 'AS-IS' process map.
- Identify best practise model for conducting Training Needs Analysis through desk research and benchmarking.
- Analyse and compare both models, and where necessary, identify and make recommendations for an improved TO-BE model for conducting Training Needs Analysis.

1.4. Overall Project Methodology

The overall aim in the design of the research methodology is to provide a logical way to consider the options that will contribute to documenting, developing, analysing and where necessary re-engineering the process for conducting training needs analysis at SAP, UK.

1.4.1. Formulating the project plan

Over the project's duration, the methodology was planned to fulfil these criteria's:

- Predict start dates for various tasks so that the project deliverable could be completed on time.
- Provide a visual electronic plan, which was easy to access and read by all members of the project team.
- Provide flexibility in the display of the plan such that modifications could be made quickly and easily.

1.4.1.1. The Project Plan

As an effective method to fulfilling the above criteria, a Gantt chart was designed using Microsoft Project. As an electronic tool, it was successful in showing the project plan, and enabled full display of the plan at a glance.

1.4.1.2. Research Methodology

In designing the research method, consideration was given to ensure the study would address the overall aims of the project and accurately gaining a clear understanding of Training Need Analysis Process. Recognising that the most normal starting point is to understand how individuals conduct a Training Needs Analysis at SAP UK, would be to ask the process team, the research methodology also seen in Figure 3 was utilised and this took the form of:

- **Interviewing Key People**

In order to investigate possible research options and ascertain direction towards defining a clear project statement, the author made a first visit to the collaborator's premises. The visit provided an opportunity for the author to explore the vision towards research, and contributed to developing a concept for the research project.

An initial meeting was first arranged with David Whitting, SAP (UK) Knowledge Transfer Consultant and Manager at the SAP Education Division. This established the scope and the aim of the project as well as the role to be played by the industrial collaborator. The first phase of the work consisted of a set of interviews within the Education Division, with key people from the Training Needs Analysis Process in order to gather process based tacit and explicit knowledge.

Semi-structured interviews were utilised for gathering and validating data, and are discussed further in section 4.3.1. The advantages and disadvantages of this less structured approach and those of its comparatives are highlighted within Appendix A.

- **Contacting other Industry experts in the field of SAP Training Needs Analysis**

Contact was established with the Robert Attuah of Axon Limited, Fredrick Akuffo of Diagonal Limited as well as various parties at Pitney Bowes Ltd. The purpose being to facilitate the initial understanding of the process involved in conducting Training Needs Analysis on SAP projects. By talking to other industry placed individuals involved with conducting Training Needs Analysis within SAP environments, it was possible to gain further insight and understanding into why the activities were carried out and how.

- **Desk study**

Once the foundations for process mapping the Training Needs Analysis were established, desks study including a comprehensive literature review was needed to facilitate further investigation. The literature review is divided in three broad research areas:

- Training Needs Analysis
- Process Mapping, and
- Business Process Re-engineering

The next stage of the desk study involved researching documented Training Needs Analysis processes across other industries. This phase of the methodology involved case study analysis to identify best practices and strengthen the Training Needs Analysis methodology model established during the initial desk study carried out. This was carried out in two stages:

- *Identifying Best practices:* When trying to improve business processes, the best way is to benchmark the organisations' own processes against best practice. In the case of Training Needs Analysis, the Best Practices provided a comparison for use during the analysis and identification of improvement opportunities upon which to make recommendations for improvements and future work.
- *Documenting other Industries:* In order to identify documentation on Best Practices, two other industries were examined comparatively in a way pertaining to their methodologies for carrying out Training Needs Analysis. In selecting suitable industries for comparative best practise analysis, attention was given to selecting industries: -
 - Whose methodologies were in line with already available and existing documented literature, and
 - Industries with an inherent focus and high requirement for accuracy and success of any resultant delivered training.

In line with this, relevant exemplary information was acquired during the desk study as utilised within the UK Military and Health Care industries.

- **Process Analysis and Benchmarking SAP's TNA Process.**

Upon completion and analysis of the AS-IS methodology and framework utilised by SAPs in conducting the Training Needs Analysis during SAP implementation projects, the AS-IS process was benchmarked against documented best practice. Through comparative best practice analysis and documented literature reviews, gaps were identified in the AS-IS process.

- **Apply BPR & Recommended Improvements to TNA Process.**

A proposed process-based framework for an improved methodology was developed for use in conducting Training Needs Analysis, at SAP.UK, after Identifying and highlighting more suited working methods for recommendations.

1.4.1.3. Further Recommendations

With proposed recommendations for a TO-BE Training Needs Analysis process in place, further recommendations were made on the best way forward and opportunities for future research. The above research methodology is displayed in Figure 3 below

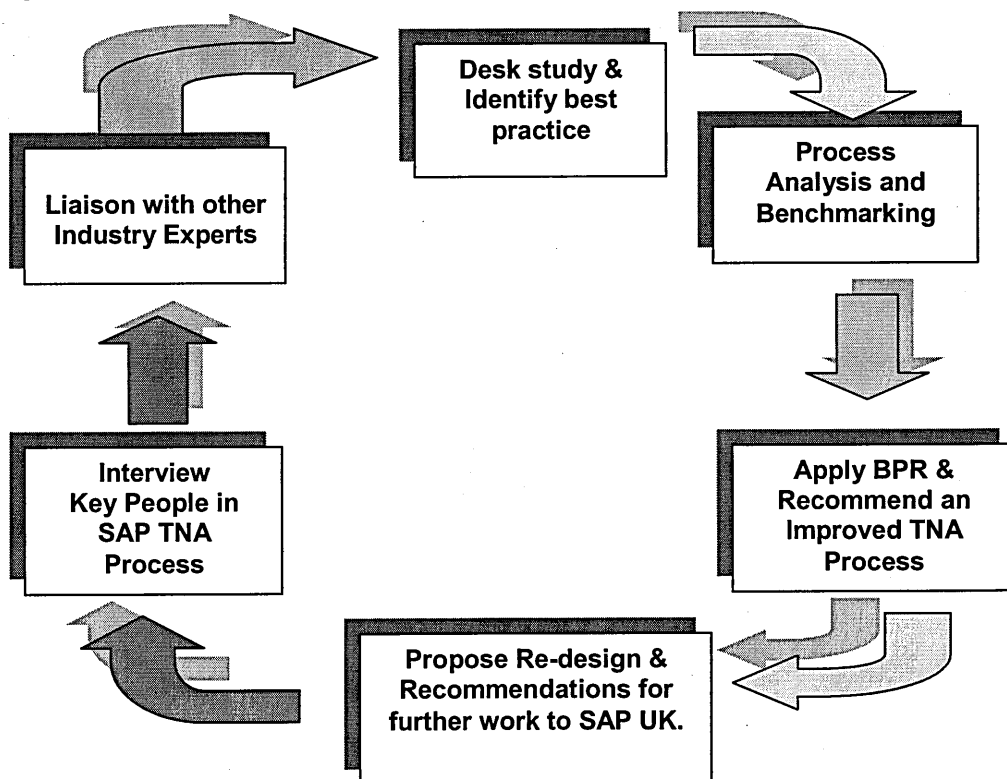


Figure 3: Phases of the Research Methodology

1.5. Report Structure

Having stated the thesis objectives, the following briefly outlines the content, structure and layout of the project report/thesis.

Chapter 2; Literature Review

This chapter documents literature on subject areas including Training Needs Analysis, Process Mapping and Business Process Re-engineering, which are reviewed and analysed in a context relevant to the thesis report.

Chapter 3; Review of Best Practise

This chapter identifies best practice in Training Needs Analysis.

Chapter 4; Data Capture

Details the procedures utilised for gathering the data required for the project while examining data collection and analysis methods used for the project.

Chapter 5; Analysis

The chapter examines and analysis the mapped Training Need Analysis process, assessing the current process and identifying possible improvement areas.

Chapter 6; Recommendations and Conclusions

This chapter documents recommendations for future work, prior to carrying out a conclusion on the project at hand.

1.6. Summary

This chapter has introduced the concept of Training Needs Analysis, examining its usability and attributed outcome as a tool for measuring its success through training during the implementation of Enterprise Resource Planning systems.

2.0. LITERATURE REVIEW

2.1. Introduction

There are three main subjects examined during this research project, and these are discussed in this chapter with a view to;

- Understanding available research material in the subject fields, and
- Discussing subject literature, which are referred to later on in the thesis.

The chapter aims to prepare the reader for the rest of the thesis, by covering the most relevant background material on the subject areas and associated concepts, providing a foundation for understanding the subject areas discussed. For further simplification, the chapter is divided into different parts as follows;

The first section examines the concept of Training Needs Analysis (TNA) and related topics including the definition of training, its concepts and methods. As there is little available literature on Training Needs Analysis in ERP implementation projects from which to establish best practises, this section identifies documented Training Needs Analysis methods, while reviewing any attributed role in the collaborating industry.

The second section of this chapter focuses on Process Mapping methodologies, providing an examination of available tools and techniques for representing and analysing the data collected.

The third section considers Business Process Re-engineering theories, providing a framework for examining how to improve the processes once they have been mapped, with a view to providing a framework from which to recommend process-based improvements for a re-engineered Training Need Analysis.

2.2. Definition of Training

Training may be viewed as a planned and systematic effort to modify or develop knowledge, skill or attitudes expressed through one's learning experience while inline with achieving effective performance which may be attributed to an activity or range of activities (Buckley et al, 2002). The purpose of training in the work situation, is as an enabler assisting individuals to acquire abilities in order to manage their performance adequately in executing a given task or job. In line with this view, Hansen, (2000), reports that performance management is an all-inclusive managerial strategy embracing training as an essential and integral component.

The words 'learning experience' emphasises that there is no clear dividing line between education and training, while stressing the importance of the integration of both concepts. Further analysis of the meaning of training, has led into a myriad of classifications of both learning and training techniques, the most famous of which are discussed briefly in the paragraphs below.

2.2.1. The Learning Techniques

In a document entitled "Helping Adults to Become Better Learners" Downs et al, (1987) state that learning is classified into memorising, understanding and doing (MUD). Focused on identifying blockages to adult learning, this is based on earlier analysis by Bloom, (1956) which divides learning into five basic types as follows:

Comprehension

Comprehension is where the learning involves knowing how, why and when certain things happen. With this method, learning is recognised as having taken place when there is recognition and not simply when the learner has memorised.

Reflex Learning

Reflex learning is involved when skilled movements or perceptual capacities have to be acquired, involving practise as well as knowing what to do. In this method, speed is usually important and the trainee needs constant repetition to develop the appropriate synchronisation and co-ordination.

Attitude Development

Attitude development focuses on enabling people to develop the capacity to alter their attitudes and social skills.

Memory Training

Memory training is concerned with trainees remembering how to handle a variety of given situations. Good examples of these are pharmacists who learn by rote a series of maximum dosages or office messengers who need to remember that all invoices go to Mr Brown and all cheques to Mrs Smith.

Procedural Learning

Procedural learning is similar to memory learning, except that the drill to be followed does not have to be memorised, but located and understood. This method can be illustrated by the procedures, which are followed in shutting down a plant at Christmas, or dealing with a safety drill.

Training Methods/ Techniques

Though consideration should be given to what type of training and delivery media are available, the Technical Research Reports (2002) states that “training may include classroom instruction supplied by the ERP vendor, web-based, interactive or other distance learning courses”. Some of these methods are described by Lee et al, (2000) and have been summarised in Table 2 with the advantages and disadvantages available further documented in Appendix B.

Training Medium	Description
Instructor-led	Here, training materials are presented by a teacher or facilitator in a traditional classroom setting or on the job. Styles include lectures, discussions, demons & workshops.
Computer-based	This method involves use of the computer & include Computer-Assisted Instruction (printed and/or instructor materials) and exclusively computer –based training.
Satellite broadcast Audio teleconference Video teleconference	In delivering the required training, this method in general is delivered via television, telephone or satellite to a remote location. Specific media are video and or audio teleconferencing and interactive distance broadcasting.
Web-based	This utilises the internet /intranet to distribute required training on Wide-Area Networks or Local-Area Networks.
Audio tapes	This method utilises pre-recorded audiotapes to deliver instruction with/without the supporting materials.
Video tapes	This method utilises pre-recorded videos to deliver instruction with/without the use of supporting materials.
Performance Support Systems/Electronic Performance Support	This method of training utilises either electronic/paper job aids for training support as on the job. They require no formal training/instruction, only on the job aid tools.
Self-paced workbook	This method of training utilises manuals or worksheets, which include instructions, goals and objectives. They provide any supplementary and reference materials needed to complete an exercise.

Table 2: Training Delivery Methods/Techniques

Though consideration should be given to what kinds or mode of training are available from prospective vendors, the percentage of the total cost of the new system should be budgeted inline for training. Some reports point out that the more you spend on training, the faster your rollout may be accomplished as it is likely that the training investment will help drive the rollout plan (McAlary 2000), while others recommend at least 10 to 15 percent, (Kale, 2000) or an estimated 120 hours per person (Esteves et al, 2002).

2.2.2 Needs Analysis

A Needs Analysis is the first and most important step in designing a training program. As a major organisational task, the Needs Analysis should be carefully structured and directed with input from jobholders, managers and training personnel. Rae (1996) identifies that by using a Needs Analysis, deficiencies can be objectively addressed, while the learning is heightened by positively influencing employee knowledge, skills and attitudes. As the employee knowledge or cognitive abilities are defined, they acquire rationale for the job, what is to be done on the job and what results are expected.

Craig (1994) documents that how we learn skills and knowledge is linked to the various abilities that enable us to carry out the learning, highlighting the need to focus upon knowledge only or skills only in the process of identifying the Needs Analysis. As the Needs Analysis allows for any deficiencies in skills, knowledge and job performance to be identified, this helps to find the ideal training and education solution required to meet an organisations learning requirement.

The process of conducting the Needs Analysis could be a simple process enquiring into what type of training employees think they need or, a highly complex research design to include quantifiable studies and matrix models

(Stanley, 2002). During analysis, one must recognise the complex relationship between skills, knowledge and ability, as well as the effect on employee turnover.

Below are nineteen events that can provide reasons for learning new skills and knowledge, as adopted from Craig, (1994). At each event, ability is seen to play a significant and influential role. Table 3 shows a list of these common events.

EVENTS GENERATING LEARNING NEEDS	
1	Promotion
2	Sideways movement
3	A new job
4	Introduction of a new technology
5	Introduction of a new method of working
6	Introduction of a new process
7	A move to multi-skilling
8	A move to dual-skilling
9	Introduction to flexible working
10	Improvement of skills and/or knowledge
11	Loss of market share
12	Take-over
13	Move to home-based working
14	Move to part-time working
15	Flattening of the organisational structure
16	Move to a semi-automated process
17	Reduction/expansion of staff numbers
18	Move to employ older worker
19	Re-allocation of responsibilities

Table 3: Events that generate learning/training needs

Identification of Training Needs

The identification of training needs, means that performance is not up to the level required and this in turn means that both the existing level of achievement and that required have been measured and assessed (Rae, 1996). As employees need all the skills and knowledge possible to meet workplace challenges,

Stanley (2002) and Bevan et al (1991) assert that identified training needs when met, result in enhanced individual and organisational performance. Hence accurate identification of the organisations training needs is crucial to its success and development. This can be viewed from three perspectives as shown in Figure 4. (Bramley, 2001).

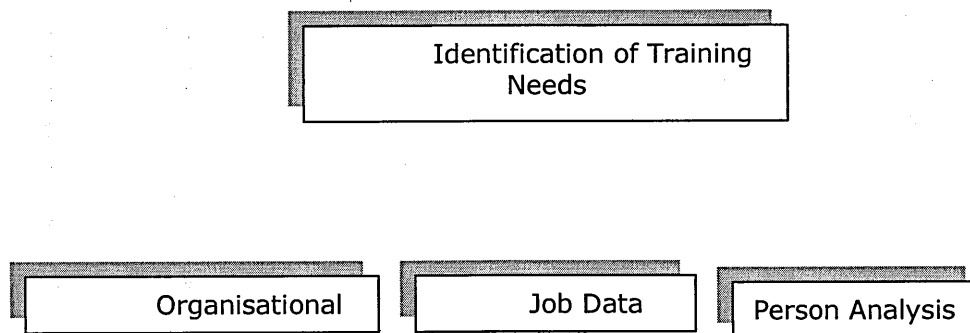


Figure 4: Levels in Identifying Training Needs.

These levels in identification involve the process or processes we choose in order to fully identify and define the training needs within our organisation.

Training Need

Training Needs are a need for performance improvements or change best met by training of some kind, however, if clearly identified, particular needs may be met by a training solution, as opposed to a 'training need' Williamson, (1993). Identifying that "not all 'performance needs' will necessarily be solved by the provision of training", this author points out that "Poor performance" could be related to other factors including poor working conditions, lack of motivation or as otherwise listed in Table 3.

2.2.3. Training Needs Analysis

Training Needs Analysis is the systematic approach to determining the real training needs which exist within an organisation or department and is the first critical stage in the training cycle pointing out that the others are design, presentation and evaluation, of which includes a re-assessment of training needs (Stockley, 2001).

Training Needs Analysis works to identify immediate needs, with a view to incorporate training into the long-range company plans. The Employee Resource Association, (1991) stipulates that this action on the part of the employer shows company employees an organisations commitment to training and development as well as to win employee support for heightened productivity.

When we talk about 'Training Needs Analysis', "we usually refer to the identifying of a need for improvement or change in performance either by an individual or a group of staff within an organisation" (Williamson, 1993).

This systematic analysis, contrasts the “should” of employee performance with the “actual” results you’re currently getting. Through employee perception, feedback and observation, it weighs the importance of the areas of deviation to the companies in order to determine where to allocate precious training resources. Identifying the training needs, careful analysis must take place to establish how exactly the needs can be targeted and met. Carefully evaluating areas of weakness, organisations can correct specific employee performance.

With training often seen as something that is done to people during training courses, that is to say, that people are trained, training Needs Analysis place emphasis on individual learning, where organisations become learning organisations and as a result, learning becomes a way of life rather than an episodic event (Senge, 1990). This author, goes further to defined a learning organisation as one;

“Where people continually expand their capacity to create the results they truly desire, where new and expansive patterns are nurtured, where collective aspiration is set free, and where people are continually learning how to learn together”.

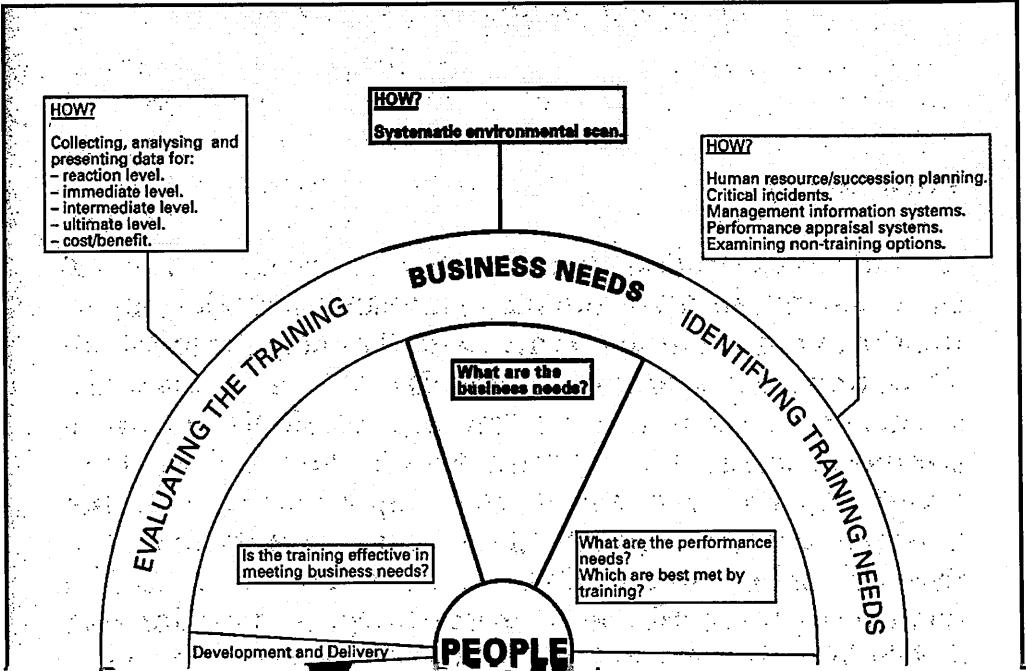
Guidelines for Conducting Training Need Analysis & Evaluation

In any complete training needs analysis process consideration should be given to areas including cost, resources, organisational priorities and time-scale which must be included in the planning process. These factors serve to highlight the importance of ensuring that training is focused, while providing the right training for the right people at the right cost (Williamson, 1993), as training needs analysis and evaluation are vital tools in ensuring these objectives are achieved.

The Chartered institute of Personnel and Development document the view of Roland et al, (2001), who have provided a summary of the guidelines for conducting training need analysis and evaluation shown in Figure 5.

From this diagram, it is possible to see that in the first instance, business needs are interpreted as the operational needs of the organisation and identified as the starting point for this training initiative. These are also seen as the strategic triggers that cause managers to look into the skills and competence of the workforce (Boam et al, 1992).

Training must be driven by the business needs of the organisation, as if the link to business needs can be established this will ensure that the training focuses on the real issues and demonstrate its relevance to the business (Chartered Institute of Personnel and Development, 2001).



In line with this and at the next stage of the above diagram business needs are translated into the need for action as a means to improve or add to the performance of the organisations human resource asset. These actions however, may or may not lead to a training intervention.

While Kirkpatrick (1998) points out the importance of:

- "What" must be evaluated?

Brinkerhoff (1998) states that a good training evaluation should be able to prove that the program:

- Is aimed at important and worthwhile organisational benefits.
- Operates smoothly and effectively and is enjoyable.
- Achieves important skills, knowledge and attitude objectives.
- Uses the best available and most cost-effective designs.
- Is used effectively on the job: and
- Provides valuable and cost-effective organisational benefits,

Training evaluation, however, can be analysed at least at two levels:

- Project level and
- Organisational level.

In their Technical Research Report, Esteves et al (2002) describes project level evaluations as "those which concern the training program as a whole", while "organisational level evaluation concerns the people involved in the training and the effects on the organisation".

Training Evaluation at Project Level

In recent research, Mulder (2001) proposes a model for training effectiveness as seen in Table 4.

Project Definition	Objective operationalisation	The level in which the objectives of the training project are specified.
	Distribution of responsibility	The level in which the training organization carries responsibility for attaining the results.
	Condition registration	The delivery conditions about which agreements have been made between the client organization and the training organization.
Project Implementation	Total satisfaction	This is the satisfaction about the total project handling, the preparation of the project.
	Condition-realisation consistency	The delivery reliability of the training organization.
	Condition-realisation satisfaction	The level of satisfaction about the performance of the training organizations with respect to the possible delivery conditions.
Project Effectiveness	Expectation realisation	The level in which the project results meet the expectations of the client organization.
	Objective realisation	The level in which the intended objectives of the training project are achieved.
	Success attribution	The level in which the training organization has been responsible for attaining the intended objectives.

Table 4: Mulders Training Evaluation model at project Level

Ideal for the evaluation of ERP implementation projects, this item based model utilises the perspective of a training organisation and its client during the evaluation of training programs. Focusing on the customer's view of the effectiveness of training programs in relation to training organisations, the model examines the project definition, project implementation and project effects.

Training Evaluation at Organisational Level

The Technical Research Report states there are various approaches available for the evaluation of training amongst which include quasi-legal approach, goal-based approach, goal-free approach, professional approach, responsive approach and systems approach. The most used however is a goal-based evaluation model. Developed by Kirkpatrick (1998), the model is based on four levels of evaluation which look closely at:

- **Reaction**

At this level assessment is based on the initial reactions of participants on the course, as a means of gaining insight into levels of satisfaction and individual perceptions on value. At the reaction level, enquiries are mostly conducted via a survey referred to as a 'smiley sheet'.

- **Learning**

Measuring the amount of learning that results from training, learning determines how much behaviour can change back on the job. The learning method is usually assessed with a criterion-referenced test.

- **Behaviour**

At the behaviour level, measurements examine what was learned by the participant, to determine how this has been utilised on the job. The behaviour method aims to establish the organisational impacts that the training can have, and measures the interaction of training to the work setting rather than as an isolated occurrence. Based on course objectives, assessment of the behaviour level is carried out through tests, observation, surveys and interviewing co-workers and supervisors.

- **Results**

This level is a measure of organisational and business impacts of the training. Kirkpatrick's (1998) model, has been pointed out as especially suited to the training contexts where specific outputs are of interest right from the outset (Athanasou, 1998).

Other authors including Philips (1991) have suggested the addition of a fifth potential criterion to the model: Return on Investment (ROI), defining it as the quantity of money returned to the organisation in relation to the training investment. The aim of the evaluation is to determine if the value of a training program exceeds its monetary costs. In calculating this, the author proposes the following formula:

Program benefits - Program costs / Program costs

There are however concerns arising with regards to using Return on Investment in the training field. Some of these concerns have been documented by Allinger et al. (1996) as follows:

- Difficulties in assigning a monetary value to the subjective benefits of data.
- The purpose and analysis of Return on Investments, stating that Return on Investment should be used to decide between program alternatives as discussed in section 2.19 rather than to justify the use of the program after the program has been used.

2.2.4 ERP and Training

As ERP is concerned with information and business processes, information it seems is "rapidly replacing capital assets as the key determinant of wealth, to the extent that the modern enterprise needs much more information delivered in close to real –time to survive"(Butler Group, 1998). Not surprisingly, in its role as an enabler, training has become one of the most cited Critical Success Factors (CSFs) in ERP implementation projects (Sumner, 1999).

While organisations manage the changes required to implement these ERP systems, emphasis are placed on the success of training to deliver the know-how required to ensure information demands are met. As the emphasis on ERP success escalates, the training of and the individual performance of employees it seems, is fast becoming a yardstick for measuring their output or performance.

While many authors including Bancroft et al (1998) highlight the importance of effective training at all levels, others (Wortmann, 1998) state that in order to realise significant benefits from ERP systems a considerable amount of training is required. Notwithstanding, there has not been enough research on the management and operationalisation of training as a critical success factors within ERP implementation projects. And hence it is evident that "without proper training, about 30 to 40 percent of front-line workers will not be able to handle the demands of the new system" (Koch, 1996)."

During ERP implementation projects, most organisations do not collect the information required to determine the utility of their own training programs (Goldstein 1993), most especially as managers seem only to be worried with the training costs rather than measuring the effectiveness of any delivered.

The evaluation of training can serve as a diagnostic technique permitting the revision of programs to meet the large number of goals and objectives. Pointing out that the evaluation of training can help decide between alternative training programs as well as who should participate in future programs (Mann, et al 1996). Some organisations use an in-house training approach, while others prefer to use training consultants from outside.

The arguments presented in favour for better evaluation of training are:

- To validate training as a business tool,
- To justify costs incurred in training,
- To help improve the design of training, and in selecting training methods.

The purpose of project control is to keep the project on course and as close to the plan as possible, working as a tool to identify problems before they happen and implement recovery plans before unrecoverable damage is done (Jurision 1999).

In an attempt to provide a set of metrics to control and monitor training issues in ERP implementation projects and to help managers achieve success in their projects, a Goal Question Metrics (GQM) plan has been developed by Esteves et al (2002) which is attached in appendix C.

2.2.4.1 Goal Question Metrics (GQM) Overview

The GQM approach is a specific technology for goal-oriented measurement in software projects, which consists of three components:

- The GQM paradigm
- GQM plans or GQM models
- The GQM method
- The GQM paradigm includes the basic idea that measurement should be goal-oriented, that is that all data collection in a measurement program should be based on a rationale which is explicitly documented and has the following advantages:
 - It helps in the identification of useful and relevant metrics as well as in the analysis and interpretation of collected data.
 - It enables an assessment of the validity of the conclusions drawn and avoids resistance against measurement programs.
- A GQM plan documents the refinement of a precisely specified measurement goal via a set of questions into a set of metrics. Thus, a GQM plan documents, which metrics are to be used to achieve a measurement goal and why. The questions provide the rationale underlying the selection of the metrics. The GQM plan has all information necessary for the collected data interpretation including definitions of data collection procedures, the information when the data should be collected,

in which way (formal definitions and description of direct measures), tools and forms that should be used and the person which is supposed to do it. It is used to guide analysis tasks because it documents for which purpose the respective data was collected.

- The GQM method provides guidance for how to set up and perform GQM-based measurement programs.

Developed by the University of Maryland, the GQM approach is a mechanism designed for providing a framework, upon which metrics program may be developed; building a mechanism, for formalising the tasks of characterisation, planning, construction, analysis learning and feedback. Basili et al, (1994) highlights that the GQM provides no specific goals but rather a framework for stating:

- The major goals of the development project; Questions derived from goals that must be answered in order to determine if the goals are achieved.
- Measurements that provide the most appropriate information for answering the questions.

The GQM contains four phases, which are interpreted as:

- Planning Phase
- Definition Phase
- Data Collection Phase
- Interpretation Phase

However, the application of a GQM-based measurement program can be made difficult by the lack of precise implementation details on how to perform the measurement process. This can be eliminated by a description of the entire measurement process and all products related to the process, which can be implemented into a GQM plan, pyramid and method.

The GQM-based measurement process consists of the following process steps:

1. Characterise organisation and project (pre-study)
2. Identify measurement goals
3. Produce GQM plan
4. Produce measurement plan
5. Collect and validate data
6. Analyze data
7. Package results for reuse

2.2.5 The Cost of Training

The feasibility of the training medium must be judged against the potential benefit offset by the cost of the solution. Here, the feasibility is calculated as the cost-benefit ratio. In this equation, the cost equals the anticipated benefit of the solution divided by the required investment. The Cost-Benefit Ratio formula can be calculated as:

CB= Anticipated Benefit of the Solution /Cost of Analysis, Design, Development, Implementation and Maintenance.

The second element of cost is the Internal Rate of Return. When the project begins, resources immediately begin to be expended. The question is, how quickly can these costs be recouped so that there will be a profit? The Internal Rate of Return (IRR) formula can be calculated as:

$$IRR = (\text{Anticipated Benefit of the Solution} / \text{Cost of Analysis, Design, Development, Implementation, Maintenance}) * \text{Time}$$

The Cost-Benefit Ratio and the Internal Rate of Return should be calculated before a project begins to determine if the project should be completed using the methodologies and media chosen.

The third element of cost is Return on Investment, which is calculated upon project completion to determine if the benefit was realised. The Return on Investment (ROI) formula is:

$$ROI = \text{Actual Benefits of the Solution} / \text{Cost of Analysis, Design, Development, Implementation and Maintenance}$$

2.3. Process Mapping

Process mapping, is a technique increasingly used to monitor and improve the efficiency of different types of organisations. Enlightening the understanding of processes that currently drive a business, it is an enabling tool, leading the way and creating a starting point for understanding the way into process creativity and knowledge expansion which provide a guideline for process mapping (Savoy et al, 2001). This author also lists the following five-step process mapping strategy

1. Define the purpose of developing a process map
2. Establish the team
3. Map the 'AS-IS' process
4. Establish measures for improvement
5. Propose changes

The main purpose of a real life model is to deal with the complexity of the business organisation by reducing it to a manageable level. Therefore the primary objective of the model is to communicate, and so the model must be visual and easy to understand with little explanation.

2.3.1. Process Mapping Tools and Techniques

Several tools and software packages are available for process modelling depending on the purpose for which they are documented. These range from very individualistic subjective methods to highly structured analytical means. As this research seeks to document activities related to conducting Training Need Analysis, several of the mapping techniques available are introduced and examined. These range from unstructured methods such as Rich Pictures to more structured methods as seen in the family of IDEF methods.

2.3.1.1. IDEF 0

IDEF0 (Integrated DEFinition Language, 0) is a method designed to model the decisions, actions and activities of an organisation or system. Originally developed by the US Air Force, IDEF is a graphical way to document processes. IDEF0 includes both a definition of graphical modelling language (syntax and semantics) and a comprehensive methodology for developing models.

A hierarchical Top-Down modelling process, IDEF0 is a highly standardised, structured approach to process mapping. Activity-based, it uses a series of connecting boxes and arrows to represent processes. Its Inputs, Outputs, Controls and Mechanisms (ICOMS) describe each activity. The description of an activity can be easily refined into greater and greater detail until the model is as descriptive as necessary. These terms can be defined as follows:

- Inputs: The objects without which the activity could not proceed.
- Outputs: The results of the activity.
- Controls: Events that affect output & will not prevent completion of activity.
- Mechanisms: The tools required to perform the activity.

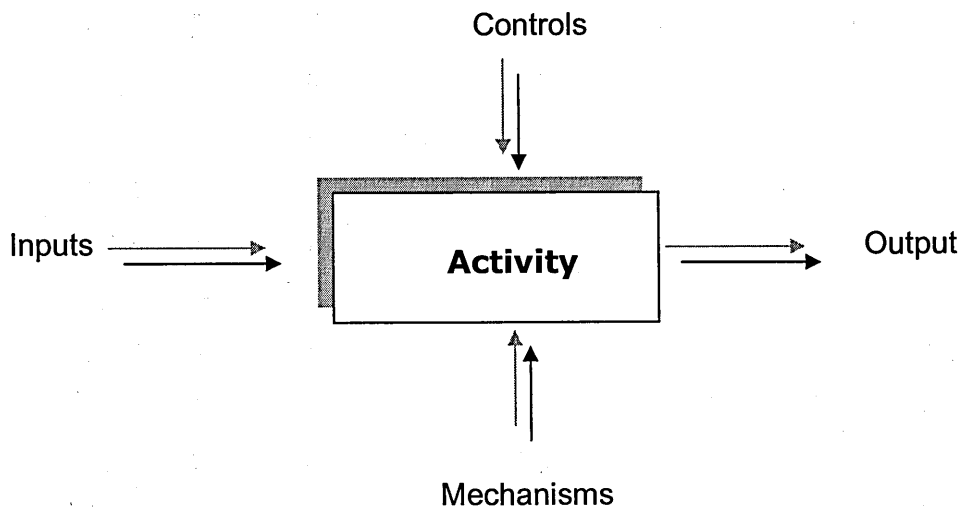


Figure 6: IDEF0 Function and Interface Arrows

2.3.1.2 Flow Charts

Flow charts graphically represent the activities that make up a process. Presenting them in a visual pictorial format, the steps are diagrammed in a sequence, so that activities appear in a series or parallel.

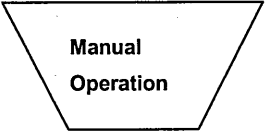
Creating a visual logic making process activities easy to comprehend, flow charts facilitate communication about any problems. The method highlights the areas in which rules or policies are unclear and any possible opportunities for improvement. Typically, many activities and inputs are intentionally not detailed; therefore, a very simple picture of the total process can be drawn.

There are three main types of flow charts, described as:

- **Functional Flow Charts** – These are charts used to describe how activities interact with one another internally or within an organisation as well as externally with other organisations and or systems.
- **Process Flow Charts** – These charts are used to describe the sequence and relationship of the tasks that make up an activity.
- **Process Flow Description Charts** – These charts provide a description of the tasks outlined in a Process Flow Chart. They are typically used to show the kinds of tasks performed within a process and the amount of storage and time, required to complete an activity.

Flow Charting Basic Symbols

Existing for centuries, this method has lived in a continuous state of temporary development, to the extent that there is no effective standard. The most common symbols however are included as follows:

	Operation - An operation occurs when an object (i.e. product, document, etc.) is intentionally changed in any of its physical or chemical characteristics, assembled or disassembled from another object, or staged for another operation, transportation, inspection or storage. Operations also occur when information is transmitted or received or when planning or calculations take place.
	Manual Operation - Is sometimes used to denote manual operations.

Chapter 2: Literature Review

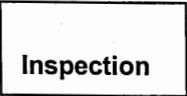
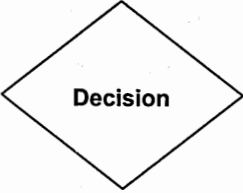
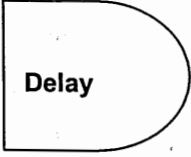
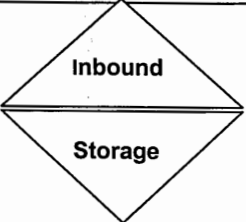
	Inspection, Verification or Measurement - An inspection, verification or measurement happens when an object is examined for identification or is verified for quality or quantity in any of its characteristics. The symbol also indicates that a decision must be made.
	Decision Making/Approval - The diamond, typically used for document or software processes, also represents a decision or an approval point. Typically, if yes, the task sequence flows to the right, if no, it flows to the left. Descriptions for the operation are sometimes simply Approved? or O.K.?
	Delay - A delay is typically shown as a half circle or a capital D. A delay occurs to an object when conditions, except where intentional changes to the physical or chemical characteristics of the object do not require immediate performance of the next planned step.
	Storage - Storage occurs when an object is kept and protected from unauthorized removal. The symbol on the left typically indicates inbound goods. When the triangle is inverted, it typically represents storage or filing.
	Transportation - Transportation occurs when an object is moved from one place to another except where such movements are a part of the operation or are caused by the operator at the workstation during an operation and/or inspection, verification or approval.

Table 5: Flow Chart Basic Symbols

Though an effective method of documenting processes, destandardisation has led to loss of popularity and hence only four symbols are widely recognised. Garllway (1994) states that this in turn has lead to great variance between the 'official' symbols and that practicalised. These are seen in the following table.

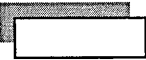
SYMBOL	DEFINITION
	Activity Description
	Decision Box
	Start/End
	Flow Direction

Table 6: Practical Basic flow Chart symbols

2.3.1.3 Rich Pictures

A rich picture is a drawing of a system that can assist in better planning or understanding (Williams, 1992). Developed in the main by Professor Peter Checkland, it is otherwise know as Soft Systems Methodology (SSM). The methodology has been popular for its utilisation in dealing with problem situations of which there exists a high social, political and human activity component. This identity distinguishes the Soft Methodology Systems form other methodologies, which in themselves are more suited for dealing with hard problems of a more technical orientation. The Soft Methodology Systems can be divided into six stages. Stated in no sequential order, these have been described as follows;

- Stage 1

A basic research into the problem area, this initial stage of the methodology involves finding out about the problem situation at hand, investigating areas and identifying who key players are and what process practicalities exist.

- **Stage 2**

At this stage of the methodology, diagrammatic expressions are used to visually communicate the problem situation and to obtaining more knowledge.

- **Stage 3**

At this stage of the investigation, the methodology is used as a means of selecting how best to view the situation at hand and produce root definitions, examining the different perspectives from which the problem can be viewed.

- **Stage 4**

This stage of the Soft Systems Methodology involves building conceptual models of what the system must do for each root definition. Here, the basic 'What' are defined in the root definition, with the 'How' of the process treated separately.

- **Stage 5**

At this stage of the Soft System Methodology, the comparison of the conceptual models with the real world takes place. The results from steps 4 and 2 are compared to see where they are similar or may differ.

- **Stage 6**

At this final stage of the Soft Systems Methodology, any feasible and desirable changes are identified, and possible ways of improving the situation are identified. At this stage, recommendations are put forward into possible actions which may be taken to improve the problem at hand.

In utilising the Soft Systems Methodology or rich picture, there are no standardised ways to adhere to. The descriptive picture, produced is left to the artistic ability and interpretation of its producer and can be easily misunderstood

due to their subjective nature. Below is an example of a rich picture that describes the activity of planning for the World Health Organization.

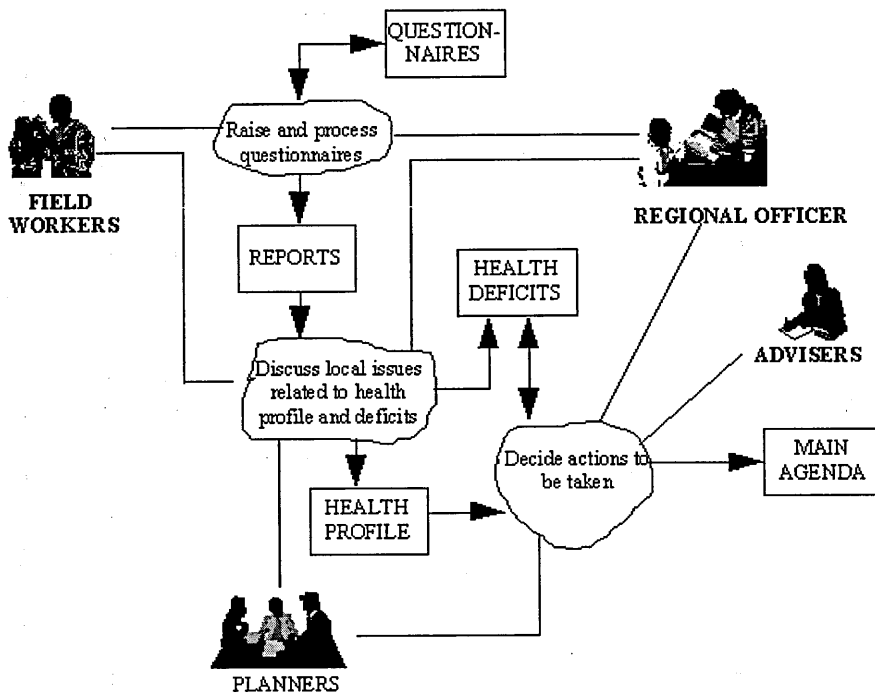


Figure 7: Rich Picture Example

2.3.1.4. Data Flow Diagrams

As can be seen in Figure 9 and 10, Data Flow Diagrams provide a system representation of events within the system and can be used at any level of detail. Utilising a graphic network of symbols, which show the flow of data, data stores and data processes it provides clear understanding into the origination and destination of data. Graphical in their composition, this method possess the ability to eliminate thousands of words, providing a graphical diagrams for logical representation as a means of modelling what a system does as opposed to utilising physical models showing how it is done.

The data contained provides a hierarchical representation, with a capability of showing the systems at any level of detail. In their nature, they are seen to portray a comprehensible picture making it easy for users to understand and review the process at hand.

These diagrams described by Hare (1994) as the basis of Structured System Analysis and Design Method aims to provide a commonly understood model of a system. They are supported by other techniques of structured systems analysis including data dictionaries, data structure diagrams and procedure-representing techniques such as decision tables, decision trees and structured English. In Data Flow Diagrams, four symbols are used to represent any system at any level of detail. These are as follows:

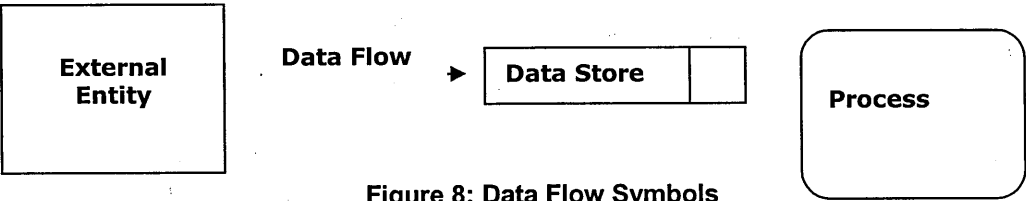


Figure 8: Data Flow Symbols

SYMBOL	MEANING
Data flows	Data movement in the system
Data stores	Data repositories for static data
Processes	Transforms incoming data flows to outgoing data flows
External Entities	Sources or destination outside the specified system boundary

Table 7: Meaning of Data Flow Symbols

With a view to illustrating data sources, destinations, flow, stores and transformations as are shown in Figure 9, it can be seen from Figure 9 that these data flow diagrams do not show the decisions or timing of events within a system.

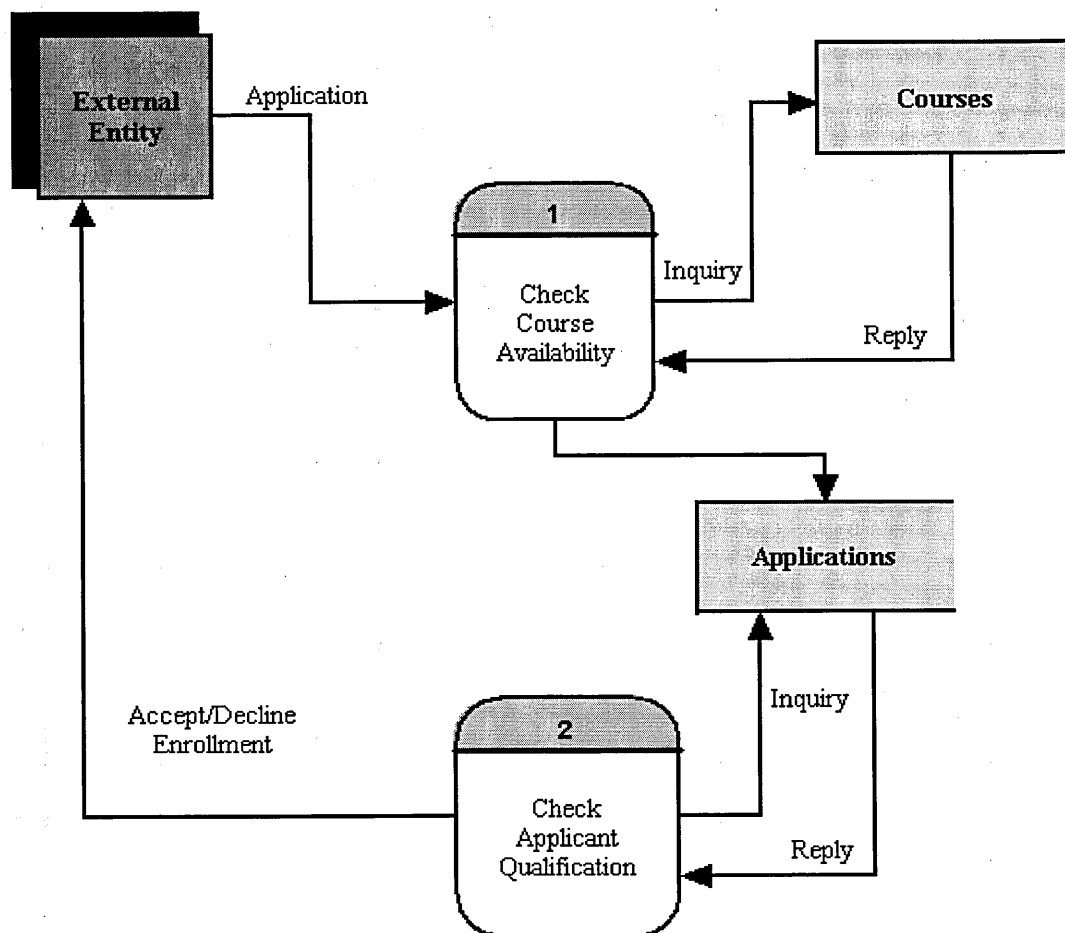


Figure 9: 1st example of DFD
(Course Registration by Gane and Sarson, 1979)

Data flow diagrams are an implementation of a method for representing systems concepts amongst which include boundaries, inputs, outputs, processes and sub-systems. As a result, the capabilities of a data flow diagram are seen to align directly with the general definitions of systems. Like other process mapping methods, they possess the ability to portray different levels of decomposition within a process map. This is exemplified in Figure 9 and 10 respectively.

Figure 4: A sample data flow diagram – bank operations

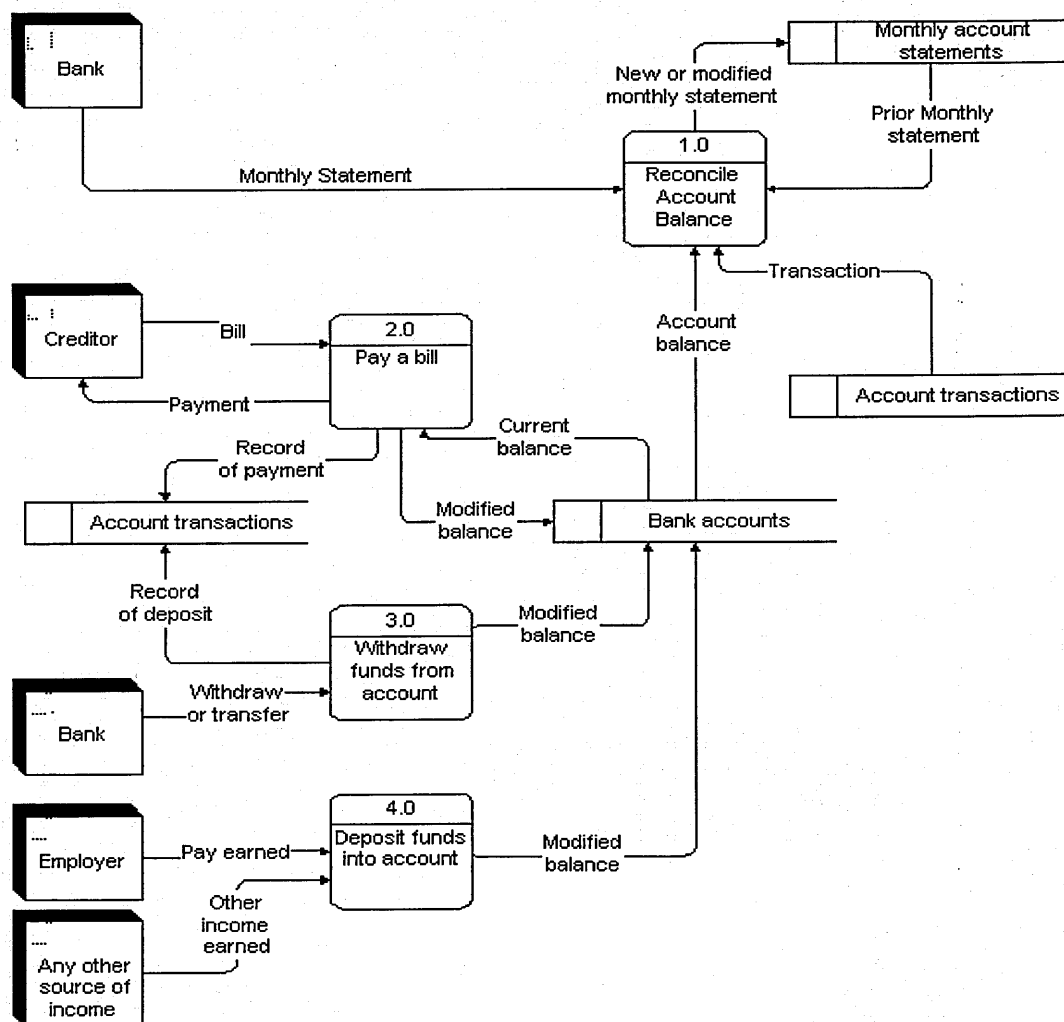


Figure 10: 2nd DFD Illustration

2.3.1.5. IDEF3

Relatively new as a process mapping method, IDEF3 was designed to complement existing IDEF0 methodologies and provides a mechanism for collecting and documenting processes. However, while IDEF3 is seen to focus on processes, IDEF0 on the other hand focuses on the documentation of higher-level activities.

Capturing precedence and causality relations between situations and events, IDEF3 employs an ordered sequence approach in explaining events and processes as is seen in that of a storyboard. The storyboard may be written from one of two different perspectives:

- A Process flow description
- An Object State Transition Network (OSTN)

While the process flow description captures the flow of data, activities and objects within an organisation, the Object State Transition Network approach focuses on the changing state of objects.

There three main components to the IDEF3 methodology are as follows:

- Unit of Behaviour (UOB)
- Junction boxes
- Links

Unit of behaviour

Equivalent to an activity box in IDEF0, a unit of behaviour is a representation of a step in a process. In IDEF3 a unit of behaviour is used to represent a function, a Process, a scenario, an activity, an operation, a decision, an action, an event, a procedure or even another part of the model.

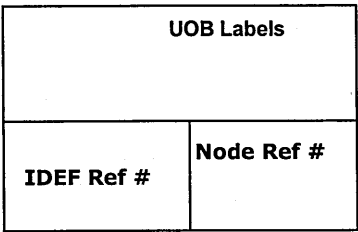
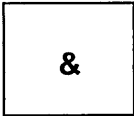


Figure 11: illustration of a UOB in IDEF3

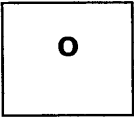
IDEF3 Junction Boxes - IDEF3 uses three types of junction box expressions:

AND



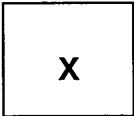
Indicating that all activities will occur

OR



Indicating that one or more activities will occur

EXCLUSIVE OR

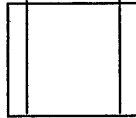


Indicating that only one activity will occur

Figure 12: IDEF3 Junctions

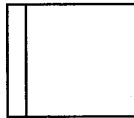
In addition to these junctions, one of **two conditions** will apply regarding the timing of the activities, which are in pictorial forms as follows:

SYNCHRONOUS



Indicating, that activities will occur simultaneously

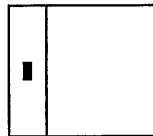
ASYNCHRONOUS



Indicating activities will occur at different times

The following expressions are used to show points at which junctions converge or diverge as conditions, and are known as:

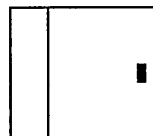
FAN -IN



Indicating Process Converge

OR

FAN -OUT



Indicating Processes diverge

Figure13: IDEF3 Conditions

IDEF3 Links

In IDEF3, Unit of Behaviours and junction boxes are connected by a series of links, governed by their own individual rules. These are shown in pictorial form below.

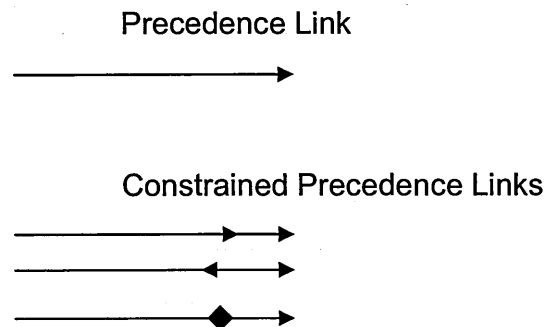


Figure 14: IDEF3 Links

2.4. Business Process Re-Engineering (BPR)

During the research, a majority of the time was spent on capturing and recording information required to allow the mapping of the current AS-IS process model. Once completed and upon analysis, some process based improvements will be investigated as a means to recommend possible options for improvements. This section of the literature review will introduce the concept of Business Process Re-engineering (BPR).

2.4.1. What is Business Process Re-engineering?

There are numerous definitions working towards providing a clear meaning to Business Process Re-Engineering its aims and benefits. Amongst these include:

“The analysis and design of the work flows and processes within and between organisations” (Davenport et al, 1990).

And

“Improvements in the performance by redesigning the processes through which an organisation operates, maximising their value-added content and minimising everything else as applied to an individual level or to the whole organisation” (Peppard, 1995). This author, suggest a comprehensive definition encompassing Business Process Re-engineering as an “improvement Philosophy”, summarising that Business Process Re-engineering becomes activated if the activities engaged in or indeed proposed are value-adding activities, that aim to achieve step improvements in performance by redesigning existing processes utilised within and organisation.

2.4.2. Implementing Business Process Re-engineering

(Harrington, 1991) offers a six-phase model for re-engineering as follow.

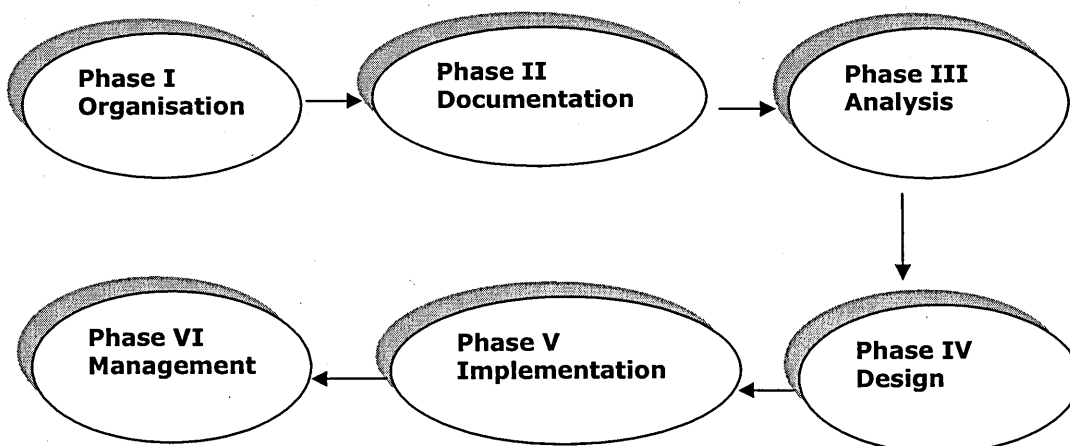


Figure 15: Harrington's six phases of Business Process Improvement

The fast-track nature of this research means that only a limited section of the above methodology can be applied. This research will therefore focus on phases I & II, with some analysis and design which will take the form of a recommended TO-BE model. The research will also provide insight into possible opportunities for further research.

2.4.3. BPR Tools and Techniques

Few authors refer to one single technique for Business Process Re-engineering and suggest no specific tools for use in reengineering business processes. These authors however focus on the aims and benefits, which result from radical improvements of processes within organisations. Upon further research various tools and techniques were discovered, amongst which included:

- **Process and Customer Focus**

Vantrappen (1992) in line with Harrington (1991) suggests that the primary aim of Business Process Re-engineering is to redesign processes with regard to improving performance from the customer's perspective.

- **Process Visualisation**

Many authors including Barrett (1994), suggests that the key to successful reengineering lies in the development of a vision of the process.

- **Process Mapping**

Recent evidence suggests that these concepts have been incorporated into tools such as Integrated Definition Method (IDEF0), Data Flow Diagrams (DFD) and Object Oriented Analysis (OOA). Cypress (1994) suggests that the tools of operational method studies are ideally suited to reengineering task, though these are often neglected.

- **Benchmarking**

Benchmarking forms an integral part of reengineering, several authors including Chang (1994) point out that benchmarking allows the visualisation and development of processes which are known to be in operation in other organisations. As a powerful tool for Business Process Re-engineering, its greatest value is in goal identification.

- **Change Management**

Several authors including Bruss et al (1993) suggest that the management of change is the largest task in reengineering. Concentrating on the need to take account of the human side of reengineering they focus on the management of organisational change. The following "4 Ps" for change have been identified as 4 key dimensions for effective change management.

Using effective facilitation tools, it is important to involve the **People within** the organisation in the design and re-engineering of the **Processes**. The involvement via means of facilitation sessions results in a healthy spread of **Political Power**, thus equipping the right people with the correct level of responsibility. To follow this up, the processes need to be controlled via an effective **Performance Measurement** system. Recognition of these 4 Ps is very evident in the deliverables, and subsequent results of the project at hand.

2.4.4. Understanding organisational Processes

Authors including Stoddard et al (1995) recommend a thorough understanding of current processes before embarking on a reengineering project, stating, current process can best be understood and documented by flowcharting and process mapping because as processes are documented, interrelationships become clear allowing the emergence of a process-based organisational map.

Deming (1993) highlights the importance of systems thinking in understanding workflow, business processes and the impact of feedback and its necessity to understand the effects of the end-to-end process and how it fits into the organisational system.

2.4.5. Organisational redesign using Business Process Re-engineering

There is a need for business process reengineering to focus on aspired results rather than tasks, as this gives direction and measurability. While Schaffer et al (1992) state that this focus makes the difference between success and failure in a change programme, Coulson-Thomas (1993), highlight the role of the "4Ps". Emphasising that people need to be equipped to assess, reengineer and support the key processes that contribute to customer satisfaction and corporate objectives, it involves substantial investment and relies heavily on the make-up of the project reengineering team and top management buy/support.

2.5. Summary

This chapter explored and reviewed the most relevant literature on the subject areas of Training Needs Analysis, Process Mapping, and Business Process Re-engineering related to the research, while inter-relating the subjects to provide a clearer understanding of concepts. A definition of both the subjects and relating areas were explored, which together provided a holistic framework upon which to gain understanding of the project. This assisted in examining, developing and selecting appropriate methodologies and foundations upon which to establish and build the project.

The chapter goes further to examine the requirements, usability and attributed outcome of Training Needs Analysis (training) as a tool for measuring the success or failure during ERP implementation projects. Through this analysis, a number of key points arising from the literature reviewed were found, which include the following:

- Process Modelling is a powerful technique, which can be applied to reveal a deeper understanding of current practises and systems deficiencies so that this visibility facilitates decision making on how to improve overall performance. Once utilised to understand current processes, it can also help to conduct comparative analysis during analysis against documented best practises.
- There are opportunities for developing a standard framework for measuring and evaluating the attributed success or failure of any training resultant from a conducted Training Needs Analysis during the implementation of an Enterprise Resource Planning system.
- It was also found that a well-defined evaluative mechanism for measuring the effectiveness of training is crucial in identifying the success and or failure of any training programs within ERP projects. Its absence in-turn creates a gap in the provision of a steady state mechanism for measuring quality during the project. Also, without a standard mechanism for evaluating and monitoring results across all ERP projects, there is a lack of uniformity in expected outcomes and results become subjective.

- The implementation of mechanisms for the collection of data required in evaluating the outcome of the Training Needs Analysis (Training) requires directed focus on output measurements, as a means of identifying and ensuring suitable methodologies for gathering data during these projects are utilised.
- Though there are numerous possibilities for identifying and dispersing training, attention must be paid to focusing such training and any distribution tools to ensure consideration is given to any constraints posed by implementing an ERP system.
- In order to ensure and facilitate a successful training program, mechanisms are required to ensure tailored solutions meet identified issues or areas of user weaknesses, which may require further strengthening through training.

The results of this literature review, forms a basis upon which to carryout further investigative research into best practices utilised in other industries during the execution of effective Training/Training Needs Analysis activities. With a view to conducting comparative analysis through benchmarking, it goes further to provide assistance in identifying areas which provide opportunities for improvements.

3.0. Review of Best Practise Case Studies in other Industries.

3.1. Introduction

When trying to improve business processes the best way is to benchmark the organisations' own processes against best practices. This method of desk research will provide a platform with which to identify and compare the main activities within the Training Needs Analysis process. In the case of methodologies, best practices provided a base for analysing the main phases of SAP's mapped AS-IS process model as seen in Appendix D against that successfully applied in other industries.

With this purpose in mind, and following the project methodology which was outlined at the beginning of the thesis (section 1.4.1.2) available practices of conducting Training Needs Analysis across different industries were selected to enable a holistic view in capturing best practices across industries. In order to gain a view of the activities as used within different industries, case studies were selected in two separate industries with high requirements/emphasis on accuracy.

The main phases of the practised methodologies were then examined to identify the current similarities for conducting Training Needs Analysis as used in both case studies.

This chapter will present the identified best practice for Training Needs Analysis within the two case studies as follows.

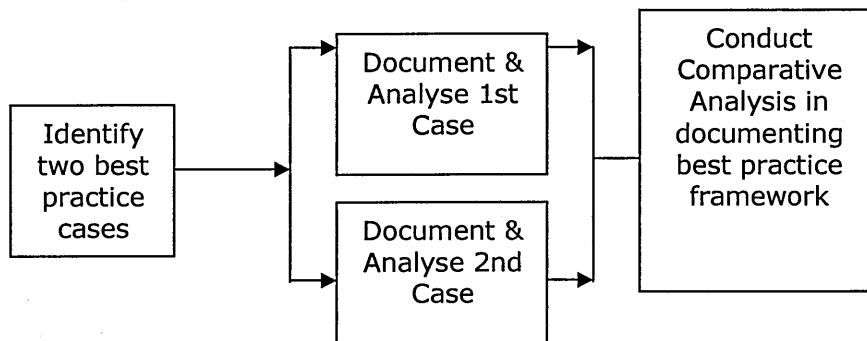


Figure 16: Best Practice Framework

3.2. Determining the focus of the research analysis.

In order to reduce the scope of the investigation, broaden the research base and to create direct focus on the research area, attention was paid to processes enabling the analysis and design of the required training. As the research evolved, some procedures became evident which could be usefully employed in SAP's Training Needs Analysis process map seen in Appendix D. The two UK industry case studies with a high requirement on accuracy as reflected in respectively in each industry were then selected and comparative investigations carried out. These were as follows:

- Training Needs Analysis in Military Procurement
- Training Needs Analysis for Reproductive Health Training

3.3. Documentation from the Best Practice Case Studies.

Once the key case studies for best practise were selected, the associated official documents were then studied and applied to identify the different phases in line

with processes identified in chapter 2.4.2, 2.4.3, 2.4.4 and 2.4.5 of the literature review as well as the associated methodologies involved in carrying out the training needs analysis documented while establishing best practices in as seen in Figure 18 and 19.

3.3.1. Training Needs Analysis Methodology in Military Procurement

In the military, Training Needs Analysis is defined as the identification of training requirements and the most cost effective means of meeting those requirements. The endorsed tool for underpinning the Business Case for the acquisition of training services is the Training Needs Analysis (TNA). A highly flexible procedure, this process provides a choice of supporting tools and techniques that vary between projects. In all cases however, a Training Needs Analysis is a product based, iterative process, providing an audit trail for all training decisions. The methodology utilised in this process for conducting Training Needs Analysis takes a four-phased approach as seen in Figure 16. The process is best explained as follows.

- **Phase 1 - Scoping Study**

During Military procurement, the purpose of the Scoping Study is to define the training requirement and provide a robust statement of work against which the outputs of the TNA will be delivered. As a result, it is seen as the key activity ensuring the most appropriate training solution is to be implemented. To this end, the Scoping Study undertaken by MOD personnel representing the customers/stakeholders, or an independent Commercial TNA Provider ensures it utilises internal and external information gathering for situational analysis and positioning in the first stage of conducting its Training Needs Analysis for the military procurement.

- **Phase 2 - Training Need Analysis Main Activities**

At this phase of the methodology, the requirements sought include:

- **Operational Task Analysis**

This leads to an Operational Task Statement.

- **Training Gap Analysis**

Which leads to a set of Training Objectives.

- **Training Options Analysis**

With a recommendation of a Training Solution, this solution will effectively meet the training requirement within the specified constraints. This solution will encompass both surge and steady-state training.

- **Training Needs Analysis Final Report**

During this phase, gathered information is analysed on job related and required knowledge and or tasks as well as available and suitable training methods and options as a means to facilitate the desired output. This phase produces four deliverables, and is followed by the Training Needs Analysis Development Phase, which enable design decisions to be made in developing a bespoke training package.

- **Phase 3 - Training Need Analysis Development**

During the Development phase of the process, design decisions are made, which lead to the development of a tailored package and should optimise the manpower requirement (regardless of mix) to deliver a support capability, to simplify the maintenance task which enable cost effective cross training and minimise the overall training burden. Unless otherwise indicated in the scoping phase of the TNA, the development phase within the military Procurement process, ensures utilisation of opportunities to increase the use of embedded or synthetic training and e-learning are explored along with the use and / or modification of existing training packages and establishments.

- **Phase 4 - Post Project Evaluation (PPE)**

The Post Project Evaluation may be split into 3 areas answer these questions:

- How well was the TNA conducted? In the Military Procurement process, it is recommended that this take place immediately after Phase 2 of the TNA.
- How well this delivered training solution met the recommendation? Is identified once the Training Solution has been delivered.
- How well the delivered training solution met the customer's requirement? Conducted once sufficient piloting is completed, this is ideally undertaken by the Customer.

Upon completion of the required training, this method examines the evaluation of the training, it's design, the training development and training delivery, with a view to establishing if the required training has met its objectives and what further training may or may not be required.

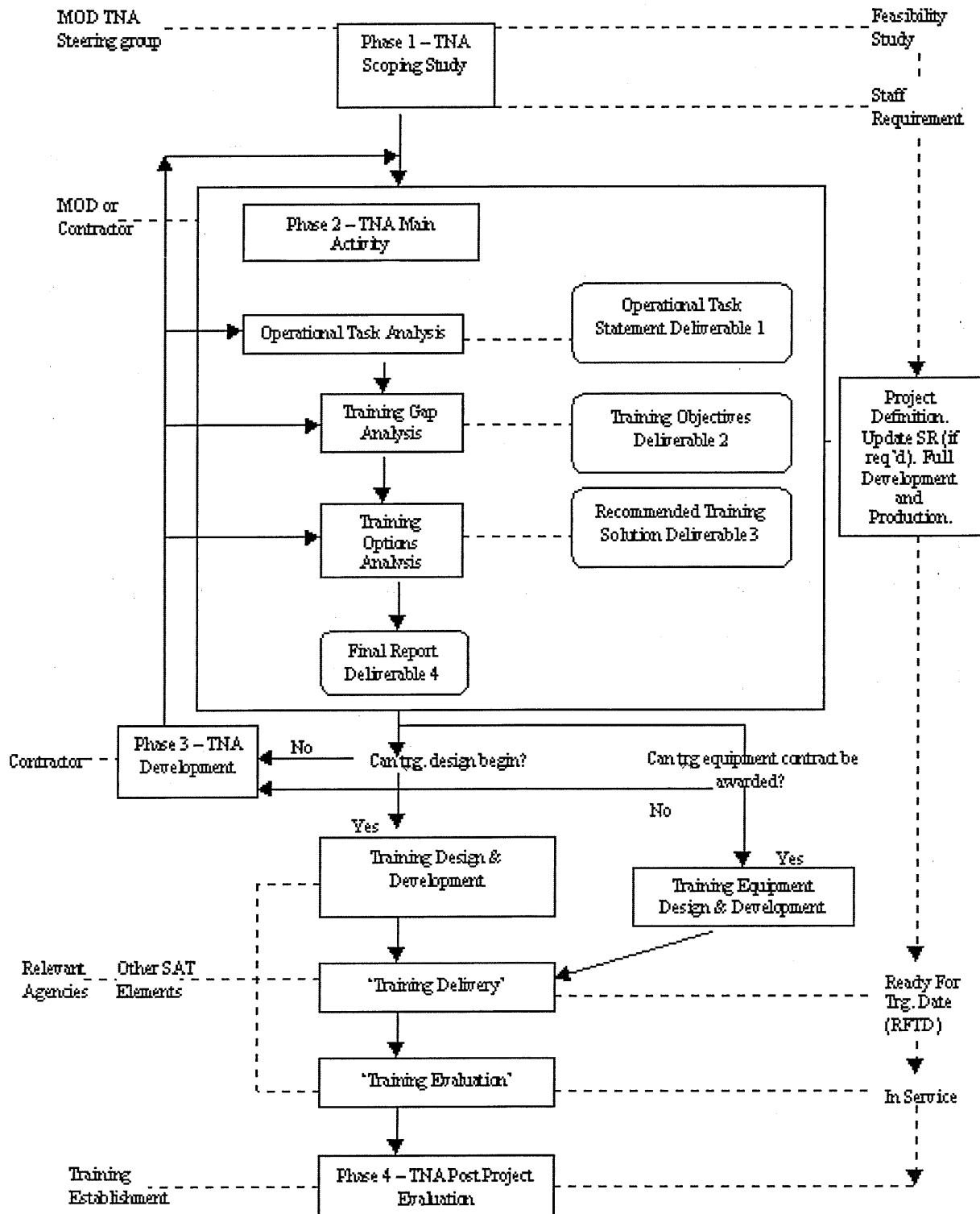


Figure 17: TNA Process in Military Procurement.

3.3.2. Training Needs Analysis Methodology in Reproductive Health Training

For reproductive health training, the Training Needs Analysis process takes a five-phased approach under the broad headings as shown in Figure 17 and discussed subsequently.

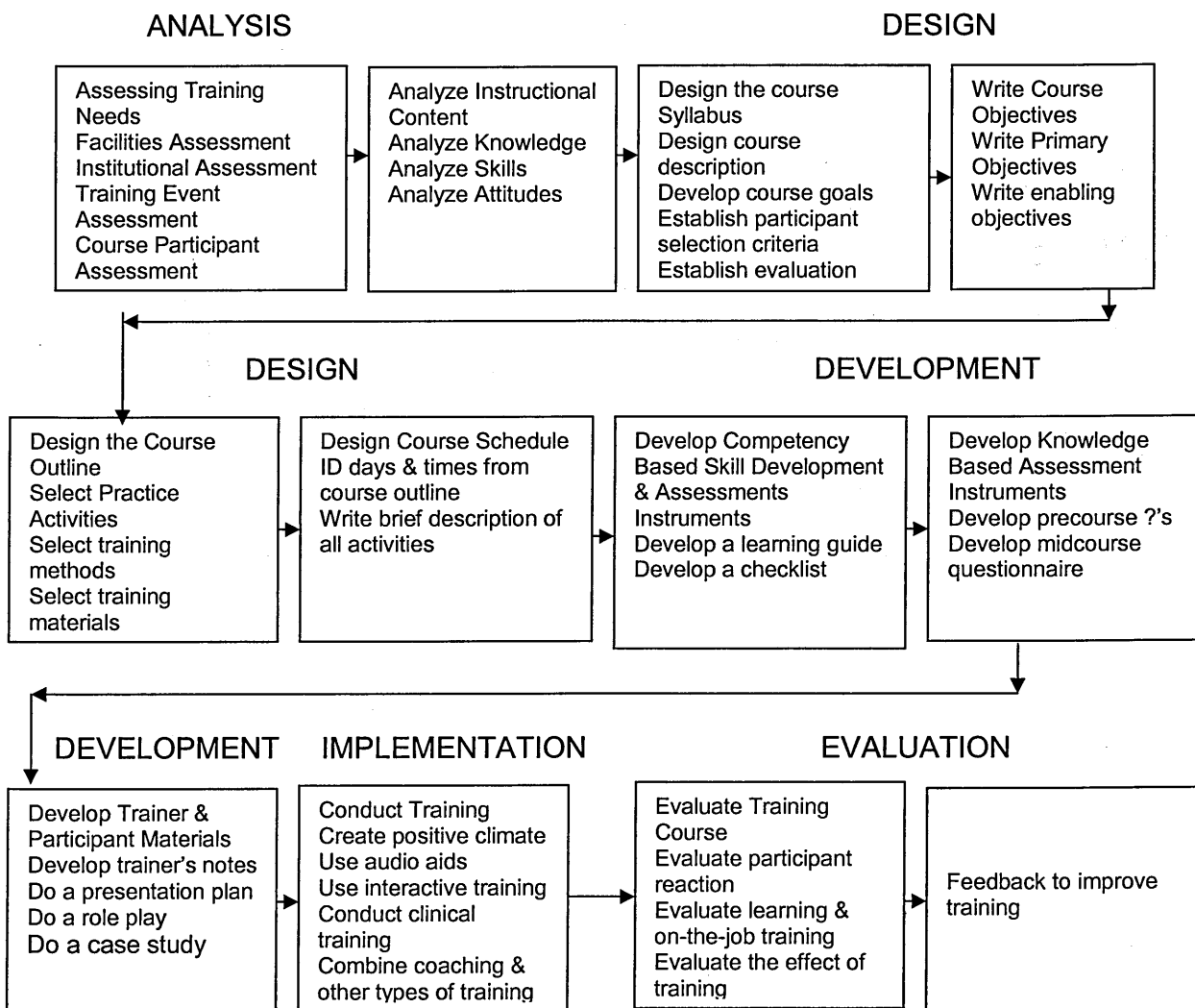


Figure 18: Training Needs Analysis for Reproductive Health Training

- **Phase 1 – Analysis**

The training needs analysis process for reproductive health training adopts analysis as the first stage of its methodology. For this, it utilises a two-part approach in gathering required information. The initial analysis conducted, assesses training needs to identify where there are problems best corrected by training and this analysis is followed by a content analysis to determine the knowledge, skills and attitudes required in order to improve job performance. As in the SAP training needs analysis methodology as seen in Appendix D, the analysis phase provides the information needed to carry out all other phases of the training need analysis, helping to:

- Identify barriers or constraints to the training
- Define any such problem
- Identify the cause of the problems and provide statement
- Determine possible solutions

- **Phase 2 - Design**

The design executes and examines areas including the design of training syllabus, writing of objectives, designing training outline and designing the training schedule. In essence, the design phase uses the results of the analysis phase to create the structure of the training. At this stage a map for delivering the required training is developed.

- **Phase 3 - Development**

Executed in three parts, the focus of the development phase is on generating training documents and materials to be used by the trainer and participants during the delivery of the training. The documents produced during the development phase could include competency-based learning guides and checklists, pre- and midcourse questionnaires, trainer's notes, assignment sheets, case studies and role-plays.

- **Phase 4 - Implementation**

The implementation phase of the process is conducted as a single event and refers to the actual delivery of the required training. The product of this phase is a competent individual who has mastered the knowledge and skills presented during the learning process. During this process, a pilot course may be used to test the design and materials as an opportunity to review and revise before full implementation.

- **Phase 5 - Evaluation**

The evaluation phase refers to the systematic collection, processing, analysing and interpretation of data to determine whether the implemented training has met its objectives. That is whether an individual's knowledge, skills and attitudes related to job performance have improved. Through participant reaction, participant learning, on-the-job performance and effect of training, this phase identifies aspects of the training process that should be strengthened. Acting as a feedback loop, the result of the evaluation phase, are recommendations for improving all of the other phases (analysis, design, development and implementation) of the process.

3.4. Analysis of Best Practice Training Needs Analysis Models

At face value, differences appear in the detailed events and activities carried out in the methodologies, which are employed while conducting Training Needs Analysis for the military procurement process and the reproductive health training process. However, upon close examination of the phases documented in both the military procurement process and the reproductive health training process, both models reveal a foundation built on a systematic approach to training model. These models which can vary in complexity are based on an iterative, self-correcting, performance based approach which varies only in detail. However, all versions are made up of the following 4 main processes shown below.

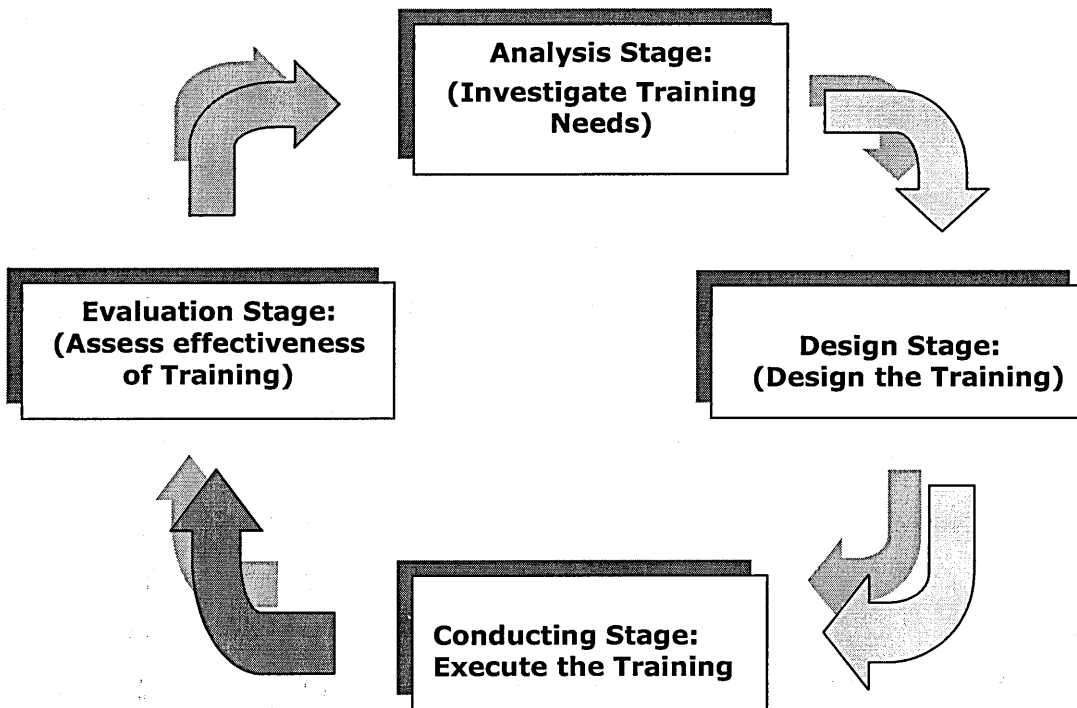


Figure 19: Basic Best Practice model - a systematic approach for Training Needs Analysis

The principles of the best practice systematic approach model forms a foundation for developing an appropriate bespoke methodology and may be elaborated upon to form a more complex or intermediate system approach model as required by an organisation when conducting a Training Needs Analysis.

Examples of these models are documented by Roland et al (2001) as seen in Figure 5 of Chapter 2 and Peter (1996) as seen in Figure 19. Both models are based on the systematic approach shown in figure 18 above.

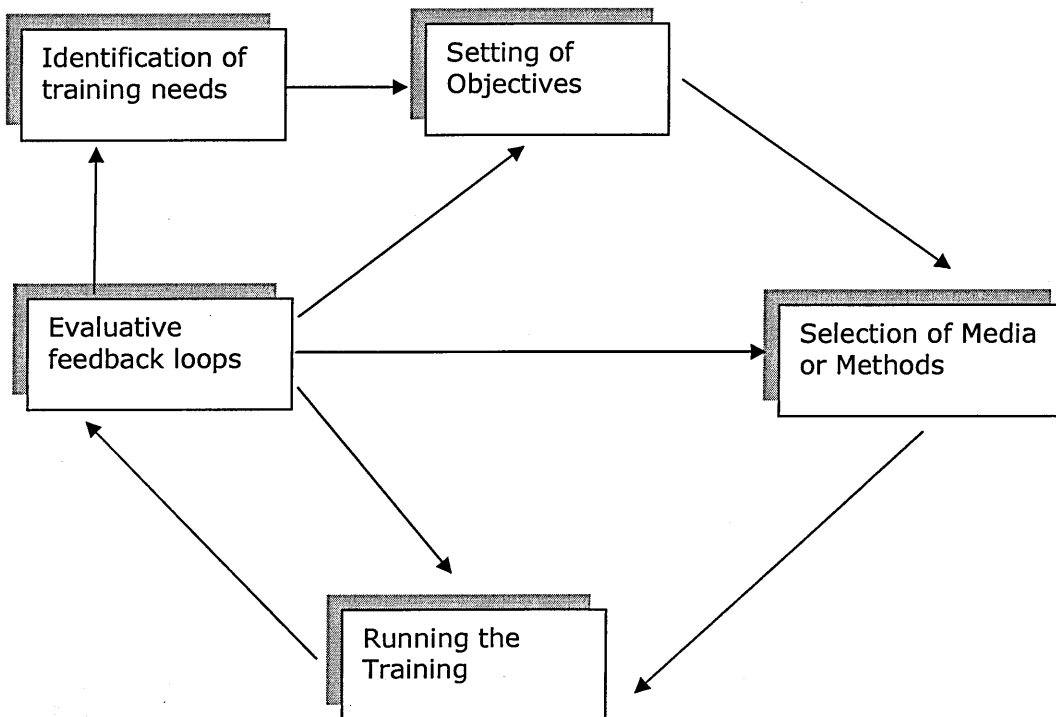


Figure 20: Intermediate best Practice Model

Midway between the basic model and the complex model, the best practice model seen in Figure 18b not only incorporates the essential phases of both the basic and complex models, but also provides a clearer identification of the relationships and inter-relationships between each activity within the process for Training Needs Analysis.

3.4.1. Best Practise Checklist

During this research, the analysis and investigation of processes for conducting Training Needs Analysis resulted in the development of a Training Needs Analysis checklist to assist during the process of documenting and identifying best practices. A copy of this framework can be seen in Appendix E. This checklist contains a number of questions grouped into the following areas as seen in Appendix E:

- Analysis
- Design
- Development
- Implementation
- Evaluation

Developed to contain the overview Training Needs Analysis process, the checklist has been designed to facilitate the achievement of best practise. However, in order to achieve best practice, every question in the checklist seen Appendix E should be answered with a 'YES' or in the positive. In other words, the closer you are to answering 'YES' to all the questions, the closer you are to achieving the best practise process for Training Needs Analysis.

3.5. Summary

This chapter has presented the findings of the research as a best practice framework and checklist for the carrying out the Training Needs Analysis process. It investigates and analyses two cases studies outside the collaborating industry, as a method for identifying best practice and documenting a baseline with which to analyse the main activities identified as those carried out by the collaborator when conducting a Training Needs Analysis. The chapter also provides a framework in figure 18/18b, upon which a recommended TO-BE methodology is developed. This recommended TO-BE model can be seen in Appendix E.

4.0. DATA CAPTURE

4.1. Introduction

In previous chapters, various options were considered for collecting, representing and disseminating the information. The purpose of this chapter is to report on how the data collection exercise worked in practice.

4.2. Steps in Data Collection Steps

The following diagram illustrates the steps taken during the data collection process.

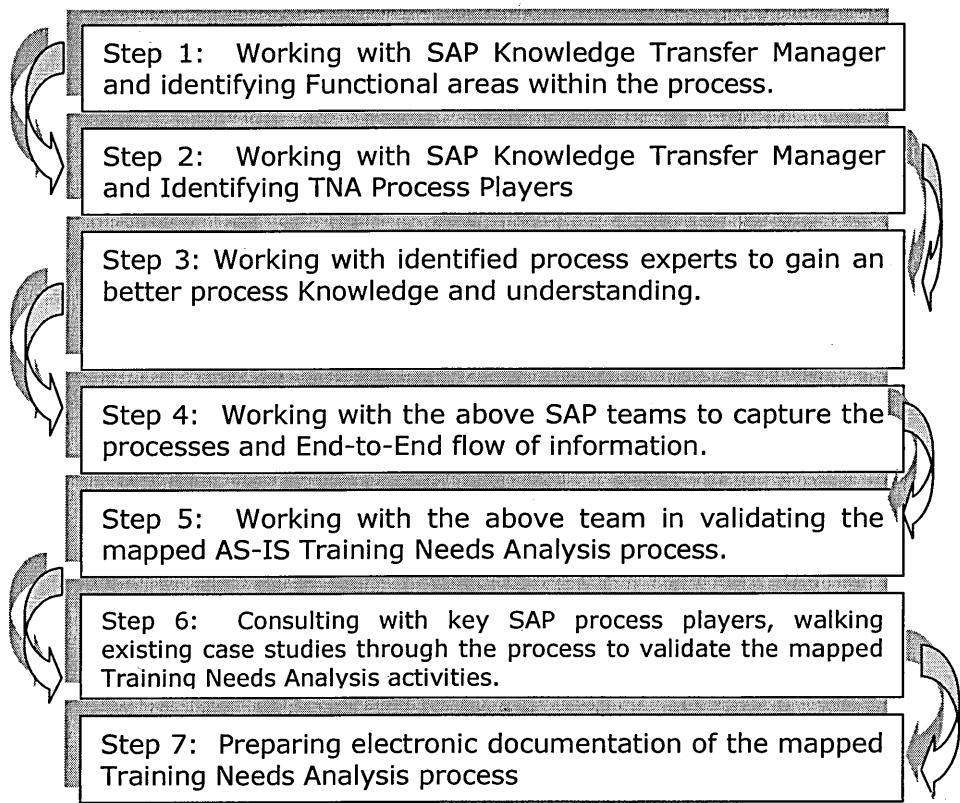


Figure 21: Steps Data Capturing

Step 1: in the first instance, the researcher worked with the SAP Knowledge Transfer Manager during meetings. This process facilitated the identifying of the various areas and groups which exist within the Training Needs Analysis process. This activity entailed identifying each area which was active and represented within the process.

Step 2: The next step involved working with the SAP Knowledge Transfer Manager during pre-arranged interviews to identify the process experts within the Training Needs Analysis, this process involved identifying the process players which were active within each identified area as involved in the process. Through this activity, the following process experts were identified:

- SAP Knowledge Transfer Manager,
- Education Accounts Executive,
- Knowledge Transfer Consultants and
- Education Business Managers

Step 3: Working with the SAP Knowledge Transfer Manager, Education Accounts Executive, Knowledge Transfer Consultants, Education Business Managers and others parties external to SAP during various interview/workshops over the period of the project, it was possible to gain an understanding of the activities required during the Training Needs Analysis process.

Step 4: Having gained some understanding of the process, it was then possible to arrange further meetings with the process experts. Working with the above SAP teams of identified process experts, it was possible to capture the activities and End-to-End flow of information across the process.

Step 5: Working with the above team during various interviews and workshops the researcher went through the process of validating the mapped AS-IS Training Needs Analysis process. During this point of the data capturing exercise, It was then possible to make verifications and amendments of the process activities amongst individuals, groups and sub-groups. The process utilized can be seen more clearly sections 4.4.2. and Figure 22.

Step 6: Working with the SAP process experts as identified in step 2, it was possible to select pre-existing case studies of SAP client, which had already passed through the mapped AS-IS process for conducting Training Needs Analysis. During the step of the data capture exercise these existing case studies were followed through their individual sequences. Each case study was viewed for any variance in the route which was active when they passed through the mapped processes and the mapped AS-IS process model. Through this, it was possible to validate the mapped Training Needs Analysis activities as active and operational as no variances existed.

Step 7: During the final part of the data capturing exercise, it was possible to present an electronic documentation of the mapped Training Needs Analysis process, as can be seen in appendix D

4.3. Data Collection Techniques

With numerous methodologies currently available to assist in capturing required data, care was exercised in choosing those suitable for the research which would facilitate the collection of the required process data within the organisation.

4.3.1. Interviewing

It was necessary to ensure that SAP, UK staff would take ownership of improvements to the AS-IS process, as this would facilitate the implementation and development of any recommended TO-BE process model. With this in mind, the interviewer took on the role of the facilitator of the process modelling exercise.

Earlier on in the interviewing process, the interviewer began with each team member, conducting single person interviews. While interviewing, each of the team members was advised to ensure that during the creation of the models, the following two key criteria's were adhered to:

- The modelling exercises had to trace the proposed route taken when conducting the Training Needs Analysis process.
- The information gathered had to represent a true view of the company's current activities so that an accurate AS-IS model could be developed.

Semi-structured Interviews

This form of interviewing was used more than any other data collection technique during the project and was implemented during the data collection exercises. Allowing a fairly open framework, it created focus during both the one-to-one and group interviews, while encouraging two-way communication and conversations.

The semi-structured interviews conducted, utilised a snowballing technique which allowed the interviewer to identify and confirm all process players. Working with the Knowledge Manager the interviewer was able to identify the sub-teams covering specific areas of the process. The interviewer also utilised this technique to identify and confirm all sub-team members within the process.

Using the snowballing technique, it emerged that there were a total of 3 sub-teams within the knowledge management team; namely Education Accounts Executive, Knowledge Transfer Consultants and Education Business Managers. These groups of 2 members per team, and the Knowledge Management Manager gave a total number of 7 members within the Knowledge Management Team who owned the mapped AS-IS Process as seen in Appendix D. The process of identifying each sub-team and all associated members assisted the researcher in the natural creation of a purposive sample as it identified all team members who were to be interviewed.

With some previous process mapping experience and a little acquired knowledge on conducting a Training Needs Analysis, the data collection exercises were utilised as a collaborative forum to gather specific process knowledge from the purposive sample of process experts identified.

Utilising these in-depth interviewing and selection techniques, allowed the interviewer to target interview specific participants, and ensured the interviewed individuals possessed the required process knowledge sought. The interviewer then proceeded to meet with members of the sub-groups identified, to map the AS-IS Training Needs Analysis Process after which validations followed.

Interviewees were then encouraged to talk through each event they engaged in during the Training Needs Analysis process, giving a verbal description of the steps involved. This allowed the process experts to participate actively in providing clear process knowledge and data. During the course of one to one interviews, the processes were jotted down on Post-Its and mapped. The mapped processes were then validated when the interviewer attended the next single or group interview among the team.

Once individually viewed and updated by all members of the sub-team, the section of the pre-mapped process which had gained sub-team consensus would be taken to the next meeting where all the members of the sub-team were available, as this provided an opportunity to clear up any discrepancies while gaining process consensus across the project as a whole.

The semi-structured interviewing which was initially applied as a snowballing technique and then developed into purposive sample, facilitated the creation of an accurate process map as the processes involved inter-team validation and eventual End-to-End process validation. This dual process assisted in eliminating the danger of any bias or subjectivity associated with conducting single semi-structured interviews while mapping the Training Needs Analysis process.

In total, the development of the End-To-End process, involved interviews with members of the knowledge transfer team including the Knowledge transfer manager, members of the SAP Education Accounts Executives, SAP Knowledge Transfer Consultants and SAP Education Business Managers.

4.3.2. Group Interviews

The group interviews conducted during sub-team/team interviewing presented an opportunity to reap some of the benefits available in the nature of one to one interviewing, while simultaneously attempting to disarm any further traces of bias and or subjectivity. Using this one to many interviewing method a forum was created making it possible to involve process experts from the various teams in group discussions throughout the project cycle.

During the research, the group interviews involved smaller groups within the team getting together to discuss and agree on process-based activities amongst themselves. Evolving naturally into small focus groups, this further ensured accuracy across the process. These voluntary focus groups, which evolved and functioned naturally during the interviewing process, were employed as a further validation technique for cross checking the mapped process among the sub-teams. Having carried out earlier validations after each session of semi-structured interviews, some process-based differences were identified in activities carried out within the process as explained by the sub-groups.

The group interviews proved an effective tool in clarifying and inconsistencies across the sub-groups within the process, as it presented an opportunity allowing key process participants to the Training Needs Analysis process to discuss and rectify issues arising on the sequence or occurrence of activities within the process and thereby creating sub-team/team consensus across the team. Challenging, successful group validation meetings were organised on 3 occasions.

4.3.3. Observation

During the research project, it was possible to undertake activity-based observation while watching various process participants working through the process during arranged observation sessions. This involved working alongside process experts including Education Accounts Executives, Knowledge Transfer Consultants and Education Business Managers to understand the process flow during the collection and analysis of data utilised. Though simple, this method provided ease in following and understanding the activities involved in the process and the flow of data/information across and within the process. During observation sessions lasting anywhere up to an hour, it was possible to work with

the above process experts in each of the above mentioned groups within the knowledge management team of the education division. This stage of the research required following through pre-documented customer information, observing how each case selected for examination had passed through the process. Identifying which routes each case followed through the process map from the start of the mapped End-to-End process seen in Appendix D to its end.

During the observation of pre-existing case studies, a total of 4 case studies were followed through to validate the modelled process map and further ensure accuracy in the AS-IS process model seen in Appendix D which was developed from the data collated during interviews.

During the interviewing stage, pre existing case study interviews were also utilised as a verification tool to view the extent to which the process model portrayed, represented an accurate view of the mapped AS-IS process map. Involving 4 existing case studies, this stage of the interviewing process created an opportunity for the interviewee to utilise existing cases within SAP, UK as a guide with which to guide the interviewer through the mapped AS-IS process model. With a view to creating an opportunity to identify any deficiencies or discrepancies within the mapped AS-IS Training Needs Analysis process. Discussed further in section 4.4.3, this process looked to examine:

- What should be happening within the Training Needs Analysis process
- What used to happen with the Training Needs Analysis process?
- What used to happen with the Training Needs Analysis process?
- What are the differences between what is happening and what should be happening?

4.3.4. Telephone Interviews

When faced with time and geographic constraints, telephone interviews were utilised as an immediate method in collating data from members of staff within the knowledge management team. This technique also proved invaluable in clearing up any misunderstanding within the process, both during data collection interviews and process modelling exercise.

4.4. Modelling Practicalities

Faced with the literal question of how to capture and create a process model in a concurrent and efficient way, flipcharts were utilised as a means for capturing and documenting the information presented during interviews. First using Post-Its and marker pens as a means of representing the flow of data and activities within the process, consideration was given to the most suitable modelling method to be utilised during the project. Having investigated the case for and against the various methods documented within section 2.3.1 of the literature review, the data flow diagram was selected as an appropriate modelling method which would adequately document and displays the captured process model and attributed information provided. This method proved to be both clear and flexible in creating visualisation of the mapped AS-IS Training Need Analysis model seen in Appendix D and allowed for easy in the development of electronic copies.

4.4.1. Flow Charts - A Review

The tool used to map the process is flowcharting. This form of diagramming proved to be very successful in gaining employee involvement during the process mapping activity.

Representing the process effectively and logically, the flowcharting tool provided a clear and concise overview, which was easy to understand. This meant the process team could visualise the maps from any point on the mapped AS-IS process model. The team was also able to understand the processing steps, which would need to be taken to complete the Training Need Analysis process. The chosen method simplified the complexity by isolating process components adding structure and speed to the process representations while making it possible to understand what data would be needed to provide appropriate inputs to the processing step at hand.

4.4.2. Validating the AS-IS Process Map

During the project, the validation of the AS-IS process took place on the site of the industrial collaborator and was performed as shown in step 6 of Figure 19 and in Figure 20: After each session of semi-structured interviews, data collated was validated by:

- Interviewing the interviewee at a later date, to confirm accuracy and occurrence of data collated.
- Interviewing other team members at semi-structured interviews, to re-confirm the documented processes and activities.
- During observation workshops arranged to follow through activities of pre-existing customers, it was possible to observe interviewees tracing back the process and following through the paths of existing customer cases through the mapped AS-IS process model seen in Appendix D.

Group interviews were also utilised as a validation technique for cross checking the mapped process and its content and the sequence of activities. This activity predominantly involved ensuring accuracy in the data collected during interviews as well as the flow and representation of information after modelling the mapped Training Needs Analysis process.

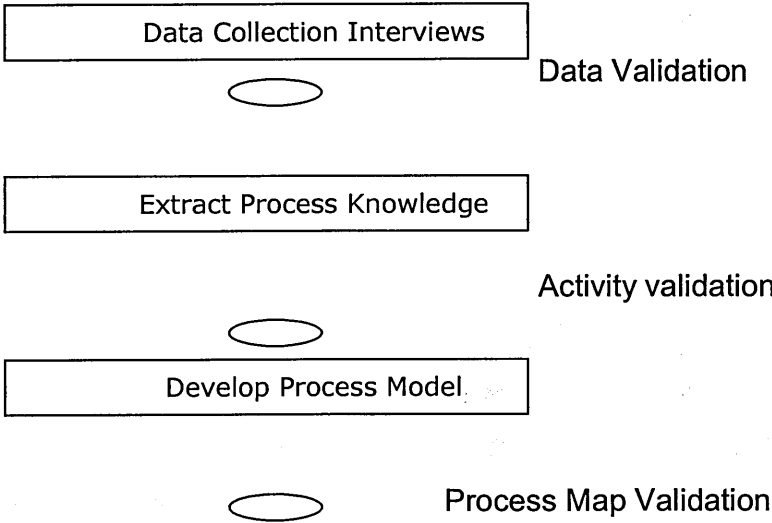


Figure 22: Validation Process

4.4.3. Case Studies

As aforementioned, 4 pre-existing case studies were followed through the process map and validated by the knowledge transfer team. This allowed further validation of the activities within the mapped AS-IS process map seen in Appendix D. As discussed, these case studies provided a means of walking through the mapped AS-IS processes. Providing a route through which to trace the past events undergone by existing customers who had already been through the End-to-End process map and a means of investigating the applicability and usability of the mapped methodology for conducting Training Needs Analysis. These case studies included:

Two Project Team Training - Training Need Analysis projects namely:

- Scottish Courage
- Haringey Council, and

Two End User Training - Training Need Analysis projects namely:

- British Airways
- Scottish Courage

The process utilised in validating the case studies was to follow each case through its route in the mapped AS-IS Training Needs Analysis process model.

Following directions from the interviewer and answering questions on what route/activities the existing process underwent as it progressed through the process, this process was lead through by the interviewee, and satisfied the aims of this section as outlined in section4.3.3, simultaneously assisting: -

- To validate each activity and its sequence in the process.
- To ensure each activity within the mapped process was accurate.
- To log any points/activities at which the case study differed from mapped AS-IS Training Needs Analysis process model.
- To investigate and document reasons for any occurring differences

The aforementioned case studies were successfully followed through the mapped AS-IS Training Needs Analysis process model in Appendix D. As there were no discrepancies arising from the representation of information a log was not required to be kept at this stage.

4.5. Summary

This chapter has described the data collection, analysis and validation techniques adopted to ensure that the requirements of the project were met.

Driven by a clear objective on the purpose of the information required to be collected or validated, bespoke selections were applied to interviewing and validation techniques to bring about the desired results.

5.0 PROCESS ANALYSIS AND RECOMMENDATIONS

5.1. Introduction

With a view to highlighting key occurrences and identifying areas of the AS-IS Training Needs Analysis process maps which may be re-engineered or improved. This chapter analyses activities within the AS-IS process map, leading to further understanding of the process and where possible recommendations towards an improved TO-BE process model. Capturing and documenting the activities involved in carrying out a required Training Needs Analysis at SAP UK, it lead to the development of the AS-IS Training Needs Analysis process map seen in Appendix D. Upon closer examination, this model, which is initiated by an invitation to tender or a proposal request, proceeds to categorise the Training Needs Analysis into one requiring end-user training, project team training or a combination of both end user training and project team training, utilising this as a method of establishing the specific type of training required during the SAP implementation project and hence identifying the intended target group to receive any training. Illustrated via a snap shot of the AS-IS process model, this process can be seen as follows:

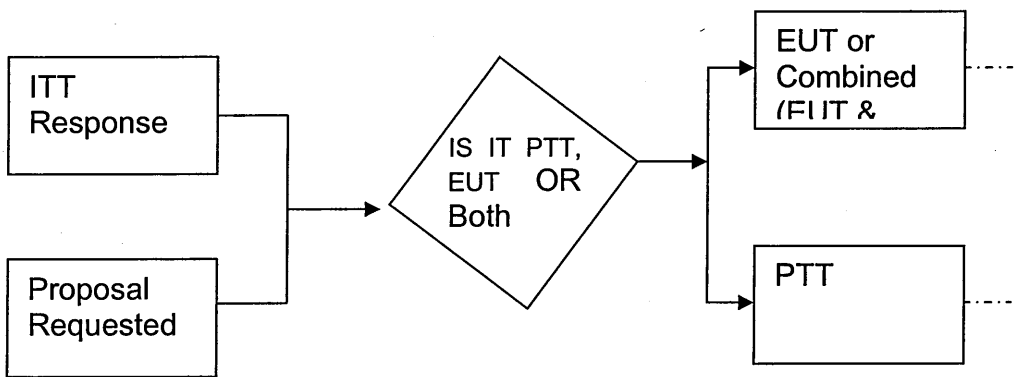


Figure 23: Snap Shot start of AS-IS Process model

Having established the clients project need and identified if the type of Training Needs Analysis required is End User Training, Project Team Training or Both, the current AS-IS process follows separate paths as it proceeds to conduct independent investigative analysis in relation to the required Training Needs Analysis in question.

For an SAP implementation project requiring a combination of ;

- End User Training or both
- End User Training and Project Team Training,

the current AS-IS process proceeds to make contact with the client to establish if an internal/formal bid process exist, to which the TNA team would be expected to follow and adhere to. In the main, this line of enquiries strives to find out if;

- The TNA must be done prior to an invitation to tender response
- The TNA is chargeable
- The client's written permission is obtained to carry out the TNA
- A Purchase Order has been received prior to conducting a TNA

However, for an SAP implementation project requiring only a

- Project Team Training,

The current AS-IS process proceeds to identify if there is currently an SAP presence at the clients site. In the main, this line of enquiry seeks to establish if;

- The clients site is a Prime
- The training project has been awarded
- A TNA has previously been conducted

As can be seen from the AS-IS model diagrammed in Appendix D, in the main, the tail end of the subsequent questions resulting from categorising the Training Needs Analysis activities as shown in figure 23 are reunited by a need for correspondence within the process.

Though there is an end to the two separate paths followed (except when a previous TNA has been conducted and validated and the process is reunited at the point where a project plan needs to be prepared) which are seen to emerge from the responses of the first question “ is it a PTT, EUT or Both”, the initial stages of investigation continue through the process, as it moves ahead to establish;

- If the bid is won or lost
- If the TNA is a free scoping or full TNA
- If permission is received
- If a purchase order is received
- The clients environment

The process then proceeds to prepare a project plan, prior to producing the project plan and finally agreeing training delivery dates.

Utilising research and best practices as a tool for conducting comparative analysis, the AS-IS process was benchmarked against documentation of selected best practice Training Needs Analysis process models. This created an opportunity for benchmarking the process as well as the development of a best

practice checklist seen in Appendix E, with a view to identifying any key differences in the methodology or framework.

This process, lead to Identifying available possibilities for re-engineering improvement for the recommended design of the TO-BE process map shown in Appendix F. Here, the nature of any problems, are explained and where possible recommendations for improvements are made both inline with the best practice checklist and identified/actual practices.

5.2. Process Analysis

The AS-IS Process Model for conducting Training Needs Analysis seen in Appendix D traces the route and flow of activities and information as they are carried out when a Training Needs Analysis is required to be conducted. Using desk researches and identified best practice frameworks seen in 3.3.1 and 3.3.2 as well as the developed checklist, shown collectively in Appendix G it was possible to establish that the main phases required when conducting a Training Needs Analysis during and ERP implementation project are as follows:

- Initial analysis
- Design
- Development
- Implementation
- Evaluation

5.2.1. Process Drivers

There are a variety of reasons why a Training Needs Analysis would be required and hence it is possible to classify the need to carry out a Training Needs Analysis based on predefined process drivers. In analysing the AS-IS process map, it became apparent the process could be driven by reasons, including:

- An existing SAP customer is carrying out a SAP product implementation or an upgrade for which training may or may not be included in the original cost. In this case, the customer would like to know the proposed training plan, training methodology and or cost associated with carrying out any required product training to support the implemented product.
- An authorised SAP dealer is carrying out an SAP product implementation or upgrade and the said customer would like SAP to partake in the bid process and be considered as the supplier for carrying out the training required to support the implemented product.
- A customer with life usage of an existing SAP system is looking to carryout a Quality Audit to audit its user rate and or audit its user performance. With a view to increasing user performance and optimise system utilisation the customer would like SAP to provide a quote for the proposed work required.
- A potential Customer would like to know what training would be available in the event that a SAP system is purchased.

Upon closer examination, the process drivers could be summarised as:

- An Invitation-to-Tender is requested
- A Project Proposal is required
- To define training project scope
- To support a bundled pre-sale activity

With this in mind it was established that the two main processes to focus upon are project team training and end user training. As aforementioned, both project team training and end user training start when it is identified that a Training Needs Analysis must be conducted and end at the point when the required Training is delivered.

5.2.2. Key Observations

During the interview meetings held with the collaborator, some documentation was gathered to assist in analysis. In establishing findings for the process utilised in conducting Training Needs Analysis (AS-IS), it was deduced that the process is designed to:

- Differentiate the type of Training Need Analysis to be conducted.
- Gather information and understand the clients training requirements.
- Design and implement a suitable training deployment methodology for delivering the training.

It was observed that collectively, the top-level activities of the AS-IS End-to-End Training Need Analysis for the two processes (End User Training and Project Team Training) can be best summarised in a flowchart diagram as follows.

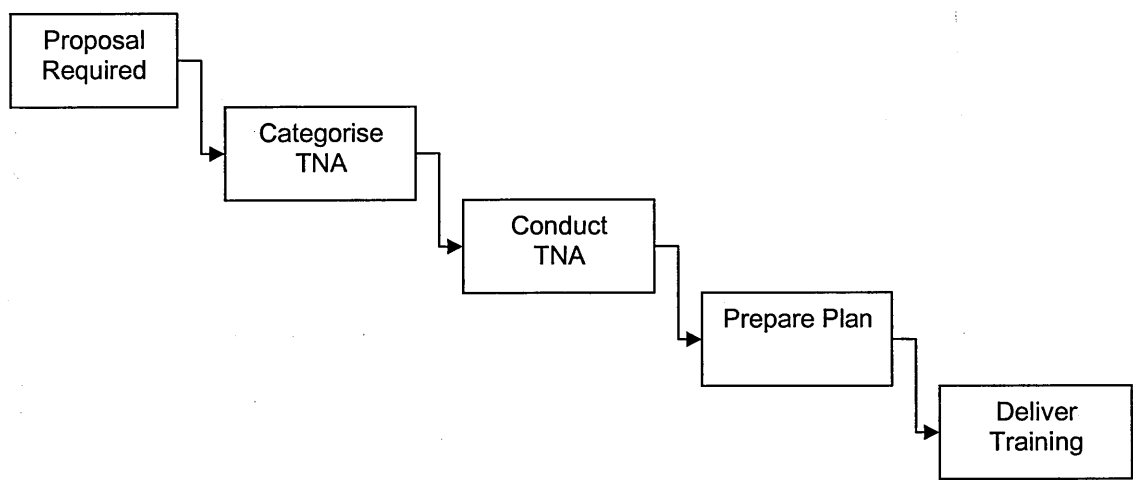


Figure 24: Top Level TNA Activities

When fully decomposed all the activities of both processes are in full view and shown in Appendix D. Upon decomposing the first level of activities, the second level of activities brings to attention what can be seen as the start of the two main processes carried out within the process of conducting a Training Needs Analysis at SAP UK. With the help of the collaborator and inline with information documented in section 5.1, the author was able to identify and confirm these processes as the:

- End User Training (EUT) TNA Process
- Project Team Training (PTT) TNA Process

Though these processes are contained in one process map, as can be seen from the earlier stages of the mapped TNA AS-IS process map shown in Figure 23, their answers to the question; Is it PTT or EUT? Results in a diversion during the process. For better understanding of the process, the two processes are discussed in more detail below.

- End User Training – Training Need Analysis

During the course of the project, it was established that the outcome of the collaborator's process for conducting End User Training - Training Need Analysis, is to produce bespoke user based training, tailored to the training needs of its client employees. Carried out during an upgrade or implementation of a SAP system, the main focus of this process is the user community and the activities are tailored to ensure the client's employees who will be affected by the system change are confident with carrying out their role-based activities in a competent manner on the implemented SAP system. As a result, the process is seen to focus on capturing both user and organisation based information required to facilitate both the designing and deploying of an appropriate training methodology for conducting any required user training. A detailed process map following the course of this activity can be seen in Appendix D.

- Project Team Training

As the name implies, the all Project team training is delivered to the project team as opposed to the user community within any organisation. In this instance, the Training Needs Analysis process was not carried out as a means for identifying a mechanism for delivering bespoke user training, but rather utilised primarily for designing a bespoke training plan for each member of the project team. To ensure project team members received the training required in any all or specific area of the project, its out come, meant each member of the SAP project team would have a personalised training plan designed to meet their individual training needs. It was established that rather than individual bespoke training, training received would come from SAP's standard suit of project training products and would be combined to meet the individuals training needs of the project team member. Full details of this process can also be seen in Appendix D.

5.3. Process Benchmarking and Gap Analysis

No management or training cycle would be complete without a brief reference to the continuing importance of the monitoring and evaluation tool (Buckley et al, 2002). However upon comparing the documented best practice and documented framework methodology seen in both Figure 19,20 to the AS-IS SAP Training Needs Analysis model in Appendix D, it can be identified that the evaluation phase though seen in the best practice models was unseen in the current SAP AS-IS model.

Upon further examination, it is apparent this gap leaves a void in the collection and analysis of training outcomes which play a vital part in evaluative feedback loops more visible in Figure 20. This missing process holds potential as a method for gaining further insight into steps which should be taken to ensure the success of SAP implementation training project. It also provides opportunities for meeting the needs of users needing further training in particular areas, while

strengthening the case for successful implementation. Though not exclusive, accurate data collection followed by evaluative analysis during this phase, plays a substantial role in determining:

- Users and areas requiring more training
- The type of training required
- Users preferred learning techniques
- Effective training delivery methods
- Utilisation and presentation of continuous training tools

5.3.1. The “AS-IS” Critique

The measurable requirement sought as an output from the results of the Training Needs Analysis at SAP UK Ltd., are unique and beyond the scope of the current AS-IS Training Needs Analysis model. Upon investigating available literature, it appears the end point of the training conducted at SAP is the measurement of success or failure of an implemented SAP system, and as a tool for measuring Returns on Investment. It appears training; the most cited Critical Success Factors is rapidly replacing capital assets as a key determinant of wealth. Despite this, training during ERP implementation projects, as a tool for performance measurement has no set methodology for measuring quality of its success or failure and hence displays lack of a predefined evaluative framework.

In June 2000, CIO Magazine reported that poor training and education of the broad user community of managers and employees who are supposed to run the business lay behind ERP disasters and failures. It states that in order to realise the benefits of training, a considerable amount of training at all levels is required.

Notwithstanding this, there are no established framework for measuring the quality and effectiveness of training. Dan Klein Vice President of education services PeopleSoft states that many companies continue to treat training as a check-the-box activity (CIO, 2000).

Contrary to the importance attributed to Training Needs Analysis which require a successful training program and ERP implementation, David Beresfied, executive director Diagonal Consulting points out that training typically occurs at the end of the implementation cycle, when activities are often running late and being compressed. According to Oracles Niemann training is usually an afterthought as many vendors implement ERP systems.

Insufficient time and resource dedication, it seems has led to the lack in the development of feedback loops for evaluating and analysing training efficiency and effectiveness as a means to measuring training productivity and strengthening any areas seen to be weak during the training cycle.

5.4. Solutions and Recommendations for a TO-BE Process Model

Due to lack of time and availability of employees further in the research period, from this point onwards the methodology could not be fully validated.

Upon gaining process knowledge on both best practice and current processes for conducting the Training Needs Analysis Process at SAP UK, it was possible to carryout a comparative analysis as a means to study, understand and pin point possible areas for improvement on the mapped AS-IS process model seen In Appendix D.

The activities carried out during the project methodology, were simultaneously executed with the aim of achieving success in re-designing the process for conducting Training Needs Analysis at SAP UK. Figure 25 shows the application of the aforementioned methods in bringing about the re-design process.

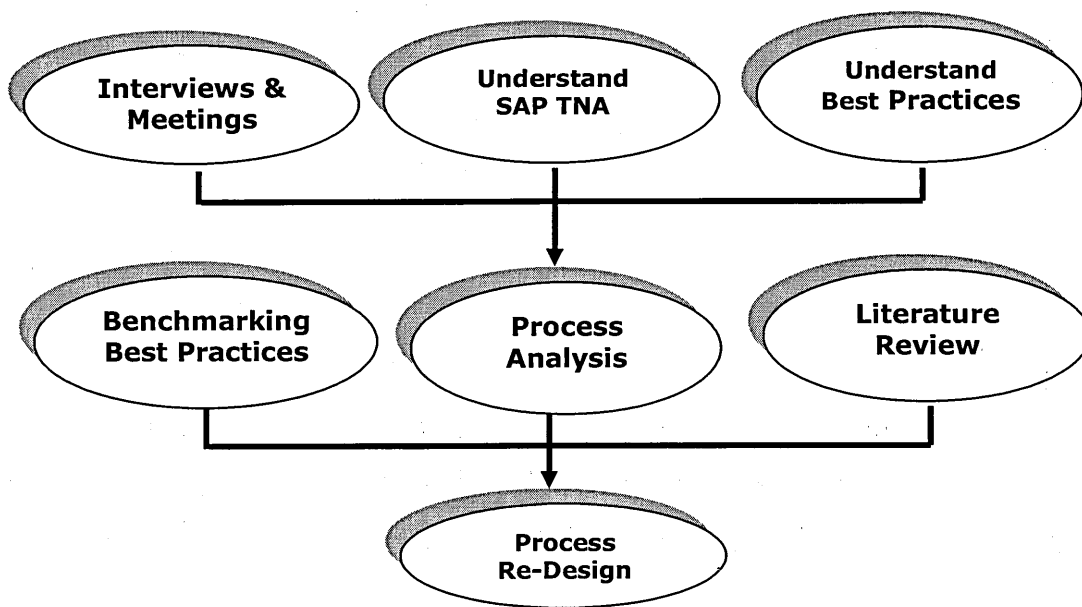


Figure 25: Re-Designing the Flowchart

5.4.1. Process Re-Design

In bringing the framework of the AS-IS process map documented in Appendix D in line with best practice methods documented in Figure 18/19 and promoting the ability to express positive agreement to the checklist developed in Appendix E, It is recommended that changes be made to two area of the current AS-IS process mapped, developed for conducting Training Needs Analysis. These areas are as follows:

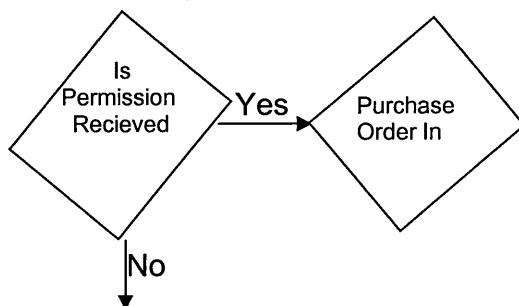
- The initial analysis phase and
- The Evaluative phase,

The Initial Analysis Phase

Upon understanding the initial analysis phase of the mapped AS-IS process model for conducting Training Needs analysis, some activities were identified as duplicated. However, upon closer examination, two of these duplications were not seen to be adding value to the mapped process. Listed below, these duplications can also be seen in Figure 26.

- Received Permission to carry out TNA
- Received Purchase Order to pay for TNA,

1st Occurrence



2nd Occurrence

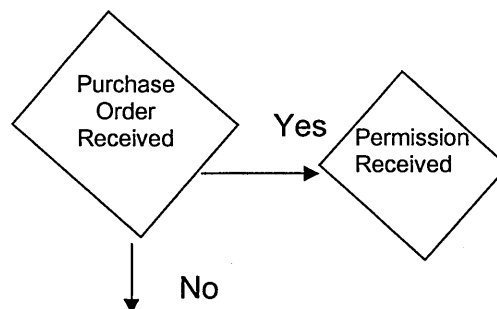


Figure 26 Snapshot showing Duplication in AS-IS Process

To rectify this, it is proposed that the existing duplication within the process should be avoided as this would contribute to removing unnecessary repetitions while making the process less tedious and more effective. To operate this proposed change, it is recommended that the first cycle within the process where enquires are made into both received permissions and received purchase order, should be eliminated, as this does not take into account the response from the project team training arena. As can be seen in figure 26, these questions are duplicated further down in the process. The case for this change is further strengthened as the second cycle of questions in this respect are placed after the input form the Project Team Training merges with that from the End User Training/Both options, and flows into one area catering for all client correspondence. By selecting this single position, the whole process is able to participate in this question cycle once it has merged into one big process, and the need for this duplication is eliminated. Once accomplished, the re-engineered activity can be seen more clearly in Figure 27.

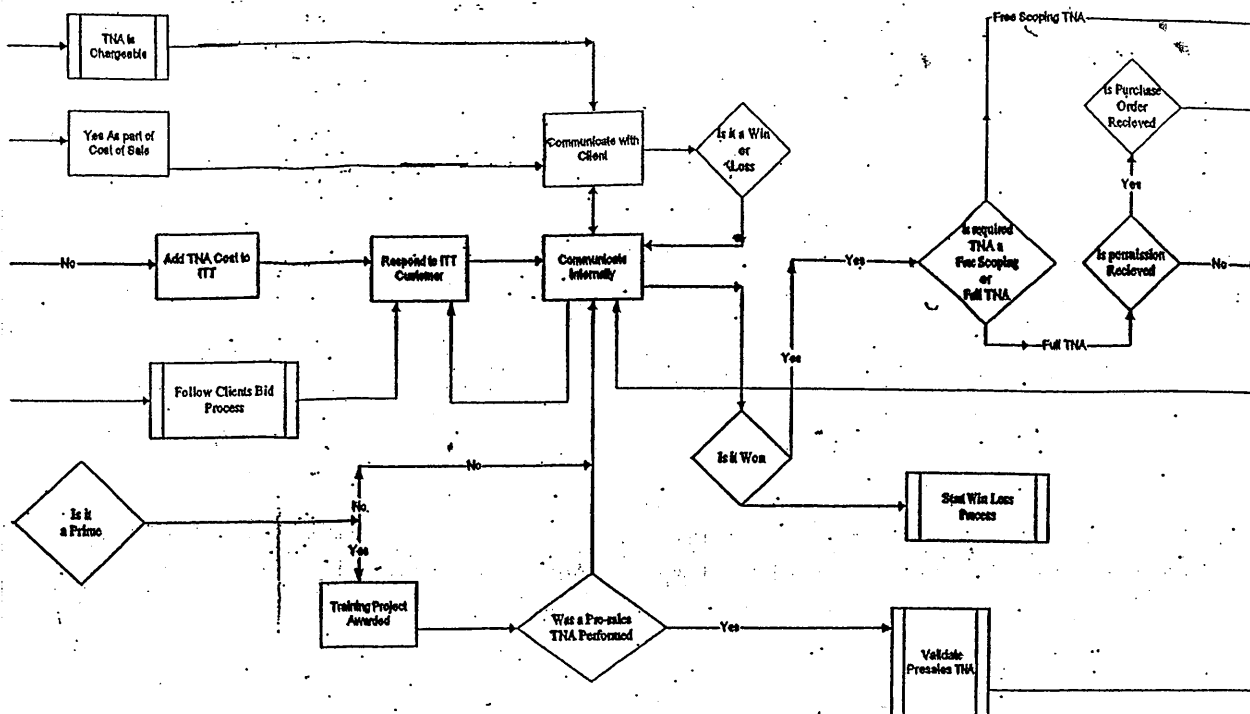


Figure 27: Re-engineered Activity Eliminating Duplications

The Evaluative phase

It is suggested that the new evaluation phase of the framework should be implemented in a two-phase approach, utilising a goal question metrics plan, while the first phase of the new evaluation methodology should serve as a mechanism to examine the effectiveness of the training, as training is identified as a vital critical success factor in ERP implementation projects.

It is also recommended that the second phase of the evaluation state should serve as a Training Needs Analysis Post Project evaluation phase, introducing a tool with which to examine how effective the Training Needs Analysis has been at meeting predefined process objectives. In line with this phase, it is also suggested that all processes for measuring output are defined and included in the objectives of the Training Needs Analysis process and in the recommended goal, question, and metrics plan. The two-phased evaluation framework of the suggested TO-BE model can be seen at a top level as follows.

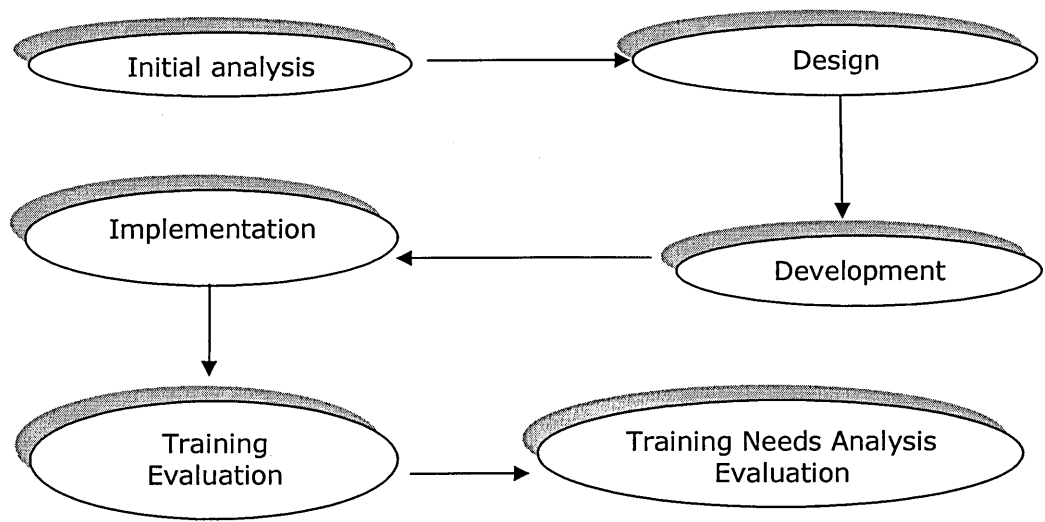


Figure 28: TOP Level TO-BE Methodology for TNA Process map

With this in place, the next activity would be developing transparent mechanisms by which objectives can be set and measured. It is suggested that during this phase, a Goal Question Metrics model be utilised in designing the evaluation phase of the TO-BE model of the process map for Training Needs Analysis during ERP implementation projects. An example for the GQM definition of questions for measurement goal can be seen in Appendix C, and the GQM would:

- Allow the definition of appropriate measurement goals
- Allow the definition of questions required for the measurement goal
- Ensure a relationship between the questions defined and the metrics

This proposed suggestion for re-designing the TO-BE process map brings' about multiple changes in the evaluative stage of the TO-BE process map framework for conducting Training Needs Analysis during ERP implementation projects. The rational for the proposed changes are discussed in the following paragraphs.

As training is seen to be the output of a conducted Training Needs Analysis, this framework would simultaneously introduce steps for evaluating the effectiveness of any training resulting from a conducted Training Needs Analysis.

The framework will also provide a feed back loop, allowing the provision of analysis between the implementation phase and the training evaluation phase as seen in Figure 29. Enabling the use of continuous improvement tools, this will require effective inputs at the design and development stages.

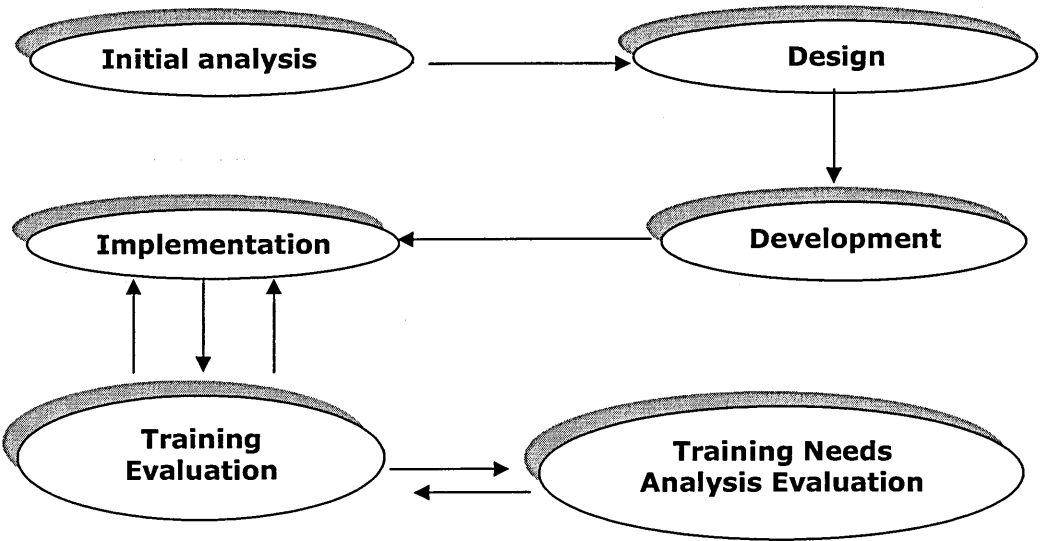


Figure 29: Proposed TO-BE Methodology, showing Continuous Improvement

With the effective use of tools such as e-learning and Computer Based Training, continuous improvement on the desired training state sought from an SAP implementation project may be carried out both during or after the training project.

In line with the proposed framework it is suggested that when required, data collection tools and techniques should be introduced throughout the process to facilitate the collection of any required data needed to assist in the evaluation process. It is also suggested that the data collection techniques and exercises be tailored to allow for utilisation as tools in the identification and analysis of areas within the training programme which need strengthening and further training as this would create an opportunity to rectify identified problem areas.

This will simultaneously enable information gathering to assist in determining the best delivery and learning methods for use in deploying the required training.

The TO-BE model as seen in Appendix F should possess a mechanism for translating the business needs into measurable training activities. With a view to aligning and representing scales utilised by the business for measuring Return On Investment (ROI) this will ensure corporate strategy and the training vision are in line and that management is aware of the role training plays in meeting ROI. This transparency would ensure the processes are transparent and understandable as well as operational, including activities for which all parties may be held responsible.

As seen from the literature review, all performance issues may not be resolved by delivering training. As a result it is suggested that a method be implemented within the processes to bring about clarity in identifying which performance issues the training activity will be held responsible for improving during an SAP implementation project.

In essence, prior to conducting an SAP implementation project, analysis should be carried out as a means of identifying any performance issues which will not be resolved by the proposed training. It is also suggested that the TO-BE model should take into account events, which are likely to generate negative impact to the success of the Training process. This would not only give some insight into personalised issues, but also provide a means for providing a more tailored service for each individual and increase the possibilities for training success.

The strength of the TO-BE model and suggested improvements is that it helps to implement the evaluation of the Training Needs Analysis process and any resulting training. Helping to ensure that inline with documented literature, considerations, frameworks and mechanism which should be utilised for the evaluation of the Training Needs Analysis process and the training outcome, are given due audience in the design and execution of the evaluation phase.

6.0. Conclusions and Further Research

The purpose of this chapter is to conclude the Thesis research by summarising any recommendations on the work carried out during the project and to highlight the benefits of the research. In addition, the chapter will also examine the research limitations and proposals for further research

6.1. Conclusions

Regarding the evaluation of the Training Needs Analysis or any provided training, it was deduced that though the existing system for conducting the Training Needs Analysis process is carried out with a view to meeting the clients training needs, there is currently no formal method for measuring the quality or success of the resultant training provided to the client. As a result, there is equally no mechanism for measuring the success of the Training Needs Analysis process.

In regards to the desired results sought from the training conducted during an ERP implementation project, the author concurs with the conclusion of (Roland et al 2001) in their opinion that; The management of performance as an idea is by no means new, however adequate time and resource must be dedicated to achieving and evaluating its true benefits with appropriate tools to monitor and facilitate desired outcomes from the training.

Building upon this view and that of Peppard (1995) as discussed in the literature review, this research project proposes inputs into the mapped AS-IS Training Needs Analysis process seen in Appendix D and brings about a re-engineered process improvement in the form of an evaluative mechanism implemented in the TO-BE process model seen in Appendix F.

Acting as an in-built quality system, this mechanism contributes to the effective evaluation of any training performed, overcoming the deficiencies seen in the AS-IS process map by providing a standard framework for use in a steady state implementation environment. The recommended TO-BE process model eliminates wasteful duplication, while allowing for careful evaluation of any areas of weakness. It also allowing for scope to correct specific employee performance through further training once targeted through a detailed evaluation process.

In line with Vantrappen (1992) and Harrington (1991) who suggests that the primary aim of Business Process Re-engineering is to redesign processes with regards to improving performance from the customer's perspective, the proposed re-engineered TO-BE Training Needs Analysis model (seen in Appendix F) has been designed to ensure adequate mechanisms for evaluating the result/effectiveness of a Training Needs Analysis and/or any resultant training conducted during the implementation of an ERP implementation project. Without these mechanisms to control the quality of outputs resulting from the Training Needs Analysis process, deficiencies in assessing the success or failure of any training would still exist and hence the level of accuracy in providing customer satisfaction deprived.

Regarding the use of training as a Critical Success Factor and an indirect tool for measuring Return on Investment, the proposed model can be seen as the first step towards aligning any expected outcomes of the Training Needs Analysis process/training with pre-defined and agreed requirements for measuring for example Return On Investment (ROI) or the success of Enterprise Resource Planning (ERP) implementation projects. With detailed design and correlation, the proposed framework/methodology for the TO-BE model seen in Appendix F

possesses the potential to provide a suitable measuring tool eliminating any lack in standardisation of requirements or the desired quality/outcome.

6.2. Main Benefits for SAP

The main benefits that SAP will obtain from the project are:

- Documented AS-IS process map for conducting the Training Needs Analysis process.
- Documented state of the art literature review on all the subject areas.
- Documentation of best practices framework and checklist for conducting Training Needs Analysis.
- Gap analysis and results of the benchmarked process.
- Recommended TO-BE framework/methodology for conducting the Training Needs Analysis process.

6.3. Research Constraints

This section highlights some of the constraints encountered as follows:

Due to the novelty of relating the topics on Training Needs Analysis, Evaluation and Enterprise Recourse Planning, there was difficulty in finding developed best practice frameworks for measuring inter-relationships and respective outputs.

Due to the above, current literature available for evaluating the true effect of Training Needs Analysis and indeed Training on SAP or the wider audience of ERP implementation projects does not properly reveal the current impact on the success or failure of such projects.

The development of the proposed TO-BE model could not be validated, as the timing of the research period fell into bidding projects at the collaborators site and members of the knowledge management team were unavailable at the later stages of the project.

6.4. Opportunities for Further Research

A further opportunity for research lies in developing the details, contents and specifications of the proposed Goal Question Metrics and its activities.

Opportunities also exist for research into the implementations of ISO standards as a quality management system across the project or indeed in the use of the intranet, in keeping electronic documentation of the mapped process.

6.5. Summary

The project described in this thesis aimed to understand and document current processes as utilised in executing the Training Needs Analysis process at SAP, UK while also conducting desk research, which included the identification of a best practice framework and checklist for conducting Training Needs Analysis. As a baseline for comparative analysis, it goes further to identify and recommend opportunities for improvement. The research succeeded by delivering:

- An AS-IS process map for conducting Training Needs Analysis at SAP.
- Comparative Analysis of the mapped process against best practice
- Identification of opportunities for improvements, with rational and benefits discussed.
- A recommended TO-BE framework for Training Needs Analysis

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APPENDICES

APPENDIX A

Interviewing Techniques Advantages and Disadvantages

(www.uni.edu/harton/surveytech.html)

APPENDIX B

Media Methods Advantages and Disadvantages

APPENDIX C

Sample of Operational GQM Format

APPENDIX D

End-End AS-IS Process Map For Training Needs Analysis at SAP (UK)

APPENDIX E

Checklist for Developing Best Practice Training Needs Analysis Framework and Methodology

APPENDIX F

Recommended TO-BE Training Needs Analysis Process Map

APPENDIX G

Collective Display of Best Practice Checklist and TO-BE Framework /Methodology

APPENDIX H

Sample of Case Study

APPENDIX I

Other Documents

Unstructured interviewing and focus groups

Introduction

An unstructured interview simply means a face-to-face interview using an interview schedule with the topics listed but with few specific questions and no fixed questions; these interviews aim to be carried out 'in-depth'. When investigators require more specific information a semi-structured format is used. The interview is still carried out in-depth. An alternative technique is to conduct interviews with small groups of people who are encouraged to interact with the group leader and talk to each other in addressing (focusing on) the issues of interest. These interviews are known as focus groups. These methods will be described in this lecture.

Types of unstructured, in-depth interview

Unstructured interviews aim to delve deep beneath the surface of superficial responses to obtain true meanings that individuals assign to events, and the complexities of their attitudes, behaviours and experiences. This method allows the respondents to tell their own stories in their own words, with prompting from the interviewer.

Unstructured interviews can be topic- or event-based, or they can be historical or cultural. Cultural interviews are between members of a shared culture and involve explorations of people's experiences and the knowledge and values they pass to the next generation. The interviews are often repeated. As culture is often communicated through stories, the interviewer should listen at length in order to elicit these.

With oral histories, the investigator chooses a period of time, or an event, and asks individuals involved to describe what happened (e.g. during the Second World War). Oral histories are face-to-face unstructured interviews which aim to allow the respondent to talk in depth and at length about past events' these can carry much memory bias and the danger of the reinterpretation of events, and require cross-checking with other sources of information. With the life history, the personal life events of the respondent are explored.

The *advantages* of unstructured interviews are that more complex issues can be probed, answers can be clarified and a more relaxed research atmosphere may more successfully obtain more in-depth as well as sensitive information.

The *disadvantages* are that the data are time consuming and difficult to collect and analyse (e.g. with content analyses and narratives), there are greater opportunities for interviewer bias to intervene and, because it is a time-consuming method, it is expensive and only feasible with small samples.

While there is inevitably potential for interviewer bias in qualitative interviews, the greater involvement and participation of the interviewer in the interaction aims to prompt greater depth, and it is assumed that once the level of communication has reached this 'depth' respondents will reveal their 'true' inner feelings, attitudes and behaviour.

In-depth interviewing: sample selection and size

Qualitative interviewing is usually based on small sample sizes, and the sampling techniques preferred include convenience sampling, purposive sampling, snowballing and theoretical sampling.

Convenience sampling refers to the sampling of subjects for reasons of convenience, e.g. easy to recruit, near at hand, likely to respond.

Purposive sampling is a deliberate non-random method of sampling, which aims to sample a group of people, or settings, with a particular characteristic.

Content analysis

When presenting qualitative data in a categorised manner, the investigator carries out a content analysis. The procedure is basically as follows: data are collected, coded by theme or category; finally, the coded data are analysed and presented. One method of analysing the data is to search the whole data set for the categories created and make comparisons between each, as appropriate.

In order to satisfy criteria of reliability, the field data (e.g. audio- and video-tape recordings, written field notes and/or text) should be listened to, viewed and/or read by a team of investigators to agree the categories used.

The categorisation exercise should be carried out by the investigator and also by an independent investigator. Their categorisations should be compared and any discrepancies discussed and final categorisation agreed. Computer packages are available for the categorisation and analysis.

The time-consuming nature of this method of research should not be underestimated. Audiotaped interviews, for example, have to be transcribed from the recording before they can be analysed.

Rules for coding

With *quantitative* analysis, the coding rule is generally that codes should be mutually exclusive so that a single unit of data can only be coded in one category. Quantitative coding does permit the use of multiple codes for replies to single questions in questionnaires to fit instances where respondents have mentioned several things in one reply.

For example, with quantitative coding, in reply to a question about what the good qualities of their general practitioners are, people might say that their doctor is good at examining them, a sympathetic listener, good at explaining things and so on; *each* item mentioned would need to be coded – and coded once (the question with several items can be ‘multicoded’). In contrast, in *qualitative* coding, each single item is permitted to be coded in more than one category (not just once) in order to permit cross-referencing and the generation of several hypotheses.

If the research stems from a theory then the codes should be chosen to represent the theory and the data coded to fit the categories.

If the aim is to describe the data in order to generate theory, then the opposite rule applies and the categories can be developed from the data.

Criticisms and potential weaknesses of this approach are that the very process of categorising and coding the data disembodies it from the person who produced it and from the interactive nature of the interview.

Narrative format

By contrast, the narrative approach stresses the importance of the story the respondent has to tell, focusing on presentations of the actual transcripts.

All qualitative reports, even those which include a content analysis, will also include sections of the transcripts alongside the investigator’s interpretations of them. Data need to be presented so that their richness is not lost.

The emphasis in narrative format is placed on analysing the content or structure of the narrative in its original and intact form. This is also known as discourse analysis. Data are sometimes, but not always, also coded by theme or category, and these coded data are used to develop an analysis of the situation.

Others report the full interaction between interviewer and patient in their narratives and use them to illustrate their interpretations. Theory, interpretation and sections of actual interview text are intertwined in the presentation.

Focus group interviews

Focus groups are unstructured interviews with small groups of people who interact with each other and the group leader. They have the advantage of making use of group dynamics to stimulate discussion, gain insights and generate ideas in order to pursue a topic in greater depth.

For example, they can be used to examine not only what people think, but also how they think and why they think in that way, their understandings and priorities.

It is a useful technique for exploring cultural values, and beliefs about health and disease. The group processes can help people to explore their views and generate questions in ways that they would find more difficult in face-to-face interviews.

Group composition

Confidentiality is not obtained in group settings, and the presence of others can be inhibiting to some respondents. Groups have to be carefully balanced in relation to the age, sex and ethnic status of respondents.

It may sometimes be necessary to have single sex groups in similar age ranges in order for the atmosphere to be permissive and relaxed.

There are no guidelines about the number of focus groups to aim for. Many investigators aim for between six and twenty, but this is dependent on the complexity of the topic. A focus group will typically contain between about six and twelve participants, and a group leader (e.g. the investigator) who uses an unstructured guide (topic/question list) to stimulate and guide discussion. The leader needs to be skilled at creating a relaxed atmosphere, leading group discussions and handling conflict, as well as drawing out passive participants.

Groups usually last between about one and two hours, and a comfortable environment is provided with refreshments. Some investigators ask participants to participate in games: card sorting exercises (e.g. with statements printed on them), specially designed board games, 'cake cutting' or coloured disc games, for example, in groups about health priorities and allocation of resources.

The groups are tape recorded, and some are video recorded. The investigator also makes observational notes during the meetings. The success of the method will depend on the topic. The methods of analysis are the same as for in-depth interviews.

Summary of main points:

- ' The advantages of unstructured approaches are that more complex issues can be probed, answers can be clarified and a more relaxed research atmosphere may more successfully obtain more in-depth as well as sensitive information.
- ' The disadvantages of unstructured approaches are that the data are time consuming and difficult to collect and analyse (e.g. with content analyses and narratives) and there are greater opportunities for interviewer bias to intervene.
- ' Transcription and coding should be undertaken during the interviewing period. The investigator should code the content by theme (computer packages are available for this).
- ' Once transcribed, data can be organised by topic, and themes coded into categories (and some may fit more than one) as the research is in progress, in order to make the final task more manageable.

- An alternative technique is to conduct interviews with small groups of people who are encouraged to interact with the group leader and talk to each other in addressing (focusing on) the issues of interest. These interviews are known as focus groups.
- Focus groups have to be carefully composed and balanced in relation to the characteristics of respondents to prevent people from feeling socially constrained.

Questions:

What types of research topics are suitable for a) unstructured interviewing and b) focus groups? Give some examples.

Outline the advantages and disadvantages of a) unstructured interviewing and b) focus groups?

Explain the principles of content analysis.

Reference for the questions:

Bowling, A. Research methods in health. Buckingham: Open University Press, 1997. Chapter 16.

Kitzinger, J. (1995) Introducing focus groups. *British Medical Journal*, 311, 299-302.

Further reading (optional):

Rubin, H.J. and Rubin, T.S. (1995) *Qualitative Interviewing: The Art of Hearing Data*. Thousand Oaks, CA: Sage Publications.

Workshop exercise:

Consider the papers by Coggan et al. (1997) and Gardner et al. (1997), in relation to the following questions:

What is the aim of the research presented?

What type of study design was used?

Is it clear how study participants were chosen and sampled?

Was an interview schedule used? What type?

How was the data analysed?

Were key themes and concepts identified from the data? Did the authors clarify how they did this?

Was any attempt at verification of the data attempted?

Do the data support the conclusions?

How convincing is the study?

Reading for exercise:

Coggan, C. Patterson, P., Fill, J. Suicide: qualitative data from focus group interviews with youth. *Social Science and Medicine*, 1997; 45:1563-1570.

APPENDIX B

Media Methods Advantages and Disadvantages

Reference

Advantages and Limitations of Media

<i>Media</i>	<i>Advantages</i>	<i>Limitations</i>
Instructor-led	Provides social interaction. Useful with variably-sized audiences. Provides personalized feedback. Integrates a variety of media. Materials can be tailored to the group or adjusted by the instructor while in progress. Short development time. Traditional method of teaching that is comfortable for students and instructors. Learners are removed from work environment so that they can focus on the course free from distractions.	Scheduling may not meet the needs of everyone who needs the information or instruction. Does not provide enough time to give everyone feedback they may need. Moves at one pace, or at the pace of the majority of the class, and does not account for individual rates and styles of learning. Lack of transfer to the workplace. Relies heavily on instructor knowledge. Inconsistent delivery and certain areas stressed or de-emphasized, causing gaps in learning and varied levels of learner involvement. Inconsistent evaluation. Involves travel time and expenses for participants to attend training at a centralized location or for instructor travel. Limits numbers that can participate at one time.
Computer-based	Consistent delivery. Accommodates individual time schedules. Extensive multi-sensory capabilities. Learner-controlled pace. High degree of interactivity and involvement by the learner. Adapts to learner performance. Consistent testing and record-keeping.	May be too text-based. Expensive due to the numbers of design team members required, authoring platform hardware and software, and cost of added media. Long design and development time, ranging from 250 to 750 design and development hours per hour of delivered instruction, depending on the complexity of the content. For a first project, even more time needs to be scheduled. Specialized computer skills are required of programmers and authors.

<i>Media</i>	<i>Advantages</i>	<i>Limitations</i>
	Unlimited opportunity for review. Over-learning through multiple presentations and examples of the same concept.	Content-/context-specific feedback may be limited. A poorly designed user interface makes navigation difficult (i.e., extensive menu layers) and/or interferes with learning (i.e., uses too many "bells and whistles").
Satellite broadcast	Transcends geographical boundaries. High levels of interaction and immediate feedback to questions in spite of distance. One instructor for a large group of participants. Reduced travel for participants and instructors (reduced cost and greater convenience). Can train large numbers in a short period of time. Can incorporate a variety of media. Two-way video permits instructor to see participants and participants to see each other.	Large time zone differences require some to participate at inappropriate times. May be a "talking head" with little or no interaction, which becomes boring; participants lose interest. Special training of instructor to handle technology or large staff to handle broadcast equipment is often required. More preparation by instructor is needed to coordinate technology. Satellite time is very expensive. One-way video does not allow students and instructor to see each other.
Video teleconferencing	Less expensive than satellite broadcasting due to use of existing telephone lines. Transcends geographical boundaries. High levels of interaction and immediate feedback to questions in spite of distance. One instructor for a large group of participants. Reduced travel for participants and instructors. Can train large numbers in a short period of time.	Delays due to compression and decompression rates of video result in video and audio out of synchronization. Large time zone differences require some to view at inappropriate times. May be a "talking head" with little or no interaction, which becomes boring; participants lose interest. Special training of instructor to handle technology or large staff to handle broadcast equipment is often required.

<i>Media</i>	<i>Advantages</i>	<i>Limitations</i>
	Can incorporate a variety of media. Two-way video permits instructor to see participants and participants to see each other.	More preparation by instructor to coordinate technology. One-way video does not allow students and instructor to see each other.
Web-based	Can include "chat rooms" where participants and instructor can have dialogue or interactive, real-time, collaborative discussions. Can include electronic mailboxes where participants can pose questions to an instructor or participants. Can include reference and data-storage capabilities. Can include sharing of files and data. Course materials can incorporate audio, video, and graphics. Material is easily updated.	More preparation by instructor to coordinate and plan course elements. Specialized design skills of programmers and authors. Security, testing, and feedback may be limited. A poorly designed user interface is difficult to navigate (i.e., extensive menu layers) and/or interferes with learning (i.e., too many "bells and whistles"). Slow video compression and decompression rates cause video and audio to be out of synchronization.
Audio tapes	Flexible in its delivery; participants can get information anywhere there is a tape player. Inexpensive to develop and deliver.	Only one sensory modality used for learning.
Video tapes	Flexible in its delivery; participants can get information anywhere there is video playback equipment. Inexpensive to duplicate and deliver after initial development costs. Good for role-modeling behavior and motivation.	Only two sensory modalities used for learning. Expensive to produce due to highly specialized skills of videographers, editors, producers, and scriptwriters. Industry standards range from \$500 up to \$2,000 per finished minute of video.

<i>Media</i>	<i>Advantages</i>	<i>Limitations</i>
Performance Support Systems/ Electronic Performance Support Systems (PSSs, EPSSs)	Provides information on an as-needed basis. Does not require formalized training that removes people from their jobs. Best for providing information on procedures and processes or reference material. Ready source of infrequently-used or complex information.	Not good for delivering concepts, principles, or demonstrations. Specialized programming and authoring skills are required of members of design team for EPSSs. May have a user interface or be constructed in such a way that it is too complex to navigate. May not be organized in a way that allows users to quickly access the information they need.
Audio teleconferencing	Inexpensive to duplicate and deliver after initial development costs. Can include large numbers of participants. Technology is readily available. Transcends geographical boundaries. High levels of interaction and immediate feedback to questions in spite of distance. Requires only one facilitator for a large group of participants. No travel required.	Visual aids are not available. Large time zone differences require some to participate at inappropriate times. Lacks visual cues for gathering information. Scheduling may not meet the needs of everyone who needs the information or instruction. Only one sensory modality used for learning.

Once the most appropriate media are determined, each medium must be associated with an objective. This match determines how each piece of information will be delivered. For example, the same business problem may involve a systemic communication issue that will be delivered using a satellite broadcast, a performance issue in providing equipment to employees so that they can get their jobs done, and training on the equipment.

APPENDIX C

Sample of Operational GQM Format

Table 2: The definition of metrics and their relationship with questions.

Level 0	1	Nº users per course	Q1
	2	Period of training	Q2, Q8
	3	Nº. hours per user	Q3, Q4
	4	Nº. hours of training	Q3, Q5
	5	Nº. hours of organizational training	Q6, Q7
	6	Nº hours of technical training	Q6, Q7
	7	Proportion of estimated training done	
	8	Quality of trainers	Q9
Level 1	9	Reaction	Q10
Level 2	10	Learning	Q11
Level 3	11	Behavioral	Q12
Level 4	12	Results	Q13
Level 5	13	Cost of training	Q14
	14	Training budget	Q15

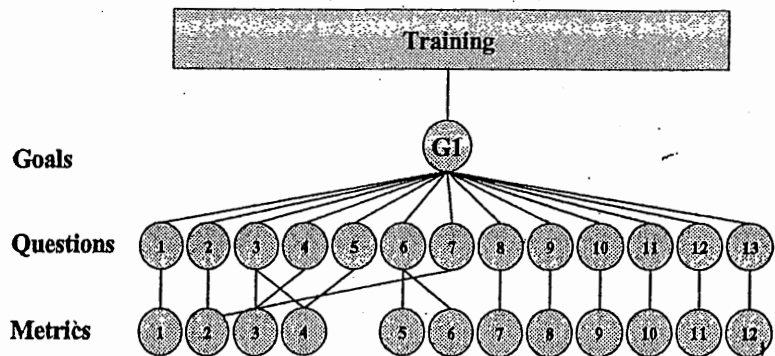


Figure 3: Graphical representation of the GQM preliminary plan.

APPENDIX D

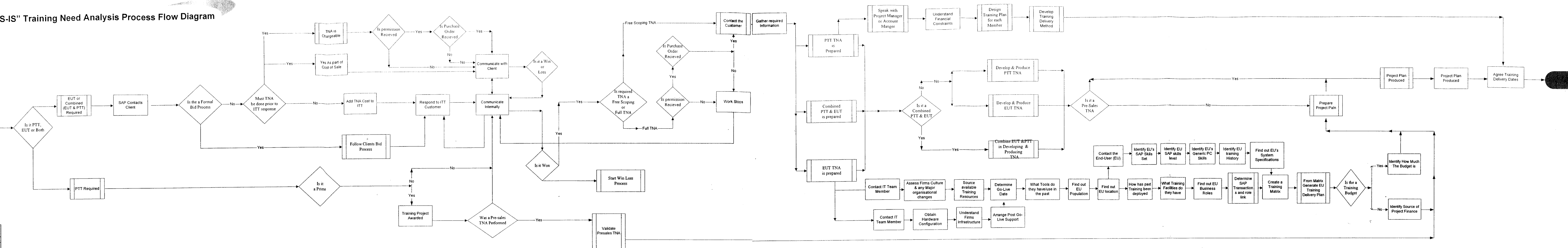
End-End AS-IS Process Map For Training Needs Analysis at SAP (UK)

SAP;
Education; "AS-IS" Training Need Analysis Process Flow Diagram



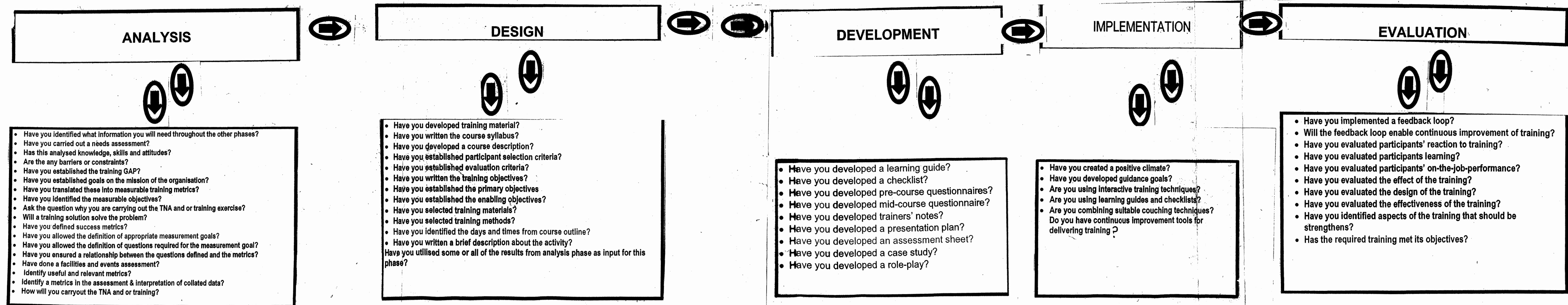
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Version	Date of Change	Change Made
01	17.09.02	Draft



APPENDIX E

Checklist for Developing Best Practice Training Needs Analysis Framework and Methodology



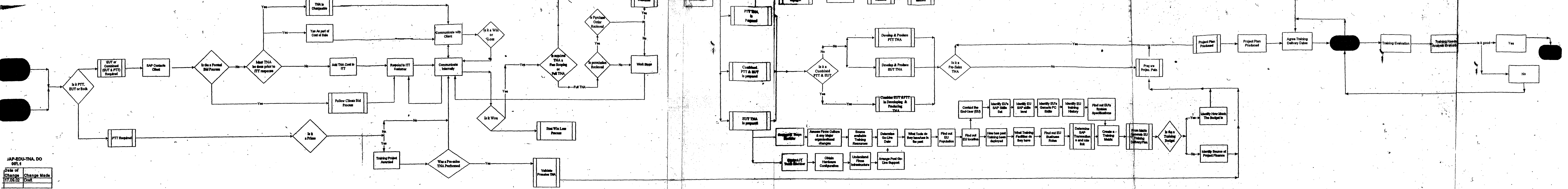
To achieve 'best Practice' in Training Needs Analysis, you must answer 'Yes' or 'positively' to all the above questions.

The stronger the degree, the more accurate your process

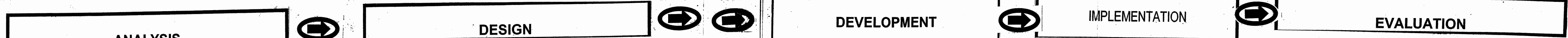
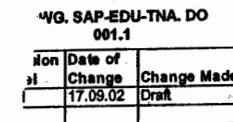
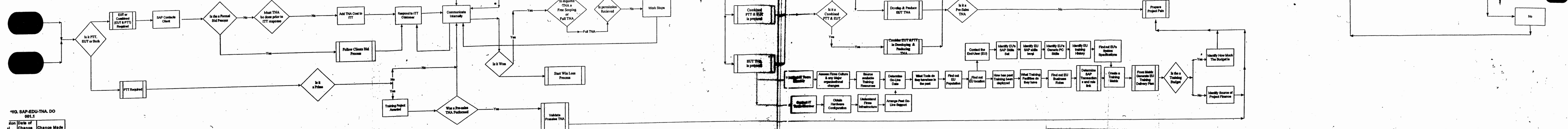
APPENDIX F

Recommended TO-BE Training Needs Analysis Process Map

Education; "TO-BE" Training Need Analysis Process Flow Diagram



& 'best practice' Checklist



- Have you identified what information you will need throughout the other phases?
- Have you carried out a needs assessment?
- Has this analysed knowledge, skills and attitudes?
- Are the any barriers or constraints?
- Have you established the training GAP?
- Have you established goals on the mission of the organisation?
- Have you translated these into measurable training metrics?
- Have you identified the measurable objectives?
- Ask the question why you are carrying out the TNA and or training exercise?
- Will a training solution solve the problem?
- Have you defined success metrics?
- Have you allowed the definition of appropriate measurement goals?
- Have you allowed the definition of questions required for the measurement goal?
- Have you ensured a relationship between the questions defined and the metrics?
- Have done a facilities and events assessment?
- Identify useful and relevant metrics?
- Identify a metrics in the assessment & interpretation of collated data?
- How will you carryout the TNA and or training?

- Have you developed training material?
 - Have you written the course syllabus?
 - Have you developed a course description?
 - Have you established participant selection criteria?
 - Have you established evaluation criteria?
 - Have you written the training objectives?
 - Have you established the primary objectives?
 - Have you established the enabling objectives?
 - Have you selected training materials?
 - Have you selected training methods?
 - Have you identified the days and times from course outline?
 - Have you written a brief description about the activity?
- Have you utilised some or all of the results from analysis phase as input for this phase?

- Have you developed a learning guide?
- Have you developed a checklist?
- Have you developed pre-course questionnaires?
- Have you developed mid-course questionnaire?
- Have you developed trainers' notes?
- Have you developed a presentation plan?
- Have you developed an assessment sheet?
- Have you developed a case study?
- Have you developed a role-play?

- Have you created a positive climate?
 - Have you developed guidance goals?
 - Are you using interactive training techniques?
 - Are you using learning guides and checklists?
 - Are you combining suitable coaching techniques?
- Do you have continuous improvement tools for delivering training?

- Have you implemented a feedback loop?
- Will the feedback loop enable continuous improvement of training?
- Have you evaluated participants' reaction to training?
- Have you evaluated participants learning?
- Have you evaluated participants' on-the-job-performance?
- Have you evaluated the effect of the training?
- Have you evaluated the design of the training?
- Have you evaluated the effectiveness of the training?
- Have you identified aspects of the training that should be strengthened?
- Has the required training met its objectives?

To achieve 'best Practice' in Training Needs Analysis, you must answer 'Yes' or 'positively' to all the above questions.

The stronger the degree, the more accurate your process