Competency-based Training and Assessment in the Workplace

Maurice Robert Curwood

Submitted in total fulfilment of the requirements of the degree of Doctor of Philosophy

October 2004

Faculty of Education
University of Melbourne

Produced on acid-free paper
Abstract

Through the late 1980s and early 1990s, a series of Federal Government papers and major reports called for changes and improvement in the skills formation of the Australian workforce, in an attempt to create a highly skilled and flexible workforce. Training reform was seen as a means of achieving the flexibility and skill levels required for general economic improvement. The Federal Government proposed increased investment in training by industry and government, and the transformation of the training system from a time-based approach to a competency-based approach. A National Training Board was established to assist in the implementation of the reform. The National Training Board perceived the national training reform agenda as a national response to increase the competitiveness and productivity of industry through the implementation of competency-based vocational education and training.

This study is concerned with the competency-based training and assessment (CBTA) systems implemented in Australian enterprises as a result of the national training reform agenda. The purpose of the study is to build and expand the limited knowledge and theory in relation to workplace CBTA systems. The study investigated the systems in three Australian enterprises. It sought to determine why the CBTA systems were implemented; what features were implemented; the factors that influenced the features; the decisions made when planning, structuring and implementing the system; and the impact of the system on the expected outcomes including competitiveness and productivity.

The study used a conceptual framework, influenced by Stufflebeam’s CIPP evaluation model, incorporating four decision-making stages, each of which was impacted upon by the enterprise’s external and internal factors. Within this conceptual framework, the Kirkpatrick Model was used to examine any evidence that the system impacted on the expected outcomes and improved the enterprise’s competitiveness and productivity.

The study used a multiple-case study research strategy in which the three case studies were used on the basis of seeking replication and allowing ‘analytical generalisation’ to a theoretical proposition and not on the basis of seeking a representative sample.

The study findings suggested Australian enterprises do not introduce systems to improve productivity and quality, but are likely to introduce a CBTA system simply because it is the recognised national training system at that time and is promoted by an organisation that is more closely linked with, and aware of, the national training system. Further, the findings suggested the enterprises are unlikely to clearly specify or measure the outcomes required and appeared to gain little value in terms of changed job performance and increased productivity by introducing the system to an experienced workforce. In implementing the CBTA system the enterprises are likely to adopt job-specific competencies based on national
competency standards; are unlikely to consider assessment important, but include it for external requirements; and they implement unique, pragmatic systems, strongly influenced by the enterprise’s specific external and internal factors and based on previous experience.

Finally, the study findings suggested the learning and assessment approaches could be improved to increase the rigour and the effectiveness of workplace CBTA systems.

The study findings raised a number of issues requiring further research to build theory to guide future policy and practice for vocational education and training in Australian companies. They included investigating the reasons companies implement a CBTA system; the development of pragmatic measures of the system’s impact on key business indicators; determining the value of a CBTA system for an experienced workforce; and the importance of retention of competence and refresher training and reassessment in some industries. The study also identified that if the national training strategy is to effectively contribute to improving enterprises’ international competitiveness, then governments and business will need to renew their efforts to convince a broader industry audience of the capacity of a competency-based training system to achieve this outcome.
Declaration

This is to certify that:

(i) the thesis comprises only my original work,

(ii) due acknowledgment has been made in the text to all other material used.

Maurice Curwood
Acknowledgments

I am indebted to two people for their assistance and support in the preparation of this thesis.

I am indebted to my supervisor Professor Patrick Griffin, who provided the opportunity for me to participate in the process and encouraged and assisted me to clarify my thoughts in the early stages. I wish to thank him for his commitment and support and for the expert advice and constructive criticism provided throughout the process, but especially in the final stages.

I am indebted to my wife, Jennifer, who for many years tolerated and supported my part-time study and who once again provided encouragement, support and advice to assist me in the preparation of this thesis.

I wish to thank the three enterprises that agreed to participate and allowed me access to their employees and their sites for the collection of data.

I also wish to thank those employees who volunteered to participate, without whom the study could not have been completed.
Chapter 6 ............................................................................................................................... 79
Case Study: Company A ......................................................................................................... 79
   The Company ..................................................................................................................... 79
   The Context ....................................................................................................................... 80
   Description of the Case ................................................................................................. 86
   Explanation and Building of Knowledge ..................................................................... 129
Chapter 7 .................................................................................................................................. 141
Case Study: Company B ......................................................................................................... 141
   The Company ..................................................................................................................... 141
   The Context ....................................................................................................................... 142
   Description of the Case ................................................................................................. 146
   Explanation and Building of Knowledge ..................................................................... 202
Chapter 8 .................................................................................................................................. 213
Case Study: Company C ......................................................................................................... 213
   The Company ..................................................................................................................... 213
   The Context ....................................................................................................................... 214
   Description of the Case ................................................................................................. 219
   Explanation and Building of Knowledge ..................................................................... 256
Chapter 9 .................................................................................................................................. 271
Conclusion .................................................................................................................................. 271
   The Study ......................................................................................................................... 271
   Comparing the Cases ..................................................................................................... 272
   Explanation and Building of Knowledge ..................................................................... 273
   Developing the Theory ................................................................................................. 292
   Implications for Future Research, Policy and Practice ............................................. 294
Bibliography ............................................................................................................................. 303
Appendices ............................................................................................................................... 313
**List of Tables**

<table>
<thead>
<tr>
<th>Table</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Table 2.1</td>
<td>Description of the activity in each of the four decision-making stages (Stufflebeam, 2000)</td>
<td>11</td>
</tr>
<tr>
<td>Table 4.1</td>
<td>Relationship between the Primary Research Questions and the Subsidiary Research Questions</td>
<td>46</td>
</tr>
<tr>
<td>Table 4.2</td>
<td>Relationship between the Four decision-making stages of the Conceptual Framework and the Subsidiary Research Questions</td>
<td>47</td>
</tr>
<tr>
<td>Table 5.1</td>
<td>Kirkpatrick’s Four Level Model</td>
<td>54</td>
</tr>
</tbody>
</table>
## List of Figures

<table>
<thead>
<tr>
<th>Figure</th>
<th>Title</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Figure 2.1</td>
<td>Conceptual Framework for the Implementation of a CBTA system by an Enterprise.</td>
<td>15</td>
</tr>
<tr>
<td>Figure 5.1</td>
<td>Planning Stage Nodes</td>
<td>71</td>
</tr>
<tr>
<td>Figure 5.2</td>
<td>Structuring Stage Nodes</td>
<td>72</td>
</tr>
<tr>
<td>Figure 5.3</td>
<td>Implementing Stage Nodes</td>
<td>73</td>
</tr>
<tr>
<td>Figure 5.4</td>
<td>Recycling or Outcome Stage Nodes</td>
<td>74</td>
</tr>
<tr>
<td>Figure 5.5</td>
<td>External Factor Nodes</td>
<td>75</td>
</tr>
<tr>
<td>Figure 5.6</td>
<td>Internal Factor Nodes</td>
<td>76</td>
</tr>
</tbody>
</table>
Introduction

The National Training Agenda

Through the late 1980s and early 1990s, a series of Federal Government papers and major reports called for changes and improvement in the skills formation of the Australian workforce and in the training system (Dawkins, 1987, 1988, 1989; Finn, 1991; Kirby, 1985; Lundberg, 1994). The initial calls for change resulted from the attempts to make the Australian workforce highly skilled and flexible, in order to meet the new demands and new challenges, and to make Australian industry more competitive (Dawkins, 1988). This was to be achieved through the restructure of the way in which work was done (Vocational Education Employment and Training Advisory Committee (VEETAC), 1992).

The Structural Efficiency Principle and the associated award review and restructuring became the driving forces for change in the Australian workforce. The approaches adopted required the development of provisions for skill related career paths, multi-skilling and broad-banding within industrial awards (Vocational Education Employment and Training Advisory Committee (VEETAC), 1992).

At the same time there was a shift towards training reform as a means of achieving the flexibility and the skill levels required to achieve general economic improvement (Dawkins, 1988; Lundberg, 1994). As part of the attempt to raise the skill levels and bring about economic improvement, the Federal Government proposed increased investment in training by industry and Government and the transformation of the training system from a time-based approach to a competency-based approach (Dawkins, 1988). Further, during this period there was a decline in the demand for young school leavers as full time workers and an increasing demand for people with the general and vocational skills necessary to perform effectively in the workforce (Lundberg, 1994). As a result, the need for training reform was now also being driven by the requirement to better prepare young people for employment and to enable them to function effectively as citizens (Dawkins, 1987; Finn, 1991; Kirby, 1985).

Therefore the requirement to upgrade and improve education and training was strongly linked with the need to make Australian industry and the supporting structure more internationally competitive and thereby to improve the country's export capacity (Dawkins, 1987, 1988; Lundberg, 1994; Vocational Education Employment and Training Advisory Committee (VEETAC), 1992).
The issue of training reform was both a Federal and States matter and the joint response by these governments was to establish a series of reforms in vocational education known as the training reform agenda. Federal, State and Territory Ministers of education and employment, through special conferences in April 1989 and November 1990 and subsequent meetings, adopted six national goals in 1992. These six goals were to form the basis for the national training agenda (Lundberg, 1994). Lundberg (1994) proposed that the “national training agenda had five main themes:

- nationally consistent competency-based training;
- national recognition of competencies, however attained;
- an open national training market;
- fair participation in vocational education and training
- an integrated entry-level training system.” (p. 1) (Lundberg, 1994)

In 1990, the Federal, State and Territory Ministers established a National Training Board (NTB) to assist in the implementation of the reform. A significant role for the NTB was to set national skill standards and to approve the competency standards developed by approved Competency Standards Bodies (Lundberg, 1994; Vocational Education Employment and Training Advisory Committee (VEETAC), 1992). The NTB was to guide and provide assistance with the implementation of the training reform agenda and specifically, the establishment of a nationally consistent competency-based training system (Vocational Education Employment and Training Advisory Committee (VEETAC), 1992).

The NTB perceived the national training reform agenda as a “co-operative national response to economic and industry restructuring, including labour market imperatives and emerging requirements arising from workplace reform. The overriding aim of the training reform agenda is to increase the competitiveness and productivity of Australian industry through industry responsive reform of the vocational education and training system” (p.4) (National Competency Standards-Policy and Guidelines, 1992).

Further, that “Higher productivity and quality in goods and services is [sic] dependent in large measure on a nation’s ability to produce both well trained workers and organisations which enable employees in all areas and levels of the organisation to contribute to their potential” (p.7) (National Competency Standards-Policy and Guidelines, 1992).

In 1992, acting in its role of guiding and providing assistance with the implementation of the training reform agenda, the NTB established and published its policy and guidelines. This indicated that the competency standards must reflect industry’s current and future needs and should include problem solving, team work, communications, and the underlying skill and knowledge to enable competency to be demonstrated in new and unexpected situations (National Competency Standards-Policy and Guidelines, 1992).
Statement of the Problem

The NTB clearly linked the implementation of competency-based vocational education and training with the concept of improved competitiveness and productivity. Industry's implementation of the training reform agenda and the competency-based training approach would be influenced by this view. Griffin (1995) noted "Competency standards currently being developed by industry in Australia appear to be based on the assumption that an identification of job tasks and skills, as well as the specification of performance, will lead to productivity improvements. Moreover, training directly aimed at these competency standards will directly affect performance on the job, and hence improve productivity" (p.36).

The NTB guidelines emphasised the workplace nature of the competency standards, but they also introduced a broader notion of competency than the competent performance of the current job function. The guidelines stated "The concept of competency focuses on what is expected of an employee in the workplace rather than on the learning process and embodies the ability to transfer and apply skills and knowledge to new situations and environments." (p.29) (National Competency Standards-Policy and Guidelines, 1992).

In more recent years, the fundamental importance of the workplace as a site for learning has been reasserted and the development of vocational education and training as an enterprise or industry based system has been given added relevance and immediacy by Government initiatives and policy (Candy & Matthews, 1998; Mulcahy & James, 1999). However, relatively little research has been directly related to workplace learning and workplace competency-based assessment (Boud, 1998; Docking, 1998).

In relation to the implementation of competency-based training systems in both educational institutions and the workplace, Lundberg (1994) stated that the effective implementation of the competency-based training reform would require pilot projects to develop assessment arrangements which are appropriate to the needs of particular industries. Moran (1992) expressed concern that unless the issue of assessment was addressed, both on and off the job, then powerful forces for change had been unleashed without the instruments available to know whether the change had worked.

How have these competency-based training and assessment (CBTA) systems been implemented in the workplace? What are these external and internal forces for change that are shaping the implementation of CBTA systems in the workplace and what are the outcomes of their implementation?

Clearly, without research that attempts to find out why it has been implemented, what has been implemented, how it has been implemented and what are the outcomes, we will never know whether the powerful forces which were unleashed have worked.
Increasingly, CBTA systems are being implemented in the Australian workplace. Yet little Australian research appears to have been undertaken into why a competency-based system was implemented, what was implemented; how systems were implemented; what decisions were made in regard to the implementation; why these decisions were made; and what were the outcomes?

Little Australian research has been undertaken to determine whether an enterprise’s expected outcomes have been achieved through a CBTA system implementation, or whether the overriding aim of the training reform agenda, to increase the competitiveness and productivity of Australian industry, as expressed by the NTB, was achieved through this implementation (Docking, 1998; Griffin, 1995). Recent Australian research into return on investment in training is beginning to address this latter issue (Moy & McDonald, 2000; Smith, 2001).

Nevertheless, we do not know how the ‘powerful forces that have been unleashed’ have shaped the implementation of a CBTA system in an Australian enterprise or whether it has worked.

**The Construction of Knowledge**

There appears to be a need to increase the knowledge and understanding of the CBTA systems being implemented in Australian enterprises (Mulcahy & James, 1999). There is a need to know about and understand why enterprises have implemented competency-based systems; what features have been implemented; the decisions made by enterprises when implementing these systems; the reasons for these decisions and the factors which influenced them; the expected outcomes and the impact of the implementation of such systems on the enterprises’ competitiveness and productivity.

Knowledge and understanding about such things as the needs of enterprises, the internal and external factors which influence their decisions when implementing systems, and the impact of implementing such systems, will assist researchers, industry planners and policy makers to better understand how their plans and policies are being implemented in the workplace and the factors that influence this implementation. Accordingly, this will assist them to plan, develop and implement systems, which can be adopted in the workplace environment of an enterprise, and achieve the planned outcomes. This could lead to the development and implementation of policies and plans on a national, state and enterprise basis to provide enterprise based vocational education and training systems which achieve the planned outcomes effectively and efficiently.
**Purpose of the Study**

The purpose of the study is to build knowledge and theory in relation to the manner in which CBTA systems are implemented in workplaces.

By examining cases the study will investigate why specific enterprises have implemented CBTA systems; what features have been implemented; the factors that influenced the features; the decisions made by these enterprises when implementing these systems; and the impact of the implementation of the system on the expected outcomes including the enterprises' competitiveness and productivity. The insights gained will add to the process of developing theories about the training needs of enterprises, the factors which influence the decisions of enterprises when implementing systems and the impact of implementing such systems.

**Organisation of the Thesis**

The thesis has been organised into nine chapters. This chapter introduces the research problem through a brief background to the factors which influenced the reform of training provision in Australia, the development of a national training agenda and the establishment of a National Training Board to facilitate reform in the vocational education and training system and the Australian workplace.

The second chapter identifies the introduction of a CBTA system as an intervention, which brings about change within an organisation. The chapter explores the models for change in the literature and develops a Conceptual Framework, using a modified form of the four stage decision-making model proposed by Stufflebeam, within which the research study was developed.

The third chapter reviews a selection of the literature related to the implementation of CBTA systems in the workplace. The chapter explores the issues and challenges in the process of implementing change into the workplace, the issues to be considered in determining the features of the CBTA system, the internal and external factors which influence the process of the intervention and the features of the CBTA system, and the impact of this intervention in the workplace.

The fourth chapter identifies the research questions that arise out of the purpose of the study and the literature review. The chapter then develops a set of study propositions associated with the implementation of a CBTA system in an Australian workplace to guide the direction and development of the study and the data collection. Finally, the chapter links the research questions to the conceptual framework with its four decision-making stages and identifies subsidiary research questions which, together with the study propositions, will assist to guide the study and the data collection process.
The fifth chapter reviews the literature to develop the methodology for the study and provides an argument for adopting a multiple-case study approach as the research strategy and develops a research methodology based on the Conceptual Framework. The chapter then outlines the data collection approach, the instruments used to collect the data and the management of that data. Finally the chapter outlines the data analysis approach and the procedures used to analyse each case.

The sixth, seventh and eighth chapters each provide a case study and its analysis for one of the three companies used in the study.

The ninth chapter provides a summary of the study, tests the study propositions against the data, identifies the themes and concepts in the case studies, and uses the propositions and the themes and concepts that have emerged from the three case studies to generalise to an overall proposition to build and expand the theory in relation to the implementation of CBTA systems in Australian enterprises. Finally, the chapter discusses the implications of the findings for future research, policy and practice.
The Conceptual Framework

Implementation of a Program or an Intervention

At a basic level, this study is concerned with implementation of a training program or system by an enterprise, and the outcomes of that implementation. As such, the implementation of that training program or system can be considered to be an intervention of change within an organisation or enterprise.

This study is concerned with knowing about and understanding that intervention and its impact. It aims to determine why enterprises implemented a competency-based training and assessment system (CBTA); what features they implemented; the factors that influenced the features; the decisions made by enterprises when implementing the system; and the impact of the implementation of the system on the expected outcomes including the enterprises’ competitiveness and productivity.

Developing a Conceptual Framework

In developing a conceptual framework for the study, insight can be gained from the literature on implementing change as well as that on implementing specific programs or activities.

Senge et al. (2002) attempted to draw together a framework which would allow the systematic organisation of the comments and experiences of ‘organizational change explorers’ into a coherent whole. They proposed that the current management literature is full of practical advice and suggestions, but provided no ready means for effectively organising the diverse insights (Senge et al., 2002). Evidence for this proposition can be found in the literature, such as, the ‘Ten Commandments’ for executing change (Kanter, Stein, & Jick, 1992) and fourteen guiding principles for change management (Graetz, Rimmer, Lawrence, & Smith, 2002).

The framework proposed by Senge et al. (2002) identified ten challenges or sets of forces that oppose organisational change. These ten challenges were classified into three broad areas in the framework, ‘The Challenges of Initiating’, ‘The Challenges of Sustaining’ and ‘The Challenges of Redesigning and Rethinking’. The approach taken by Senge et al. was to initiate the development of a framework to allow the effective organisation of diverse data and insights over time, to assist in the knowledge building or theory building for implementing change.
The intention of the framework was to classify the barriers or challenges that would be encountered during the implementation of change, to identify the strategies for overcoming these challenges and to build knowledge and theory on organisational change. As such, it was not proposed as a framework that identified the processes or stages through which an intervention was developed and introduced. It was a framework to collect and classify data over a period of time, which would then assist in building up the theory and knowledge that could perhaps lead to a framework of the stages of organisational change. However, it did develop the concept of three processes or stages in organisational change relating to initiating, sustaining, and redesigning and rethinking. But, the order of these stages was not fixed, as Senge et al. (2000) proposed that each organisation would encounter the challenges in their own sequence.

Kanter et al. (1992) proposed a ‘Big Three’ Model of change in which they identified the key elements that must be understood to master change. The basis of the model was that organisations were seen as groups of activity with common elements that allowed activities and people to be grouped and treated as an entity (Kanter et al., 1992). As the activities changed and people changed and took on new activities the organisation was said to be in motion with some central thrust and directional tendency (Kanter et al., 1992).

The model identified three types of movement: the motion of environment, which was macro evolutionary; the motion of the parts relative to one another, which was micro-evolutionary; and the struggle for power and control, which focused on political dimensions and revolutionary activity. These three levels of motion took on three basic and corresponding levels of change. These were changes in identity of the organisation or entity, coordination changes for the internal parts and changes in control. These three levels of change were considered to roughly correspond to three action roles: the change strategist whose province was the macro-evolutionary aspects and developed the concept; the change implementor which involved project management and execution rather than conception; and finally the change recipients who were those who were strongly affected by the change and required to sustain it. Kanter et al. (1992) proposed that implementing organisational change was generally modelled as a three stage process and identified models by Lewin (1947) Beckhard and Harris (1977), Beer (1980), Kanter (1983), Tichy and Devanna (1986) and Nadler and Tushman (1989) which they claimed all included a similar three stage process. A model of change proposed for multinational companies (Martin, Beaumont, & Pate, 2003) included a similar three stage process to those identified by Kanter et al. (1992). The three stage processes that were identified generally involved a stage of recognising the need to change and conceptualising and planning the required change, a stage of implementing the plan and a stage of consolidating the new arrangements into the ongoing activities of the organisation. These three stage processes did not include the ‘stage’ of ‘reorganising and rethinking’ proposed by Senge et al. (2000), but included the other two ‘stages’ proposed by them.
Colenso (2000) outlined the ‘Kaisan’ systems approach to change and identified four areas of an organisation in which change can occur, these being organisational process, structure, hierarchy and people. Colenso (2000) proposed a four stage cycle of activity for change with the stages: planning, doing or implementing, checking for outcome and acting to ensure that the improvement or change is maintained. These stages were consistent with the three stage processes identified by Kanter et al. (1992) except that there was a checking or evaluation stage. A four stage process proposed by Fullan also included an outcome stage (Morrison, 1998). The four stages were initiation, implementation, continuation and outcome. Similarly, Stufflebeam et al. (1985) proposed a four stage process for implementing a program which included the initial stages of conceptualising, planning and implementing, but also included an evaluation or recycling stage.

Research has shown that in the implementation of change in an organisation, decisions were made based on an evaluation of the progressive outcomes (Frantz, 1998; Gephart, 1998). This progressive evaluation might change the implementation strategies to achieve the expected outcome, or might even cause a change in the planned outcomes to ensure that the change was implemented (Frantz, 1998). Organisations reacted to their environment and the impact of previous strategies with emergent or changing strategies which aligned and realigned the change and the organisation as the change was implemented (Beach, 1990; Graetz et al., 2002; Mento, Jones, & Dirndorfer, 2002; Mintzberg, 1987; Senge et al., 2002). The inclusion of a fourth stage or process of evaluation or recycling in a decision-making framework as proposed by a number of the models is consistent with this concept. However, the research suggested that the evaluation and recycling was not a discrete decision-making stage occurring when all other stages have been completed, but that it was also an ongoing recycling stage based on the progressive outcomes, which occurred within and throughout all the other decision-making stages.

Stufflebeam et al. (1985) associated four decision-making stages with the implementation of an educational program. These four decision-making stages were categorised as the planning decisions, the structuring decisions, the implementing decisions and the recycling decisions (Popham, 1988; Stufflebeam & Shinkfield, 1985). Stufflebeam directly related the study, or evaluation, of these four decision-making stages of implementation to four interrelated types of evaluation: Content evaluation (planning decisions), Input evaluation (structuring decisions), Process evaluation (implementing decisions) and Product evaluation (recycling decisions) (Stufflebeam & Shinkfield, 1985). These four interrelated types of evaluations formed the basis for Stufflebeam’s CIPP evaluation or accountability model (Stufflebeam, 2000).

Finally, a six stage problem solving model was proposed by Bank (1992) which also included an evaluation stage as the final stage (Morrison, 1998). However all the stages identified in this model are represented in the Stufflebeam four stage decision-making model. Stages one
and two, ‘Identifying the exact problem’ and ‘Identifying the cause of the problem’ are incorporated by Stufflebeam in the planning decision stage, and stages three and four, ‘Generating possible solutions’ and ‘Choosing the most appropriate solution’ are incorporated by Stufflebeam in the structuring decision stage.

The literature identified two competing theories of change; the planned change model and the emergent learning approach (Gephart, 1998; Mintzberg, 1987; Morrison, 1998). A planned change model usually had a structured framework commencing with a clear vision and the setting of goals, or identifying the expected outcomes, and a planned approach to achieving the change and the outcomes. An emergent learning approach employed an action framework in which a powerful, but emerging vision was relied upon to guide the change with the implementation dependent on the continual feedback and readjustment of strategies and actions. In this process it was expected that the goals would evolve (Gephart, 1998).

Research to determine which model best described the change process in a number of organisations indicated that this depended on the position of the respondent in the organisation (Gephart, 1998). This research also showed that managers often started the process with a planned change model, but found that an emergent learning approach was adopted as the implementation process proceeded. However, overall, the research suggested that while respondents might reconstruct a ‘mental model’ of a planned approach to describe or relate the events that occurred, what had actually happened might best be described by an emergent learning approach.

Graetz et al. (2002) also noted the diversity in the change process and its change path in Australian organisations due to the different strategies, programs and tools that managers used in organisational change. They explained this diversity by the particular blend of personal, organisational and environmental characteristics in organisations. In exploring this diversity they identified and compared two alternative schools of thought on change process models. The contingency or situational approach to change and the systems approach which was more structured and where change strategies must share common essential ingredients (Graetz et al., 2002). These alternative schools of thought were consistent with the planned change approach and the emergent learning approach.

A framework based on four decision-making stages

As discussed, many different models of change were proposed in the literature, but the four decision-making stages proposed by Stufflebeam incorporated the features identified in the stages of most of the models. Based on this discussion, it is proposed in this study that in introducing a CBTA system an enterprise will progress through the stages represented by the four decision-making stages identified by Stufflebeam (2000). Enterprises might identify these stages in a different form and use them to different degrees, employing a range of strategies and techniques. However, it is proposed that the stages of development through
which an enterprise progresses in introducing its CBTA system can be conceptually characterised by the planning decisions, structuring decisions, implementing decisions and recycling decisions stages identified by Stufflebeam (2000). However, it is also proposed that the concept of the recycling decisions stage, as discussed above, is not just a discrete decision-making stage occurring only when the other stages have been completed and an overall outcome achieved. It is proposed that ongoing recycling decisions occur based on the progressive ‘outcomes’. Further, it is proposed that a progressive ‘outcome’ could be in a number of forms. It could be identified as an outcome resulting from planning, structuring and implementing decisions on a ‘part’ of the CBTA system. It could also be identified as perceiving or realising the consequences of a decision made in the planning decision stage or the structuring decision stage prior to any implementing decisions and implementation. In either case, an assessment of the progressive outcome has caused a recycling decision to be made. In this sense, the concept of the recycling decision-making stage is seen as an ongoing reviewing and recycling process, as indicated in the table below, to keep the process on track. That is, the recycling decision-making stage represents ongoing reviewing and recycling decisions based on the progressive outcomes, which occur within and throughout all the other decision-making stages as well as when all the other stages have been completed.

The following table describes the activity that occurs in each of the four decision-making stages identified by Stufflebeam.

<table>
<thead>
<tr>
<th>Decision-making Stages</th>
<th>Description of the activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Planning Decisions</td>
<td>Assesses needs, problems and opportunities as the bases for defining goals and priorities and judging the significance of outcomes.</td>
</tr>
<tr>
<td>Structuring Decisions</td>
<td>Assesses alternative approaches to meeting needs as a means of planning programs and allocating resources.</td>
</tr>
<tr>
<td>Implementing Decisions</td>
<td>Assesses the implementation of plans to guide activities and later to help explain outcomes.</td>
</tr>
<tr>
<td>Recycling and Outcome Decisions</td>
<td>Identifies intended and unintended outcomes both to keep the process on track and determine effectiveness.</td>
</tr>
</tbody>
</table>

Compared with the three stage models, the proposed framework based on four decision-making stages recognises that organisations are in a state of ongoing flux and movement (Frantz, 1998; Graetz et al., 2002; Senge et al., 2002) throughout the change process. The inclusion of a recycling and outcomes stage in the proposed conceptual framework recognises the state of ongoing flux and movement and captures the stage of evaluating, rethinking and changing of plans and strategies as the new program is being introduced and progressive outcomes are identified. In this manner, the model has the capacity to account for both the planned change model and the emergent learning approach.
The structure of the conceptual framework appears to promote a systems approach to implementing a program with its four identified stages. However, it doesn’t specify any particular strategies that should be used in each stage, and the inclusion of the concept of recycling decisions occurring within and throughout the other stages, also allows it to describe the emergent learning approach or contingency approach.

Therefore the basic conceptual framework proposed for this study is initially based on the four decision-making stages: the planning decisions, structuring decisions, implementing decisions and recycling decisions identified by Stufflebeam (Popham, 1988; Stufflebeam, Madaus, & Kellaghan, 2000; Stufflebeam & Shinkfield, 1985). However, it is emphasised that, unlike the model proposed by Stufflebeam for evaluation, the recycling decisions are also based on progressive outcomes and not just the outcomes when all the other stages have been completed.

Features of CBTA systems

In considering competency-based training and assessment systems (CBTA), five features were considered as basic to competency-based training (Harris, Guthrie, Hobart, & Lundberg, 1995). These were:

- a specification of learning outcomes in measurable terms;
- the prior determination of these outcomes through the analysis of the arena and context in which they are to be demonstrated (such as an occupation or occupational area);
- the measurement of these outcomes as being the criteria of the success of the learning process;
- a learning process that emphasises the attaining of the specified outcomes to the stated standards rather than the length of time or mode of learning;
- the recognition of prior learning by crediting that learning rather than demanding a repetition of it (p.30) (Harris et al., 1995).

Incorporating the features of a CBTA system into the conceptual framework

It is proposed that the features identified by Harris et al. (1995) could be represented using the following categories for a CBTA system:

- the competency ‘definition’, scope and complexity;
- the process to recognise current competencies;
- the assessment processes and instruments; and,
- the learning approaches.

In the implementation of a CBTA system it is proposed that planning, structuring, implementing and recycling decisions will be made in relation to each of these features. As a
result, the basic conceptual framework needs to be structured to reflect that it is about the introduction of a CBTA system. Therefore, these features will be incorporated into each of the four decision-making stages of the conceptual framework as shown in Figure 2.1 below.

Incorporating external and internal factors into the conceptual framework

Graetz et al. (2002) stated that although there often is disagreement about the cause of a change, there is general agreement that the stimulus for a change can be categorised by its source. Although it was not always the case, it is now recognised that the stimulus for change in an organisation may originate from a source within the enterprise or from an external source (Graetz et al., 2002). Internal factors which drive the requirement for change may originate from business strategies and management decisions or from the characteristics or requirements of the employees (Colenso, 2000; Graetz et al., 2002). The internal factors may include changes in operations, such as resourcing levels, technology, work practices, work conditions, customer demand, supplier services, and also include equipment performance and maintenance periods, attendance patterns, employee acceptance and reaction, industrial relations and overall skill losses due to loss of skilled employees (Cherrington, 1994; Graetz et al., 2002; Mulder, Nijhof, & Brinkerhoff, 1995; Prais, 1995; Pritchard, 1995; Silverman, 1996; Strickland, 1998). The external factors may include global economic changes, deregulation of the industry, changing trade arrangements between countries, new regulation and legislative requirements, changes in the labour market, changes in market requirements or competition within the industry (Capelli, Katz, Knoke, Osterman, & Useem, 1997; Colenso, 2000; Graetz et al., 2002).

These external and internal factors will impact on the decision-making in the planning, structuring, implementing and recycling stages of the CBTA system intervention, and also on the enterprise’s performance over time (Graetz et al., 2002; Hedges, 1997; Mulder et al., 1995; Phillips, 1998; Strickland, 1998). Researchers have also acknowledged the importance of incorporating both macro (organisational) and micro (group and individual) internal factors into training research and planning (Goldstein, 1989). Ignoring these external and internal factors is to ignore the environment in which the program is to be implemented and therefore its successful implementation (Darrah, 1996).

Therefore, any conceptual framework that involves the intervention of change must acknowledge the impact these factors have on the CBTA system intervention at each decision-making stage, and also on the overall performance of an organisation (Brinkerhoff, 1998; Hedges, 1997; Phillips, 1998). Consequently, the conceptual framework must include consideration of the external context and its impact on the decisions made in each of the four decision-making stages and the outcome of those decisions. The conceptual framework must also acknowledge that the CBTA system would be developed within the context of a unique
enterprise and would be influenced by all the internal factors of that enterprise throughout its development.

**The Conceptual Framework**

The conceptual framework proposed for this study is based on four decision-making stages, including the concept that recycling decision-making is based on the progressive outcomes, as well as the outcomes when all the other stages have been completed, to enable the model to account for both the planned change model and the emergent learning approach. Within each decision-making stage of this conceptual framework, as argued above, the four features of a CBTA system are incorporated to identify the decisions made in relation to each feature. That is, each of the planning, structuring, implementing and recycling decision-making stages incorporates the four features of a CBTA system.

Finally, this conceptual framework, with its four decision-making stages, acknowledges the external and internal factors which shape the decisions during each of the stages and will shape the final outcome. This conceptual framework is shown diagrammatically in Figure 2.1 below.
Figure 2.1: Conceptual Framework for the Implementation of a CBTA system by an Enterprise.

Enterprise Context

External Factors

Internal Factors

Planning decisions
- the competency ‘definition’, scope and complexity;
- the process to recognise current competencies;
- the assessment processes and instruments; and,
- the learning approaches.

Structuring decisions
- the competency ‘definition’, scope and complexity; etc...

Implementing decisions
- the competency ‘definition’, scope and complexity; etc...

Recycling decisions
- the competency ‘definition’, scope and complexity; etc...

Planning decisions
- the competency ‘definition’, scope and complexity;
- the process to recognise current competencies;
- the assessment processes and instruments; and,
- the learning approaches.

Structuring decisions
- the competency ‘definition’, scope and complexity; etc...

Implementing decisions
- the competency ‘definition’, scope and complexity; etc...

Recycling decisions
- the competency ‘definition’, scope and complexity; etc...
Implementing a Competency-based Training and Assessment System

This chapter reviews a selection of the literature related to the implementation of competency-based training and assessment (CBTA) systems in the workplace. The chapter explores the issues to be considered in determining the features of the CBTA system. It also explores research on measuring the impact of the intervention of a CBTA system, the issues and challenges in the process of implementing change into the workplace and the internal and external factors that influence a CBTA system intervention, its process and features.

The implementation of a CBTA system in a workplace can be considered as a change or an intervention in the activities of the workplace. It was proposed in Chapter 2 that the conceptual framework, with its four decision-making stages and the external and internal factors, could describe the change process for the implementation of the CBTA system. Consistent with this proposition, this chapter is structured so that the main headings relate directly to the conceptual framework.

The main headings are based on the four decision-making stages of the conceptual framework and the external and internal factors that are likely to influence the decisions made in those stages. The chapter is divided into three sections.

The first section lists the first three decision-making stages of the conceptual framework, that is, planning, structuring and implementing, under the one heading and considers the issues related to planning, structuring and implementing the features of a CBTA system.

The second section considers the recycling or outcome decision-making stage of the conceptual framework and the issues associated with measuring the outcomes and the effectiveness of the implementation.

Finally, the third section considers the literature related to change and the internal and external factors that might influence the decisions at each decision-making stage.

Planning, Structuring and Implementing

Kanter et al. (1992) argued that attempts to bring about changes and to intervene in the activities of an organisation were brought about because there was a view among one or more people associated with the organisation that the organisation could do better. They
argued that the stimulus for this view might come from an external source or from an internal source.

This raises a number of questions. Why does an enterprise implement a CBTA system? What needs and problems prompted it to wish to change from its current situation and implement a CBTA system?

This study is concerned with investigating enterprises that have decided to implement a CBTA system to satisfy their needs and to achieve the outcomes required. The planning, structuring and implementing decision-making stages in this study are concerned with the issues associated with the introduction of a CBTA system in the workplace. The following section reviews the literature in relation to, and under the headings of, the four features of a CBTA system identified in the decision-making stages of the conceptual framework.

Features of a CBTA System

The competency ‘definition’, scope and complexity

The competency ‘definition’, scope and complexity used in a workplace is of interest, particularly the extent to which it might satisfy the stated objectives for implementing a CBTA system and the extent to which it reflected what the workplace intended to implement. The NTB, while not directly specifying a competency definition, indicated that the competency standards must reflect industry’s current and future needs and should include problem solving, team work, communications, and the underlying skill and knowledge to enable competency to be demonstrated in new and unexpected situations (National Competency Standards–Policy and Guidelines, 1992). Competency had also been defined as the performance of specified skills in the workplace at an acceptable level, organising one’s tasks, responding and reacting appropriately when things go wrong, fulfilling a role in the scheme of things at work and transferring skills and knowledge to new situations (Hager, Athanasou, & Gonczi, 1994). These definitions identified that the competency standards must be sufficiently broad to reflect the current and future needs of industry and should encompass higher order competencies such as problem solving, team work, communications, and the underlying skill and knowledge to enable competency to be demonstrated in new and unexpected situations. They also indicated that an acceptable level of performance is determined in the actual workplace. This raises the question of what level of performance is expected in the workplace? How do enterprises decide on the level or standard of performance in their enterprise?

Early in the implementation of competency-based training, a survey of 350 Australian enterprises showed that 75% of the 199 medium to large enterprises who responded, considered they were using a competency-based approach to training, but most of these were not interested in using national competency standards (Allen Consulting Group, 1994).
Although the survey report also noted that the responses significantly over-represented those actually involved (Allen Consulting Group, 1994) with the national training reform agenda, which included the provision of competency-based training. However, the survey had not identified why the enterprises had introduced a competency-based approach or the basis on which the enterprises had decided on the level of performance or competence required. At a later stage, when national competency standards had been developed for most industries, focus groups comprising representatives from training providers and industry training advisory bodies reflected that many enterprises were still looking for the achievement of learning outcomes rather than competence related to industry standards (Foster, 1998). That is, the enterprises were focussing on the individual’s achievement of learning outcomes, which was an assessment of what had been learnt from a training program, rather than performance on the job. Although the learning outcomes were generally based on competencies, they did not involve an assessment of performance at a specified standard in the workplace.

Cornford (2000) asserted that the implementation of competency-based training was flawed and that there was little take up or understanding of the concept within enterprises in this early period. He used empirical research published in 1995 and 1996 to support this assertion (Cornford, 2000). However the research did not survey a broad sample of enterprises nor was it sufficiently extensive to support his claim on the take up within enterprises. A national survey of 195 companies, taken at a later time (Mulcahy & James, 1999) across a wide range of industry sectors, indicated that 82% of the companies surveyed (particularly those in manufacturing, 92%) used national competency standards and a high proportion augmented these with enterprise specific competencies. This would suggest that the implementation process has been a slow one and the enterprises were slowly adopting the thinking and practices associated with competency standards developed at both a national and enterprise level.

However, the national survey and intensive case studies of eight companies by Mulcahy and James (1999) showed most of these companies had a concept of competency which was limited to performing job-specific tasks in the workplace to the standard required. Few extended their concept to include higher order competency, such as problem solving, team building, communications and the development of the underlying skill and knowledge to enable competency to be demonstrated in new and unexpected situations as proposed by the NTB definition (Mulcahy & James, 1999). The study showed that the thinking in enterprises was about the development of competencies that were specifically job related and enterprises had not planned for the acquisition or development of higher order competencies.

Concern had been expressed by educationalists in the U.K. about the shift of emphasis to workplace learning and assessment and the potential development of a narrow concept of competence (Jessup, 1991). Many educationalists feared this shift would result in a narrow concept of competence based upon the immediate job requirements. A trend was evident
which showed industries had established statements of competence which were narrow and reflected the narrow jobs people often performed in specific enterprises (Jessup, 1991). A similar conclusion was drawn from observing companies in Australia. Mulcahy and James (1998) concluded that: “As it is implemented in many workplaces, competency-based training tends to overemphasise the routine, visible aspects of work, but is weak in the areas most valued in a learning organisation - flexibility, responsiveness, critical thinking, improvement and innovation” (p.6). Further, they argued that competency-based training in the workplace was in danger of only developing competence in site-specific skill and knowledge, and while competency-based training showed positive outcomes for routine problem-solving, it provided a relatively limited contribution to problem solving of a non-routine or contingency nature (Mulcahy & James, 1998)

National industry competency standards, based on the NTB guidelines, were expected to generally encourage the development of higher order competencies and the ability to transfer skills and knowledge to new situations. Has the specification of national competency standards encouraged enterprises to broaden their thinking and incorporate higher order competencies in their CBTA systems? Mulcahy and James (1999) believed that there was scope for an enterprise to use these national industry standards and to interpret them in a creative manner to suit their own purposes. However, they believed that enterprises were more concerned about developing specific work procedural knowledge and skills rather than facilitation skills, supported by the knowledge which underpins the capacity to develop solutions to particular problems and other higher order competencies such as communication, team work and conflict resolution (Mulcahy & James, 1999)

The national industry competency standards had the potential to encourage a broad approach. However, the adoption of a broader approach would depend on whether an enterprise adopted these standards and, if so, how the enterprise interpreted and implemented them. Have enterprises adopted the national competency standards for their industry and, if so, how have they used and interpreted the competency standards?

It is expected that when implementing CBTA systems, enterprises have adopted a narrow definition of competence, which related directly to their concept of competency development to perform job-specific tasks. Consistent with this, it is expected that an enterprise would have adopted competency standards with a low level of complexity, using a narrow, pragmatic and job-specific approach, and given little attention to including higher order competencies.

The process to recognise current competencies

Docking (1998) found that recognition of prior learning (RPL) attracted little interest from researchers. Little is known about whether a recognition of prior learning (RPL) or a
recognition of current competencies (RCC) process has been implemented by Australian enterprises in their CBTA systems. Further, little is known about the structure used for such a process or the reason for implementing it.

Docking (1998) reported that the focus had more recently been on the recognition of current competencies derived from any source for application in the workplace and had moved away from the initial focus of recognising prior qualifications for credits and exemptions towards formal qualifications (Docking, 1998). It is not clear why enterprises implement a RCC process. Down (1996) suggested that the RCC process in general, rather than rigorously assessing existing skills and knowledge, could be used as an initial introduction to the training program to achieve attitudinal changes, to acknowledge that the employees’ skills were valued and to provide motivation for further participation.

Harris et al. (1995) argued that the recognition of current competencies (RCC) was more relevant in the workplace than recognition of prior learning (RPL), on the basis that competency often had a use-by date and could decay over time. This appears to assume that the RPL process would not include any assessment of performance in the workplace, which might or might not be the case. A RCC process, which involved the demonstration of competence on the job, might be more relevant because of its closer relationship with the competence to be assessed and the ability to more reliably infer competence from such an assessment. However, it also appears to be an issue of timing and an assumption that the skills and knowledge developed through the prior learning might have decayed since their acquisition. Nevertheless, the confidence an enterprise has in the outcome of either process will depend on the actual assessment process used and its capacity to predict competent performance on the job. Further, it would appear that the fear of competencies decaying over a period of time could apply to either process at some time in the future, unless the skills were practiced on the job thereafter. Research has shown that the speed and accuracy of skills can be improved with practice and that certain skills showed a high level of retention over a twelve month period (Anderson, 1995a). Conversely, it could be expected that not practicing the skills might lead to decay of those skills and knowledge. Misko (1999) argued that if an enterprise had no evidence that a skill had endured, even though there was evidence that a skill existed at some previous time, then, depending on the importance of the skill, the enterprise must consider safeguards in its process of giving recognition for prior learning of that skill. Bishop (1994) proposed that such safeguards might include a reassessment process, given that the only guarantee an assessor could give was that the competencies certified were possessed at the time of testing. This was considered to be particularly so where, over time, the lack of practice and changing technology could lead to a loss of competencies (Bishop, 1994). However it is doubtful, given that enterprises only appear to be concerned with the competencies that are required to do the job, that they would be concerned about the loss of competencies that were no longer required due to changes in technology. However, enterprises would need to determine whether skills and knowledge
that were still required could be lost due to lack of practice and whether they needed to reassess. Bishop (1994) and Bloch et al. (1995) proposed that an enterprise might need to reassess critical competencies or, in consideration of the costs of assessment, risk management strategies should at least be used in the areas requiring reassessment. This could involve a reassessment of the critical competencies just prior to the worker commencing to use them (Bloch, Clayton, & Favero, 1995).

This raises additional questions about what enterprises have implemented in their CBTA systems and why? Have enterprises included a RCC process? Why has it been included? Is it to reduce the cost of training or to increase motivation? Have enterprises considered the loss of skills and knowledge and the need to reassess?

It is expected that enterprises would consider costs in determining whether to implement an RPL or RCC process and would adopt a pragmatic approach to implementing a cost-effective process without considering issues such as retention of skills and knowledge.

**The assessment processes and instruments**

The NTB identified five principles for competency-based assessment (CBA) which included the requirement for validity, reliability and flexibility (National Competency Standards-Policy and Guidelines, 1992). Rumsey (1994) identified four basic principles of assessment being validity, reliability, flexibility and fairness, which are generally regarded as the principles on which CBA is based (Smith & Keating, 2003). These principles reflected the view that sound assessment in a competency-based system had four essential requirements (Hager, Athanasou, & Gonczi, 1994). Messick (1994) argued that validity, reliability and fairness are basic issues that must be addressed for all assessment, not only because they are measurement principles but also because they are social values which have meaning and force outside of measurement. It would appear that, if it requires sound assessment, it is incumbent upon an enterprise to consider these principles in the planning, structuring and implementation of its assessment processes and instruments. The following sub-sections explore the issues an enterprise would need to consider when planning, structuring and implementing its assessment processes and instruments.

**Validity**

Mitchell (1989) contended that there was the potential for workplace assessments undertaken in the ongoing course of work to have high validity, but there were dangers in this assumption. He also contended that assessment of the actual performance under normal work conditions was more likely to have a higher validity and have a better chance of predicting future competent performance than simulations in the workplace or elsewhere (Mitchell, 1989). However, when considering the validity of an assessment, it was argued that there was a need to be clear about what was being measured (Messick, 1994). The enterprise needed to
determine whether it was the actual performance in the workplace that was being measured or the underlying skills and knowledge that contributed to the performance and about which competence could be inferred from that performance and a range of other evidence. The enterprise would also need to clarify whether the assessment outcome was to be predictive of performance in the future, and what it was that was being predicted for the future.

Bishop (1994) argued that workplace assessment might offer a narrow range of evidence, thereby providing insufficient evidence to infer competence with any validity. Workplace assessments might readily provide evidence of face validity, but additional evidence of content, criterion, construct and consequential validity might be required before the assessment could claim to be valid (Gillis & Bateman, 1999). Criterion validity was considered to be particularly important (Gonczi, Hager, & Athanasou, 1993; Griffin, 1997) if there was a requirement to predict what a person was likely to be able to do in the future. Wolf (1995) argued that the best predictor measures were considered to be those which incorporated parts of the future behaviour that was of interest. Cropley (1995) argued that a broader view should be taken of validity for a competency-based assessment system. The concern should be about whether the assessment system was valid, rather than the validity of an assessment outcome (Cropley, 1995). However, in raising this concern, he was simply arguing for the inclusion of practices in assessment systems that were likely to enhance the validity of the assessment outcomes. These included the assessors being clear about the performance or assessment criteria used and ensuring that a range of evidence was collected which was clearly related to the units of competence to be assessed (Cropley, 1995). Griffin (1997) added to this, and argued that validity could be enhanced by multiple measurements or observations, which in a competency-based system implied the collection of a range of evidence that was sufficient and could be clearly related to the unit of competency specified. Gillis and Bateman (1999) were concerned about the range of evidence collected for assessment in the workplace. They were concerned that where enterprises required higher order competencies, the collection of a narrow range of evidence through performance assessments in the workplace might, in fact, not measure these competencies (Gillis & Bateman, 1999).

Finally, in relation to competency-based assessment it was argued that rather than the focus developed in earlier Australian literature and training package publications on CBA validity, a broader focus should be considered which focused on the validity of the interpretation and use of the assessment outcome (Thomson, Saunders, & Foyster, 2001). Gillis et al. (1999) and Masters et al. (1999) had also raised this notion, that validity referred to the meaningfulness, the usefulness and the interpretation of the evidence collected.
Reliability

Gillis and Bateman (1999) argued that reliability was an estimate of how accurate or precise the assessment task was as a measurement instrument. They stated that reliability was concerned with how much error is included in the evidence. Consequently, they argued that increasing reliability becomes a process of controlling or eliminating the factors that reduce the accuracy of interpretation, given that assessment is a judgement or inference which is based on the evidence (Gillis & Bateman, 1999). Three sources were proposed as the causes of errors of measurement (Masters & Keeves, 1999). These were the variability in the making of the observation or judgement due to the observer, the variability in the making of the observation or judgement due to the instrument being employed, and the variability in the characteristics being measured (Masters & Keeves, 1999). Processes for controlling this error included “the making of multiple measurements by sampling the behaviour or observable phenomena associated with the characteristic under survey” (p.4) (Masters & Keeves, 1999). However, Masters and Keeves (1999) noted that the range of observations employed must be sufficiently wide to provide a meaningful indicator of the variability while ensuring that the same characteristic was being measured.

Processes of control for enhancing reliability for competency-based assessment have been identified. These included developing consistent assessment procedures, specifying clear task or performance criteria, collecting sufficient and appropriate evidence and consistent interpretation of the evidence through introducing moderation and monitoring processes (Bloch et al., 1995; Fletcher, 1992; Gillis & Bateman, 1999; Watson, 1994).

Fair and Flexible

Rumsey (1994) contended that assessment practices were flexible if they could accommodate the scope of knowledge and skills required within the range of contexts while catering for the needs and personal situations of potential candidates. Further, he contended that assessments were fair if they didn't disadvantage particular persons (Rumsey, 1993). Principles were identified for assessments which were both fair and flexible, these included considerations of equity for individuals and accessibility to assessment methods at times and in locations which were appropriate to the individual (Cropley, 1995)

Assessment System Development

In developing its assessment system, what consideration will an enterprise give to the assessment features of validity, reliability, fairness and flexibility in the planning, structuring and implementing of its assessment processes and instruments? Hager et al. (1994) proposed that any system can enhance factors, such as, reliability and validity, but cost and
time cause design decisions, which strike a balance between the key principles and the cost of implementation.

When considering the requirement for multiple measures to enhance both validity and reliability a balance is required between cost-effectiveness and whether sufficient evidence has been gathered to infer competence with confidence. Rumsey (1994) argued that to judge someone competent on one piece of evidence would be very risky indeed and certainly undesirable, but "dozens of observations or examples would probably be unnecessary and a needless expense." (p.15). However, it appears that the use of internal assessors who could observe a number of performances over a period of time in the course of the normal work activities could provide a cost-effective solution to this concern. Another solution was provided by Cropley (1995), who cited a 'partial credit analysis' assessment model (Griffin, 1993) that grouped the competencies in particular areas or work functions and placed them on a scale of increasing competence based on associated criteria or thresholds. This framework has the potential to provide a cost-effective solution by only assessing a particular work function or domain at a threshold level and, based on this judgement, inferring competence at this level and all other lower threshold levels in the domain. Such a framework and assessment system might allow cost-effective processes to be implemented by not requiring all competencies to be directly assessed. Other proposals for reducing the cost included determining the ‘criticality’ of the competence in terms of the frequency of use, the added value and the risk of not being competent, which could influence decisions on cost-effectiveness and the gathering of sufficient evidence for these competencies (CBT Working Party Assessment Steering Group, 1992; Debling, 1989; Wolf, 1989).

How much does the cost of an approach, or its cost-effectiveness, impact on the decisions of enterprises when developing a CBTA system? Do enterprises consider the balance between collecting sufficient evidence and the cost? Do enterprises look for more cost-effective assessment approaches or base their decision-making on a pragmatic assessment approach that suits its particular circumstances?

To assist in the decision-making and to achieve an appropriate balance between the many factors, an enterprise needs to be clear about the purpose of the assessment, what is being assessed, how it is to be assessed and what are the consequences of the assessment outcome.

What is the purpose of assessment in an enterprise? What is it that is being assessed? Jessup (1991) and Mulcahy and James (1998) indicated that the tendency in the workplace is to consider only the requirements of the current job and not the broader and general competencies that might be predictive of transferability and other higher level skills such as problem solving.
Why are enterprises assessing? Is it to identify training needs, or for selection or classification purposes, or to determine the skills or competence of the workforce, or for certification purposes? Are enterprises concerned with developing transferability and other higher order competencies such as problem solving, and therefore assessing general competencies that might be predictive of these competencies or are they simply interested in assessing performance in the current job?

Hager (1997) identified that in the structuring decision-making stage an enterprise would need to give consideration to who would do the assessing and what, if any, preparation or training would be required for this role. Advice provided on practical assessment models and techniques stated that the assessors should have expert knowledge of the areas in which they are assessing (CBT Working Party Assessment Steering Group, 1992; Fletcher, 1992; Rumsey, 1994). In particular, it was proposed that great importance should be placed on the assessors being able to interpret the criteria, observe performances within the workplace over a period of time and use their expertise to ensure that sufficient evidence was collected to make the judgement. It was proposed that enterprise-based or internal assessors are, in theory, the best people to undertake the job (Fletcher, 1992; Wolf, 1995). However, it was also noted that there was an inherent tension with the use of internal assessors, because of the impact of personal relationships, the budget implications and other workplace factors which might bias the judgement of an internal workplace assessor (Down, 1996; Wolf, 1995).

Billett (1998b) argued that the importance of using an internal assessor was emphasised, because expert performance also embeds in it the characteristics of the particular workplace. This assertion (Billett, 1998b) also raised the notion that it is the standards accepted in the enterprise on which the judgement is made, not the national competency standards. This notion was consistent with the position taken by Griffin (1995), who proposed that a criterion is a threshold that delineates between levels of competence but that “a standard defines acceptable levels or the desirable threshold for a specific situation.” (p.40)

The complexity of the assessment process (Gillis, 2003), the notion that expert performance is embedded in the characteristics of the particular workplace (Billett, 1998b), and the inherent tension that exists when using internal assessors (Wolf, 1995), are all factors that emphasise the importance of ensuring that the internal assessor is adequately prepared for the role. Clearly, there are advantages in having internal assessors who are experts in the role in the enterprise and who are also capable of understanding the complexities of the assessment decision. Depending on their role in the enterprise, it would be expected that these internal assessors had some previous experience in making judgements about the performance of workers in the enterprise. Warnings are given about the use of ‘gut feeling’ or ‘professional judgements’ (Docking, 1997), but Gillis (2003) cites research which suggested that these concerns might be unfounded and that professional judgements are an integral part of competency-based assessment and that these led to more accurate judgements of performance. However, given that these internal experts are unlikely to have had significant
experience in formal assessment of competencies, it is important that they are competent to perform this function. Therefore, it is critical that they are trained and shown to be competent to perform the task, particularly if they are making judgements about critical competencies, which might have significant consequences for the enterprise. This need for training and a deeper understanding of the assessment process was further emphasised by the concern raised (Garrick, 1998; Mulcahy & James, 1998) about the attitude that had developed and the approach taken by some workplaces, which suggested that the competency assessment process was very objective. Wolf (1995), when commenting on the situation in the U.K., argued that nothing could be further from the truth when assessing against national standards. Mulcahy and James (1998) were concerned that this strong belief in the objectivity of the process meant the subjective element was not controlled in any way, leading to potentially poor reliability and perhaps abuse of the process. Gillis (2003) clearly identified the complex nature of the judgement that needed to be made by the assessor. The complexity of the judgement, the need to consider the key assessment principles and the concerns raised about how enterprises view the process, all emphasised the need for internal assessors to be trained and to understand the process of assessment and the complex judgements that are required. Nevertheless, do enterprises require their assessors to be trained and qualified as workplace assessors?

Hager (1997) also identified the need for an enterprise to consider how it was going to assess and, in particular, to consider the value of integrated holistic assessments for its CBTA system. In the structuring decision-making stage an enterprise needs to determine what assessment approach it would implement. Two broad approaches are normally referred to in the literature for making such a decision. The first, an atomistic approach, which looks for a one-to-one correspondence between the assessment and the learning outcomes, the standards or the performance criteria - sometimes identified as a checklist approach or a ‘tick and flick’ approach. The second, an holistic or integrated approach, which looks at the performance of a function or a global level of performance. This might include assessment of a set of elements or units of competence, and competence is inferred from a global performance containing these elements. Docking (1998) argued that learning and performance in the workplace were complex and multi-dimensional and it was likely that no one approach to assessment could serve all needs. Moreover, he argued that by adopting a particular theoretical position on assessment, a practice which conformed to the theory might be implemented in the workplace, but this might not serve the needs of the employee or the enterprise (Docking, 1998).

The literature generally supported the use of integrated or holistic assessment strategies in the workplace because of the potential for greater efficiency and cost-effectiveness (Bloch, 1993; Gonczi et al., 1993). Support was also generally given to an integrated or holistic approach because it could be used to assess a series of tasks that were normally performed on the job. This allowed an assessment which was directly faithful to the job performance
required (Gonczi et al., 1993; Harris et al., 1995); provided the opportunity to observe values and attitudes (Gonczi et al., 1993) that were important to the performance; was more likely to be a better predictor of future performance in the job (Wolf, 1995); and could be judged using an assessor’s internalised, holistic model of ‘expert’ performance (Wolf, 1995).

The overall effectiveness and efficiency of the assessment system will depend on the decisions made by the enterprise to achieve a balance between all the factors involved. Many of the factors requiring decisions have been identified above and all decisions will depend to a large degree on the consequences or the ‘criticality’ of the assessment as perceived by the enterprise. Other more mundane factors such as the workplace priorities, time constraints and commitments will also impact on the priority of the assessment process and its effectiveness (Wolf, 1995).

Generally, the literature emphasised that fully considering these factors in the planning and structuring decision-making stages of an assessment system would potentially provide a more effective system, which encouraged the collection of evidence that was cost-effective, simple and holistic (CBT Working Party Assessment Steering Group, 1992; Harris et al., 1995). However it was proposed that enterprises generally take a pragmatic approach to the development of systems in the workplace, and do not fully consider these factors, but implement basic systems which are modified over time in response to issues, rather than using a planned systematic approach or strategy (Down, 1996; Toop, Gibb, & Worsnop, 1994).

What assessment approaches are used in enterprises? Why have they adopted particular approaches? Little appears to be known about the assessment methods used in Australian enterprises, but considerable use of the ‘tick and flick’ assessment method was found in workplace delivered training for apprentices and trainees in Victoria (Schofield, 2000).

It is expected that enterprises will have adopted pragmatic assessment approaches with little attention given to issues such as reliability, validity, predictability and the use of systematic, holistic approaches.

**The learning approaches**

Candy and Matthews (1998) contended that as a consequence of the macro and micro economic changes that had impacted on the workplace, continuous turbulence had replaced stability and this had placed greater emphasis on the need for continuing learning in the workplace.

What is this learning that is occurring? Marsick and Watkins (1990) defined learning as “the way in which individuals or groups acquire, interpret, reorganise, change or assimilate a related cluster of information, skills and feelings” (p.4). However, learning was also defined
as "the process by which relatively permanent changes occur in behavioural potential as a result of experience" (p.4) (Anderson, 2000). It is this behavioural potential, and then the actual realisation of that potential through competent performance, that is of significance in the workplace.

Marsick (1987) contended that workplace learning had previously been described using a behaviouristic paradigm. This approach required a machine like response by the individual in an organisation with clear hierarchical structures and job functions and controls at all levels of the operation. However, increasingly, workplace learning was reflecting a new paradigm which allowed for reflective and collaborative approaches (Marsick, 1987). Nevertheless, training designs based on the behaviouristic paradigm still existed in some workplaces (Down, 1996; May & Kahnweiler, 2000). Further, Garrick (1998) argued that the current human resource practices, with the introduction of competency-based standards, could increase this occurrence by reflecting and promoting a strong human capital development emphasis, which some related to the behaviourist approach.

What learning approaches are implemented in an enterprise? Hager (1998) proposed that workplace learning could be classified in at least two ways, 'informal workplace learning' and 'on-the-job training', and developed principles for identifying which type of training was occurring in a particular workplace (Hager, 1998b). On-the-job training was trainer centred, planned, included contextualised learning as knowledge to be applied in practice and was based on prescribed outcomes, whereas informal learning was learner centred, unplanned, with learning developed as a capability with no distinction between the knowledge and skills developed and with no prescribed learning outcomes. Marsick et al. (1990) introduced the term incidental learning to describe another way of learning and proposed that there was a difference between informal learning and incidental learning. However the informal learning described by Marsick et al. (1990) was planned and intentional and differed from Hager's description. Marsick et al. (1990) described informal learning as planned and intentional whereas incidental learning was never planned and intentional. Incidental learning included such things as, learning by mistakes, learning by doing, learning by networking and learning from a series of interpersonal experiments (Marsick & Watkins, 1987). Three modes of informal learning had been identified. These were job assignment, relationships and self-directed learning (Marsick & Watkins, 1987). Job assignment embodied the range of routine and non-routine activities provided in the workplace. Relationships referred to the interactions the learner had with other people including coaching, mentoring, modelling, networking with peers and feedback from a boss. Self-directed learning related to the individual taking the initiative and responsibility for planning, directing and evaluating or reflecting on their own learning (Marsick & Watkins, 1987; Ravid, 1987).

The lack of consistency in these and other descriptions of learning make it difficult to use a common label to characterise the learning approach used by an enterprise without providing
supporting information to describe the activity. However, it is expected that on-the-job learning, informal learning and incidental learning, as described by both Hager (1998) and Marsick et al. (1990), all occur in the workplace.

How effective are these learning approaches? What learning approaches are likely to be more effective for an enterprise? Billet (1994a) and others claimed that workplace training provided a more effective learning environment than training in other learning environments and was also the preferred location of skilled workers (Billett, 1994a; Darrah, 1996; Down, 1996; Harris et al., 1995; Mulcahy & James, 1999). However, the extent of the effectiveness (Billett, 1994a, 1998b, 2000; Harris & Volet, 1996; Mulcahy & James, 1999; Prawat, 1993) depended on the appropriateness of the knowledge, the emphasis on procedural knowledge and the capacity of workplace learning methods to develop the theoretical knowledge and understanding required for competent performance. It was claimed the learning effectiveness could be enhanced (Billett, 2000; Moy & McDonald, 2000) by the direct guidance of others, both experts and peers, through providing opportunities for learning, models for comparison and benchmarks of expected performance. Similarly, indirect guidance provided by peers was claimed to enhance learning through comparing, listening and observing and by providing access to the values and the knowledge associated with acceptable approaches and the expected performance (Billett, 1998b; Bova, 1987). Further, it is claimed that the learning could also be enhanced by the learner’s readiness to take the initiative; the degree of learner creativity in seeing a situation in many different ways; and the learner’s capacity to reflect critically on the assumptions and beliefs underlying the activities (Marsick & Watkins, 1990). Reio Jr and Wiswell (2000) argued that the degree to which this would occur was likely to be related to the degree of curiosity generated within the learner through the organisational setting and the learning environment, and the resulting motivation established within the learner. However, other issues, such as cultural issues, social class, the nature of the learner, including prior learning experience, would all influence the way in which an adult wished to learn and would impact on their capacity and willingness to take the initiative in their learning process (Merriam, 1993; Pratt, 1993). The effectiveness of the learning would also depend on the extent to which the competency-based training allowed for adult learning principles and the learning differences of the employees (Garrick, 1998; Griffin, 1997; Harris et al., 1995; Pratt, 1993).

Learning experiences, such as observation, coaching and increasing autonomy of practice were also considered to allow more effective learning to occur in a manner which was generative of deep conceptual understandings (Billett, 1994a). This mode of learning emphasised the learner initiating and approximating increasingly mature performances (Billett, 1994b). This more independent or self directed mode of learning was considered to encourage the satisfaction of curiosity, improve motivation and encourage the development of problem solving activities (Reio Jr. & Wiswell, 2000). Billet (1994a) also argued that such an
approach aided the development of the learner's conceptual and procedural base and improved the capacity for problem solving and transferable outcomes.

Do enterprises want to develop problem-solving skills? It was previously proposed that enterprises specified only those competencies directly related to doing the job and were not concerned with higher order competencies. However, it was argued (Anderson, 1995a; Billett, 1998b) that if an enterprise required the development of higher level competencies, then the workers needed to be exposed to new situations. Anderson (1995a) argued that all cognitive activities were fundamentally problem solving and all procedural knowledge had its origins in problem solving. That is, the learner was confronted with the initial problem, which was then resolved through a series of cognitive activity to develop a sequence of steps based on previously successful actions, to achieve the initial goal. This new sequence of steps was then repeated over and over again to achieve the performance required by the initial goal and eventually it became a learned procedure (Anderson, 1995a).

Anderson (1995a) proposed that there were three ways in which the problem solver could acquire knowledge of the actions required for moving towards a solution. These were discovering the solution through activity, being told how to solve the problem, or observing an example of a solution (Anderson, 1995a). Anderson (1995a) argued that to establish the knowledge and skills for implementing a broad range of actions for problem solving, the learner must be presented progressively with a series of new situations or problems for which new actions or sequences of steps could be created, established and refined. Anderson (1995a) contended that extensive practice and exposure to new situations was conducive to the development of expert performance. This development was associated with an enhanced memory for problem related information, changed problem representation and the development of new constructs for the representation of problems, leading to more effective problem solving procedures and optimal ways of organising for the resolution of problems in the particular domain (Anderson, 1995a). Similarly, Billet (1998b) argued that the degree to which a worker was exposed to new situations would influence the degree to which the worker engaged in higher order procedures and learnt to transform and extend existing knowledge and move beyond the procedural knowledge stage to an autonomous stage, which was crucial for competent performance. For a worker to achieve this level of performance, extensive routine and non-routine problem solving was required within the workplace setting (Billett, 1998b; Reio Jr. & Wiswell, 2000), which developed the characteristics of expertise that were reflective of the particular workplace and were embedded in its values (Billett, 1998b). However, these embedded values could inhibit transfer to other internal or external situations unless an effort was also made to assist the transferability of knowledge and skills to other settings (Billett, 1998b).

Do enterprises want workers to transfer skills and knowledge to new situations? The NTB proposed that competency standards should include the underlying skills and knowledge to
enable competency to be demonstrated in new and unexpected situations (National Competency Standards-Policy and Guidelines, 1992). However, it was proposed above that enterprises were not concerned with developing general competencies or higher order competencies. It is not clear from the literature whether enterprises would be seeking transferability of skills, but given the pragmatic approach proposed for the implementation of a CBTA system, it is unlikely that this would be required.

Anderson (1995a) claimed that little, if any, evidence was available to support the central concept held in many theories of learning, that knowledge was transferable. He stated that the evidence that existed suggested positive transfer could occur from one domain to another when these involved the same abstract knowledge elements (Anderson, 1995a). Billet (1998b) and others had argued that the situational aspects of the knowledge and skills developed to provide expert performance in a specific workplace, could inhibit transfer to other internal or external situations (Wilson, 1993). Research undertaken by companies in the USA showed that knowledge and skills gained through training had a poor level of transfer to other workplace settings (Broad, 1997). In particular, where a workplace training program was delivered away from the 'workstation', the transfer of knowledge and skills was very poor in the absence of any particular effort to facilitate the transfer to the 'workstation' or job setting (Broad, 1997). This research indicated that strategies such as coaching, encouragement and opportunities to use the new knowledge and skills in a supportive work environment had improved the transfer and use of the new knowledge and skills on the job (Broad, 1997).

In planning, structuring and implementing their CBTA systems are enterprises concerned about learning approaches that are conducive to the retention of skills and knowledge? Anderson (1995a) argued that the ability of the learner to recall the learned material does not depend on whether the person intended to learn the material or not. The critical factor for the memory was whether the material was processed in a manner conducive to learning (Anderson, 1995b).

It was argued that practice and repetition improved the memory and the ability to recall the practiced functions (Anderson, 1995a, 1995b; Gagne, 1985) and the greater the repetition the more available it is for recall in the future. (Anderson, 1995b). Research had shown that the rate of learning, that is, the improvement of performance with increasing practice, approximated a logarithmic function and showed a slowing of improvement over an increasing number of practices (Anderson, 1995b). However, the strength of recall was not only a function of repeated practice, it was also dependent on the processing activity, and it improved the more elaborately the learned material was processed (Anderson, 1995b). Memory and recall of material improved with a form of processing which considered the meaning of the learned material, rather than establishing a shallow or surface form of stimuli (Anderson, 1995b). Further, research showed that recall was better in the context in which the material was learned, particularly if the material learned was integrated in the memory.
with the context (Anderson, 1995b). This supported the notion that learning retention could be considered to be a function of the training design, the learner characteristics and the work environment (Baldwin & Ford, 1988; May & Kahnweiler, 2000).

Anderson (1995b) contended that the capacity to recall decayed with time, irrespective of the initial amount of practice, but for increased amounts of initial practice, the level of retention would be higher at any time during the decay process after this increased initial practice. Research had also shown that distributed practice and spaced repetition of practice, reinforced learning and enhanced retention (Anderson, 1995a). This research supported the notion, raised previously, that the maintenance of competencies at the level required also had a 'use-by' date and the level could 'decay', unless these periods of practice and relevant problem solving were maintained (Harris et al., 1995).

The literature identified a range of factors that could be considered by an enterprise when planning, structuring and implementing its learning approaches within the CBTA system. These included whether the learning approaches would be a combination of on-the-job and informal learning, and the context in which the on-the-job training should occur. It also included the use practices involving direct and indirect support from experts and peers that were claimed to enhance learning. It was also claimed that the learning would be enhanced by the generation of the learner's initiative and curiosity, encouraged by the enterprise setting and learning environment and with broader learning experiences. These learning experiences were claimed to be more effective if they provided the opportunity for increasing autonomy of practice and deep conceptual understanding, as well as extensive practice in the context in which they were to be used, rather than providing just simple repetitive practice, based on a behaviourist paradigm. It was also claimed that learning would be enhanced by the implementation of adult learning principles and consideration of the learning differences of the employees. Finally, it was claimed that exposure to new situations and extensive routine and non-routine problem solving in the workplace setting was conducive to developing higher order problem solving skills and transferability of skills and knowledge.

It is not expected that enterprises will have considered or even been aware of the decisions required in relation to these theoretical issues in the planning, structuring and implementing decision-making stages of their CBTA systems. It is expected that the enterprises will have adopted pragmatic learning approaches that suited their particular circumstances and will not have identified approaches that could optimise learning effectiveness, transferability and retention of competencies.
The Recycling and Outcomes

This section considers the recycling or outcome decision-making stage of the conceptual framework and the issues associated with measuring the outcomes and the impact of the implementation.

The effectiveness of the change depends, at least, on the achievement of the planned or expected outcomes from the change. This requires a capacity to identify and measure the impact of the change and the achievement of the outcomes. The NTB proposed that the overriding aim of the national training reform agenda and the associated competency-based system approach was to increase the competitiveness and productivity of Australian industry (National Competency Standards-Policy and Guidelines, 1992). Australian research studies have not identified the reasons why Australian enterprises implement CBTA systems or the expected outcomes from implementing such systems. However, research has shown that many companies were uninterested in the competency-based training process, because they believed it added “nothing to their bottom line, even though many of them have quite sophisticated in-house training programs” (p.204) (Ewer & Ablett, 1996).

Australian research literature included very little on the identifiable and measurable outcomes of training activities (Docking, 1998; Griffin, 1995; Smith, 2001). However, some recent Australian studies were undertaken on the return on investment in enterprise based training (Moy & McDonald, 2000; Smith, 2001), but few of these were within a single enterprise (Moy & McDonald, 2000).

Misko (1996) identified that most enterprises were prepared to identify what they believed to have been the benefits gained as a result of training provided to the enterprise. The benefits most frequently identified included improved productivity, quality, knowledge, employee morale and job satisfaction, cost-efficiency and cost-effectiveness (Misko, 1996; Moy & McDonald, 2000). However, other studies identified that very few enterprises had any formal mechanisms to measure these outcomes or to equate the expenditure on training with productivity increases (Billett, 1998a; Billett & Cooper, 1998; Down, 1996; Dumbrell, 2000; Misko, 1996; Moy & McDonald, 2000). As those who did engage in any formal processes were mainly large enterprises, it was suggested (Moy, 2001), that the unsuitability of current models was a deterrent for small and medium sized enterprises. While this is likely to be a factor, this assumed that enterprises valued training as a strategic tool for development and improvement. It also assumed that enterprises set objectives and outcomes for their training effort and were interested in measuring the impact of this strategic tool and wished to identify its contribution to productivity. It is possible that the reason an enterprise trains its workers is more mundane and is simply to ensure a minimum level of skills and knowledge. Such training might be provided simply to minimise the loss of income, such as ensuring that a worker could provide basic customer service or to reduce serious mistakes or to reduce
accidents and damage, etc., rather than as a significant strategic tool linked to the business outcomes in an enterprise’s development. However, training is also likely to be provided as an adjunct to significant strategic tools, such as changes in technology, but no consideration is given to its contribution to the overall outcome. Do enterprises really want to measure the contribution of training or a CBTA system to their business outcomes? Kirkpatrick, commenting on the situation in the USA, claimed that there were still only a few enterprises asking trainers to justify the effort and expenditure (Kirkpatrick, 1998b). Does this show a lack of interest, a realisation that this is hard to do, or a belief that any training will provide a benefit?

Research had indicated that some companies had shown interest in the outcomes of their training, but were using less formal procedures and were prepared to justify the training by identifying the benefits observed (Down, 1996; Misko, 1996; Mulcahy & James, 1999). This could perhaps be seen as a justification for the training effort and expenditure by those directly involved, where the training is considered to provide some benefits, but is not considered to be a significant contributor to business outcomes.

There were few reports of cost-benefit analysis of training identified within Australian enterprises, which was attributed to the problem of separating the benefit of training from those attributable to other factors (Billett, 1998a; Billett & Cooper, 1998; McDonald, 1998; Moy & McDonald, 2000; Smith, 2001). It is claimed that the inability to identify all the factors, and the degree to which each influenced the outcomes, had frustrated those who had attempted to measure validly the benefit of training as a ‘bottom line’ outcome (Billett, 1998a; Billett & Cooper, 1998; Moy & McDonald, 2000). Researchers had usually claimed that the complexity of the task and the difficulty in controlling variables prevented the reporting of sensible findings (Billett, 1998a; Billett & Cooper, 1998). Billett and Cooper (1998) suggested taking specific purpose approaches to measure the benefit of training might be better than attempting to account for all the variables. They cited Mountain (1994), and Pine and Tingley (1993), who suggested an approach which analysed evaluation data from training programs at the four levels of the Kirkpatrick Model (Kirkpatrick, 1998a; Mountain, 1994; Pine & Tingley, 1993).

The Kirkpatrick Model provided a four level framework for evaluation of the impact of training (Kirkpatrick, 1998a). It was claimed that this model was often viewed as a standard in industry training evaluation (Broad, 1997; Moore & Seidner, 1998), but it was also perceived by some to have limitations (Galvin, 1987; Newstron, 1987).

The Kirkpatrick Model, and modified and extended versions designed to overcome the perceived limitations, had been used extensively to evaluate training impact and return on investment in companies (Gaines Robinson & Robinson, 1989; Moy & McDonald, 2000; Phillips, 1997, 1998). A combination of two models, one of which was reported to be the
Kirkpatrick Model, was used with a time series approach to collect data from four enterprises to measure the impact of a discrete training program on each enterprise’s performance (Doucouliagos & Sgro, 2001). It is considered that enterprises could use a time series approach could be used with the Kirkpatrick Model to collect data to measure the impact of a CBTA system given the period of time over which the system is implemented.

It is not expected that Australian enterprises will have implemented any formal evaluation mechanisms to determine if the expected outcomes have been achieved through the CBTA system. It is expected that the enterprises will not have expressed any outcomes for their CBTA system that directly relate to their business outcomes. It is expected that, if required, the enterprises will be able to identify the perceived benefits of the training through observed improvements in employees’ job performance, but not through measured or observed improvements in productivity, quality and safety.

Do enterprises benefit from the implementation of CBTA systems in the manner implied by the NTB? That is, has the implementation of CBTA systems increased the competitiveness and productivity of Australian industry? More recent Australian studies have taken a narrow approach and concentrated on the return on investment as a way in which training professionals could justify their activities, rather than taking a broader view. However, some research activities have taken a broader view and emphasised overall organisational benefits, such as increased productivity, greater quality and reduced costs, which ensued when improvements in competence resulted in improved job performance (Brinkerhoff, 1998; Moy & McDonald, 2000). Although most studies have been concerned with discrete training programs, which is not informative when attempting to investigate the impact of the implementation of a CBTA system. Further, all of them relate to the provision of training and do not consider the impact of, or the requirement for a related assessment process.

More importantly, Moy and McDonald (2000) reported on some research studies that have broadened their focus beyond just considering the impact of discrete training activities, to considering the impact of learning and development within an organisation and were collecting data over a period of time. Such broader approaches are consistent with the concept of a learning organisation, and also with the evaluation of the impact of CBTA systems, with their potential for broader impact within the enterprise and their ongoing individual learning activities, as opposed to discrete training activities for a group of participants. These broader approaches would be appropriate for enterprises that deliberately introduced the concept and culture of learning organisations as a strategic tool. These enterprises are more likely to value training and more likely to want to evaluate the impact of this strategic decision in terms of their business outcomes. However, as suggested, these approaches would also be appropriate for enterprises with CBTA systems.
A number of Australian research studies across enterprises have shown positive benefits from the implementation of training (Moy & McDonald, 2000; Smith, 2001). However, these have not identified the benefits of introducing a CBTA system, but concentrated on the delivery of training, generally for specific purposes. Such research had also shown that the productivity benefits of training were enhanced when integrated with some other change in management practices, such as the introduction of new technology or processes, or changes in work practices (Blandy, Dockery, Hawke, & Webster, 2001; Moy & McDonald, 2000; Smith, 2001). Research developed on a microeconomic basis, supported the finding that the benefits of training were enhanced when integrated with other business practices (Maglen & Hopkins, 2001). This research had also shown that a key factor in overall business performance included the integration of the training with the strategic objectives and plans of an organisation (Maglen & Hopkins, 2001).

Do enterprises integrate their training with strategic objectives? Are they expecting increases in productivity and competitiveness as a result of the implementation of a CBTA system? It is expected that this is not the case and that enterprises do not see training as a key business strategy, but as an adjunct to another business strategy and expect to enhance the benefits from that strategy because of the training.

**External and Internal Factors**

This section provides an overview of the nature of change, the external and internal factors that act as the drivers of change in an enterprise and the impact of these external and internal factors on the implementation of a CBTA system in Australian enterprises.

**The Nature of Change**

Strauss and Corbin (1990) stated that change is characterised by a happening or an event that produces a difference in something. As a result it might change the conditions of that something to a sufficient degree that it brings about a corresponding change in the action or interaction strategies (Strauss & Corbin, 1990). Consistent with this, change could simply be defined as the movement from the present state towards a future state, but in the modern business environment the complexities of this change could be overwhelming for organisations (Graetz et al., 2002). It was argued that change is initiated by internal factors or external forces and leads to a realignment of existing values, practices and outcomes. (Morrison, 1998)
Reaction to change

The implementation of any change in an organisation creates a reaction (Cherrington, 1994; Graetz et al., 2002; Senge et al., 2002; Silverman, 1996; Strickland, 1998). Cherrington (1994) referred to significant changes, which could include the implementation of a CBTA system, as 'transformational' changes and proposed that such changes would produce a significant reaction. Strickland (1998) argued that this reaction might be categorised as one of four responses. The change might be accepted with an indifferent attitude; it might be implemented with the cooperation of the employees; it might be supported and implemented with the full engagement of the employees; or it might be resisted with the purpose of preventing it from happening (Strickland, 1998). It was proposed that various forms of resistance or defensive action could occur, ranging from passive resistance and undermining to short term blocking or denial processes, through to actively implementing strategies to prevent the change from taking place (Argyris, 1993; Graetz et al., 2002; Silverman, 1996; Strickland, 1998). This resistance might come from individuals in any part of the organisation or it might come from sections of the organisation based on threats to the power structure or the inertia of a highly structured organisation (Cherrington, 1994; Down, 1996; Graetz et al., 2002). The type and extent of reaction to the implementation of CBTA systems in Australian enterprises is unknown, but any negative reaction is likely to have a negative effect on the effectiveness of the implementation and the impact of the system. Graetz et al. (2002) proposed that the likelihood of the change occurring would be dependent on the strength of the resistance and the mode of the impetus or driver of change.

Drivers of change

It was argued that the pressure or impetus for organisational change could occur because of external or internal factors (Denton, 1998; Graetz et al., 2002; Kanter et al., 1992; Strickland, 1998). It was also argued that these factors could be the initial causes of the change, but they also influenced and impacted on the actions and decisions made to provide a solution (Denton, 1998; Strauss & Corbin, 1990). This in turn would impact on the organisation's activities and its performance (Hedges, 1997; Mulder et al., 1995; Phillips, 1998; Strickland, 1998). The external and internal factors that influence the organisation might be planned or unplanned. For a manufacturing enterprise these factors included changes in customer demand, supplier services, technology usage, equipment performance, equipment maintenance periods, attendance patterns and industrial relations (Mulder et al., 1995; Prais, 1995; Pritchard, 1995; Strickland, 1998). They also included overall skill losses due to loss of skilled employees, which in turn might cause changes in operations, such as resourcing levels, work practices, work conditions etc. (Mulder et al., 1995; Prais, 1995; Pritchard, 1995; Strickland, 1998).
Candy and Matthews (1998) contended that a major external macro-level factor for Australian enterprises was a shift from a national focus within a resource-based economy to an international focus within a knowledge-based economy. They contended that at the same time pressure was placed on the restrictive work practices and the traditional industrial relations practices to cause award restructuring, an environment for more open workplace learning and an emphasis on technology and total quality management (Candy & Matthews, 1998). Garrick (1998) argued that this period of economic and industrial change provided the opportunity for major industry groups and big unions to frame competency-based standards as a useful device for creating a sense of greater certainty and for developing new grounds for industrial negotiations. Down (1996) and Graetz et al. (2002) also argued that the strong link between training systems and workplace industrial relations assisted the drive to implement CBTA systems in the workplace in the early stages of its development.

As indicated previously, Australian research studies have not identified the reasons why Australian enterprises implemented CBTA system and have not identified whether the main drivers of the intervention were external to the enterprise or were internal factors specific to that enterprise. However, it is expected that these external factors are the main drivers for the implementation of CBTA systems in Australian enterprises.

Irrespective of what factors are the main drivers for the implementation, it is also expected that the form of the CBTA system and its features are influenced in the planning, structuring and implementing decision-making stages by both the external and internal factors that specifically relate to the enterprise. Argyris and Schon (1996) noted that the internal working environment or culture of an organisation shaped its development, such that what was implemented in an organisation was not always what was intended nor was it consistent with the organisation’s documentation of the action to take place. It was argued that the formal documents, policies, proposals, etc. of an organisation’s espoused or intended actions were often incongruent with the organisation’s actual patterns of activity (Argyris & Schon, 1996) and that the aspirations of the planners were not always realised in what was actually implemented (Popham, 1988).

Many internal factors specific to an enterprise could impact on the form and features of a CBTA system during the planning, structuring and implementing decision-making stages. These could include the personal knowledge and experiences of the planners, trainers etc.; the commitment of senior managers to training; the commitment from the relevant industry union to implement and embrace change; the capacity of the employees to implement and embrace the change and the commitment from the employees to undertake training (Capelli et al., 1997; Down, 1996; Graetz et al., 2002; Moy & McDonald, 2000).

As a result, it is expected that external and internal factors specific to the enterprise will impact on all the decision-making stages of the conceptual model, and it is expected that
what is implemented could be different from what was intended, depending on the degree of influence of the external and internal factors. Further, it is expected that the outcome will be a CBTA system that is unique to each enterprise and is strongly influenced by the external and internal factors specific to each enterprise.

The Impact of External and Internal Factors on the Features of a CBTA System

As indicated above, the external and internal factors are expected to impact on all the decision-making stages of the conceptual model. In particular it is expected that specific influences might impact on these decision-making stages and shape the features of the CBTA system. These specific influences are identified below under the headings of the features proposed in the conceptual model.

The competency 'definition', scope and complexity

It is expected that the competency definition used as the basis of the system will depend on a number of factors. These would include the developers’ degree of understanding of the national training reform agenda and educational theory and practice issues and their personal knowledge and experience at the time. The scope and complexity of the competencies will also depend on the developers’ understanding and knowledge of these matters, but is also likely to be based on the influence of certain groups in the workplace (Garrick, 1998). Garrick (1998) argued that where strong unions existed, the training was more likely to be formalised, whereas without this presence, the training was likely to reflect the employer’s interests. Consistent with this, Mulcahy and James (1999) contended that where a union presence existed, the union’s emphasis was placed on achieving a broad skill base for employees for portability reasons, whereas the employer was seeking training to meet the specific business needs. Down (1996) reported that in one enterprise, groups comprising employer and employee representatives made the decisions on the scope and complexity of the competencies for particular jobs. Mulcahy and James (1999) reported survey results that provided some insight into the factors influencing companies when making decisions on the competency standards. One company reported that its decision to use enterprise standards, and not national competency standards, was partly to avoid the possibility of unions linking local pay rates to national averages. Another reported the importance of using national standards when tenders specified and sought evidence of quality, safety and environmental standards, and also for companies to protect themselves when required, to the extent that they were able to claim that they satisfied moral, ethical and legal requirements. Other companies reported the virtues of competency-based training as being practical and performance based, with enterprise training being used to achieve what they wanted, without the unnecessary classroom-based theoretical and knowledge components (Mulcahy & James, 1999). Contrary to this, some employers expressed concern regarding the apparent
inability to adequately convey conceptual knowledge in a competency-based training approach (Mulcahy & James, 1999).

**The process to recognise current competencies**

It is expected that the inclusion of a RCC process will also be influenced by the developers’ degree of understanding of the national training reform agenda and their personal knowledge and experience of CBTA systems. The extent of this knowledge might also depend on the support and advice of employer bodies and other external organisations that have had some experience with CBTA systems. Thomson et al. (2001) noted the earlier confusion and lack of universally agreed understanding about the use of RPL. However, their research with six case studies, four of which were within a workplace, found that RPL or RCC is often a major component of the assessors function. Down (1996) noted that in-principle acceptance of RCC processes occurred between employers and unions in some industries. Employers have also introduced RCC processes into enterprise CBTA systems to motivate employees or to entice them to become involved in a formal company training program (Down, 1996).

**The assessment processes and instruments**

It is expected that the assessment processes and instruments used as the basis of the system will depend on a number of factors. These would include the developers’ degree of understanding of assessment theory and practice issues and their personal knowledge and experience. The reason for implementing a CBTA system and the consequent purpose of the assessment component is also expected to influence the process used. It is expected that the time and cost of the process will impact on its form and also the priority given to the implementation of the process within the organisation. (Wolf, 1995) Garrick (1998) argued that employees influenced the process by expecting their workplace learning experiences to be validated as competencies. The employers and the employees influence was sometimes driven by the linking of competencies possessed with salary structures (Garrick, 1998; Mulcahy & James, 1999).

**The learning approaches**

It is expected that the learning approaches used as the basis of the system will depend on a number of factors. These would include the developers’ degree of understanding of learning theory and practice issues and their personal knowledge and experience. Decisions in relation to the learning approaches adopted are expected to be influenced by production requirements, the capacity to provide access to learning activities, situations and equipment, and the capacity to provide access to experts for providing guidance and support to the learners (Billett, 1998b; Darrah, 1996). These decisions might also be influenced by the reluctance of experts to provide the resources and their time for the training (Down, 1996) or
to share their knowledge to maintain their power base and status (Billett, 1998b; Darrah, 1996).

**Research Questions and Propositions**

This chapter has reviewed a selection of the literature related to CBTA systems in the workplace and explored issues related to the features of CBTA systems. It also explored research on measuring the impact of the intervention of a CBTA system, the issues and challenges in the process of implementing change into the workplace and the internal and external factors that influence a CBTA system intervention, its processes and features.

However, as indicated previously, there has been little research on why Australian enterprises have implemented CBTA systems and what has happened regarding the implementation of CBTA systems in individual Australian enterprises. Despite the current lack of knowledge and understanding of the CBTA systems being implemented in Australian enterprises and the factors which influence the approaches taken, the literature does provide some insights into the approaches which appear to have been adopted by enterprises in Australia. The next chapter draws upon this literature to develop research questions and study propositions for the study.
Research Questions and Propositions

The literature review identifies the issues and challenges generally associated with introducing a new program into the workplace and, in particular, the issues associated with the implementation of a CBTA system in the workplace.

However, as indicated previously, there has been little research on what has happened regarding the implementation of CBTA systems in individual Australian enterprises. Consequently the literature review raises a number of ‘what’ and ‘why’ questions about the implementation of such systems in Australian enterprises.

The Research Questions

The literature review identifies that there is a lack of knowledge and understanding about what is happening in individual Australian enterprises and that we need to increase our knowledge and understanding of the implementation of CBTA systems in Australian enterprises. There is a need to know and understand why enterprises implemented a competency-based system; what features they have implemented; the factors that influenced the features; the decisions made by enterprises when planning, structuring and implementing the systems; and the impact of the implementation of the system on the expected outcomes including the enterprises’ competitiveness and productivity. There is a need for research which adds to the process of building theory in relation to CBTA systems implemented in individual workplaces. This knowledge and understanding will assist researchers, industry planners and policy makers to better understand how their plans and policies are being implemented in the workplace and the factors that influence this implementation.

The purpose of the study and the literature review give rise to the following research questions:

Why do enterprises implement CBTA systems?

What CBTA systems do enterprises implement?

What external and internal factors significantly influence these CBTA systems?

What impact does a CBTA system have on an enterprise?
**Study Propositions**

From the literature review a set of propositions can be developed for the implementation of CBTA systems in Australian enterprises. Despite the current lack of knowledge and understanding of the CBTA systems being implemented and the factors which influence the approaches taken, the literature does provide some insights into the approaches which appear to have been adopted by enterprises in Australia and elsewhere.

In many enterprises external or internal events or factors provided the impetus for the establishment of a training program. Sometimes these events occurred prior to the national training reform agenda’s transformation of training to a competency-based approach. However for some enterprises, in the period after the national training reform agenda was set in place, the need to change was driven through the need to achieve increased competitiveness and to take advantage of the Structural Efficiency Principle and the associated award review and restructuring (Down, 1996). In some cases, the need to change was also driven by government changes to import tariffs and the funding incentives provided by the Federal Government to support training reform initiatives (Down, 1996).

It is suggested that in the majority of enterprises, the major driving force for change and the implementation of a competency-based training system was an external economic imperative rather than a change arising through internal considerations. Further, it is also suggested that many enterprises could identify the benefits of training, but despite the apparent implementation of CBTA systems to achieve specific outcomes, few will have any formal evaluation mechanisms to determine if the expected outcomes have been achieved (Billett & Cooper, 1998; Misko, 1996; Moy & McDonald, 2000).

There is evidence to suggest that enterprises take a pragmatic approach to the introduction of a new program and are likely to implement the change and develop the competency-based training system based on their previous experience and understandings, rather than from a theoretical framework and understanding (Down, 1996). It is suggested that they are then likely to continue the pragmatic approach and modify the system over a period of time, generally due to practical imperatives, to develop a more efficient and effective system (Down, 1996; Toop et al., 1994). In taking this pragmatic approach, it is suggested that CBTA systems have been implemented with enterprises adopting a narrow, pragmatic skills-based definition and approach, using competency standards with a low level of complexity and with little attention given to higher order competencies (Jessup, 1991; Mulcahy & James, 1998). Further, the enterprises are likely to have adopted cost-effective practices such as recognition of current competencies (Harris et al., 1995) and to have given little attention to assessment issues such as reliability, validity, predictability and the use of systematic, holistic approaches (Bishop, 1994; Hager, 1998a). Similarly, in developing the learning approaches, it is likely that enterprises will have given little attention to learning theory (Harris et al., 1995). That is,
the learning approaches adopted by the enterprise will have given little consideration to implementing approaches that are conducive to competent performance or will enhance the ability to transfer and apply skills and knowledge to new situations and environments. Further, it is suggested that the enterprises will neither have identified the learning approaches that could be adopted to optimise learning effectiveness and the retention of competencies, nor the learning style of the participants in order to guide their decision.

Based on the insights from the literature review a set of propositions can be established for the study. The purpose of the study propositions is to guide the direction and development of the study and the data collection processes. The need to establish a set of study propositions is also consistent with the case study research strategy described by Yin (2003), proposed in Chapter 5 as the research strategy for this study.

The propositions established for this study are that:

**Proposition 1**

The enterprises will implement a CBTA system to achieve productivity, safety and quality improvements to enhance their competitiveness.

**Proposition 2**

The enterprises will implement a CBTA system that is unique to the enterprise and strongly influenced by external and internal factors specific to the enterprise.

**Proposition 3**

The enterprises will implement a pragmatic CBTA system using a narrow skills-based approach giving little attention to higher order competencies; the requirement for transferability of skills and knowledge to new situations and environments; the assessment principles and issues or the learning approaches that could optimise learning effectiveness and retention of competencies.

**Proposition 4**

The enterprises will improve the CBTA system using an evolutionary process of resolving system issues as they arise over time.

**Proposition 5**

The enterprises will identify the perceived benefits of the training by observing improvements in employees’ job performance, but will have no formal evaluation mechanisms to determine if the expected outcomes have been achieved through the CBTA system.
Linking the Research Questions with the Conceptual Framework

The research questions posed above can be linked with the decision-making stages in the Conceptual Framework. However, based on these research questions and the study propositions, and to assist in guiding the study and the data collection process, subsidiary research questions have been developed in relation to each decision-making stage. The relationship between the primary research questions and the subsidiary research questions is shown in Table 4.1. The relationship between the four decision-making stages of the conceptual framework and the subsidiary research questions is then shown in Table 4.2.

Table 4.1 Relationship between the Primary Research Questions and the Subsidiary Research Questions

<table>
<thead>
<tr>
<th>Primary Research Question</th>
<th>Subsidiary Research Question</th>
</tr>
</thead>
<tbody>
<tr>
<td>Why do enterprises implement CBTA systems?</td>
<td>What factors prompted the decision to implement a CBTA system?</td>
</tr>
<tr>
<td></td>
<td>What were the expected outcomes from the introduction of the CBTA system?</td>
</tr>
<tr>
<td>What CBTA systems do enterprises implement?</td>
<td>What CBTA system was planned?</td>
</tr>
<tr>
<td></td>
<td>What CBTA system was structured?</td>
</tr>
<tr>
<td></td>
<td>Why did the enterprise want a CBTA system of this type?</td>
</tr>
<tr>
<td></td>
<td>What CBTA system was implemented?</td>
</tr>
<tr>
<td>What external and internal factors significantly influence these CBTA systems?</td>
<td>What internal and external factors influenced the decision-making?</td>
</tr>
<tr>
<td></td>
<td>How did these these internal and external factors impact on the decision-making?</td>
</tr>
<tr>
<td>What impact does a CBTA system have on an enterprise?</td>
<td>What impact did the changes to the CBTA system have on the expected outcomes?</td>
</tr>
<tr>
<td></td>
<td>Was the system implemented effectively?</td>
</tr>
<tr>
<td></td>
<td>What evidence is there that the implementation of the CBTA system impacted on the expected outcomes and improved competitiveness and productivity?</td>
</tr>
<tr>
<td>Decision-making Stages</td>
<td>Activity at each decision-making stage. Stufflebeam (2000)</td>
</tr>
<tr>
<td>------------------------</td>
<td>----------------------------------------------------------</td>
</tr>
<tr>
<td>Planning decisions</td>
<td>Assesses needs, problems and opportunities as the bases for defining goals and priorities and judging the significance of outcomes.</td>
</tr>
<tr>
<td>Structuring decisions</td>
<td>Assesses alternative approaches to meeting needs as a means of planning programs and allocating resources</td>
</tr>
<tr>
<td>Implementing decisions</td>
<td>Assesses the implementation of plans to guide activities and later to help explain outcomes.</td>
</tr>
<tr>
<td>Recycling decisions</td>
<td>Identifies intended and unintended outcomes both to keep the process on track and determine effectiveness.</td>
</tr>
</tbody>
</table>
Research Strategy and Methodology

The Case Study Strategy

Yin (2003) proposed that "In general, case studies are the preferred strategy when 'how' and 'why' questions are being posed, when the investigator has little control over events, and when the focus is on contemporary phenomenon within some real-life context" (p.1). Further, he stated that as a research endeavour "the case study contributes uniquely to our knowledge of individual, organisational, social and political phenomena" (p.2) (Yin, 1994). Punch (1998) proposed that the case study aims to develop an in-depth understanding of the situation in its natural setting, while recognising its complexity and the context. He also proposed that the case study is a strategy rather than a particular qualitative research method and a number of different approaches could be employed within the case study design (Punch, 1998). Merriam (1988) also stated that a case study design is used to gain an in-depth understanding of the situation and its meaning for those involved. Merriam (1988) argued that the case study strategy is seen as an inductive process that provides a method for dealing with and understanding critical issues of practice and extending the knowledge base to improve practice. Further, it was proposed that a 'bounded system' or context should be identifiable before deciding on a case study design and strategy (Merriam, 1988; Punch, 1998).

Punch (1998) stated that a common criticism of the case study strategy is its capacity for generalisation. He argued that the development of “propositions raises the analysis above simple description, and in this way a case study can contribute potentially generalizable findings” (p.155) (Punch, 1998). He identified three types of generalisation, two of which could be employed in a case study. These were “analytic or theory-connected generalization” and “case-to-case transfer” (p.155) (Punch, 1998). Yin (2003) also argued that it is possible to generalise from case study findings. In particular, he argued that case studies are generalisable to theoretical propositions and that the case study “does not represent a 'sample', and the investigator's goal is to expand and generalise theories (analytical generalisation) and not to enumerate frequencies (statistical generalisation)” (p.10) (Yin, 2003).

Yin (2003) proposed that study propositions are a basic component of case study research design and “each proposition directs attention to something that should be examined within the scope of the study” (p.23). Others proposed that in using the case study strategy the
investigator should try to generalise from propositions to 'theory', analogous to the way a scientist generalises from experimental results to theory (Donmoyer, 1990; Eisner, 1997; Punch, 1998; Silverman, 2000; Slavin, 1992).

The purpose of this study is to build knowledge and develop theory through gaining an in-depth knowledge and understanding of the situation in an enterprise and then, as proposed, to generalise from propositions to theory. As such the study has an individual case of interest, being a specific enterprise. Further, within that specific enterprise a 'bounded system' can be identified. This is the CBTA system that has been planned, structured and implemented by the specific enterprise.

In addition the following factors, which relate directly to the reasons outlined above for using a case study strategy, also apply:

- there is a lack of previous research on many of the questions - from which increased understanding and knowledge can be gained;
- the research questions are of a 'how' and 'why' nature, with the need to determine the reasons for actions;
- there is a lack of any degree of control over the 'events' under study; and
- the focus of the study is on a contemporary phenomenon within a real-life context.

Based on the factors identified above, and the propositions of Yin (2003) and others, a case study strategy has been adopted on the basis that it is the most appropriate strategy for this research. In this study a specific enterprise has been identified as the individual case of interest and the 'bounded system' is the CBTA system planned, structured and implemented in that enterprise.

A Multiple Case Study Approach

Yin (2003) also proposed that "a major insight is to consider multiple cases as one would consider multiple experiments - that is, to follow a 'replication' logic" (p.47) (Yin, 2003). In this situation the function of the multiple case study approach is not to create empirical or statistical generalisations through increasing the sample, but to further develop and build theory through analytical generalisation and comparison of the cases.

The Research Strategy

Adopting Multiple Case Studies

As indicated above, a case study strategy was adopted as the most appropriate strategy for this research. But, consistent with the propositions of Yin (1998), to enable each enterprise to contribute further to a theoretical base, a multiple case study approach was adopted to seek replication of the findings.
Punch (1998) argued that the adoption of a single case study combined with study propositions provided the potential for case studies to contribute generalisable findings through analytical generalisation. Yin (2003) supported the argument that it is possible to generalise from a single case study, but also argued that this generalisation would be enhanced, based on a ‘replication logic’, if multiple case studies were used. He argued that, just as generalisation from a single experiment is enhanced by multiple experiments which replicate the original results, the generalisation contributed by a single case study through the analysis of particular phenomena can be enhanced by multiple case studies which, through analysis, are shown to replicate the phenomena. This study is based on this concept. The study adopts the position that, while it is possible for a single case study to contribute generalisable findings to expand the knowledge and theory, this is enhanced if the ‘replication logic’ concept is adopted and multiple case studies are used to enhance the generalisation to develop a theoretical proposition. In doing this, the concept of ‘replication logic’ is emphasised, but it is stressed that the use of multiple case studies is neither to achieve a representative sample nor generalise through ‘statistical generalisation’. Therefore, the number of case studies selected for the study is not critical in the sense that a statistical sample of the population is required, however, more than one case study is required to enable analytical generalisation through replication.

This study has researched the CBTA system in three enterprises (each in the manufacturing industry sector) not on the basis of seeking a representative sample, but on the basis of seeking replication and ‘analytical generalisation’. An individual case study has been prepared for each enterprise’s bounded system. A single case study design was planned and the processes for research and data collection were replicated at each site (to the degree that this could occur while acknowledging the differences at each site). This research design provided a sound methodology for ‘analytical generalisation’ and the capacity to add to the existing theoretical base on CBTA systems in the Australian workplace (Merriam, 1988; Schofield, 1990).

Merriam (1988) described the investigator’s approach in a case study as being to observe, intuit and sense what is occurring in a natural setting. Case study research allows a number of methodologies to be employed and also allows contextual factors to be explored (Smith, Lourie, Hill, Bush, & Lobegeier, 1997). In this study the broad external contextual setting was similar for each enterprise, but the internal context for each enterprise was different and an understanding of this was important for fully understanding the decisions and the decision-making processes applied in each enterprise. The case study research strategy enabled the contextual aspects of these enterprises to be explored, to the extent possible within the degree of access provided and the time available to the researcher.
**Criteria for Selection of the Cases**

Eighteen enterprises were contacted to determine if they could be used as a case study. Each of the eighteen enterprises was in the manufacturing sector, all were medium to large enterprises with process manufacturing components and all were known to have implemented some form of CBTA for their process manufacturing workers.

Specifically, the criteria used for selecting the initial enterprises for contact were that:

- they were in the manufacturing sector;
- they were providing a competency-based training and assessment program to a significant number of their employees;
- the CBTA system had been in place for sufficient time to allow identification of the features of the system and possibly some measure of the outcomes.

After follow up discussion with the eighteen companies, three agreed to participate in the research. Five provided no final response after being contacted a number of times. Ten enterprises indicated they did not wish to participate. In the latter cases, the company representative generally expressed the company's inability to commit staff to the perceived time involved in participating as a case study. In a few cases, the company representative indicated that staff could not be committed because of their involvement with other special company activities at the time.

The enterprises were not selected to provide a representative statistical sample, but, as indicated above, were selected to provide multiple case studies of enterprises in similar circumstances and which were known to be providing CBTA for their process workers. The purpose of this was to enhance the generalisation. This research strategy approach was consistent with Yin's (2003) multiple case proposition, where the purpose was not to select a representative sample. The goal in each case study was, through analytical generalisation, to expand and generalise theories consistent with the conceptual framework and attempt to replicate the findings to build and expand the theoretical base for the implementation of CBTA systems in the Australian workplace.

**Limitations of the Research Strategy**

The enterprises studied were not seen as a representative sample, nor was this required within the case study strategy adopted (Yin, 1998). Nevertheless, the enterprises involved as case studies were limited to those who were willing to participate, which did not provide a broad spread of the industries represented in the manufacturing sector and necessitates further case study research in other sub-sectors of the industry, to build up the theoretical base. Each enterprise that indicated its willingness to participate in the research was used as a case study. It was considered that three case studies provided a manageable research load for the researcher, while allowing a multiple case study approach that would provide the
replication proposed by Yin (2003). It was also considered that this number of case studies would allow the building of a theoretical base and, given the volatility of industry activity, would also allow for any unexpected withdrawal of one of the enterprises over the period of the research.

The analysis of data and the descriptions, explanations and theory building will be influenced by the pre-conceptions or expectations of the researcher (Willig, 2001). Some of these pre-conceptions and expectations have been developed through the literature review and are expressed through the study propositions (Chapter 4).

The research strategy does not claim to identify cause and effect, nor does it lead to the making of predictions. To the extent that the comparison of the three cases allows for the expression of some theoretical generalisation or the formation of propositions, then these have been expressed as a contribution to the building of knowledge and theory. However, further case studies would be required to enable further analytical generalisation to build upon the knowledge for any theory proposed as an outcome of this study.

**Methodology within the Research Strategy**

The conceptual framework developed in Chapter 2 formed the structure within which the data were to be collected. As shown in Table 4.2, the subsidiary research questions were directly linked to the conceptual framework and were designed to collect the data required to explain the introduction of the CBTA system within each of the decision-making stages described in the conceptual framework.

The conceptual framework was based on four decision-making stages. These were the planning, structuring, implementing and recycling decision–making stages. Each of these decision-making stages incorporated the four features identified for a CBTA system. Further, the conceptual framework acknowledged the external and internal factors that impacted on the decisions at each stage. The data collection structure, approach and analysis were directly linked to this conceptual framework and its four decision-making stages.

Owen et al. (1999) described five categories of evaluation. One is described as a ‘clarification category’ and another as an ‘impact category’ (Owen & Rogers, 1999).

A ‘clarification category’ activity seeks to clarify the internal structure and functioning of the program, identify the rationale, the intended outcomes and the structure that has been implemented. An ‘impact category’ activity seeks to assess the impact of a settled program and involves a summative approach and the collection of data on outcomes (Owen & Rogers, 1999).

The intent of this study was to use the concept of a ‘clarification category’ activity and the concept of an ‘impact category’ activity within the conceptual framework.
The 'clarification category' activity was used to identify and analyse the reason for wanting a CBTA system, the expected outcomes, the system developed from the four decision-making stages, the external and internal factors that influenced the decisions and how they impacted on the features that were implemented. The 'clarification category' activity was used in each case study to explore these issues in the planning, structuring and implementation decision-making stages of the conceptual framework. These issues were explored for the following CBTA system features, incorporated within each decision-making stage of the conceptual framework as outlined in Chapter 2:

- the competency 'definition', scope and complexity;
- the process to recognise current competencies;
- the assessment processes and instruments; and,
- the learning approaches.

The 'impact category' activity was used to identify the impact of the planning, structuring and implementing decisions on the expected outcomes, whether the system was implemented effectively and to identify and examine any evidence that the system impacted on the expected outcomes and improved competitiveness and productivity.

To provide a framework for the identification and examination of any evidence that the system impacted on the expected outcomes and improved competitiveness and productivity, the study used a modified Kirkpatrick's four level model, subsumed within the recycling decision-making stage of the conceptual framework. The four levels of the Kirkpatrick Model (Kirkpatrick, 1998a) are shown in the following table:

| Level 1: Reaction: How well do the trainees like the program? |
| Level 2: Learning: What principles, facts and techniques did the trainees understand and absorb? |
| Level 3: Behaviour: Did the trainees change their on the job behaviour? |
| Level 4: Results: What results were obtained? |

The model is normally used for evaluating a specified, finite training program conducted away from the workstation (Kirkpatrick, 1998a). The model's four levels allow the collection of data on the trainees’ attitude to learning, identification of the learning that has taken place over a period of time, the behavioural change and the opportunity to use this newly learned knowledge and skills in the workplace and the results obtained through this process. Therefore the model is compatible with the collection of data for an enterprise CBTA system, where the learning can occur both intentionally and incidentally within the workplace and where the learned knowledge and skills can generally be applied directly to the job.
However, measuring the impact of a CBTA system is different from measuring the impact at the end of a specific, finite time, group training session, because of the different nature of the delivery method expected in an enterprise CBTA system.

These differences include:

- the overall ongoing and flexible nature of the CBTA system;
- employees training to acquire different sets of competency over similar time periods;
- accounting for learning that takes place at the workstation as part of the normal workday activities;
- employees having different training starting and finishing times within the overall CBTA system;
- individual employees becoming competent in a different skill-set from each other.

As a result, the study considered the collection of quantitative data for Level 4 of the Kirkpatrick Model using a time series approach. This required identifying the availability and type of output data collected by the enterprise. However, the output data, such as productivity and quality measures used by the companies were not made available to the researcher.

Further, it is doubtful whether the enterprises maintained records that clearly identified the times when other initiatives or interventions that were likely to impact on the output were introduced. Also, the trends caused by the initiatives identified would be very difficult to determine, given that many were not discrete interventions and in some cases they were unlikely to have had an immediate impact. Techniques have been proposed to account for any evidence of the impact of training, while considering the impact of other factors (Brinkerhoff, 1998; Gaines Robinson & Robinson, 1989; Phillips, 1997). But these were for discrete relatively short-term training delivery and would be extremely difficult to use for CBTA systems given the differences in delivery outlined above.

For the companies in this study, a time series approach would be required to identify when changes occurred and to estimate the impact of each significant event. In these companies the significant events included reductions in workforce numbers over a period of time, the implementation of new technology, major plant stoppages, changes in output levels due to economic and market circumstances and industrial action, some of which would not have had an immediate impact. Because of the inability to access company data, the study was limited to solely relying on the anecdotal ‘measures’ of the expected outcomes and improved productivity provided in the interviews and the questionnaires.

**Data Collection**

As indicated above, the conceptual framework developed in Chapter 2 formed the structure within which the data was to be collected.
The study research questions for which the data were collected are:

*Why do enterprises implement CBTA systems?*

*What CBTA systems do enterprises implement?*

*What external and internal factors significantly influence these CBTA systems?*

*What impact does a CBTA system have on an enterprise?*

As shown in Table 4.1 above, these research questions were linked to a set of subsidiary research questions and, as shown in Table 4.2, these subsidiary research questions were in turn directly linked to the conceptual framework. The subsidiary research questions guided the data collection approach and the design of the data collection instruments within the structure of the conceptual framework. Similarly, the data collection was guided by the study propositions developed in Chapter 4, which were formed to guide the data collection and analysis to support the development of an overall theoretical proposition.

**Data Collection Approach**

Many data collection approaches are appropriate within a case study strategy. Three broad groups or categories were identified: interviews, documents and direct observations (Tuckman, 1999). Yin (2003) identified six categories of sources of evidence: documentation, archival records, interviews, direct observations, participant-observation and physical artefacts. Denscombe (1998) identified four categories of data collection approaches: questionnaires, interviews, observation and documents. The data collection approaches in this study were based on the four categories outlined by Denscombe.

Specifically, the following data sources and data collection techniques were planned for the study:

- semi-structured interviews conducted with senior management, training managers, external consultants, supervisors and employees;
- questionnaires administered to employees
- collection of data from the company's documents and records;
- observation of the learning and assessment processes;
- observation of employee activity in relation to the use of competencies.

The broad relationship between the study research questions and the planned data collection approaches is shown in Appendix H.

The main data collection approach was to be the semi-structured interview. Interviews were to be conducted with the developers of the CBTA system and the managers and employees who interacted with the system. A semi-structured approach was planned for all the
interviews. This approach was planned because it allowed some scope for either participant to broaden the discussion and explore relevant areas that might have provided increased understanding of the situation, while providing direction to the interaction to ensure that information was gained for each of the research questions (York, 1998). However, the planned data collection approach included other methods consistent with each of the four categories identified by Denscombe (1998), that is, a questionnaire, interviews, observation and documentation.

Data Collection Instruments

**Interviews**

Four different semi-structured interviews were conducted. The first was for the developers of the system, the second was also for the developers of the system, the third was for supervisors of the employees, the fourth was for the trainers and workplace assessors and the fifth was for the employees. A schedule was developed for each group to be interviewed. The question schedule design was guided by the subsidiary research questions to enable data to be collected within the structure of the conceptual framework and the subsumed Kirkpatrick Model framework. This would also provide the appropriate data to test the study propositions. The schedule structure, the questions and the sequence of the questions reflected the four decision-making stages, the external and internal factors and the four levels of the Kirkpatrick Model. The set of question schedules used for one participating enterprise are shown in Appendices A to E. The schedules used in each enterprise were similar, but with the terminology changed to reflect the particular enterprise.

**Questionnaire**

The questionnaire was designed for administering to the employees. The conceptual framework also guided the design of the questionnaire, which was used to collect data in four main areas to determine:

- whether the participants’ degree of acceptance of the training might have been an internal factor in influencing the way in which the system was implemented.
- whether the participants’ learning preferences might have been an internal factor in the company's decision-making to adopt certain learning approaches.
- whether the participants’ preferred learning styles were consistent with approaches which were conducive to optimising learning and retention of the skills and knowledge.
- the impact of the system on the employees in terms of the learning that occurred, the competencies used on the job and any improvement in job performance.

Overall, the questionnaire was designed to collect data on what the employees felt about the training; what they learnt as a result of the training; and what changes had occurred in the
way they did their job as a result of the training. In addition, the questionnaire was designed to gain the employees’ opinion on what changes had occurred in their performance as a result of the training, and in relation to the expected outcomes from a CBTA system, of improved competitiveness and productivity, as espoused by the NTB (National Competency Standards-Policy and Guidelines, 1992).

The scope and length of the questionnaire were kept to a minimum. Feedback received from the enterprises that were approached to participate in the research, and from some of those who were participating in the research, indicated that they wanted to minimise the time for which the employees were unproductive. To meet the enterprises’ requirements, while achieving the data collection requirements, it was planned that the questionnaire would take about 15 to 20 minutes to complete. It was also planned that the questionnaire would be administered at the workplace to maximise the return rate and to enable it to be completed and reflected upon in the context to which it referred. The questionnaire was titled ‘Getting Your Opinion’ and was referred to as a response sheet to gain the employees’ opinion, to avoid any pre-established concerns the employees might have had about completing an instrument known as a questionnaire (Cox, 1996).

A pilot administration of the questionnaire was conducted with employees in one of the participating companies who had a similar role, but were not working in the plants used for the research. Verbal and written responses were sought from the employees regarding the questionnaire. The questionnaire was then discussed with a research peer group for comment. Modifications were then made to the questionnaire based on the pilot and the feedback from the employees and the peer group. The questionnaire used is shown in Appendix F.

The questionnaire was constructed so that a five-point rating scale was used where an opinion was required from the employee. The five-point rating scale was selected because of its capacity to gain data on the extent of each employee’s agreement with the statements (Kline, 1986) and because of its capacity to provide some differentiation on the extent to which an individual employee favoured particular learning approaches (Black, 1999). A five-point scale was selected as opposed to a binary scale, because it provided increased choices which was likely to improve the reliability of the responses (Black, 1999; Maxim, 1999).

**Data Collection Method and Schedule**

An initial exploratory interview and one or more familiarisation visits were conducted with each participating enterprise to identify enterprise data which were available, to identify locations, develop the context etc. These took place prior to any formal data collection processes. While these proved valuable, considerable follow up and persistence was required to identify if any documentation existed and to get access to that which did exist. The interview schedules and the questionnaire were modified to use the enterprise
terminology as required and other contextual adjustments were made. This proved to be an ongoing process as interview data identified further specific terminology, which was introduced in subsequent interviews or included in the questionnaire.

In each company, the employees who participated in the CBTA system were known as operators. Each of the companies had strict security arrangements and direct access to the operators was limited by these arrangements. Contact with the companies was generally through one key person and all contact with the operators was through this person. This person ‘signed in’ the researcher, who was then to be accompanied by a company employee at all times. Access to the operators was only available at those times when an appointment time could be arranged during the office hours of the contact person, which generally limited access and only provided access to those operators who were on the day shift at that time.

**Interviews**

Interviews were used as a data collection methodology with key proponents, planners and participants in the program. These were used to gain knowledge and understanding, which focused directly on the research questions and the case. A semi-structured interview technique was used. This maintained the strength of the structured interview, where all respondents were asked the same questions, but enabled some of the advantages of the unstructured interview where issues could be explored further as they related to the particular perspective of the respondent and to clarify responses (Brown & Dowling, 1998).

One-to-one interviews were conducted at the workplace to ensure confidentiality. The sequence of the questions in the interview schedule was not always maintained. Where, in a free flowing response, the employee introduced a topic that would have been covered in a later question, he was generally allowed to continue this response. In this manner the unstructured interview approach allowed the respondent to introduce related matters as part of his response. These matters were usually followed up at that time, rather than cutting the respondent short by indicating that a later question would cover that matter. Where the employee asked if he should pursue a particular topic that was known by the interviewer to be coming later, he was generally advised that an opportunity would follow. This was particularly so when the current question elicited a part response that would require further explanation or follow up. The use of a semi-structured approach also enabled good rapport to be established with each respondent, who had some control over the development of the interview (Brown & Dowling, 1998). The rapport established with this approach provided a good opportunity to explore and understand the reasons for the decisions made, which was an important part of this study.

The operators who participated in the interview were volunteers who were on the shift working at the times when the researcher was able to gain access to the company. Generally these
were pre-arranged, but in a couple of cases volunteers were sought just prior to the interviews.

At each interview permission was sought and obtained to audiotape record the interview. This was undertaken to minimise any inaccuracies which might have occurred with the use of field notes and therefore to improve the reliability of the data (Perakyla, 1997). Brief field notes were also taken at each interview.

As indicated previously, one preliminary interview was conducted in each company with the key person responsible for the implementation and maintenance of the CBTA system. Following this, a series of interviews was conducted using the interview schedules shown in Appendices A to E. Thirteen interviews were conducted in Company A, comprising two with the developer, three with managers, three with the trainers/assessors (two of whom were operators and one was an external consultant) and five with operators. Seventeen interviews were conducted in Company B, comprising five with the developers (one of whom was an external consultant), three with managers, three with middle managers/team leaders/assessors and six with operators. Seven interviews were conducted in Company C, comprising two with managers, one with a middle manager/senior team leader and four with operators.

**Questionnaires**

To assist in the collection of reliable data from the operators, a questionnaire was used to collect information from as large a group as possible to collaborate and verify the main data collected through the interview process.

The questionnaire was administered in only two of the companies. The questionnaire was not administered in Company C, where the training and assessment program had been suspended by the management. There was considerable resentment within the workforce as a result of this suspension and the loss of access to higher salary scales. It was considered that administering the questionnaire about the training and assessment system might have exacerbated this situation. Also, the responses to the questionnaire would have been highly biased by this resentment and been of little value.

Company A and Company B were subject to strict security arrangements and, as indicated above, the researcher was not able to gain direct access to the operators on the shifts. Consequently, intermediaries were relied upon to deliver the questionnaires and the accompanying explanatory letter and Consent Form to the operators. Responses were confidential and the completed questionnaire and a signed Consent Form were separately returned directly to the researcher through reply paid post. As no names were included on the responses, only a general follow up could occur within the company on the researcher’s behalf to gain additional responses. While this was not a totally satisfactory process, it was
the only way to gain access to the operators, other than those who were interviewed. As a result the response rates for Company A and Company B were low. Approximately 60 operators participated in the system in Company A and 40 questionnaires were provided for distribution, but only seventeen responses were received. Approximately 150 operators participated in Company B and 90 questionnaires were provided for distribution, but only fifteen responses were received. However, as the responses were not meant to be a representative sample, but were part of a process to collect data to collaborate and verify the interview data, these returns provided sufficient responses for that purpose.

The data from the questionnaire was used to support and confirm interview responses as a form of triangulation (Stake, 2000; Yin, 2003). Similarly, to the extent of their availability, all key proponents, together with all managers, supervisors and training personnel who were involved in the implementation were interviewed to provide support, clarification and confirmation to the interview responses from each respondent.

**Observations**

Limited opportunities were available for observation due to the inability to gain ready access, because of the security arrangements in all companies. In a few cases, informal observations were made during the interview process as the operators performed their normal functions at the workstation while being interviewed. During some interviews the operators provided access to the learning materials and components of the assessment instruments and demonstrated their use. It was not possible to directly observe the assessment process for an individual. This was partly due to the security arrangements of each company and the ad hoc nature of the arrangements used to schedule an assessment. Also, in two companies a large number of the assessments had been completed prior to the study commencing.

**Documents**

The availability of documentation related to the provision of the CBTA system in each enterprise was extremely limited as no document management or archival practices seemed to exist for working documents of this nature. This situation was noted in another study where documentation on why and how decisions occurred and the features that were implemented were also found to be scarce in a manufacturing environment (Down, 1996). Some documents were available in each company about the current activities, but little or none was available on previous activities, proposals, submissions or internal correspondence. Those documents that were made available were studied and they were used to provide additional information and to verify and confirm some data from other sources.
Reliability and Validity of the Data Collected

The reliability of the data collected through interviews, documentation and observation, is often criticised, based on how the researcher categorises the data and the consistency with which the researcher assigns the data to the categories (Silverman, 2000). Similarly, criticism is raised about the potential problems which can arise from the use of powerful anecdotal material without sound attempts to analyse how representative the data is and also to analyse less clear or contradictory data (Silverman, 2000). This complaint of 'anecdotalism' and the additional concern raised about the gap which can occur between beliefs and actions, that is, what people say and what they do, leads to questions about the validity of the research (Argyris & Schon, 1996; Silverman, 2000).

In this study, the collection of data through some simple observations, in addition to the interviews, enabled some verification of the interview statements in relation to what system had been put in place. Similarly, the collection of data from operators by both interview and by questionnaire enabled some verification of each type of response. The collection of data through the document inspection enabled some limited verification of the interview statements. The multiple approaches that could be implemented provided different data, which enabled some corroboration and verification of the findings. This approach provided the capacity for findings to be corroborated, qualified or discarded on the basis of the findings of another approach or source. As a result, the approach adopted had the potential to enhance the reliability and the validity of the data.

Data Management and Record Keeping

Audiotape Recording and Transcripts

As indicated previously, approval was given to record all interviews using audiotape. This was done to provide an accurate record of what was said compared with the summarised interview notes. It was also done to provide an opportunity to review the material and reflect on its content in terms of meanings or other more subtle points, which were likely to be overlooked in the note-taking and summarising process. A transcript was then prepared from the audiotape by the researcher and, together with the audiotape recording, used as the basis of the analysis for the interview.

Interview Notes

Summary notes were prepared during each interview as a backup to the audiotape recorded interviews. The field notes from the preliminary interviews were used in the analysis process as these interviews were not audiotape recorded.
Limitations to Data Collection

Data collection was limited in the enterprises involved due to the lack of any substantial documentation on the planning, structuring and implementing of the CBTA systems. Data collection was also limited due to the difficulties in gaining ready access to personnel because of their work commitments and the requirement for the researcher to deal directly through a contact person to make contact with the operators at each company. This involved indirect communication with most of the personnel involved. This lack of opportunity for the researcher to communicate directly with the operators, in particular, limited the researcher’s ability to encourage participants to be involved or to be interviewed or to increase the response rate from the questionnaire. The researcher relied heavily on the goodwill of one or two people in each enterprise who, particularly in relation to gaining access to the operators, were prepared to assist with internal communication and the gaining of their consent to be interviewed. They also established the interview times, provided internal introductions and guiding services, located available documentation and encouraged questionnaire responses. Despite this goodwill, these people were also busy with their job and required continual encouragement, reminders and harassing to establish the contacts and organise for the access required for collecting the data.

In addition, the security associated with each of these companies, including the need to sign in and out and to be escorted at all times by a company employee, prevented the researcher from gaining a deep understanding of the workplace culture and from observing activities and events as they occurred (Willig, 2001). In two companies it was not possible to observe the events associated with the case as they had occurred prior to the commencement of the research. In the third company training was occurring at the time of the research study and some limited opportunities occurred for observation of the training and assessment activities.

Further, irrespective of the access to the data, the interpretation of the data collected has its limitations, as outlined in the following section. For example, the interview data has limitations. The representation of the reality presented by the interviewee is subject to a number of factors, such as information retention and the subjective nature of accounts based on an individual's own attitude, behaviour and position within the organisation (Baker, 1997; Silverman, 2000). Similarly, other forms of the data have limitations as outlined in the following section.

Finally, the scope of the data was also limited because no request or attempt was made to interview either external or company union representatives to avoid causing any industrial relations issues within the companies.

These limitations on the collection of certain forms of data limited the capacity of the research to use a range of data sources and therefore limited the use of triangulation approaches to enable a better and deeper understanding of each case (Silverman, 2000; Willig, 2001).


**Data Analysis**

**Overview of the Data Analysis Approach**

The conceptual framework proposed for the study was based on four decision-making stages. These were the planning, structuring, implementing and recycling decision-making stages. Each of these decision-making stages incorporated the four features identified for a CBTA system. Further, the conceptual framework acknowledged that external and internal factors impacted on the decisions at each of the decision-making stages.

The data was analysed for specific purposes, as identified above, based on the concept of a ‘clarification category’ activity. This involved analysing the interview data using the approaches identified below, and classifying or coding the data within one of the decision-making stages of the conceptual framework and generally under one of the features of the CBTA system within that decision-making stage. For example, data related to a decision made for a particular CBTA feature were coded under that feature as a planning decision, a structuring decision, an implementing decision or a recycling decision, corresponding to the stage when the decision occurred. In addition, data related to a factor that impacted on these decisions were classified or coded as either an external factor or an internal factor.

The data was also analysed for specific purposes, as identified above, based on the concept of an ‘impact category’ activity, including identifying and examining any evidence that the system impacted on the expected outcomes and improved competitiveness and productivity. This evidence was identified and coded using the modified Kirkpatrick Model framework subsumed in the conceptual framework within the recycling decision-making stage. This Kirkpatrick Model framework enabled the evidence to be more readily identified and classified in a structured manner by using the four levels. The data was analysed and any evidence was identified that related to the trainees’ attitude to learning, the learning that had occurred, the behavioural changes on the job, the opportunity to use the newly learned knowledge and skills on the job and the results obtained through this process, such as the impact of the system on the expected outcomes and improved competitiveness and productivity. This evidence was then classified or coded under one of the four levels of the model. In addition, any evidence related to the effectiveness of the introduction of the CBTA system and the unexpected outcomes were identified and coded under these categories as shown in Figure 5.4 below.

The analysis of the interview and documentary data was undertaken using the software tool QSR NVivo. As indicated above, the conceptual framework and the embedded Kirkpatrick Model formed the basic framework for the data analysis and the classification or coding process. The NVivo software was set up to enable the data to be classified or coded under specified groups or ‘parent nodes’ based on the four decision-making stages of the
conceptual framework and the external and internal factors as described below and shown in Figures 5.1 to 5.6. ‘Child nodes’ were initially developed using the four CBTA features and additional ‘child nodes’ were added as the data was analysed to provide a finer classification of the data. The four levels of the Kirkpatrick Model were established as ‘child nodes’ as shown in Figure 5.4. The NVivo software allowed the interview transcripts and company documentation to be analysed, and paragraphs, sentences, phrases or single words were highlighted and coded to a specific category or ‘node’. Multiple coding occurred where the data applied to more than one category or node. Notes and ‘memos’, which were linked to the original data, were made while analysing the data using the NVivo software to highlight the themes and concepts that appeared to be emerging. Notes were also made which raised questions about the data and its meaning. These notes and memos were analysed at the conclusion of the data analysis for each case study. As a result, the underlying themes and concepts for the introduction of the CBTA system in each enterprise were identified in the case study report.

The Data Analysis Approach

The analysis was mainly based on the structured analysis approach (Gibbs, 2002) because a structure had been established to collect the data required by setting up predetermined ‘parent nodes’ based on the conceptual framework. However, an open coding approach was initially adopted (Gibbs, 2002; Punch, 1998), consistent with the initial stages of a grounded theory approach, to establish the ‘parent nodes’ and ‘child nodes’ for the conceptual framework components of External Factors and Internal Factors. This open coding approach allowed these factors to emerge from the data, rather than from the preconceived ideas of the researcher.

The structured analysis approach supported the notion of establishing predetermined categories for data analysis, based on theory or propositions from previous experience (Gibbs, 2002), which was consistent with the establishment of the predetermined parent nodes based on the four decision-making stages of the conceptual framework for the data analysis process as shown in Figures 5.1 to 5.6 below.

The structured analysis approach (Gibbs, 2002) was used for each of the three companies or cases, with the intent of a ‘clarification category’ activity and an ‘impact category’ activity (Owen & Rogers, 1999) as outlined above, and consistent with the conceptual framework identified in Chapter 2.

This approach was used to determine and clarify the internal structure and functioning of the system. It was used to identify the rationale, the expected outcomes and the structure that had been implemented. It was also used to identify the impact of the system on the expected outcomes and to examine any evidence to suggest that the system had achieved the expected outcomes and improved competitiveness and productivity as expected by the NTB.
As indicated above, each of these parent nodes, separate sub-categories or ‘child nodes’ were established for the features of the CBTA system as outlined in the conceptual framework (Chapter 2). That is, the competency ‘definition’; scope and complexity; the process to recognise current competencies; the assessment processes and instruments; and the learning approaches were established as ‘child nodes’.

The data for each company was analysed and coded to a child node within one of the four decision-making stages. The data analysis process was cognisant of the primary and subsidiary research questions of ‘what’, ‘why’ and ‘how’ and within this, the data was ‘questioned’ (Strauss & Corbin, 1998) to not only identify the descriptive nature, but also to move from the descriptive to the conceptual to build the knowledge and theory. The analysis was also testing the conceptual framework and whether the process of the intervention appeared to support the notion or concept of using four decision-making stages.

An open coding process (Gibbs, 2002; Punch, 1998; Strauss & Corbin, 1998) was used within the broad structured categories or ‘parent nodes’ of External Factors and Internal Factors. This data analysis process was undertaken as the first stage of the conceptual analysis of the data with the intention of establishing conceptual categories from the data. This approach was reflective of the concepts of a grounded theory approach (Gibbs, 2002; Owen & Rogers, 1999; Punch, 1998; Strauss & Corbin, 1998). Consistent with the initial use of open coding in a grounded theory approach, no predetermined sub-categories or ‘child nodes’ were established within these two ‘parent nodes’, but it was the intent of the process to develop the nodes from the data.

This initial open coding approach was used for each of the three companies, consistent with the ‘clarification category’ activity (Owen & Rogers, 1999) identified above. The purpose of this approach was to identify the factors or concepts, both internal and external, which influenced the decision-making at each stage of the CBTA system intervention. That is, the analysis and coding was implemented to identify, at each decision-making stage, those internal or external factors, conditions or actions which influenced the decision-making and which shaped, facilitated or constrained the form of each of the features of the CBTA system, and therefore the form of the intervention.

At the same time, the evidence for the outcomes was analysed using an axial coding approach (Punch, 1998; Strauss & Corbin, 1998). This was to determine if any relationships existed between the categories and sub-categories and to look for answers as to where, when, how and why an event or phenomenon occurred and with what consequences or outcomes (Strauss & Corbin, 1998). The purpose of the coding and analysis was to understand or explain the event or phenomenon.

Also consistent with a grounded theory approach a follow up interview was conducted with the key training decision maker in Company A and Company B. The need for this interview
was guided by the initial analysis of the data; to pursue the concepts and directions suggested in relation to the external and internal factors that appeared to emerge.

Finally, an open coding approach (Gibbs, 2002) and the associated establishment of any relevant categories from the data, was also used for the data from each of the three companies, consistent with the ‘impact category’ activity (Owen & Rogers, 1999) as outlined above. This was used to identify any evidence for the outcomes expected by the NTB from the implementation of a CBTA system, and any unexpected outcomes. That is, the analysing and coding of the data was open to identifying any unexpected sub-categories or influences and any unexpected outcomes that were represented in the data. Similarly, as outlined above, the evidence for the outcomes was examined using an axial coding approach to determine if any relationships existed between the categories and sub-categories and to look for answers as to where, when, how and why an event or phenomenon occurred and with what consequences or outcomes, for the purpose of understanding or explaining the event or phenomenon.

**Analysis of the Interview Data**

The analysis of the interview data was undertaken with an understanding of the discussion about how such data might be interpreted (Silverman, 2000). This discussion related partly to the validity of the data based on the accuracy of the respondent's memories, the individual's response tendencies and so on, but also, through interviewer bias and effects, to the interpretation the analyst places on the response (Punch, 1998; Silverman, 2000).

Within the data analysis approach outlined above, the interview data was interpreted from the point of view of a ‘realist’ approach. That is, the interview response was taken as describing some ‘external reality’ or ‘internal experience’ (Silverman, 2000). However, it was recognised that the experience and perception of the individual is selective and that the interview data was the individual's perception or interpretation of the phenomena or events, which could be described in many different ways (Balnaves & Caputi, 2001; Willig, 2001).

The ‘realist’ approach can be compared with the ‘narrative’ approach which views the respondents answer as a ‘cultural story’ (Silverman, 2000). The narrative approach is seen as one in which the respondent deploys a narrative approach to make their actions explainable and understandable to those who might otherwise not understand (Gibbs, 2002; Punch, 1998; Silverman, 2000).

Taking the ‘realist’ approach was considered to be consistent with this study's case study approach, which is to determine the ‘how’, ‘what’ and ‘why’ of each case (Willig, 2001; Yin, 1994). Based on this ‘realist’ approach, the data was analysed and categorised with the underlying view that it represented a true description of the features of the CBTA system intervention and the associated activities and experiences of the participants. The validity of
the data and a confirmation of the analysis based on this approach was to be supported, to the extent possible, by any data gained by the other methods which were built into the research design, such as observation, questionnaires and document inspection.

However, within this approach, the analysis was also undertaken cognisant of the view that a respondent might describe and justify actions using conventional 'cultural stories', based on the value systems and cultural experiences of the prevailing culture or the popular beliefs which existed about the particular situation, rather than providing meaningful insights into their view or experience (Baker, 1997; Miller & Glassner, 1997; Silverman, 2000). Sensitivity to this view was kept in mind during the data coding process. This sensitivity was also emphasised by replaying the audiotape recorded interview data and listening, concentrating and reflecting on the broader narrative. This was to determine whether any underlying 'cultural story' and themes were behind the interview narrative which might further enlighten the study or which might raise doubts about the manner in which the data was coded based on the 'realist' approach.

**Analysis of the Documentary Data**

Atkinson and Coffey (1997) noted that documentation and texts are 'social facts' and are not "transparent representations of organizational routines, decision-making processes, or professional diagnoses" (p.47). As such, they construct particular organisational representations in accordance with the organisational conventions and cannot be treated as firm evidence of what they report (Atkinson & Coffey, 1997). Consequently, it was not planned to analyse the documentation available relating to the planning, structuring and implementing of the CBTA system, such as minutes of meetings, proposals and reports, on the basis that it contained true statements. It was analysed as a source of what it reported, in the context of the other data collected, the purpose of the document and the conventions of the organisation for reporting events and decisions (Punch, 1998). Further, it was analysed in terms of its origin, its purpose and the reason for its creation (Prior, 1997). As such, it was used as a source of information together with the interviews and observations, to provide insight on its development and the matters it reported.

**Analysis of the Questionnaire Data**

The purpose of the questionnaire was to gather data from a larger number of operators than was possible through the interviews and to use this data to provide some corroboration and verification of the views expressed in the interviews. The questionnaire used a rating scale of a type which allowed respondents to agree or disagree on items and provided some discrimination on the basis of the strength with which the views were held (Balnaves & Caputi, 2001; Black, 1999).
The combined response of all the respondents was analysed for each question. First, for questions 1 to 5 a simple frequency count was made and this was analysed to gain some understanding of the prior educational background and the length of service in the company of those responding and their status in relation to the percentage of the program completed. Second, histograms were developed for questions 6 to 15 to determine the frequency of each choice within a question. Based on these individual histograms, and in some cases, a visual comparison between histograms across different questions, a simple analysis was made of the opinions provided to support and confirm the views provided through the interviews. Any more sophisticated analysis would not be appropriate because a sample was not conducted of the population of operators, nor was the questionnaire structured in a manner that would allow such analysis.

A limitation of the questionnaire could be the reliability of the data for question 6, because of the difference in time between when the questionnaire was administered and the time when the attitude to be measured was held. For example, the Kirkpatrick Model at Level 1 relied on how well the participants enjoyed the training. The measure required was a measure of the respondent’s attitude during the training, which Kirkpatrick inferred might impact on the learner’s motivation and the amount learnt during the training (Kirkpatrick, 1998a). The intent of the Kirkpatrick Model was to measure this attitude as soon after the completion of the training as possible. Whereas, in this case, the questionnaire was administered after the training, but in many cases this was a considerable time after the training was completed. Other influences, such as the success in completing the training or the expected outcomes and rewards, might well have caused a change in the person’s attitude or opinion about the training over the period of time between doing the training and administering the questionnaire. On the other hand, a meaningful response could only be provided to other parts of the questionnaire if it was administered some time after the completion of the training to determine whether any changes in performance had occurred as a result of the training. However a similar limitation generally applied to the interview data because of the same time differences. Consequently, any conclusions drawn from the interview data that was verified by the questionnaire data would need to take account of the reliability of the data.

Finally, the analysis of the questionnaire is limited by all the limitations of any questionnaire. These include limitations caused by a respondent:

- answering in a way which he thinks will make a good or bad impression (Black, 1999);
- answering with what he thinks he should say, rather than how he feels (Black, 1999; Tuckman, 1999);
- answering how he thinks he behaves, rather than how he actually behaves (Kline, 1979; Tuckman, 1999);
- answering with bias towards the middle or any other part of the scale (Black, 1999);
- deliberately providing misleading responses (Black, 1999).
Should responses of this nature occur then the capacity for the questionnaire responses to verify the interview responses would be limited.

**Procedures for the Analysis of the Data for each Case**

**Coding of Data**

Coding has been described as both a specific and a concrete activity which starts the analysis, but also as a process of analysis (Punch, 1998). This description is supported by the notion that there are two main types of codes: \"descriptive codes and inferential (or pattern) codes\" (p.205) (Punch, 1998). Descriptive coding is used for coding segments of data that are descriptive and is a useful process for summarising the data and identifying the answers to the \‘what\', and the descriptive part of the \‘why\' questions. Inferential coding is of a higher order and a more advanced level of analysis and is used in an interpretative sense requiring some degree of inference from the data. This can be considered as a deeper analysis of \‘why\' and inferring the influences and consequences to build up a pattern (Punch, 1998) for comparison with other cases. Punch (1998) likens the inferential coding to factor analysis in quantitative research, identifying concepts at a higher level of abstraction.

The data was analysed and coded through a sequence of coding, initially at the descriptive or \‘what\' and \‘why\' level and then considered at a more analytical level. The latter process considered the \‘why\' at a more conceptual level and identified the influences and the consequences. These were recorded as notes and memos or additional data was coded within each of the coded nodes. This consideration of the influences and consequences was implemented to assist in the possible higher level conceptual linking of the concepts associated with the \‘why\' questions (Punch, 1998). This was to assist in determining the reasons for the decision-making and to develop the themes and concepts from the case study.

**Predetermined Data Categories**

Consistent with this overall data analysis process, as indicated previously, parent nodes and the associated child nodes were initially established under the structured analysis approach based on the conceptual framework and the cascading child nodes were generally established in the open coded analysis approach or during the analysis. Coding of the data was undertaken within these categories using the concepts, understanding, sensitivity and processes as outlined above. Themes arising from the influences and consequences were also identified and coded or prepared as a memo or notes for later comparison. The following Figures 5.1 to 5.4 identify the parent and child nodes which were used for the analysis within each of the four decision making stages of the conceptual framework.
<table>
<thead>
<tr>
<th><strong>Parent Node</strong></th>
<th><strong>Cascading Child nodes</strong></th>
<th><strong>Dimensions or Issues considered</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Planning Stage</strong></td>
<td>Evidence of use of this conceptual stage</td>
<td>Expected outcomes</td>
</tr>
<tr>
<td></td>
<td>the competency ‘definition’, scope and complexity;</td>
<td>Systematic approach</td>
</tr>
<tr>
<td></td>
<td>the process for RCC;</td>
<td>Evolutionary approach</td>
</tr>
<tr>
<td></td>
<td>the assessment processes and instruments;</td>
<td>Higher order or narrow</td>
</tr>
<tr>
<td></td>
<td>Assessment Approach</td>
<td>Job-specific</td>
</tr>
<tr>
<td></td>
<td>Key Principles applied / considered</td>
<td>Purpose</td>
</tr>
<tr>
<td></td>
<td>the learning approaches</td>
<td>Cost effective</td>
</tr>
<tr>
<td></td>
<td>Informal workplace learning</td>
<td>Sufficiency of evidence</td>
</tr>
<tr>
<td></td>
<td>Incidental workplace learning</td>
<td>Importance of the competence</td>
</tr>
<tr>
<td></td>
<td>Effectiveness Approach</td>
<td>Reliability</td>
</tr>
<tr>
<td></td>
<td>Adult learning principles</td>
<td>Validity</td>
</tr>
<tr>
<td></td>
<td>Learning retention</td>
<td>Fair and Flexible</td>
</tr>
<tr>
<td></td>
<td>Procedural knowledge</td>
<td>Predictive validity</td>
</tr>
<tr>
<td></td>
<td>Theoretical knowledge</td>
<td>Holistic or Atomistic</td>
</tr>
<tr>
<td></td>
<td>Problem solving</td>
<td>Objectivity or Subjectivity</td>
</tr>
<tr>
<td></td>
<td>Transferable outcomes</td>
<td>Contextual fidelity</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Figure 5.1 Planning Stage Nodes**
### Figure 5.2 Structuring Stage Nodes

<table>
<thead>
<tr>
<th>Parent Node</th>
<th>Cascading Child nodes</th>
<th>Dimensions or Issues considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structuring Stage</td>
<td>Evidence of use of this conceptual stage</td>
<td>Systematic approach</td>
</tr>
<tr>
<td></td>
<td>the competency ‘definition’, scope and complexity;</td>
<td>Evolutionary approach</td>
</tr>
<tr>
<td></td>
<td>the process for RCC;</td>
<td>Higher order or narrow Job-specific</td>
</tr>
<tr>
<td></td>
<td>Formal Process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>No process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>RCC process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Effective &amp; efficient</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assessors</td>
<td>Contextual fidelity</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>Generalisation</td>
</tr>
<tr>
<td></td>
<td>Competency based approach</td>
<td>Predictive validity</td>
</tr>
<tr>
<td></td>
<td>Refresher training</td>
<td>Holistic or Atomistic</td>
</tr>
<tr>
<td></td>
<td>Effective and efficient</td>
<td>Objectivity or Subjectivity</td>
</tr>
<tr>
<td></td>
<td>Key Principles applied / considered</td>
<td>Cost effective</td>
</tr>
<tr>
<td></td>
<td>Informal workplace learning</td>
<td>Sufficiency of Evidence</td>
</tr>
<tr>
<td></td>
<td>Incidental workplace learning</td>
<td>Importance of the competence</td>
</tr>
<tr>
<td></td>
<td>Effectiveness</td>
<td>Reliability</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>Validity</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Fair and Flexible</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Adult learning principles</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Learning retention</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Procedural knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Theoretical knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Problem solving</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Transferable outcomes</td>
</tr>
<tr>
<td>Parent Node</td>
<td>Cascading Child nodes</td>
<td>Dimensions or Issues considered</td>
</tr>
<tr>
<td>-------------</td>
<td>-----------------------</td>
<td>---------------------------------</td>
</tr>
<tr>
<td>Implementing Stage</td>
<td>Evidence of use of this conceptual stage</td>
<td>Systematic approach, Evolutionary approach</td>
</tr>
<tr>
<td></td>
<td>the competency ‘definition’, scope and complexity</td>
<td>Higher order or narrow, Job-specific</td>
</tr>
<tr>
<td></td>
<td>the process for RCC; Formal Process, No process</td>
<td>RCC process, Effective &amp; efficient</td>
</tr>
<tr>
<td></td>
<td>Assessors Approach Competency-based approach Refresher training</td>
<td>Contextual fidelity, Generalisation, Predictive validity, Holistic or Atomistic, Objectivity or Subjectivity, Cost effective, Sufficiency of Evidence, Importance of the competence</td>
</tr>
<tr>
<td></td>
<td>Effective and efficient Key Principles applied / considered</td>
<td>Reliability, Validity, Fair and Flexible</td>
</tr>
<tr>
<td></td>
<td>the assessment processes and instruments;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Informal workplace learning Effectiveness Approach Transferable outcomes</td>
<td>Adult learning principles, Learning retention, Procedural knowledge, Theoretical knowledge, Problem solving</td>
</tr>
<tr>
<td></td>
<td>Incidental workplace learning</td>
<td></td>
</tr>
</tbody>
</table>
### Figure 5.4 Recycling or Outcome Stage Nodes

<table>
<thead>
<tr>
<th>Parent Node</th>
<th>Cascading Child nodes</th>
<th>Dimensions or Issues considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recycling and Outcomes Stage</td>
<td>Evidence of use of this conceptual stage</td>
<td>Systematic approach Evolutionary approach</td>
</tr>
<tr>
<td></td>
<td>the competency ‘definition’, scope and complexity;</td>
<td>Higher order or narrow Job-specific</td>
</tr>
<tr>
<td></td>
<td>the process for RCC;</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formal Process</td>
<td>RCC process Effective &amp; efficient</td>
</tr>
<tr>
<td></td>
<td>No process</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Assessors</td>
<td>Competency-based approach</td>
</tr>
<tr>
<td></td>
<td>Approach</td>
<td>Refresher training</td>
</tr>
<tr>
<td></td>
<td>Effective and efficient</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Key Principles applied / considered</td>
<td>Contextual fidelity Generalisation Predictive validity Holistic or Atomistic Objectivity or Subjectivity</td>
</tr>
<tr>
<td></td>
<td>the learning approaches</td>
<td>Cost effective Sufficiency of evidence</td>
</tr>
<tr>
<td></td>
<td>Informal workplace learning</td>
<td>Cost effective</td>
</tr>
<tr>
<td></td>
<td>Incidental workplace learning</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Happy to do training</td>
<td>Reliability Validity</td>
</tr>
<tr>
<td></td>
<td>Learning new skills</td>
<td>Fair and Flexible</td>
</tr>
<tr>
<td></td>
<td>Skills used on the job</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Performance Changes</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Formal mechanism</td>
<td>Adult learning principles</td>
</tr>
<tr>
<td></td>
<td>Anecdotal measures</td>
<td>Learning retention</td>
</tr>
<tr>
<td></td>
<td>Effectiveness Approach</td>
<td>Procedural knowledge</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Theoretical knowledge</td>
</tr>
<tr>
<td></td>
<td>Expected outcomes Unexpected Outcomes Productivity Quality</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Transferable outcomes Problem solving</td>
<td></td>
</tr>
</tbody>
</table>

74
As indicated previously, no predetermined categories or nodes were established for the External and Internal factors identified in the conceptual framework. This approach was taken to enable those nodes to be developed from the data. The broad categories identified through the analysis process for the External factors were Unions, Economic conditions, Government funds, Linkages of company staff and External regulations. The broad categories identified for the Internal factors were Purpose of the CBTA system intervention, Company staff, Unions, Earlier experiences, Outcome expectations, Changes in operations-resources and Enterprise bargaining. The External factor and Internal factor parent nodes or categories and the associated child nodes established from the data as a result of the open coding approach are shown in Figures 5.5 and 5.6 below.

**Figure 5.5 External Factor Nodes**

<table>
<thead>
<tr>
<th>Parent Node</th>
<th>Cascading Child nodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>External Factors</td>
<td>Unions → Negative, Positive</td>
</tr>
<tr>
<td></td>
<td>Economic conditions</td>
</tr>
<tr>
<td></td>
<td>Government funds</td>
</tr>
<tr>
<td></td>
<td>Staff linkages with external bodies</td>
</tr>
<tr>
<td></td>
<td>External regulations</td>
</tr>
</tbody>
</table>
Figure 5.6 Internal Factor Nodes

<table>
<thead>
<tr>
<th>Parent Node</th>
<th>Cascading Child nodes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Purpose of the CBTA system</td>
<td>Company staff characteristics</td>
</tr>
<tr>
<td></td>
<td>Management and business rules.</td>
</tr>
<tr>
<td></td>
<td>Staff attitude.</td>
</tr>
<tr>
<td></td>
<td>Training department.</td>
</tr>
<tr>
<td></td>
<td>Understanding of competency-based systems.</td>
</tr>
<tr>
<td></td>
<td>Staff as a driving force.</td>
</tr>
<tr>
<td></td>
<td>Preferred learning approach.</td>
</tr>
<tr>
<td>Company Staff</td>
<td>Supportive</td>
</tr>
<tr>
<td></td>
<td>Feared but supportive</td>
</tr>
<tr>
<td></td>
<td>Feared and resisted</td>
</tr>
<tr>
<td></td>
<td>Followed union attitude</td>
</tr>
<tr>
<td>Internal Factors</td>
<td>Positive.</td>
</tr>
<tr>
<td></td>
<td>Negative.</td>
</tr>
<tr>
<td>Unions</td>
<td>Supportive</td>
</tr>
<tr>
<td></td>
<td>Feared but supportive</td>
</tr>
<tr>
<td></td>
<td>Feared and resisted</td>
</tr>
<tr>
<td></td>
<td>Followed union attitude</td>
</tr>
<tr>
<td>Earlier experiences</td>
<td>Company staff attitude</td>
</tr>
<tr>
<td></td>
<td>Training department management</td>
</tr>
<tr>
<td></td>
<td>Previous models or attempts.</td>
</tr>
<tr>
<td></td>
<td>Unions</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
</tr>
<tr>
<td></td>
<td>Negative</td>
</tr>
<tr>
<td>Outcome expectations</td>
<td>Resource-operational changes</td>
</tr>
<tr>
<td>Enterprise bargaining</td>
<td></td>
</tr>
</tbody>
</table>
Limits in Coding Data

Coding of data can establish a framework within which the data can be usefully organised and analysed, but it can also restrict broader thinking about the data by establishing a rigid grid within which all analysis is focused, which could possibly lead to overlooking unexpected outcomes (Silverman, 2000). Further, the choice of categories can further restrict the breadth of the analysis and the identification of the theoretical relationships (Silverman, 2000). Finally, and obviously, care must be taken to correctly code the data into the selected categories.

Outcome of the Data Analysis

The conceptual framework, with the subsumed Kirkpatrick Model, formed the structural framework for the data collection planning, the data collection and the data analysis. As a result, this structure has been carried forward in the case study report for each individual case.

The following three chapters provide reports on each of the three case studies based on the outcome of the data analysis. As indicated above, the data was analysed and coded within the QSR NVivo software using the conceptual framework decision-making stages and the subsumed modified Kirkpatrick Model as the framework, which has been carried through in each report. In the ‘Description of the Case’ section for each company in the next three chapters, the data has been presented under headings which represent the categories or stages identified in the conceptual framework and the subsumed Kirkpatrick Model. The presentation of the data in this manner reflects the conceptual framework, responds to the subsidiary research questions and allows the reader to more readily follow the decision-making journey of the companies in establishing their CBTA systems. Further, the ‘Themes and Concepts Identified in the Case’ section for each company in the next three chapters were derived from the note taking and memos and the higher level analysis in the data analysis process for each case. In addition, the following three chapters use the data analysis to respond to the study propositions to test these for each case.
Case Study: Company A

The Company

Company A is an Australian company which is a subsidiary of a USA based multi-national. It is a manufacturer of chemicals and related products mainly for Australian domestic markets. The company employs over 650 people across Australia with about 400 people employed at the manufacturing plant in which the CBTA system was implemented.

The manufacturing plant was established in the early 1940’s and it has been owned by a number of different companies over its lifetime. Similarly, many of the manufacturing plant employees have remained as plant operators over long periods of time, despite the change in ownership of the company.

The total manufacturing plant is organised into ten separate plants. The Plant Supervisor of each plant takes considerable responsibility for its operation and output within the constraints of the overall management and administration of the total site, and within the customer product requirements and the financial and budget allocations established for the particular plant. Under this arrangement the Plant Supervisor takes responsibility for the plant operators’ training which relates directly to the operation of the plant. The Plant Supervisor is responsible for developing an annual training plan for this part of the plant operators’ development and provides funds from the budget allocated to the plant for this purpose. The overall site production department has a Training Manager who consolidates the training plan for the plant by including the company’s corporate training requirements. The Training Manager is responsible for the implementation and administration of the CBTA system intervention for plant operators across all ten plants.

Other departments, for example the health and safety team, take responsibility for other specialist training activities which form part of the company’s overall corporate training, such as safety training programs provided across the site to the whole company workforce.
The Context

The ‘boundary’ of the Case Study for Company A was identified as encompassing the CBTA system intervention that occurred for the Plant Operators in two of the company’s manufacturing plants. This included the external and internal factors that influenced the decision-making in this intervention.

The more recent changes in company ownership had brought about considerable cultural change for many of the current employees. Successive owners had developed cost cutting approaches to achieve improved financial performance. Company A had also brought about changes as it sought to be globally competitive and had undertaken a process of restructuring the role of its employees in plant management and plant operations. The plant operators were directly impacted by these changes. The changes broadened the scope of the plant operators’ role and made them responsible for the job functions previously undertaken by the plant foremen and coordinators. The changes also required the acceptance and use of new technology to assist in the operation of the plants. These changes were accompanied by new and more flexible remuneration arrangements for the plant operators and a reduction in the number of employees operating and supporting the operation of the plants. The changes in new technology included the progressive introduction of automated digital computer control systems to replace the former electro-mechanical control panels, which required manual adjustment of controls on the panel and out in the plant. When the study commenced, Plant 1 had 45 male operators having recently reduced from 60 operators and Plant 2 had 15 male operators, which had reduced from 20 operators. Further reductions occurred over the period of the study.

A major explosion occurred in the Longford Gas Plant, Victoria, in September 1998, which heightened government awareness of the safety requirements of manufacturing plants of this nature (See Appendix G). As a result, the Victorian State Government issued the Occupational Health and Safety (Major Hazard Facilities) Regulations, 2000, that identified manufacturing plants of this nature as major hazard facilities and provided regulations for their operation, which directly impacted on both the company and the plant operators.

Role of the Plant Operator

In very broad terms the plant operator was responsible for performing the day-to-day functions and activities to keep the manufacturing plant operating effectively and efficiently. This included monitoring and controlling the plant’s performance to ensure it operated within normal and acceptable parameters, the efficient and effective use of raw materials and resources, and ensuring the achievement of a product within the specifications required. The plant was monitored through the use of a control panel and changes were made to the plant operating equipment, either through automatically controlling the operation or physically...
attending to and changing plant controls. This included opening and closing valves and shutting down and starting up equipment to change the conditions and the product outcome as required. Following the elimination of the supervisory positions the operators organised and managed plant equipment maintenance and repairs, and the ordering of raw materials and other products and utilities required for the plant. In addition, they were responsible for the changes to the plant’s operation to meet the specifications of particular customers and they generally made and implemented decisions that impacted on the product outcome and the safe, effective and efficient operation of the plant.

**Previous Training Experience**

The company had mixed experience with the provision of training for its operators. Plant 1 was seen as the senior plant because of its greater complexity of operation and had the highest classified and skilled operators. The training history within this plant was extensive. During the construction of the plant in the late 1970’s, people from outside the company were employed as operators. These new employees undertook a 3 months full time training classroom-based program, which was developed jointly by the engineers who were responsible for the plant design and by engineers from the USA plant. This classroom-based training program was integrated with tours around the construction site and identification of the major components. These new operators also developed their skills while commissioning the plant and in the initial start up process. Many of the current operators were involved in this initial program. At the time, Plant 1 had a Training Foreman who was responsible for developing further training, delivering this training and making an initial assessment of the operators. The level of training offered was sufficient for the operators to gain the skill level required to operate the plant in a procedural manner. Operators employed since that time had also undertaken a three month initial training program with the Training Foreman, and they were then assigned to a partner or ‘buddy’ with whom they operated the plant and learnt the practical skills for the operation of the plant. The Plant Supervisor was responsible for finally determining whether the operator was capable of operating the plant. This was normally assessed by an oral questioning process. Training opportunities had been made available to the operators in this plant over a period of time because of its size and status within the organisation. The training provided was initial training for new employees and structured training in specialist functions for existing employees. In addition, in more recent times, what was known as ‘refresher training’ was provided in the plant. Initially this was an irregular review and revision session of the skills required to perform identified functions as a plant operator. The drive for this earlier refresher training in Plant 1 came from the operators, the day coordinators of the time, and the individual Plant Supervisors, as a result of the cultural and work role changes that were occurring.

The training opportunities previously available to the operators in Plant 2, other than their initial training, were very limited with most operators receiving little additional training. When
this plant was established the operators came to the plant from other company plants on the site. All the operators had previously received initial training on another plant. When they transferred to the new plant, the engineers gave the operators some basic training on the procedures for operating the plant, but they were not given any detailed training on the equipment as it was assumed that they had developed these skills on their previous plant. Nor were they given any knowledge-based training on the processes that occurred in the plant or the impact of certain operating procedures on the plant’s processes or the product outcome.

New employees engaged to work in the plant since that time had received little formal training. The training approach adopted for these new employees comprised a period of individually reading the procedure manuals and equipment operating manuals and then learning the practical procedures for operating the plant using the ‘buddy’ system. There was no formal structure to the training and no time limit was established for when an operator should reach the level required for independently operating the plant. Nor were there any formal assessment arrangements to identify if the operator was competent to operate the plant. The plant operated with a shift team comprising senior operators, who were considered to be capable of operating the plant, and other less skilled operators who were coordinated by the senior operators and who provided support appropriate to their skill levels.

In the early to mid 1990’s the company planned to reduce the number of operators and supervisory positions on all plants. This plan broadened the range of responsibilities for the remaining operators. The company recognised that this required a cultural change within the organisation and a resultant demand for training. One or more training coordinator positions were planned for each plant to facilitate the change process. Senior operators were selected for the positions and each was offered an additional allowance to provide this service. The role for these positions was not clear and many training coordinators remained on the normal operator work roster, which rotated operators between day and evening shifts. As a result, the training coordinators did not readily come into contact with all the operators and the effectiveness of any training in a plant was dependent on the individual training coordinator in that particular plant.

**Curriculum-based Program Pilot**

Late in 1992 the company identified that the plant operators needed to understand the knowledge components required for effectively operating the plant. The initial employment requirements didn’t specify plant operating skills or knowledge of chemical processes and, as indicated above, the knowledge components were not covered in the initial or subsequent training. The company was employing tradespeople from fitting, plumbing, instrument making and other fields, and other people without a trade qualification, but with a perceived aptitude for doing the job. None had qualifications that would provide a background in the knowledge
components for operating a chemical plant. The company identified the need for knowledge-based training because of the performance of their employees. The operators had the hands-on skills required at the time, but didn’t have the knowledge base to understand the processes that occurred in the plant. Incident investigations attributed the cause of most of the operators’ errors to a lack of understanding of the basic chemical processes that were occurring in the plant.

The Training Foreman in Plant 1 was a member of the National Chemical and Oil Industries Training Committee and was directly involved in the development of a curriculum-based program especially developed for the plant operators in the industry. A pilot of the curriculum-based program was to be conducted during 1992 by the Victorian Allied Industries Training Board using a small group of companies. The Training Foreman took this opportunity to involve the company and used the pilot for twelve operators to trial some of the modules of the new program.

Late in 1993, consistent with the requirement to train the operators in the knowledge components of the role, the Training Foreman in Plant 1 planned for a full pilot of the new program in the company. This pilot was to be offered in conjunction with a TAFE Institute. The Training Foreman considered that the training would achieve the company’s outcome of filling the ‘knowledge gaps’ of the operators and would also facilitate the development of the skills and knowledge required for the restructured plant operator role.

A pilot program project proposal was presented to the General Manager. The company decided to become a Registered Provider within the Victorian vocational education and training system to enable it to access the State government funding available to private providers within that system. Approval was gained from the General Manager for the company to seek to become a private provider and gain funding and to issue Certificates in its name. A submission was made to the state training authority to partly fund the pilot program, and funds were provided to commence the program in 1994.

The plan was for 50 plant operators to commence the Operative Certificate in Chemical Plant Skills in 1994. This was a 240 hour program and was the first level of a three level Advanced Certificate. Participation in the program was totally voluntary. Operators were encouraged to participate by presenting the benefits of undertaking such a program, including that this was a development that would provide recognition for their existing skills and also represented the future direction for employment in the industry. A pre-certificate literacy and numeracy program was planned for those who required it, but was not implemented.

The operators’ initial reaction to participation in the program was one of fear. Many of the operators had been employed in the position for many years, some with up to 25 years employment in the role. The Training Foreman discussed the program with the unions to convince them of the need for the training. The pilot started with 50 people, with volunteers
coming from across most of the company plants. However, the majority of the participants came from Plant 1.

The management of the pilot program was transferred from the Training Foreman in Plant 1 to the company’s Training Department. The program was not successful for a number of reasons. First, the Training Department was considered to have managed the program badly, through lack of commitment. Second, the company management provided little support for the pilot project. Third, the link with the TAFE Institute didn’t work effectively. Fourth, the participants were having difficulty because of poor learning experiences, so a high drop out occurred. Only about ten operators successfully finished after considerable encouragement to complete the program from the initiator. Approximately four people from Plant 1 and two or three people from Plant 2 were in the group of ten who finished the program.

The company generally found the delivery of the curriculum-based program to be cumbersome. The company felt they were locked into the delivery of certain aspects and content of the program, which the participants considered was not relevant to their role, and which were not required for the operation of the company’s plants.

**The Development of Company Competency Standards**

Late in 1993 the company started its first attempt to write competencies for the tasks to be performed by the operators using the learning outcomes expressed in the curriculum-based program. This process lapsed in 1994 when the pilot program commenced and little work was done in that year. The process recommenced in 1995 and research was undertaken to identify the tasks performed by each operator position within the company’s plants and to write competencies against these.

The motivation for this development was to establish the knowledge and skill relativities between the positions required in each plant and to support the existing graded classification system, which applied to operators within each plant and across each plant. The company and the operators wished to settle an ongoing internal industrial relations debate about the remuneration rates paid relative to the difficulty or higher level skills perceived to be required within and across plants. This process was to either justify the existing remuneration differentials across these classifications or to establish new remuneration levels. The company was attempting to do this by describing the roles of the different levels of operator. This was to be done by identifying the competencies or tasks required at each level within, and across, the ten plants. In this process the company was attempting to base the competencies on the tasks performed by the operators and the relevant learning outcomes specified in the existing nationally recognised curriculum-based program. The company’s capacity to develop these competencies and settle this internal concern was aided by the close links that the Plant 1 Training Foreman had with the state and national industry training advisory bodies and the information and knowledge this provided directly to the company.
The establishment of the competencies received support from the unions and received greater support from senior management than the earlier training attempts because of its potential to resolve the underlying industrial relations debate and unrest. The unions had also tried to link the level of competency achieved to the payment of salaries over and above those paid for the classification of the position. This had been a feature of arrangements with a previous owner of the manufacturing plant.

**The CBTA system**

A new Australian National Training Framework (NTF) was established which incorporated a new system in the form of nationally endorsed Training Packages (Smith & Keating, 2003). This occurred in 1997, part way through the company’s attempt to develop competencies from the curriculum-based program. The format of the company competencies was changed around that time and the competencies were expressed in the format specified for the development of the new training packages. The knowledge of this national change and the company's prompt response to changing its approach resulted from the close link the Plant 1 Training Foreman had with the state and national industry training bodies. The writing of the competencies in the new format lapsed as the company employees, who were writing the first set of competencies against the curriculum-based learning outcomes, left the company part way through the writing process. An external consultant was then contracted to write a new set of company competencies in 1997 and these were completed in 1999. The format of these competencies was to be based on the format proposed by the NTB (*National Competency Standards-Policy and Guidelines*, 1992). The Chemical, Hydrocarbons and Oil Refining Industry Training Package, Code PMA 98, was issued in 1998 under the arrangements of the NTF. Despite this being the relevant industry training package, the company continued with the development of its own competencies and did not base the content of the company competencies on the units of competence identified in the industry’s national training package. The company competencies were based on the previous company work, which had identified the tasks performed by the operators in the various plants and specified the job roles.

In the later stages of development of the first set of competencies, which recommenced in 1995, the plant operators’ role had been extended to compensate for the reduction in the number of operators and the abolition of the day coordinator and foreman positions. Under these arrangements the operators undertook additional responsibility for the management of activities associated with the operation of the plant, such as allocation of their own annual leave and the computer booking, organisation and project management of plant maintenance and repairs. These new and broader competencies for the changed role were included in the second set of company competencies. The subsequent training and assessment provided through the company’s CBTA system was based on this broader set of competencies, which acknowledged the broader job role.
The outcome of this process was a set of company competencies, written in the format specified by the NTB, but based on the roles of the plant operators in each plant. These competencies had not been aligned with the industry’s national training package competencies.

**Description of the Case**

**The Planning Decision Stage**

**Identified needs and problems**

*What factors prompted the decision to implement a CBTA system?*

After completing the identification of the company competencies in 1999, the first cycle of the competency-based project intervention was put in place and operated in its initial form until 2001. The initial implementation involved no direct competency-based training and no formal assessment, but took the form of a self-assessment process against the company competencies. Plant operators were invited to participate voluntarily in this self-assessment process and identify their own training needs.

The company employed a new Training Manager in 2001. He was previously the Training Foreman who had initiated the first pilot in Plant 1 using the curriculum-based program.

The purpose of the first cycle implementation was to identify the operators’ 'knowledge gap', particularly as a result of the restructuring which produced a broader role for the plant operators, and to provide training to develop the knowledge and skills required. However, due to an external influence, the company then decided that it needed to prove that the plant operators were competent.

All the operators had been employed for many years since their initial training, which had not been formally assessed. Consequently, the company had no records or formal mechanism by which it could establish the skill level of its operators. Therefore the Training Manager proposed that the first cycle implementation should be replaced by a more formal second cycle implementation that included a formal process of assessment against the company competency standards. The purpose of the formal assessment process in the second cycle implementation was to enable the company to prove that its operators were competent at the company standard. A secondary expectation in the proposal made by the Training Manager was that the competency-based project could increase the operators’ productivity. However, while this was part of the proposal for the second cycle, it was not considered by the Training Manager to be a major part.
The imperative for the new proposal and the second cycle implementation was the introduction of the major hazard facilities regulations in 2000 ("Occupational Health and Safety (Major Hazard Facilities) Regulations," 2000) and the resultant need to show that the operators were competent against some recognised standard.

Plant Supervisors, who were not involved in the initiation of the CBTA system, considered that the purpose for the implementation of the second cycle of the CBTA system was related to other factors. They considered that the implementation was driven by the lack of training across the plants; the new technology which had been introduced with inadequate training; the association of the lack of training with the occurrence of ‘incidents’ and the clear lack of knowledge displayed by the operators.

**Company expectations for the outcome of the CBTA system**

*What were the expected outcomes from the introduction of the CBTA system?*

The company’s major expectation from the second cycle of the implementation of the CBTA system was that it would be able to prove that the plant operators were competent. This expectation was directly related to the company’s obligation to comply with the major hazard facilities regulations ("Occupational Health and Safety (Major Hazard Facilities) Regulations," 2000). In addition, the earlier expectation of the first cycle implementation still held, that the operators’ ‘knowledge gaps’ would be identified and that training would be provided to remedy these gaps. Both expectations related to the company’s expectation that it would raise the knowledge and skill levels of the plant operators until they were considered to be competent.

There was also an underlying expectation that only emerged under more intense questioning. This was that there would be associated improvements in productivity and quality as a result of CBTA system. The Training Manager stated that this expectation had not been expressed as an outcome because it was seen by the company as “a given”, that any training provided would improve performance and therefore productivity.

In addition, while not expressed by the company, the Plant Supervisors had an expectation that the operators would develop trouble shooting and problem solving competencies.

**The planned CBTA system**

*What CBTA system was planned?*

**The competency ‘definition’, scope and complexity**

The company was initially concerned about the level of the underlying knowledge of its operators and saw there was a need to develop this knowledge. The company believed that
if the operators had a greater knowledge base they would have a better understanding of why they needed to perform certain practical procedures and would also be more effective in problem solving and trouble shooting within the plant. The company wanted its operators to learn more than just the practical procedural activities so they would think about what they were doing, why they were doing it and when and how they should do it. The company required the scope of the company competencies to reflect more than just the procedural knowledge required for the job, although this was considered to be important, by including the underlying knowledge. The company expected that this would enable its operators to know when and why they should apply the procedures.

The process to recognise current competencies

The company’s initial planning for the CBTA system included a formal RCC process and an associated appeals process for all assessment judgements. The planners considered that by including a RCC process the company was not attempting to save money, but was avoiding the need to spend it in a climate of reduced funds for training. Further, the Training Manager indicated that he did not want to insult the operators by requiring them to go through a full training and assessment process when he believed they could show that they were competent. But more importantly, the process was to be included because it provided a process for assessing against the competencies, finding the learning gaps and identifying the training required.

The assessment processes and instruments

The Training Manager and the senior shop steward agreed that, as a major hazard facility, a formal assessment process was required for the CBTA system to enable the company to prove that its workforce was competent, if required to do so. The company realised that the Training Manager did not have the capacity to undertake all the assessment across the ten plants. As a result, a committee comprising the senior shop steward, other shop stewards and the Training Manager agreed on the use of other assessors across the site. It was agreed that operators occupying training coordinator positions in the plants, which attracted extra salary in an annualised arrangement, would be used to also undertake assessment of the operators. This decision was based on resource and cost considerations, rather than one associated with the principles of assessment within the workplace. However the training coordinators were senior and experienced operators.

The learning approaches

The company had a history of providing various forms of training to its workforce. However, the competency-based training was the company’s first structured training program planned for the operators with identified outcomes and assessment processes. Generally the prior
training was in-house and provided by the professional engineers when new equipment or processes were introduced. Generally this was considered by the operators to be poorly delivered, not relevant to the job they were performing and aimed at a level above that which they could understand.

Through the curriculum-based pilot program the company was attempting to provide training that was relevant and which would enable the operators to develop the underlying knowledge for the competencies required for the job. At that time the company searched for appropriate existing learning materials and could only locate expensive materials that originated from the USA. The company then decided that the only way to provide the necessary learning materials was to produce its own. These materials were produced using company funds and the funds obtained by the company as a private provider within the state vocational education and training system. They were basic paper-based materials on pumps and other small equipment items that were progressively developed and were available and ready for use in the CBTA system.

The Training Manager had expected that all the plant operators in Plant 1 would be assessed as competent through the RCC process, therefore no planning decisions were made in relation to the learning approaches for this group.

It was expected that the previously developed format would be used for training the plant operators in Plant 2. For any new employees this involved using the initial training program followed by the ‘buddy’ system, and for existing employees who were assessed as ‘not yet competent’ on specific units of competence, this involved on-the-job training with the ‘buddy’ system. This on-the-job training would comprise the use of any available and relevant learning materials and the use of written company plant operating procedures.

**The Structuring Decision Stage**

**The structured CBTA system**

*What CBTA system was structured?*

*Why did the enterprise want a CBTA system of this type?*

**The competency ‘definition’, scope and complexity**

The company decided to develop its own competencies using an external consultant. It was not clear why the company decided to continue to develop its own competencies when the training package became available. The establishment of the competencies was still the subject of the internal industrial relations debate, but this no longer had a strong influence on the decision as the intensity of the debate had weakened as other issues related to redundancies became much more important. It was considered that certain key people had
invested considerable time, money and their reputation in the project and therefore were committed to completing it rather than abandoning it with no final outcome. Also supervisors, and the operator representatives from the various plants, considered that the national competencies were not specific enough to show the level of skill required in their plant and to differentiate between the roles of the operators in the many plants on the site. The operators in each plant wanted to reflect the skills required in the operation of the specific processes in their plant. Finally the consultant, who had a financial interest in the outcome, was also considered to have influenced the decision to develop company and plant specific competencies.

Specific competencies, often based on the industry training package competencies, were then developed to suit the particular requirements of the job and, where applicable, more generic industry competencies were taken directly from the industry training package.

The job competency profiles only covered those competencies required for the particular job and the tasks performed in the plant, which were not necessarily the full scope of the national industry competencies for similar roles. The external consultant developed the job competency profiles by using a representative group of operators, a representative of the human resources department and the Plant Supervisors.

The Plant Supervisors indicated that the scope of the competencies needed to include generic competencies such as the ability to communicate effectively, to handle conflict resolution and to problem solve. They believed that, to some degree, the competencies developed in the structuring decision-making stage reflected those requirements, but there should have been more emphasis on those aspects. Some operators considered that the competencies were not sufficiently broad and had expected broader knowledge components in the competencies to assist them with problem solving, particularly those which related to the chemical processes that occurred in the plant. A Plant Supervisor, in acknowledging that some of the operators wanted to learn more, did not believe that this additional knowledge was required for the job.

**The process to recognise current competencies**

The planned formal RCC process was developed in the structuring decision-making stage and the company included an associated appeals process for all assessment judgements.

It was decided that for the RCC process, evidence of competence would be accepted from the operator’s current position or from a previous position or from previous training.

In structuring the RCC process arrangements it was decided that the preferred method for assessing that a competency had been acquired would be through a demonstration of the skills in a workplace setting. This method was preferred because it was considered to be the
The most appropriate method for the operators, many of whom had never been assessed before, and because it was more likely to provide proof to satisfy the major hazard facilities regulations. It was also decided to include evidence gained from actual or simulated workplace performance, oral and written questioning, oral presentations, projects, work-based assignments, third party reports and product and services outcomes. It was decided that the assessment process could occur in a range of environments, appropriate to the context and nature of the competencies being assessed, including assessment while undertaking the normal job role and assessment undertaken away from the job. The option was also provided for each unit of competence to be assessed separately or in a more holistic manner by assessing a combination or set of units in the one process.

**The assessment processes and instruments**

In the structuring decision-making stage the company decided that competent assessors would conduct the assessment. They "would collect sufficient evidence, objectively assess and judge the competence of a candidate" against the company competency standards (Company-A, 2001). A competent assessor was identified in the company guidelines as a qualified assessor "who is competent against the assessor competency standards" and who has "the relevant vocational competencies" or "has ready access to another person who is competent in, and can advise the assessor on, the relevant competencies at least to the level being assessed." (Company-A, 2001) Further, the guidelines identified that a competent assessor could be "a workplace supervisor with the relevant vocational competencies at least to the level being assessed who utilises industry endorsed assessment procedures with the outcome being validated by a qualified assessor who is competent against the assessor standards."

The guidelines developed at the structuring decision-making stage provided for "a steering group comprising a selection of members of the relevant unions, Training coordinators and the Training manager [that] will ensure all criteria are met fairly and equitably." It was also the function of the steering committee to ensure that all assessors were competent and maintained their competence, and to oversee the correct recording and use of assessments (Company-A, 2001).

The assessment process decided upon was the same as the RCC process, as outlined above. In the structuring decision-making stage it was decided that the assessment instruments would be designed to allow judgements about workplace performance based on the company competencies and standards. The assessment instruments were to be designed to ensure that all aspects of each unit of competence were covered, as identified by the NTB. This included the performance of individual tasks (task skills); managing a number of different tasks within the job (task management skills); responding to problems, breakdowns and changes in routine (contingency management skills); dealing with the
responsibilities and expectations of the workplace (job environment skills) and relevant underpinning knowledge (transfer skills) (Company-A, 2001).

It was also decided in the structuring decision-making stage that the assessment would be “gender and culturally inclusive and take into account the language, literacy and numeracy skills” of both the candidate and the assessor (Company-A, 2001). The assessor was required to gather evidence which was “appropriate to the assessor, the context and the candidate” and the evidence collected must “meet the principles of validity, equity, authenticity and sufficiency.” (Company-A, 2001) The assessor was also required to ensure that the candidate understood the process and was comfortable in the environment in which the assessment was to take place. Finally, the assessor was required to ensure that the assessment closely reflected “workplace reality” and was advised that a range of methods should be used to collect the evidence required “to ensure reliability of the assessment” (Company-A, 2001). Guidelines were also provided which required the assessor to report the assessment outcomes and record and provide feedback on the results.

An appeals and reassessment process was decided upon that allowed the candidate to request a reassessment if reasonable grounds could be established to doubt the original outcome. The process was an escalating one, which commenced with the team leader and then proceeded to the Steering Committee if the matter was still in dispute. To resolve a dispute the Steering Committee could recommend that a reassessment take place using an external assessor.

An important and significant feature was also decided upon and documented in the structuring decision-making stage. This was the requirement for the employee’s competencies to be reviewed and updated on an annual basis or as the job changed.

The learning approaches

As indicated previously, prior to the CBTA system intervention the company had established a network of training coordinators in each plant. Plant 1 had two training coordinators and Plant 2 had one training coordinator. The training coordinators were operators who volunteered for the position and in some cases received an additional component in their annualised salary to compensate for the extra work. Generally they were senior and experienced operators. The training coordinators in Plant 1 operated on the normal rotating shift roster for a plant operator and would only see all the operators in the plant through planning and requesting attendance at designated training days for the particular shifts. The training coordinator in Plant 2 operated in a full time day position and saw all the operators over a period of time as they rotated through the day shift. The training coordinators were required to organise and deliver training.
As indicated above, the Training Manager expected that all the plant operators in Plant 1 would be assessed as competent in the RCC process, therefore no structuring decisions were made in relation to the learning approaches for this group. Further, no decision was made in the structuring decision-making stage to change the learning approaches previously used in the company for the operators in Plant 2.

To facilitate training the company had negotiated an Enterprise Bargaining Agreement that included an arrangement requiring the plant operators to attend for training on a certain number of days for the year. Under these arrangements a training day would be conducted on a day when the operators were not on shift and which they would normally consider as a day off.

The Implementing Decision Stage

The implemented CBTA system

What CBTA system was implemented?

The competency ‘definition’, scope and complexity

The job profile competencies were not implemented as structured. The outcome of the approach taken by the consultant and the company representatives was a large number of company competencies for the jobs described in each plant. These competencies related specifically to the plant for which the job was described and highlighted the differences in plant equipment and other plant specific operations. A Steering Committee was established to overview the implementation and to resolve issues and problems. One of the first functions undertaken by the Steering Committee was to simplify the company competencies structure by consolidating some of the original company competencies to provide common competencies across the plants for similar tasks and to develop three levels or components. The Steering Committee established job competency profiles using the company competencies. Each job competency profile comprised three components. The first component comprised the core competencies, which were common to all plant operator positions in all plants. The second component comprised the generic operator competencies, which applied to a range of similar jobs across a number of the plants, but not to all jobs within a plant. The third component comprised the technical specialist competencies, which were relevant for a particular job within a specific plant.

The company competencies as planned and implemented were different from those in the national industry training package because they were more specific, but as was discovered later, they also included some additional competencies that were not reflected in the training package. After the initial implementation and the RCC assessment in Plant 1, which was made against the national industry training package competencies, the Training Manager
undertook an exercise to align the company competencies with those in the training package. This was done because the RCC assessment had been done against the training package competencies and he was concerned that the company competencies might not be seen to represent industry standards. This concern was in relation to any incident inquiry or external compliance audit under the recently issued major hazard facilities regulations. As a result of this exercise it was determined that the company competencies included some additional competencies that were not reflected in the training package.

The Training Manager estimated that the job competency profiles for the operators in Plants 1 and 2 reflected from 70% to 90% of the competencies required for the achievement of a recognised certificate. However, as indicated above, they also included some competencies that were not reflected in the national industry training package. Nevertheless, the scope of the competencies for all the plant operators related to the narrower and more specific scope of their particular role in the company rather than the broader national training package competencies.

The process to recognise current competencies

The implementation of the RCC process differed from that indicated in the planning decision-making stage where it was intimated that the training coordinators would be the assessors. The guidelines developed in the structuring decision-making stage did not specify whether internal or external assessors would be used and the company had not developed or expressed any views on whether internal or external assessors should be used. However, the company engaged external assessors. This change was influenced by the company’s desire to demonstrate as quickly as possible that its operators were competent, as its response to the requirements of the major hazard facilities regulations. The training coordinators were not qualified as assessors at the time and it was expedient to initially use external assessors in Plant 1.

Two external assessors, assisted by the training coordinators undertook the initial assessment of the operators in Plant 1. The external assessors were engineers who were not totally familiar with the plant or the work role and were supported by the training coordinators who provided that perspective. The external assessors assessed the operators against the national industry training package, with which they were familiar, and did not assess against the company competencies. This approach differed from that which was planned and structured. Partly as a result of this approach, the Training Manager completed an alignment process between the company competencies and the national industry training package competencies. The process identified some company competencies that were additional to the training package competencies. Consequently, the external assessors had not assessed the additional company competencies.
The external assessors mainly took a recognition of prior learning approach, rather than a RCC approach, and generally based their decisions on a thorough investigation of the prior training undertaken by each operator, despite much of this not having been previously assessed. However in some cases, the external assessors followed this approach with an interview and oral questioning process and asked for a demonstration on some equipment and a general explanation and overview of the operation of the plant.

Following this initial assessment process the training coordinators in Plant 1 successfully completed a Certificate IV in Assessment and Workplace Training to qualify as assessors. After the alignment process, these training coordinators assessed the additional company competencies and completed this task late in 2001. They used an interview and oral questioning process for the additional competencies and relied upon this and their knowledge of the operator’s performance to make a judgement on whether the operator was competent. They justified this approach on the basis that they had seen each operator performing the tasks on-the-job over a period of time and were aware of their performance and level of competence.

At a later stage, another external assessor was contracted by the company to provide assessment services in Plant 2 and other plants on the site. This external assessor was a member of staff from a TAFE Institute, but through his previous employment was an experienced plant operator. Through this arrangement the company offered the operators in Plant 2 the opportunity to be assessed against the nationally accredited Certificate IV based on the industry Training Package PMA 98 and to be issued with a certificate on successful achievement of the competencies required. The external assessor was initially engaged to use the industry training package competencies to assess those plant operators who wished to proceed to gain a Certificate IV, which would then be issued by the TAFE Institute as a Registered Training Organisation. This was an arrangement that was considered to be beneficial for both the company and the TAFE Institute and had been developed when the external assessor and the Training Manager met at a conference. The company enrolled its employees in the TAFE Institute program and paid the normal student enrolment fees, which were not the full cost of the service, and received the training and assessment services for its employees. This arrangement was funded by the TAFE Institute and assisted it to satisfy its contractual arrangements with the state vocational education and training system by including these enrolments in its student contact hour targets.

The company had planned to use an assessment process to prove that the operators were competent, to satisfy the requirements of the major hazard facilities regulations. However, the company became aware that, because of the amount of assessing required across all the plants, it did not have the internal resources to complete its assessment of the company competencies in the planned time period. When the company realised that it did not have the capacity to conduct all the assessments with its existing internal assessors in a timely
manner, it engaged the external TAFE Institute assessor to conduct the assessments in Plant 2 and in other company plants on the site. The TAFE Institute external assessor had been engaged to assist in the initial assessment of plant operators against the company competencies. In this respect, the Training Manager believed that the company gained an additional benefit, as he viewed the TAFE Institute assessor as an external auditor and believed that this process gave credibility to the standard of assessment that was occurring in the company. With respect to this study, the external consultant from the TAFE Institute only undertook the assessment of operators in Plant 2 and was not involved with the assessments in Plant 1.

The initial assessment process in Plant 2 consisted of two parts. Initially the external assessor asked the operator a series of questions on the underlying knowledge for each unit of competency. Then the external assessor walked around the plant with the operator and asked for a description of the operation of the equipment and the processes that occurred in the vessels. In most cases the questions where provided to the operator prior to the assessment activity. When the assessor was uncertain about whether an operator was competent in a certain area, he indicated to the operator that he needed more evidence and in some cases this was provided in other forms. The external assessor undertook the majority of the assessments for the RCC process in Plant 2. He was assisted in the latter part of the process by the Plant 2 training coordinator who, by this time, had successfully completed a Certificate IV in Assessment and Workplace Training to qualify as an assessor.

The internal assessor in Plant 2 used oral questioning and, if an opportunity became available, required the operator to demonstrate a performance in the workplace. When there was no opportunity to conduct a demonstration then the operator would be asked to talk through the procedure required for performing the function. The external assessor assessed against the company competencies, but also extended the assessment to include competencies from the Certificate III and Certificate IV in the industry training package. Most of the operators in Plant 2 received recognition for the majority of the company competencies and required the completion of one or two units of competency to gain a Certificate III using the national industry training package competencies.

The assessment processes and instruments

As indicated above, external assessors were contracted by the company to provide assessment services. This was not considered in the planning decision-making stage or the structuring decision-making stage, where it appeared that the training coordinators were to be used as the assessors. These external assessors were used for the RCC process in both Plants 1 and 2 and the ongoing assessment process in Plant 2. No follow up assessment process was required for the operators from Plant 1 as they had all been assessed as
competent in the RCC process. The assessment process implemented for the ongoing assessment in Plant 2 was the same as that described above for the RCC.

The guidelines for assessment were decided in the structuring decision-making stage and they acknowledged and outlined the principles that the assessment must be reliable, flexible, fair and valid (Company-A, 2001). The company did not provide guidelines on how this was to be achieved, although the trained assessors should have been aware of these concepts and some of the strategies that could be used to implement assessments consistent with these principles.

Individual assessors considered that they had satisfied reliability and fairness principles by generally asking each operator the same questions. It was also reported that on certain occasions an assessor would review the assessment outcome with a Plant Supervisor, to gain feedback on the reliability of the assessment in relation to the operator’s performance in the day to day role. In addition, acknowledging that they were dealing with people who were sometimes uncomfortable with an assessment process, the assessors indicated that they modified the process to enable the person to overcome their apprehension. This involved commencing to test the operator’s knowledge at a lower level than required and building up in complexity to reach or sometimes go beyond the competency standard required. The operator was also encouraged to demonstrate his knowledge in the manner in which he was most comfortable. This might have involved leading the operator through the work he had done in an area to allow him to discover that he already had evidence in a physical form that he could present to satisfy the competency, rather than attempting to describe a situation.

The company’s internal assessors were seen as “experts” in their field. In some cases an expert who was not qualified as an assessor teamed up with a qualified assessor, to assist with the validity of the assessment. The company used the external assessor because it believed that this also demonstrated the validity of the assessment.

A holistic approach to assessments was generally taken, although this was sometimes driven by the degree of tolerance of the plant operator being assessed, who often objected to repeated questions in relation to certain equipment or across different items of equipment which required the same operating procedure. Finally, at the structuring decision-making stage a decision was made that the competence of the operators would be reviewed and updated on an annual basis or when the job changed. At the time of the study this process had not been implemented for either Plant 1 or 2 operators.

**The learning approaches**

The learning approach to be adopted for the CBTA system was not clearly identified in the planning decision-making stage or the structuring decision-making stage. It would appear
that by not making any reference to this feature the company had determined to continue with its current learning practices.

The current practice was that training coordinators managed and implemented the training required for the direct operation of the plant. As indicated previously, Plant 1 had two training coordinators; each was responsible for the operators in one distinct part of the Plant. These training coordinators worked on the normal shift roster and had the same operator responsibilities and work functions as the other operators on the shift. Preparation and organisation for training only occurred in Plant 1 when the training coordinators could set aside time during their normal plant operating duties. One of the Plant Supervisors estimated that each training coordinator could allocate about 10% of his time to the preparation and delivery of training over the full year.

The training coordinator in Plant 2 was also an operator, but operated only on the day shift. He was given the role of maintaining quality systems and updating and writing new procedures, as well as undertaking the training role which was related to these systems and procedures, rather than being directly involved in the operation of the plant. Because he was always on the day shift, the training coordinator could readily monitor the training and the progress of the other operators as they rotated through that shift. The Plant Supervisor estimated that the training coordinator in Plant 2 could allocate about 20% of his time to the preparation and delivery of training over the full year.

No training was provided to the operators in Plant 1 as part of the CBTA system, as all the operators where judged to be competent based on their prior learning and work experience. However, some of these operators considered that the RCC process had, in itself, been a learning process for them because they had re-learnt old skills. They believed that the process had caused them to recall some of the procedures that they had not used for quite a while and had also assisted them in their role by specifying the level or standard at which they should operate. When the new digital control system technology was introduced into Plant 1, the supplier provided formal training sessions off-site. There was also evidence of some incidental learning of the procedures implemented by operators to successfully correct particular situations. That is, some of the operators interviewed from Plant 1 indicated that they made use of the historical database within the digital control system to review their previous successful sequence of actions and also the successful sequence of actions implemented by fellow operators on the previous shifts.

The RCC process identified the training needs of the individual operators in Plant 2. The company and the TAFE Institute then provided the appropriate training to the operators to enable them to demonstrate that they were competent on all the competencies. This approach appeared to differ from what was planned and structured in that a TAFE Institute became involved and a broader range of learning materials became available. The provision
of some training services by the TAFE Institute was part of the arrangement when the company engaged the TAFE Institute consultant to provide assessment services for the operators in Plant 2. This joint training provision was primarily to enable the operators to satisfy the company competencies, but it also provided them with the opportunity to complete a Certificate III and study for the additional modules required for the Certificate IV.

The learning approach used for the training in Plant 2 mainly relied upon on-the-job experiences using a ‘buddy’ system until the person was judged to be competent in that aspect of the plant’s operation. This learning approach was sometimes supplemented by individual self-paced learning using basic learning materials. The learning materials normally used were the print-based operating procedures developed for the plant, sometimes supplemented by print-based material prepared by the training coordinator. Where appropriate the learning materials also included TAFE Institute learning materials, which were generally print-based, however for the additional Certificate IV units some computer based learning was available through a CD. The TAFE Institute learning materials were available on pumps, valves etc. through the National Toolbox materials developed by the TAFE Institute with ANTA funding.

The plant operators in Plant 2 had also participated in an off-site residential training program that emphasised team building, communication and positive workplace behaviours and they had engaged in a number of team challenges to develop these skills. Finally, where a common need was identified, the training coordinator provided some class-based training for a shift.

**Refresher training**

Training which had become known in the company as “refresher training” had occurred prior to the introduction of the CBTA system and was offered to the operators in Plant 1 by the training coordinators. However, in its original form it was not well structured and had been ad hoc. Although this had been a part of the earlier training process, it was not mentioned in the structuring decision-making stage or documented in the Company’s guidelines as a process that would continue. Nevertheless, the training coordinators who provided the refresher training in Plant 1 had been retained after the introduction of the CBTA system, which implied that this training was not to be discouraged. However, after the implementation of the RCC process, the form of this training took on a more significant and structured role as a learning approach in Plant 1.

The company did not include refresher training as an integral part of the CBTA system intervention as no assessment was conducted and, at least initially, it was not linked in any direct way to the stated company competencies or the training package competencies.
However, the content covered in the training generally related directly to the operators’ job and therefore, the competencies specified for the operators’ role.

Some refresher training had previously occurred in Plant 2, but it had not been organised while the CBTA system was in progress as all attention was focused on completing that program. When it had been offered prior to that, it was irregular and infrequent. However, the operators and the Plant Supervisor in Plant 2 believed that there was a need for refresher training. The operators held this belief because they identified weaknesses in their performance, and the Plant Supervisor because he considered that the operators were making mistakes and were not correctly implementing some procedures.

Although it had not been specified as an integral part of the CBTA system, a change had occurred in the refresher training approach in Plant 1 after the introduction of the CBTA system. Since the implementation of the CBTA system and the issuing of the major hazard facilities regulations, the refresher training in Plant 1 had become more structured and was offered for four hour sessions, three or four times a year per shift team. This refresher training was conducted on the negotiated training days for each shift when the plant operators would normally have the day off.

The operators and the training coordinators in Plant 1 determined the content of the refresher training, which was generally based on the critical plant functions where the operators felt they had deficiencies.

Two broad forms of refresher training occurred in Plant 1. The first form was generally based on a scenario, which reflected a major plant incident, such as a power failure, and tested the responses of the operators to that situation. This scenario approach was a group based approach and required input from all members of the shift team. The training coordinator described a scenario and challenged the group and individuals as they outlined the procedure that should be implemented. The training coordinator increasingly outlined a more critical scenario or introduced new factors to put pressure on the group to respond to the new situation.

The outcome from some of these sessions was agreement on the common procedures to be used within the team for a particular emergency situation or potentially dangerous scenario. The ongoing reduction in the number of operators through planned redundancies also required the plant operators to devise new procedural responses to emergencies using fewer personnel. All of the operators interviewed valued this sharing of individual methods and learning from each other and the joint development of the best common approach to a situation. This agreement on common approaches also assisted the operators on ‘shift change overs’ to recognise what had been done in the previous shift to solve a potential operating problem in the plant.
The second form of refresher training was to revise the general job functions required for the role. Refresher training in these general job functions was required because they were used infrequently and many of the operators had not performed the functions for some time, or in some cases, had never had the opportunity to perform the function during a shift. This was the case despite all of the operators being in the job for a considerable time. This form of refresher training concentrated on the performance of a specific group of tasks, such as shutting down a part of the plant or a piece of equipment. It sometimes included a knowledge-based component as well as the revision of the procedural functions, but it was more likely to include just a revision of the procedures. The training coordinator used a classroom session for this refresher training based on the company manuals, which introduced the procedures and outlined how the tasks should be performed. This training occurred for those situations where few operators had recent experience of the job functions or in the initial stages of new procedures. Most of this refresher training was done using a classroom-based approach. However, increasingly, the approach for revising the performance of specific job functions had become a facilitated group based approach where the operators used the procedures from the company manual and revised and learnt these as a group, while talking to each other about how the various tasks were performed.

The internal and external factors which influenced the decision-making

What internal and external factors influenced the decision-making?

The internal factors

Staff characteristics

In the planning decision-making stage the company was concerned that the plant operators, while capable of operating the plant, did so in a mechanical or procedural manner without understanding what they were doing or why they were doing it. The company considered the plant operators used mechanical or procedural reactions to changes in the plant's operation that were passed on to them in their initial training and early development in the position. The CBTA system was seen as a way of improving the plant operators’ knowledge of the plant and its operation, which would provide the operator with the capacity to think and understand what to do and why it should be done. In this way the company was also seeking to improve the problem solving skills of the operators and increase their ability to accept responsibility and reduce their reliance on supervisors and others for resolving their problems.

Underlying this initial thinking was the company’s belief that this increase in knowledge and responsibility would also reduce the stress levels of the operators. They believed some of the operators were prone to panic and would commence shutting down the plant when the
warning systems operated and they were scared stiff that one day the warning systems wouldn’t operate and they wouldn’t know what to do because they didn’t understand the plant.

**Changing operations and resources**

The plan to increase the knowledge and skills of the plant operators and reduce their reliance on others was also driven by the company’s underlying program of reducing the number of plant operators. Whereas a supervisor was previously responsible for a number of teams of three or four operators, this was reduced to two or three operators with no middle manager supervisors. In this situation the role of the operator had broadened and the operator had to become more self-reliant and knowledgeable about the operation of the plant. As a result, the reduction of the workforce was one of the drivers for the company to establish competencies and additional training resulting in a CBTA system. The company was concerned to ensure that the operators had the knowledge, the problem solving skills and the confidence to take on the broader role with its greater responsibility and perform it in a competent manner.

**Union involvement**

The union partially influenced the company’s first attempt to develop competencies through an industrial relations debate over classification levels and remuneration. As indicated previously, the process of establishing the competencies was introduced as a way of resolving an ongoing internal industrial relations debate between the company and the union. The company was attempting to resolve the dispute by describing the roles of the different levels of operators. This was done by identifying the competencies or tasks required at each level within, and across, the ten plants on the site. The union followed this up with its support for the resulting CBTA system with its self-assessment. This support was provided after many discussions with the company and the gaining of a reassurance that the outcome of the assessments would only be used to identify training needs, and would not be used for determining redundancies or for any other purpose.

The company’s proposal to change the CBTA system, which had a voluntary self-assessment process, to include a formal assessment process was a significant change for the workforce. This change involved a group of people who had not been assessed by the company, who had been in the role for many years and generally had not enjoyed schooling. Further, agreement had previously been reached on the introduction of a CBTA system which was voluntary and was not particularly threatening, and a change was now proposed to that agreement. The issuing of the major hazard facilities regulations directly and wholly influenced the decision for this change. When the Training Manager first identified that a change was required in the assessment process, he discussed the matter with the senior shop steward and indicated the inadequacy of a self-assessment system for satisfying the company’s obligations under the major hazard facilities regulations. The senior shop steward
identified some concerns, but provided support for the concept. In particular, the shop steward wanted to ensure that the union had involvement in the planning and implementation. This was readily agreed upon. As a result, the second cycle of the CBTA system intervention included the establishment of a training committee, comprising company and union representatives, and this group agreed on the planning for the intervention. This included discussing an outline of how the CBTA system was going to be structured, how it was going to be implemented, when it would be implemented, who the assessors would be and what appeals processes would be included.

The company had reduced its operator workforce over a period of time and the union was concerned that the outcomes of the new assessment program could be used as a basis for determining redundancies. Following reassurance that these outcomes would not be considered as part of the redundancy process the union supported the changes. Given that the CBTA system was to be implemented at a time when redundancies were occurring in the industry, and for other reasons, the union wanted the operators to get a recognised qualification to enable them to gain employment in other companies. The Training Manager also believed that it would be more difficult in the future for people to gain employment in the industry without a recognised plant operator qualification. It was agreed that the CBTA system would include the opportunity for the operators to gain a recognised qualification if they wished. Further, while participation was not voluntary, it was agreed that the plant operators would be encouraged to participate through being convinced of the need for such a program, rather than by stating that they were required to participate to fulfil their obligations under the major hazard facilities regulation.

The operators were encouraged to participate by being reminded that the industry was changing and that they needed to be recognised as persons who were competent to perform the role if they wished to stay in the industry. The formal assessment process was offered as the way in which the operators could prove they were competent and as a way of assisting them, if required, to be more competent in their job by identifying weaknesses, which could then be remedied through training. The unions were fully supportive of this approach and assisted to encourage the operators’ participation.

Management

The General Manager at the time had received and approved a proposal for the pilot program in 1993. The senior manager responsible for site production had supported and assisted with the initial implementation of the company competencies. The Site Production Manager and the Plant Supervisors were directly involved in the initial process for specifying the roles of the operators and the subsequent refining of these through a consultation process to establish the company competencies. The Plant Supervisors maintained a direct interest in the implementation of the CBTA system and were responsible for the delivery of the training
through the training coordinator and facilitating the assessment process in their plant. However, they had not directly influenced the direction of the CBTA system, which remained the responsibility of the Training Manager. The Site Production Manager approved and supported the proposal to introduce a formal assessment process in the second cycle of the intervention to assist in satisfying the company's obligations under the major hazard facilities regulations. The Site Production Manager received regular reports on the progress of the implementation across all plants on the site, but had not directly influenced the direction of the CBTA system. Generally the Training Manager had been responsible for the implementation of the CBTA system and its development within the budget provided to him for the management of all training across the site. The budget available for this training was decreased in the 2002 budget consistent with the cost saving exercises that had occurred in the company.

**The external factors**

**Major hazard facilities regulations**

A major impetus for the change from the original self-assessment process in the first cycle of the intervention to a formal assessment process was the implementation of new government regulations for areas designated as major hazard facilities. The Victorian State Government had introduced the Occupational Health and Safety (Major Hazard Facilities) Regulations 2000 as a direct result of the major gas explosion at the Longford Gas Plant (See Appendix G).

The major hazard facilities regulations required the company site to be registered and the company and the plant operators to comply with a number of strict regulations. Among these was the requirement for the company to provide the plant operators with information, instruction and training ("Occupational Health and Safety (Major Hazard Facilities) Regulations," 2000). This was to be in relation to the hazards in the plant, the major incidents which could occur, the control measures to be applied, the contents of a “Safety Management System” and all other things that were necessary for the employees to perform their work in a manner which was safe and without risk to health ("Occupational Health and Safety (Major Hazard Facilities) Regulations," 2000). In addition, the company was required to ensure that the information, instruction and training was “recorded, monitored, reviewed and revised in order to remain relevant and effective.” ("Occupational Health and Safety (Major Hazard Facilities) Regulations," 2000).

The major hazard facilities regulations also placed some responsibility on each employee and specified the “Duties of employees at major hazard facilities”. The regulations required, among other things, that the operators must follow the procedures relating to the prevention and control of major incidents and take corrective action under those prevention and control
and emergency procedures, even if such corrective action could interrupt the operation of the

The introduction of these regulations significantly shifted the company’s primary purpose for
introducing the CBTA system from one of increasing the knowledge of the operators to one of
proving that the operators were competent in their job. The major hazard facilities
regulations, combined with the fact that the company had not assessed its workforce at that
time, dictated the need for the company to implement a structured program with competency-
based assessment. It was at this time that the Training Manager considered that the best
way for the company to meet the requirements of the regulations was to undertake a formal
competency-based assessment process with the plant operators. A formal proposal was
presented to the company’s senior management, which argued that the implementation of a
competency-based assessment program with a formal assessment component was the best
way for the company to satisfy its requirements under the regulations. This proposal was
accepted.

From 2001, the company commenced to have all its plant operators across the ten plants
assessed against the company competency standards using a formal assessment process.
The concept of introducing a formal assessment process was accepted more readily in this
second cycle of the intervention than the concept of a self-assessment process was accepted
in the first cycle. Considerable discussion and convincing had occurred when the first cycle
was proposed and concern was raised about job loss, through redundancies, being linked to
the program. These concerns were partially allayed and participation in the first cycle
assessment had been voluntary and was therefore less of a threat to all the operators than a
compulsory arrangement. Nevertheless, there was considerable fear about being involved
and conducting an assessment which could expose weaknesses to peers and the
management. However, the first cycle had operated for around 9 months and trust had been
established between the company, the union and the operators, because these self-
assessments had not been used for other purposes. Further, a positive culture about
assessment had been partially introduced as participation in the first cycle had convinced
some of the operators that a self-assessment process was a useful tool for identifying their
own weaknesses and for establishing their training needs. Further, the positive nature of the
assessment outcome was emphasised by encouraging the operators to participate in the
assessment because it would provide a way for them to have their existing skills and
knowledge recognised. The trust that had been established in the initial cycle and the ground
work established through initial union discussions and demonstrating the value to some of the
operators of participating, had partially broken the operators’ major concerns about being
assessed when the second cycle was proposed. Further, as indicated above, as well as
specifying the requirements for an employer, the major hazard facilities regulations specified
duties for the employees, which placed some obligation on the operators to perform
competently. This obligation was readily recognised by both the unions and the operators and influenced their decision to support the changed arrangements.

**Funding sources**

The implementation of the original curriculum-based program and the pilot delivery to 50 operators was supported by funds provided by the state vocational education and training authority. While this funding was significant, the company did make a part contribution to the program using the rebate it had gained from the apprentice training it was doing on the site. The Training Manager stated that the training need was identified at the time and that the training would have gone ahead irrespective of whether the external funding had been available. The extent to which this outside source of funds contributed to gaining management support and the decision to proceed is unknown. The company had indicated that it needed funding to provide the learning materials for the program, and for that reason it became a recognised private training provider to become eligible to seek state government funds for the delivery of training. At a later stage the company also sought to provide a traineeship program which was rejected by the union at the time. Whether this was a strategy to gain additional funds was also unclear.

The company had also made a significant financial commitment to the development of a set of company competencies. Initially this was through the allocation of personnel from the then Training Department to write the competencies and the allocation of time by others to participate in the process of development and consultation. Subsequently, significant funds were provided to engage an external consultant to complete the project.

The company had reduced the training budget as part of its cost cutting exercise over a period of time. Therefore the source of funding to establish the CBTA system was a matter of some concern to the Training Manager. The CBTA system had to be implemented using the annual company training budget funding provided to the Training Manager, which influenced the extent to which the CBTA system could be developed. Consequently, the CBTA system had been rolled out plant by plant within the company site, with the plants providing the resources for training from within their own budgets, which as indicated previously, included training coordinators.

External funding support was forthcoming for the CBTA system through a mutually acceptable arrangement with the TAFE Institute. The TAFE Institute funded an assessor and some training from its state funded program profile for the participants in Plant 2. In return, the company enrolled the students and provided the normal student enrolment fee to access these programs and resources. This arrangement assisted the Training Manager to complete the assessments more quickly than would have been possible using only company funds. The Training Manager could possibly have sought additional funds from other sources.
However the union and the operators had closed off one source having previously refused the Training Manager’s proposal to introduction traineeships which they saw as a threat to the operators’ jobs. Other sources of funds might have been available, but the Training Manager appeared more comfortable managing a roll out of the CBTA system plant by plant with its evolving development, rather than managing a larger scale project.

External consultants

Prior to the appointment of the current Training Manager, the company’s decision to use an external consultant to develop company competencies following the initial company attempt, shaped the future direction of the CBTA system. The consultant convinced the company that it should proceed to develop company competencies against the specified roles within each of the plants, rather than adopting the training package competencies which were available at that time. The consultant’s reason for doing this was not known. However, the company was influenced in its decision to accept the recommendation partly because of its desire to resolve the industrial relations debate, which still existed at the time, and partly because of its previous investment in the project.

The Training Manager was influenced to take action to align the company competencies with the training package competencies by the external consultants who assessed the operators in Plant 1 using the training package competencies. This satisfied his concerns that the company competencies were comparable to the industry standards and identified some competencies additional to those in the training package. At no time had it been suggested that the company would discard its competencies and adopt the training package competencies. The alignment process had reassured the Training Manager that the company competencies were at industry standards and confirmed the decision to implement the CBTA system across the remaining company plants on the site using the company competencies.

The engaging of the TAFE Institute consultant provided the opportunity for the company to gain funded support for its assessment program and to enhance its learning approach with additional learning materials. This also provided the operators with an opportunity to progress to the Certificate IV and increase their skills and knowledge, with the potential of at least increasing their esteem and job satisfaction, at little cost to the company. Further, the external assessment provided additional credibility for the company’s claim that its operators were competent to perform their job.

External contacts

The initiator of the pilot program, who later became the Training Manager, was a member of the state and national industry training advisory bodies and was involved in establishing the curriculum-based program and later the national industry competencies for the CBTA system. Through this contact the initiator was well aware of the purpose and developmental status of
the programs and was able to shift the company’s direction to a CBTA system soon after the shift at the national level. In addition, this involvement led to the contact with the consultant who acted as the external assessor and had linked the company with a TAFE Institute.

**The impact of the internal and external factors on the decision-making**

How did these internal and external factors impact on the decision-making?

**The competency ‘definition’, scope and complexity**

The scope and complexity of the competencies were initially influenced by company representatives and internal union representatives, who were involved in the initial development of the company competencies, and their desire to show the complexity and differences between the job roles required in the operation of the various plants. This was driven by a process designed to resolve an industrial issue, by either supporting the existing differentials in remuneration or providing evidence for increased differentials. The process resulted in identifying the differences between the roles of the operators across and within the ten plants, by specifying the job role and then the competencies related to each specific plant and each job group within each plant. The process stalled at one stage, but the external consultant engaged to complete the development, influenced the company to continue to develop company specific competencies rather than using the training package. The company readily decided to continue the development of company competencies as it had already made a substantial investment in funds and time to the development of the company competencies. The outcome from the process was a set of unique company competencies for each of the roles identified in each plant.

The degree of specificity in the company competencies made the implementation of a CBTA system based on these competencies problematic. To simplify the implementation there was a need to consolidate the competencies to reflect more generic competencies that could describe significant parts of the common roles across each of the plants. The Training Manager saw the need to consolidate the competencies at the implementing decision-making stage and influenced the Steering Committee responsible for overseeing the implementation to rationalise the competencies. The committee established many competencies, which were less specific and were common across all the plants, and resolved the internal industrial relations differences.

The engaging of external assessors and the major hazard facilities regulations directly influenced the new Training Manager to align the company competencies against the national industry training package competencies, to ensure that the operators had been assessed against all of the company competencies and to prove that the company competencies were at the industry standard.
The company maintained the use of the company competencies throughout the implementation of the CBTA system, despite the option to accept the training package competencies at a number of stages. A number of factors probably influenced this position. One, the company had made a significant financial commitment to their development. Two, the people who were involved in the development, agreement and consolidation had made a personal commitment to the competencies. Three, the competencies had been developed between the company and the union to reflect a job hierarchy for classification and remuneration purposes and any movement from these might have caused further industrial issues. Four, the company had said it was about ensuring its operators were competent to do their job, which they believed was represented by the competencies that they had developed, and they were not concerned about getting Certificates, which was part of the training package structure.

The process to recognise current competencies

The introduction of a RCC process was based on the Training Manager’s understanding of the features included in a CBTA system, and his desire to not insult the experienced operators, and to use it to identify training needs and not to spend on unnecessary training.

Some urgency had been created for the implementation of the CBTA system and the assessment across all the plants, as a result of the major hazard facilities regulations. This caused the Training Manager to commence the assessment process with external assessors, rather than wait for the internal assessors to be trained to perform the task. The external assessors assessed against the training package competencies rather than the company competencies, which was not consistent with the company guidelines. The company guidelines specified that the company competencies were the benchmark and that assessment would be made against these competencies. It is not clear why the external assessors used the training package competencies. However, this change did not influence the company to adopt the training package competencies in the CBTA system. Similarly, an external assessor from a TAFE Institute was used in Plant 2 because no internal assessor was available. This assessor used the company competencies, however he also used the training package competencies for those operators who wished to proceed to gain a qualification. The operators’ assessment records were maintained by the company, but because the operators were enrolled at the TAFE Institute, a second set of records would have been maintained by the TAFE Institute which translated this performance against the training package competencies to enable a Certificate to be awarded. Similarly this development did not influence the company to adopt the training package competencies in the CBTA system.
The assessment processes and instruments

At the structuring decision-making stage a decision was made to review the competence of the operators on an annual basis or when the job changed. When the job changed, such as when the digital control system was introduced into Plant 1, all the operators were assessed again on the revised control system company competencies. In this case the assessment was based on the digital control system rather than the previous system. However, no annual review had been conducted, despite the Training Manager’s plan to do this. Insufficient resources were available to review the assessment in Plant 1, when the initial process was still being implemented in Plant 2 and progressively in the other eight plants. The Training Manager advised that the implementation of a review of assessments would be delayed until all the operators in the other plants had been assessed as competent and would depend on the resources available at the time. However, it was of interest that the Training Manager and the company had proposed an annual review at the time of developing the guidelines. This had been influenced by the concern about loss of competencies, but was also included in the agreed guidelines by the company to give it the option of reassessing without the union raising industrial relations concerns at a later time.

The learning approaches

The refresher training was not directly linked to the CBTA system, but it had become an integral part of the learning approach for the operators. The refresher training had been revitalised by the operators so that they could maintain their level of competence in areas directly related to the performance of their role. The operators were concerned that they had forgotten certain job functions and the associated procedures, simply because these did not occur in their normal day-to-day activities. The refresher training was in areas in which the operators felt they had weaknesses, and generally related to the procedures and responses required in emergency situations or the performance of a rare maintenance task. The operators were not confident that they could recall the correct responses, due to the lack of practice of these functions and the associated procedures. Further, the reduction in the workforce changed the functions of each member of the shift team, so the functions previously performed by the extra operators had to be picked up by the remaining operators. Therefore the refresher training included identifying the most effective sequence of actions or procedures for certain situations and also allowed the operators to identify and reach agreement on who in the team should perform certain functions.

The increasing significance of the refresher training and the development of its more formal structure had resulted from the implementation of the major hazard facilities regulations and the operators’ increased awareness of the obligations placed on them through these regulations. The content of the refresher training and the operators’ recognition of this as a
part of the training regime, especially for emergency situations, continued to be influenced by the requirements of the regulations.

The introduction of the new technology for plant operation and management, while directly beneficial for the company, had exacerbated the operators’ loss of skill and knowledge and had increased the importance of the refresher training. This was due to the decreasing number and frequency of plant breakdowns because of the control system, which reduced the number and frequency of the opportunities for the operators’ to put their emergency skills and knowledge into practice.

Finally, the refresher training had been revitalised and maintained by the operators in Plant 1 because it adopted a peer group learning approach based on discussion and the sharing of knowledge, which was a preferred learning mode for many operators and in which they were willing to participate.

The operators’ and the Plant Supervisor’s support for refresher training was also emerging in Plant 2. The operators and the Plant Supervisor in Plant 2 had recognised that refresher training was required to maintain the level of performance required.

The Recycling/Outcome Decision Stage

The company was progressively introducing the CBTA system across the ten plants of the manufacturing site. It was first implemented in what was known as the most ‘senior’ plant, Plant 1, then implemented in Plant 2 and on through to the less senior plants. As a consequence the intervention was at various stages of implementation and development across the site during the study. Therefore recycling decisions were occurring within each decision-making stage in each plant, which immediately influenced the developments in that plant. But recycling decisions were also occurring after each plant implementation, which influenced the decisions as the process commenced for the following plant. This progressive introduction of the CBTA system across the site led to a number of changes in the way in which the intervention occurred in each plant.

The impact of the changes

What impact did the changes to the CBTA system have on the expected outcomes?

Recycling decisions were made for Plants 1 and 2, based on the outcomes of the system implementation in the other eight plants, that brought about changes in the CBTA system in Plants 1 and 2. In other plants, the planning and structuring decision-making stages reflected a more refined approach, compared with the earlier plant implementation in Plants 1 and 2, and included improved learning approaches and assessment approaches, some of which were being implemented into Plant 2.
The company guidelines specified that the Steering Committee formed to monitor the implementation had a role in reviewing and improving the process when and where necessary. However, the Steering Committee had made some initial changes, but met infrequently once the implementation had commenced.

Generally, the company had implemented the CBTA system in Plants 1 and 2 as it had planned, but had introduced changes over time through the recycling process which were designed to enhance the operators' learning.

The competency 'definition', scope and complexity

The Steering Committee reassessed the company competencies at the implementing decision-making stage. The resulting recycling decisions provided a more rational and structured set of competencies for implementation, compared with the company and plant specific competencies that had initially emerged from the earlier process to develop the company competencies. It is probable that these more refined competencies would also more readily reflect the more generic training package competencies and in this sense would enable the company to more readily prove that its competencies were at an industry standard. As such, the changes might have enhanced the company’s capacity to prove its operators were competent to satisfy its obligations under the major hazard facilities regulations, which was an expected outcome. Otherwise, it would appear that these changes would not have impacted on the company’s expected outcome of increasing the operators underlying knowledge.

The company had recently installed new digital control technology in Plant 1 and was progressively installing the same technology in Plant 2 during the study. As a result, the scope and complexity of certain competencies had changed to reflect the changed job role and the equipment to be used.

Consequently, the recycling decision-making caused overall changes to the CBTA system in Plant 1, which would enhance the company’s capacity to achieve and maintain its expected outcomes. That is, they would ensure the operators maintained relevant competencies and the company could continue to prove its operators were competent to satisfy its obligations under the major hazard facilities regulations.

The process to recognise current competencies

The use of external consultants as assessors ensured that the assessment was completed more quickly than if the company had waited for the training coordinators to become qualified in assessing. This enabled the company to more quickly achieve its expected outcome, to prove its operators were competent to satisfy its obligations under the major hazard facilities regulations. However, this change is unlikely to have significantly impacted on the company’s
expected outcome of increasing the operators underlying knowledge. Nevertheless, the experience gained by the training coordinators in assisting and observing this process might have increased their awareness of the standards required and enhanced their training delivery, which might have indirectly enhanced the knowledge and skills of the operators. Some operators indicated that their performance was enhanced by their awareness of the standards of performance required on the job. This could be evidence to suggest that the trainers’ awareness might also have increased as suggested and enhanced their training delivery.

The contracting of the TAFE Institute and its consultant to undertake RCC assessments in Plant 2 reflected recycling decisions made as a result of the implementation of the CBTA system in Plant 1. The company engaged the TAFE Institute assessor when it realised that it needed additional support if it was to implement the CBTA system across its plants in a reasonable time period. In addition, the Training Manager engaged the consultant because he believed that using the external assessor provided additional credibility for the assessments, which would enhance the company’s capacity to prove its operators were competent to satisfy its obligations under the major hazard facilities regulations.

Finally, engaging the TAFE Institute external assessor brought with it enhanced learning materials and approaches, which were likely to have more effectively increased the operators underlying knowledge.

The experience gained in providing the RCC processes for the operators in Plants 1 and 2 assisted in the development of an improved process for the operators in the other eight plants on the site. The new improved RCC process included providing a list of the units of competence for their position to each operator and providing advise on the method and form of evidence they should collect to prove they were competent. The external assessor then used that evidence, together with oral questioning and workplace performance as the basis of the assessment. The operators were also allowed to bring along a supporting expert person to verify the evidence presented on their workplace performance. This method was the main way for the operators to prove they were competent on some areas which could not be readily demonstrated, such as, shut down and start up of a plant. Generally, the operators in these plants were assessed by identifying and recognising their current competencies, based on a demonstration of the performance in the workplace or in a simulated situation, rather than adopting the earlier approach used for Plant 1 which was mainly recognising prior learning from previous training. This new RCC approach is now planned for use when operators transfer to Plants 1 and 2. This improved approach is likely to further enhance the reliability and validity of the assessments and generally would enhance the company’s capacity to prove its operators were competent to satisfy its obligations under the major hazard facilities regulations.
The assessment processes and instruments

The company changed its assessment process from self-assessment in the first cycle of the intervention to a formal assessment process in the second cycle as a result of the introduction of the major hazard facilities regulations. This was a significant change to enable the company to demonstrate that its operators were competent to satisfy its obligations under the major hazard facilities regulations and achieve its expected outcome.

The company had also identified in the structuring decision-making stage the need for ongoing learning and revision and the need for competency audits through an annual reassessment process. This had not been implemented, but further consideration was being given to this decision. The company had initially included this requirement in its guidelines, through negotiation and agreement with the Union, to ensure that it had the capacity to conduct a review and reassessment process at some later stage if required. As a result an assessment process was recently planned for implementation for some of the more formal refresher training. A Plant 1 training coordinator had also raised the notion of introducing a process of assessment after the refresher training.

Very recent thinking in 2004 had included a proposal to establish a framework for all competencies, based on importance and frequency of use, which would identify the need for reassessment and would identify when a reassessment was to be conducted. These developments, if implemented, were likely to improve the capacity of the company to achieve its expected outcomes, but more importantly, to maintain the operators’ knowledge and skills at the standard required and enhance the company’s capacity to prove over a period of time that its operators were competent.

A decision was also made at the structuring decision-making stage to assess the operators when the job role changed. This process was implemented when the new digital control system was fully implemented in Plant 1. Under these arrangements the company’s unit of competence “Operate process control systems (continuous plants)” was to be reassessed based on the new digital control system. The experienced gained in assessment across the company plants, and the resultant recycling decision-making, was evident in this assessment process. The process was more rigorous and more formal than the earlier assessment activities in Plant 1, and required a demonstration of competence using the new digital control system as well as oral questioning. The changes and improvements in these processes, through experience and increased assessment knowledge and skills, could only provide greater assurance that the knowledge and skills are possessed by the operators, perhaps causing them to increase their level of knowledge and skills to satisfy the better measurement of the standard required. Consequently, this improved approach could only enhance the company’s capacity to prove its operators were competent to satisfy its obligations under the
major hazard facilities regulations and could potentially raise the knowledge and skill levels of the operators.

During the period of the study, a new concept had emerged in the company, which was known as a ‘desk-top’ exercise. This was the provision of a series of exercises designed to test the responses of the operators and the Plant Supervisors to emergency situations. Each exercise was to be based on an emergency scenario developed by the Training Manager and the site supervisor. A ‘desk-top’ exercise was not conceived to allow formal assessment of the individual operators, but it would provide a form of group assessment and feedback on the performance of the group. Potentially, this provided a valuable assessment tool with the opportunity to gain a holistic assessment of the performance of the shift team or group as a whole in resolving an emergency situation. These exercises were planned for implementation in the near future with the Plant 1 and 2 operators. Given that the role of the individual in the scenario could be delineation, with specified performance levels developed for each role, debriefings and team self-evaluation could also provide an opportunity for some individual assessment of operators in these situations. This might provide a more valid assessment of the competence of an operator in an emergency situation, which invariably required a team effort, rather than separately assessing each individual in relation to this emergency situation. Such exercises are likely to increase the operator’s underlying knowledge through the feedback and also enhance the validity of the assessment in these situations. As such, the exercises have the capacity to enhance and maintain the achievement of the expected outcomes over a period of time.

The learning approaches

The need for ongoing learning and revision had been identified. This partly came about because the operators recognised that their performance was inadequate in some areas of the job, and partly because the Plant Supervisors were questioning the effectiveness of the original training because of the performance of some of the operators. As a result the operators in Plant 1 had initiated a more formal and structured approach to the refresher training than had occurred in the past.

The Plant Supervisors and the operators generally acknowledged that refresher training was required. The reasons for this varied. The operators considered that through lack of ongoing use many of the correct procedures were forgotten. The Plant Supervisors considered that the operators became lax at times and did not use the correct processes and procedures and reverted to old habits or the procedures they had previously developed from experience over a long period of time. Safety investigations of incidents in the plant often attributed the incidents to mistakes or implementation of incorrect procedures, and therefore supported this view.
The occurrence of these incidents caused some Plant Supervisors to question the effectiveness of the assessing of competence and the original processes for learning the procedures, some of which had occurred in the initial training. In particular, one Plant Supervisor considered that it became obvious that the operators did not know the plant well enough when the plant changed from an old electro-mechanical control system to the new digital control system.

Recent consideration was given to restructuring the refresher training to include some formal assessment, which confirmed the increasing importance that was now being placed on this form of training by the company. As indicated above, a new learning concept was emerging in the company. This was the use of what were known as a ‘desk-top’ exercises. As well as providing a means of testing the shift teams’ performance in ‘scenario’ situations the concept provided an effective team based learning approach for the operators. The refresher training restructure and the ‘desk-top’ exercises planned for implementation are changes which, it is expected, will enhance the capacity to achieve and maintain the expected outcomes over a period of time. However, they also herald a shift in the company’s thinking regarding the expected outcomes, which now include reducing incidents, and as a result improving safety, the quality of the product, equipment longevity and as a probable consequence, the company’s productivity.

As the CBTA system was progressively introduced into the plants across the site, decisions were made in each of the recycling decision-making stages that occurred during this process. In this process the Training Manager was beginning to focus more on the learning approaches in the system, whereas his previous focus was mainly on the assessment function which was consistent with the main expected outcome influenced by the major hazard facilities regulations. The training for the new digital control system in Plant 1 utilised a more formal training process compared with the earlier training processes used for training the operators. All operators received a formal training program that was aligned with the competencies to be achieved and were then assessed on the job against the identified competencies. This process was different from the earlier processes of providing a basic initial training, and a follow up which tended to rely heavily on the buddy system, and learning on-the-job before any assessment took place.

Some of the developments in the learning approaches in Plant 2 also reflected the recycling decisions made as a result of the intervention in Plant 1. This included engaging the TAFE Institute for some of the training and using its learning materials. Using these learning materials also encouraged the training coordinator to commence to develop company print-based learning materials based on the manuals and procedures for operating the plant.

Initially, the decision made by the Plant Supervisor and training coordinator in Plant 2, to provide an ad hoc training approach and a buddy system period for the implementation of the
digital control system, did not emulate the approach taken in Plant 1. However, this decision was revised, based on the concerns of the operators about the effectiveness of the approach and their knowledge that external and formal training had been effectively provided for the operators in Plant 1.

Further, while they had not engaged in refresher training to date, the Plant Supervisor and operators in Plant 2 had identified the need to do so.

New learning approaches were introduced into some of the other plants following the implementation of the CBTA system in plants 1 and 2. It is likely that these approaches will be reflected in the future learning approaches for operators in Plant 1 and Plant 2. These included the use of the TAFE Institute learning materials and the establishment of a separate area as a training centre, which was in the early stages of development. The training centre included pumps, valves and other key small components in the plant that had been sectioned or ‘cut-away’ to reveal the internal components. These ‘models’ were used to provide a visual image for the operators as they learnt about each piece of equipment from new print-based learning materials known as Equipment Function Outlines. These Equipment Function Outlines provided details of the operation of the equipment and covered the associated knowledge components including the basic chemistry and physics associated with the operation and the chemical reactions that occurred in the various pieces of equipment.

The new learning approach for the other plants included a more comprehensive and intensive full time basic training program that was provided for new operators in a classroom situation for a period of 5 weeks, compared with the previous initial training approach. The initial training now emphasised the knowledge required for the position, rather than simply learning procedural operating functions. This basic training was still followed by the mentor or buddy system, where the new operators learnt on-the-job with the assistance of the mentor.

Computer-based training was also being developed for some plants, based on critical incident scenarios. Planned future developments included the use of the intranet to provide a range of learning material which could be used for individual refresher training.

All of these changes and improvements in the learning approaches have the capacity to enhance and maintain the achievement of the expected outcomes over a period of time and are beginning to include approaches that will improve the effectiveness of the learning and develop the theoretical knowledge and understanding required for competent performance.
The effectiveness of the CBTA system implementation

Was the system implemented effectively?

The CBTA system evolved from earlier attempts by the company to use curriculum-based training programs and then a number of cycles of developing competencies and implementing a competency-based approach to its training. These attempts assisted the company to plan and develop its concepts as they evolved. The planning decision-making stages and the structuring decision-making stage were extensive and involved consultation with the stakeholders. The features of the CBTA system and the competencies were clearly documented and all participants were aware of the requirements of the program.

The review and rationalisation of the company competencies during the implementation decision-making stage provided a structure that could be more effectively implemented than one based on the previous plant specific company competencies. The implementation of common competencies across similar roles in each plant enabled the implementation to be more effective, and reduced the ongoing management requirements of the CBTA system. The use of these common competencies also created a better and more effective structure for facilitating the transfer of operators to higher level plants by providing recognition for the common competencies developed in the previous plant. Consequently, this provided a more cost-effective approach for operators transferring to higher level plants, as it only required the company to assess the additional higher level knowledge and skills required for the more complex plant. This was also important because the transfer of operators to higher level plants was the means by which the operators developed their career.

The rationalisation, and subsequent use of common competencies, also had the potential to facilitate further cost-effective improvements through the future development of common assessment instruments and processes across the plants, and therefore had the potential to increase the reliability of the assessments across the plants. This arrangement also provided the opportunity to more effectively use the trained assessors, as those in higher level plants could be used in the other plants. Similarly, the arrangement had the potential to increase effectiveness because some learning materials could also be common to all plants.

The CBTA system was progressively implemented across the plants in a planned staged approach limited by the level of resources available. However, no clear deadlines were planned or identified at the start of the process for the implementation and the completion of various stages. The time required for completion of the implementation was simply dependent on the resources that could be made available for the CBTA system over the period. The Training Manager developed annual plans for the implementation of the CBTA system based on the resources allocated in that year, and was required to report on the progress of the implementation against that plan.
The staged process was based on a common implementation approach for all plants. While it was not planned to do so, this staged process provided the opportunity for recycling decisions during the implementation in each plant and at the completion. This resulted in improvements in the CBTA system for implementation in the next plant. In particular, the use of a common approach to the implementation in each plant reduced the time required for the planning and structuring decision-making stages for features that had already been implemented in a previous plant. As a result, the time used for the planning and structuring decision-making stages was concentrated on improvements to the CBTA system, which led to the progressive development and improvement of the learning support materials and the assessment approach.

The use of company competencies was not a cost-effective approach, when the training package competencies were available. These could have been modified as required to meet the company’s needs. Over the longer term the company will be involved in revising its competencies as processes and technology change. It is likely, as the company revises its competencies and as further revisions occur in the training package competencies, that the company will slowly include training package competencies rather than develop its own. It is also likely that over a period of time, in the not too distant future, that the company will eventually adopt the training package competencies to form its own set of competencies. This will occur because the use of the training package competencies will reduce the costs required for introducing new competencies. Further, this is also likely to occur because the company will wish to continue to show, for the purposes of the major hazard facilities regulations, that its operators are trained and competent at a level commensurate with the industry standard. To do this, the company is likely to turn to the training package competencies with its new entrants, rather than conducting a continual upgrade and mapping process using its own competencies. Further, the use of training package competencies is more likely to provide opportunities to access other training aligned with the training packages and potential funding incentives. Finally, this transition is likely to occur because the current Training Manager is a member of the state government industry training advisory body and has formed a view on this matter.

On reviewing the company’s CBTA system, as it was implemented in Plant 1, the Training Manager believed that the company should have taken a different approach with the development of the competencies. That is, he believed that the company should have taken the national training package competencies and changed them slightly to reflect the plant operator roles, rather than taking the expensive and more complex path of writing company competencies and then eventually aligning them with the national competencies. However, this observation was made in hindsight, and no action had been taken during the implementation or at the end of the process to make any changes to the scope or complexity of the competencies used in the system or for the future.
The use of the more generic national training package competencies would have eliminated the cost to the company of developing its own plant specific competencies. The use of the training package competencies would have eliminated the need, and time required by the Steering Committee, to convince all concerned that common competencies could be developed across the plants from the plant specific competencies. This, in turn, would have eliminated the cost of mapping the company competencies against the training package competencies to demonstrate that they were at a recognised industry standard. Further, the use of the training package competencies would have made the use of the external assessors more cost-effective. However, it is likely that the company would still have had some competencies that were additional to the training package, as identified in the mapping process. It is also possible that these competencies might not have been identified had the company relied solely upon the training package for its initial identification of the competencies. This highlights the importance of clearly identifying the job role, and then selecting the competencies that are required to perform this job, rather than simply selecting those competencies from the training package which are perceived to be required for the job role.

Using the training package competencies had the potential to provide a more effective implementation in a number of other ways. It would have allowed the company to more readily align its competencies with updated training package competencies, the first of which were issued in 2002. Further, when employing and training for the future, it would have allowed the company to readily and cost-effectively recognise the competencies of an operator who had come from another company in a similar field, where the person had previously been judged to be competent on all or relevant parts of the industry training package. Similarly, the use of training package competencies would potentially benefit existing company operators who needed to, or chose to, work in another company.

The use of external assessors in Plant 1 ensured that the assessment was completed more quickly than if the company had waited for the training coordinators to become qualified and gain experience in assessing. However, the effectiveness of the process could be questioned. The external consultants were not ‘experts’ in plant operation and required considerable input from the training coordinators to frame appropriate questions for the assessment. Further, the reliance they placed on prior learning, based on the content of the training programs previously undertaken, might have been a cost-effective process, but the reliability of the assessments would be doubtful given that the individual operators had not been assessed in any way after these training programs. The process was supplemented by interviews when required, but it appeared that there was no requirement for the operators to demonstrate their skills and knowledge on the job. The failure to use a RCC process incorporating some requirement to demonstrate performance also raises doubt about the validity and effectiveness of this assessment process, particular in relation to it proving that the operators were competent to perform their job.
The TAFE Institute external consultant had previously been a plant operator in a number of companies and as such was considered to be an ‘expert’. The use of this assessor provided at least two benefits that improved the effectiveness of the activity. One, it provided a cost-effective approach, because the TAFE Institute funded a large proportion of the activity and an expert was available to provide reliable and valid assessments. Two, it allowed time for the company to train the Plant 2 training coordinator as an assessor and provided him with the opportunity to learn and develop experience while operating with the more experienced assessor. Further, the use of an external consultant in this case provided some additional credibility to the assessment outcome and because of his previous experience as an assessor, was likely to provide greater reliability through a more consistent and practiced assessment approach.

The company’s decision in the structuring decision-making stage, and more lately through a recycling decision-making stage, relating to the need for ongoing learning and revision and the need for competency audits through a reassessment process raises some issues about the effectiveness of the implementation. That is, in an industry where it is not possible to demonstrate all the competencies and to perform and practice the associated tasks in the normal course of the job, is a reassessment or periodic audit a necessary feature of a CBTA system? Is this particularly so for those critical competencies where the failure to perform competently can lead to significant safety, health and environmental issues, as recognised in this industry by the major hazard facilities regulations? In fact, should these regulations be more specific about assessment and the need for periodic assessment, rather than simply relying on training to ensure the level of competence is achieved and maintained at the standard required? Some of these are discussed further below.

Finally, the implementation might have been more effective in Plant 1 and 2 had the structuring decision-making stage considered the learning approaches that could be implemented. The initial implementation was focused on an assessment process and the need to show as quickly as possible that the operators were competent to perform their job, because of the influence of the major hazard facilities regulations. Following this, the Plant Supervisors were questioning the original processes used for learning the procedures and the assessing of competence, when mistakes occurred and the procedures were often forgotten. Had the group training approaches adopted by the operators for refresher training and the more recent proposal for ‘desk-top’ exercises been implemented initially, as an integral part of the CBTA system, then the learning might have been more effective. As a result, the assessment process conducted in Plant 1 might have made judgements using a RCC process related to the group training competency development process which had been conducted, rather than relying on a process based on past training programs in which the operators were not assessed. It would appear that these learning approaches will eventually be adopted as a result of recycling decision-making to improve the effectiveness of the CBTA system.
As indicated previously, many of the operators interviewed valued the team or group based learning approach used in the ‘scenario based’ refresher training and considered they learnt more effectively using this approach compared with reading through the procedures or using a class-based approach. Some of the operators interviewed considered the quality of the refresher training was improving and, as a result of that training and the greater emphasis being placed upon it, their understanding of the correct procedures and what would be required of them in certain situations had improved.

The impact of the CBTA system

What evidence is there that the implementation of the CBTA system impacted on the expected outcomes and improved competitiveness and productivity?

Consistent with the Conceptual Framework and the methodology, a form of Kirkpatrick’s model was used as the framework to identify the impact of the implementation of the CBTA system. This allowed an examination of the impact of the intervention in relation to the expected outcomes and the overriding aim of improved competitiveness and productivity for CBTA systems, as expressed by the NTB (National Competency Standards-Policy and Guidelines, 1992). The four levels of the Kirkpatrick Model develop a sequence of data for analysis, which contributes to the overall response to the research question.

Level 1:

Do the participants enjoy the training and does it encourage and motivate the participants to engage willingly in further training and demonstrate the newly acquired competencies on-the-job?

Initially, the operators in Plant 1 did not engage in any training directly related to the CBTA system, as they were all assessed as competent in the RCC process. Following that, they had undertaken training for the new digital control system as part of the CBTA system and had been reassessed on the operation of control systems for the plant. In addition they had participated in refresher training. They showed they were willing to participate in both of the training activities that followed the initial introduction of the CBTA system. Some of the people interviewed, including the operators, used the 100% attendance record as an indication of the operators’ willingness to participate in refresher training. The operators also indicated they enjoyed the training and were willing to participate.

The operators in Plant 2 generally showed that they enjoyed the CBTA system training sufficiently to be motivated to do the training. Some initially perceived the need to participate in the training as a threat, but once they understood the purpose of the overall CBTA system they showed a willingness to participate. Often it had been difficult to get them started on the TAFE Institute self-paced learning materials, but once started they were generally motivated
to continue and expected prompt feedback on assessments to enable them to sign on for more training. Once engaged in the learning process they showed they were keen to learn and many were proceeding with studies for the Certificate III and Certificate IV. Further, once they saw the outcome required from the training and understood what was required of them, they were more likely to be motivated and participate in the training. The operators interviewed also expressed their willingness to participate in any refresher training that might be forthcoming in Plant 2.

Generally, the operators’ major discontent arose from the requirement to attend for training on what they perceived as their day off, and the need to undertake any training they perceived as not being directly related to their job. Generally the latter concern was raised in relation to the corporate training which occurred from time to time.

**Level 2:**

*What changes in competency levels (skills, knowledge and attitude) occurred following the implementation of the training?*

As indicated above, initially the operators in Plant 1 had not engaged in any training related to the CBTA system. However, they experienced a change in their job and participated in the associated training and assessment. They had also participated in refresher training since the CBTA system was implemented and incidental learning had occurred through the performance of their job.

The Plant Supervisors in Plant 1 had observed that the operators had learnt new skills since the implementation of the CBTA system and also as a result of the refresher training. One Plant Supervisor indicated that some of the operators, who previously thought they knew all about the plant, had learnt new skills and knowledge, however they were reluctant to acknowledge this had occurred.

Generally the operators in Plant 1 indicated they had learnt very little as a result of the introduction of the CBTA system. There were, however, comments from some about recalling forgotten procedures as a result of the RCC process interviews. Also, some operators commented on how the RCC process had enabled them to identify the standards of performance expected and this had changed their attitude in terms of their performance of certain tasks.

One of the Plant 1 training coordinators believed the operators had learnt from the refresher training based on his observation of how the operators had performed and responded to questions in the refresher training sessions.

The Plant Supervisor in Plant 2 perceived there was a measurable effect following the implementation of the CBTA system, which was evident in the greater awareness displayed
among the operators of the importance of the procedures and the skills required to perform
the procedures. He also considered, based on the improved standard of performance, either
the operators’ skill levels were improving or they had upgraded the standard at which they
performed, which had previously been allowed to lapse. Further, he indicated he was more
confident than he had previously been, particularly with some operators, that they knew what
they were doing. This was based on the responses he received to his questioning on the
cause for certain deviations and on his discussion with them on how they could rectify the
performance of the plant and implement the changes required.

The operators in Plant 2 had participated in company training and many had decided to
continue with the TAFE Institute training. About 30% of the operators in Plant 2 had to do one
module to gain the Certificate IV and the other 70% had about three modules to complete to
get to a Certificate IV level.

The Plant 2 training coordinator had also noticed the increased learning, which produced
greater attention to detail evidenced by operators identifying errors in written procedures.
This had partly occurred as mentors in the ‘buddy’ system reviewed the procedures to ensure
that they knew the correct procedures, so they were not found wanting by their assistant or
did not pass on incorrect information.

Level 3:

Did the trainees improve their job skills?

The Plant Supervisors in each plant had observed an improvement in the job performance of
many operators which related to greater attention to detail, a willingness to think through a
problem or issue and greater awareness of the need for, and importance of, procedures and
their correct implementation. However, each supervisor also indicated that at times there was
a tendency for some operators to slip back to old habits and cut corners, which then led to
poorer operator or plant performance.

One of the Plant 1 Plant Supervisors had observed that the operators had increased their
involvement in problem solving and thinking about and identifying what might be the problem,
before attempting to pass the problem on to him.

In general, the operators interviewed in Plant 1 did not consider they had improved their job
skills and performance, which was consistent with the general belief of the operators that they
had learnt little from the process. However, some conceded that they had a greater
awareness of the requirements of the role and their performance, and consequently they
considered they were doing the tasks more carefully. Further, there were strong comments
from the operators about the improved ‘shift change over’ due to the use of the common
procedures agreed upon through the refresher training.
The external consultant involved in the training and assessment of the operators in Plant 2 indicated there was evidence that the operators in the plant were developing problem solving skills and developing problem solving processes, rather than jumping into action and using trial and error processes. However, he noted there was still a tendency, amongst a few operators, to give the problem to the supervisor.

The Plant 2 training coordinator indicated it was hard to tell whether the learning that had taken place had translated into changes in work performance. He believed it was difficult to detect a big change in the overall job performance of the operators, because of the nature of the job. However, he observed that the operators were more readily documenting the procedures and activities they had performed, and he believed they were able to do this because of their greater understanding of what was occurring and their greater confidence in what they were doing.

A Plant 2 operator indicated the underlying knowledge he had learnt from one of the modules assisted him in problem solving in one situation, whereas he would not have readily identified the problem had he not done the training. He also reflected that he was thinking about problem solving and relying on some of the training he had undertaken. Another reflected on the learning that had occurred for him, through the broader training provided for the increased responsibilities resulting from the reduced number of operators on the shift.

**Are the trainees given the opportunity to demonstrate the specified competencies on-the-job?**

The operators were not prevented from demonstrating the full range of competencies on-the-job and, in fact, they were encouraged to take on the full range of functions within the role. But the nature of the role often meant that the opportunity to perform a specific function for a particular operator occurred very rarely or in some cases not at all. In one case reported, very experienced operators of at least 10 years standing had not performed certain maintenance functions during their period of employment, because the need to do so had never arisen. Similarly, the opportunity to perform emergency procedures was limited.

**Have the trainees demonstrated the competencies and maintained the specified levels on-the-job following the implementation of the training?**

The Plant Supervisors, the training coordinators and the operators all indicated that skills and knowledge in relation to procedures which were not used often were forgotten, or as indicated above, people slipped back to cutting corners or using older incorrect procedures. All who were interviewed expressed the strong view that the skills and knowledge not used were temporarily lost. As indicated above, the nature of the role was such that many job tasks were not used in the normal course of the working period and were forgotten. Many of the procedures forgotten were those required for emergency situations which, by their very
nature, were critical but did not occur often as the procedures performed by the operators on a daily basis were designed to prevent such occurrences.

**Level 4:**

*What evidence is there that the implementation of the training had an impact on the organisation's expected outcomes?*

**Achieving the Company’s Expectations**

The company’s primary expected outcome was achieved for Plant 1. That is, through the assessment process the plant operators had been judged, at a point in time, to be competent to perform their role against the company competencies, which could then be linked back to the national industry training package standards. In the case of Plant 2, the company’s expectations had yet to be achieved, as all the plant operators had not been judged to be competent at the time of the study. However, it was expected that this would occur in the near future. As a result, the company would be able to state that all the operators in Plants 1 and 2 were competent against the company standards, which was its required outcome as a response to the major hazard facilities regulations. Further, because the company had used external assessors it was confident it could show that its operators were judged to be competent against industry standards at the time of assessment by an external audit.

The plant operators in Plants 1 and 2 had developed their skills and knowledge using a range of previously provided training programs together with learning through experience on-the-job. However, if the company’s expectation went beyond proving that the operators were competent at a point in time, then the achievement of their expectation would have to be questioned. That is, if they expected that once proved competent the operators would maintain their level of competence as a result of the implementation of this CBTA system, then the achievement of their expected outcome would be in question. After the implementation of the CBTA system, the Plant Supervisors believed the operators were prone to forget procedures or to cut corners in their operations and they required refresher training. Many of the operators interviewed also believed they had lost some of their skills over a period of time, but this was only supported by two of the seventeen questionnaire responses, with another eight operators neither agreeing nor disagreeing that they had lost skills after the CBTA system.

The Training Manager had expected the operators’ “knowledge gaps” would be identified and training could then be provided to remedy these gaps. However, despite the implementation of the CBTA system he was not satisfied that the skill level of the plant operators had improved to the level he required, but he believed that the company’s expectation of proving that the operators were competent against the industry standards had been achieved. His concern could be readily explained, given that no knowledge-based learning had been
provided to the Plant 1 operators prior to the assessment process. As a result, it is unlikely the CBTA system increased their knowledge.

**Competitiveness, productivity and quality improvements**

The primary expected outcome stated by the company was to prove that the operators were competent. However a secondary and underlying outcome was an expected improvement in productivity and quality. The NTB also specified an overriding aim of the national training reform agenda was to increase the competitiveness and productivity of Australian industry. In addition, the Plant Supervisors expected that the operators would develop trouble shooting and problem solving competencies.

The operators in Plant 1 were assessed as competent through a RCC process. Consequently, they initially required and received no formally recognised training as part of the CBTA system to achieve the required level of competence. However, they had undertaken training for the new digital control system, which was implemented after the initial assessment process, and refresher training prior to the time of the study. The operators reported that the assessment process and its specification of standards tended to produce what could be described as incidental learning process or a self-learning process for the operators. The Plant Supervisors and some operators suggested a resultant improvement in performance on-the-job since the provision of the CBTA system. The operators partially attributed this to their increased awareness as a result of the assessment process. The operators also identified improvements in the plant’s operation as a result of the common procedures they now used and had learnt and agreed upon through the refresher training. As a result they believed that they had greater certainty about what had happened previously in the management of the plant and this improved the ‘shift change over’ process and the subsequent operation of the plant.

One Plant Supervisors in Plant 1 noted how reducing the workforce had improved productivity. However, few readily recognised or acknowledged the impact of the training in assisting the operators to develop the new range of knowledge and skills and the capacity to effectively take on this broader role and the associated responsibility.

The Plant Supervisor in Plant 2 proposed that evidence was available through plant performance records that showed productivity improvements had occurred over the time period of the training in the CBTA system. This was measured by a reduction in the manufacture of second grade product and consequently less reworking of the product, because the operators were maintaining the product within specification. He also suggested that evidence was also available which showed the safety record of the company had improved over this period. However some of the safety training was conducted as corporate training and was not part of the CBTA system.
With many changes being introduced by the company it was not possible to attribute all improvement to the implementation of the CBTA system and the associated learning which took place. Clearly, reducing the workforce had a significant impact on the productivity. Although some operators said this reduction was occurring at the expense of plant safety, there was no evidence to suggest this was true. Similarly, the introduction of the new technology, and the greater control this provided for managing the product specification and automating and simplifying functions previously done manually, must have had an impact on both productivity and safety. However, the implementation of the new technology had only just commenced in Plant 2 in the latter part of the study, and the improvements outlined above had been identified over the past 24 months. Therefore, much of the improvement in Plant 2 productivity could be attributed to the reduction in the workforce, the associated training undertaken by all the operators in Plant 2 and the increased awareness of the standard of performance required.

Other measures, such as reductions in broken equipment and reductions in incidents due to mistakes had also been made in Plant 2. These reductions contributed to less plant downtime and improved the plant productivity. These reductions could also be partially attributed to an improved job performance, which could be partially related to the implementation of the CBTA system with its training and its increased awareness of the standard of performance required.

Use of formal mechanisms to measure the impact

The company regularly maintained many formal business performance measures related to productivity, quality and safety, but none attempted to directly identify the impact the CBTA system had on these measures.

The Plant Supervisors and the Training Manager acknowledged that any attempt to formally measure the impact of the implementation of the CBTA system on productivity, quality and safety, and then to identify the contribution of the CBTA system to any change, would be extremely difficult. They believed this was particularly so when other significant changes, such as the introduction of digital control systems and significant reductions in the workforce had also been phased in over a long period of time to improve productivity and quality.

Use of anecdotal methods to measure the impact

Plant Supervisors, the training coordinators, the Training Manager and some of the operators provided anecdotal evidence of improvement in performance, but none could directly attribute this to the implementation of the CBTA system. Most indicated a belief that the implementation of the CBTA system had brought about an improvement in the business performance measures. Some attributed this to the changed culture in the organisation and the increasing emphasis on levels of performance and business outcomes. Some attributed
this improvement to the heightened awareness of the standards of performance required and the operators’ knowledge of what was expected. Some attributed this simply to the greater attention and interest being shown in the operators by management and supervisors, through the increased emphasis on their performance and training across the site.

Some operators felt they had been marginally more productive as a result of the implementation of the CBTA system, but most felt there was little change. In particular, those who reflected on this considered they were more productive because there was a lot less second grade product being produced and a lot less reworking to get a product within specification. However, they indicated many things could have contributed to this improvement in performance, particularly improvements that had been made to the plant.

Some of those interviewed specifically commented on the improved attitude and culture of the smaller number of operators who remained following the redundancies. This was evident by the greater responsibility and care these operators had taken over the procedures to be used, their level of performance and the quality of the product outcome.

**Explanation and Building of Knowledge**

**The conceptual framework**

As discussed in Chapter 2, two competing theories of change were identified; the planned change model and the emergent learning approach. The approach adopted in this case was a planned change model. Although the company did not identify any formal stages in the introduction of the CBTA system, the planning and structuring decision-making stages were identifiable. Documented guidelines were established in the structuring decision making stage, which outlined the structure and features of the CBTA system and the roles and responsibilities of those who were to be involved. The implementation occurred one plant at a time, and recycling decision-making occurred during this implementation and at the completion of the implementation in each plant. A progressive path of improvements could be identified in the progressive implementation of the CBTA system across the plants. The Conceptual Framework adopted for the study was able to describe the process which occurred with this intervention. Each of the stages was employed in this case as the intervention was planned, structured, implemented and recycled, with changes in direction occurring as a result of the internal or external factors which emerged. The Conceptual Framework identified the initial planning and structuring which had occurred and the more limited implementation of the CBTA system in Plant 1, due to the experience of the operators in the plant and the use of a RCC approach. The implementation was more expansive in Plant 2, and with the experience gained from Plant 1 and the use of recycling decisions, more features of the CBTA system were implemented. Subsequent implementation in the plants
that were not within the boundaries of this Case Study showed more expansive implementation of the features based on the recycling decision-making.

Although the developer had not identified any specific stages for the development of the intervention, the Conceptual Framework provided an appropriate structure within which actions could be classified and the case study developed.

**The Kirkpatrick Model**

The Kirkpatrick Model also provided an appropriate framework within the Conceptual Framework to collect data on the impact of the intervention. Through its four levels, the model provided a framework for the collection of evidence as a measure of the learning which had taken place over a period of time, the opportunities provided to use this newly learned knowledge and skills in the workplace and the results obtained through this process. Although quantitative data was not available from the company with which to make an assessment of the impact of the intervention, the Kirkpatrick Model allowed for the ordered collection of anecdotal evidence to provide some insight into the impact of the intervention. This has been used where appropriate in the propositions below.

**The propositions**

The study established a series of propositions in relation to the manner in which the CBTA system would be introduced in an enterprise. The following outlines the implementation of the CBTA system in Company A in relation to those propositions.

**Proposition 1**

*The enterprises will implement a CBTA system to achieve productivity, safety and quality improvements to enhance their competitiveness.*

Enhancing the company’s competitiveness was not expressed as the initial purpose for implementing the CBTA system. However, when promoted, the Training Manager indicated productivity and quality improvements were a ‘given’ expectation for any training program. The Plant Supervisors also included problem solving and trouble shooting as their expectation of a CBTA system. However, none of this was mentioned as the primary objective. Initially, this was to increase the knowledge of the operators. Possibly quality and safety issues were underlying this expectation, but the company did not explicitly identify them. The primary objective then changed after the issuing of the major hazard facilities regulations, to wanting to prove that the operators were competent to perform their job. These regulations were based on safety, health and environmental requirements, and although the CBTA system included knowledge and skill requirements that were directly related to safety, health and environmental issues, the company did not specify any outcome from the system that was to
improve the safety of the plant’s operations. However, it is likely that this outcome was also an implicit underlying expectation of the outcome of being able to show that the operators were competent to perform their role.

The Training Manager postulated that providing any training was good and that benefits would occur as a result. These benefits were not clearly specified. However, if and when the outcomes were specified, they were often expressed as a change in operator behaviour and their knowledge and skill levels and not as a requirement to improve productivity, quality and safety.

Generally, the company could not be considered to have implemented the CBTA system to achieve productivity, safety and quality improvements to enhance their competitiveness.

**Proposition 2**

The enterprises will implement a CBTA system that is unique to the enterprise and strongly influenced by external and internal factors specific to the enterprise.

To a large extent the planning and structuring decision-making stages were influenced by an evolving sequence of activities and internal factors which commenced with a number of attempts to implement a more formal structure into the training regime of the company. This evolutionary process was influenced and driven by the Training Manager’s knowledge of the training developments at a national and state level. The company commenced a long path of development to formalise its training and to link it with the state and national vocational education and training programs. This commenced with a curriculum-based program and the development of job roles based on the learning outcomes. This moved to developing company competencies that were refined over a period of time. Throughout this process, while linking to state and national programs, the company was developing a unique set of roles and competencies which met the internal requirements of the company. Despite the company’s knowledge of the training package development in 1998, it continued to develop its own competencies. The competencies were influenced by the proposed format for the national competency standards, but did not significantly draw upon the training package competencies. At a later stage the company was forced to map its competencies against the national training package competencies because of the work of the external assessors, but it continued with its unique development.

Significant planning and structuring decision-making stages were evident in the introduction of the CBTA system, which relied heavily on some of the previous planning and implementation. Consultation occurred with stakeholders and the features of the CBTA system to be implemented were discussed. The company competencies were developed in a consultative manner with the stakeholders and were clearly documented and available to the operators. Changes to rationalise these competencies were also negotiated with the stakeholders by a
representative Steering Committee. The CBTA system policy and practices were discussed and culminated in documenting a set of guidelines. However, the features of the CBTA system and the guidelines drew heavily on the national guidelines and principles. As proposed, the unique development was influenced significantly by internal factors, such as industrial relations, the knowledge of the Training Manager, previous experiences, staff characteristics and a view that the operators’ tasks were unique to the company, if not to each plant. However, it was also influenced in its format and features by external factors relating to the national training approaches and, in particular, the company’s expectations were strongly influenced by the major hazard facilities regulations.

The process of introducing the intervention was a pragmatic and conservative approach of phasing in the CBTA system plant by plant, according to the level of resources available, but allowing recycling decision-making based on the implementation in each plant.

Generally, the company had implemented a unique CBTA system that was strongly influenced by external and internal factors specific to the enterprise.

**Proposition 3**

The enterprises will implement a pragmatic CBTA system using a narrow skills-based approach giving little attention to higher order competencies; the requirement for transferability of skills and knowledge to new situations and environments; the assessment principles and issues or the learning approaches that could optimise learning effectiveness and retention of competencies.

The company based its initial competencies on the job roles within the various plants. At a later stage an external consultant was engaged to develop the competencies, which were the basis for the competencies finally used in the CBTA system. The competencies developed by the consultant were developed against the specified job roles in each plant and as a result were specific to each plant. However, the consultant was an experienced educational consultant, who had access to the competencies in the training package at the time, and ensured that the competencies also included higher order competencies such as working in teams, problem solving and troubleshooting. The rationalised competencies developed by the Steering Committee from those developed by the consultant were less plant specific, but retained the higher order competencies such as problem solving and troubleshooting which were required by the company. The rationalised plant specific competencies comprised three components. The first component comprised the core competencies, which were common to all plant operator positions in all plants. The second component comprised the generic operator competencies, which applied to a range of similar jobs across a number of the plants, but not to all jobs within a plant. The third component comprised the technical specialist competencies, which were relevant for a particular job within a specific plant. As a result, the rationalisation process provided a structure that facilitated transfer across the plants. The operators transferring to higher level plants required some basic training to
supplement their current competencies, together with training in the higher level competencies required for the new plant. However, the company did not consider the need to develop competencies that would facilitate the transferability of the skills and knowledge to new situations and environments. The competencies were specific to operating in a particular plant. The extent to which the actual competencies and the associated learning materials promoted transferability of skills to new situations and environments, beyond operating in one of the company plants, is not known. However, competencies were developed to provide problem solving and troubleshooting skills, which potentially would facilitate transfer to new situations and environments.

The company had initially developed a very pragmatic self-assessment approach. This decision was based on taking a gentle approach to introduce the concept of assessment to a group of experienced and mature operators, many of whom had not been assessed since their school days. The decision was not based on recognised assessment principles for a CBTA system. The subsequent formalising of the CBTA system assessment process was based on guidelines that specified the recognised assessment principles. The features of the CBTA system, as specified in the company guidelines, included an initial process for the recognition of skills and knowledge. This process was implemented in a cost-effective and pragmatic manner in Plant 1, when the external consultants undertook a ‘desk-top’ RCC process, based on previous training programs in which the operators had not been assessed, supplemented by some interviews. However there was no evidence to suggest that the company had included a RCC process as a cost saving process or that the pragmatic implementation was primarily based on a requirement to be a cost-effective approach. The process adopted in Plant 2 was a more extensive RCC process that was based on interviews and included a real or simulated demonstration of the skills and knowledge required.

The company did give attention to the generally accepted assessment principles in the assessment guidelines, and acknowledged the need for assessments to be reliable, fair, flexible and valid. The guidelines also provided some basic advice on the development of assessment processes. However, it left the implementation of assessment practices that incorporated these features and principles to the trained assessors.

The decision to use a trained and experienced external assessor from the TAFE Institute was not based on ensuring that principles, such as reliability, fairness, flexibility and validity were observed. However, this decision was likely to have enhanced the reliability of the assessment in Plant 2. The reliability and validity of the assessment was also likely to have been enhanced when the TAFE Institute assessor was assisted by the training coordinator, who could make judgements based on observations made over a range of performances in the workplace and on the validity of such performances. Further, the reliability and validity of the assessment was likely to be enhanced by these two experts requiring evidence from a demonstration of skills and knowledge at the relevant workstation.
There was no evidence to suggest that any consideration was given in the planning or structuring decision-making stages to learning approaches which would optimise learning effectiveness or the retention of competencies. No new learning approaches were planned or structured for the operators as part of the CBTA system. However, following the implementation, the Plant 1 operators initiated a more formal and rigorous refresher learning approach, because of their concerns about the retention of knowledge and skills. The Plant 1 operators also initiated a scenario group based approach, which was a preferred approach for many of the operators and as such was likely to contribute to more effective learning. The coaching, peer support and reinforcing of the knowledge and skills in the scenario approach had the potential to increase the operators’ retention of these skills and knowledge.

New learning approaches were introduced into Plant 2 because the company had engaged a TAFE Institute consultant who provided access to the print-based and other media learning material available. In addition the training coordinator then developed some print-based learning material for self-paced individualised learning associated with plant operating procedures. None of this was deliberately based on plans to optimise learning effectiveness or retention of competencies. The operators in Plant 2 also wanted refresher training, because they were concerned about the retention of skills and knowledge that were not used on the job, except in critical or emergency situations.

Generally, the company had implemented a pragmatic CBTA system, which was based on job-specific competencies, but had given consideration to higher order competencies and to assessment principles. However, no consideration had been given to the transferability of skills to new situations and environments or to learning approaches that could optimise learning effectiveness and retention of competencies.

**Proposition 4**

*The enterprises will improve the CBTA system using an evolutionary process of resolving system issues as they arise over time.*

As indicated above, the planning and structuring decision-making stages were influenced by an evolutionary process. The process of implementing the CBTA system across the company plants was an evolutionary process, whereby the lessons learnt from one implementation influenced the recycling decision-making for the next plant. As a result, improvement could be identified in this progressive implementation across the plant. Further, as the number of plants in which the CBTA system had been implemented increased, many features of the CBTA system were consolidated and required less resources and time for their development and implementation in the next plant. As a result, this released time and resources, which could then be directed to developing and extending other features of the CBTA system. This generally included improvements in the content and delivery mode for the learning materials across each plant, but also included improvements in the assessment process.
Generally, the company took a planned and structured approach and initially included some basic features and approaches, which improved through an evolutionary process of responding and resolving the issues through recycling decision-making over a period of time.

**Proposition 5**

The enterprises will identify the perceived benefits of the training by observing improvements in employees’ job performance, but will have no formal evaluation mechanisms to determine if the expected outcomes have been achieved through the CBTA system.

The company had not developed any structure to identify the benefits of implementing the CBTA system. The company’s expected outcomes were to increase the knowledge of the operators and to prove that those operators were competent to satisfy its obligations under the major hazard facilities regulations. From the company’s point of view these outcomes could be measured by the individual assessment of the operators. Therefore no other measures were required. However, the underlying expectation of improving productivity and quality could not be assessed in this manner. When questioned, the Plant Supervisors indicated performance improvements they had observed, which they attributed to the CBTA system. This included improved problem solving and troubleshooting and an increased awareness of what was required for the job. Equally, they identified poor performances from their observations, but also because of the number of incidents that occurred. However, there was no attempt to link improved performance in the workplace to improved productivity or quality.

The company had no formal or informal mechanisms to determine if the expected outcomes had been achieved. The only measures were obtained from the assessment instruments used. As indicated previously, the Training Manager held the view that it was a given that providing training would result in increased productivity and quality improvements. However, no mechanism had been developed to formally measure whether this was the case.

**Themes and Concepts Identified in the Case**

The purpose of the study was to build theory in relation to the manner in which CBTA systems are implemented in workplaces. This case study investigated why the company introduced a CBTA system; the features that have been implemented; the decisions made by the company when planning, structuring and implementing the system; the reasons for its decisions and the factors which influenced them. In addition, the case study identified the company’s expected outcomes and the impact of the implementation of the system.

The insights gained from the case study of this company can add to the process of developing theories about the training needs of enterprises, the factors which influence the decisions of enterprises when implementing systems and the impact of implementing such
systems. The themes and concepts arising from the data can also contribute to the development of this broader knowledge.

The themes and concepts arising from the data in this case study include:

The drive for more training was partly initiated by the operators

The introduction of the CBTA system was staged across the two plants that formed the boundary of the case study. The implementation was completed in Plant 1, subject to more recycling decision-making, and was nearly completed in Plant 2, but training and assessment was still occurring. The drive for more training had come from the operators in Plant 1 following the competency-based assessment process. As a result they had reinvigorated the previously conducted refresher training and had established a more rigorous and formal refresher training program. Similarly, the Plant 2 operators were expressing a need for more training to ensure the retention of competencies.

The approach to implementing the CBTA system

The initiator developed a small-scale implementation, staging the implementation in one plant at a time, rather than a larger scale implementation involving more than one plant. This approach was partly based on the limited resources known to be available within the company for the implementation. The initiator had previously sought external funds to establish a pilot program, and because of his contacts in the state vocational education and training system, would have been aware of other sources of funds to provide a larger scale implementation. Therefore, it is likely that the decision to use a small-scale approach was partly due to a lack of potential resources, but also partly reflected a cautious approach to implementing a significant change across the operator workforce in the company’s plants.

No documented proposal to senior managers about the implementation was available. Therefore it was not clear whether any reasons were provided to senior managers for supporting a particular implementation approach for this second cycle of the CBTA system in 2001. This was the initial implementation of a compulsory formal assessment process for operators in the company, which might have shaped the scope of the implementation. No other historical documentation appeared to be available on the CBTA system. Although earlier documents, dated 1992 and 1993, related to the curriculum-based training were found on some floppy discs. No more recent documents could be found either on the Training Manager’s computer hard drive or among other back-up discs. No archiving or filing of such documents appeared to have occurred.

The initiator was involved in the state vocational education and training system and was therefore aware of the developments in competency-based training approaches at both a national and state level. He was aware of the NTB guidelines and other associated
documentation outlining the features that should be included in a good CBTA system (National Competency Standards-Policy and Guidelines, 1992). Perhaps as a result of this, and the previous company attempts to implement structured training, the initiator commenced a deliberate process of planning and structuring, which was inclusive of the company management, the unions and the operators before commencing any implementation. Guidelines were developed and documented for all the features of a CBTA system, which were agreed upon within the company and which formed the basis for the implementation.

The initial development of the company competencies was based on the job roles, which had been identified for all operator positions in the company. The format for these company competencies was based on national guidelines (National Competency Standards-Policy and Guidelines, 1992). Although the industry based training package became available during the period when the company competencies were being developed, this was not used to any significant extent and the company continued the development of its own competencies. On aligning the company competencies with the Training Package competencies at a later stage, it became evident that the company had developed some competencies that were not included in the Training Package. When the CBTA system was implemented in each plant, the competencies for all the identified roles in the plant had been documented and were made available to the operators as they commenced their participation in the CBTA system.

Overall the implementation was a staged approach mainly based on the outcome from the planning and structuring decision-making stages, but improved through recycling decision-making as the implementation proceeded across all the plants.

Retention, periodic assessment and ongoing performance levels

The company had perceived the potential for reviewing and reassessing the competencies at some stage after the initial implementation, and had incorporated a statement to this effect in the agreed guidelines. However, no action had been taken at this stage to review and reassess the competencies.

Early indications of some need to reassess the competencies was raised by a Plant 1 training coordinator, when he proposed that refresher training was needed because the operators were losing some of their skills and knowledge due to lack of use. In particular, this loss involved many of the critical competencies that would only be required in an emergency situation. He indicated that because of this loss, there was probably a need to assess after the refresher training. Much more recently, the Training Manager had indicated that in the near future the company might commence a process to reassess the competencies considered to be critical and might extend this to all competencies. The company was considering setting up an electronic tracking system in the near future. Following this, the company would consider all the competencies, identify their degree of importance, and establish a period for the reassessment of all critical competencies. The next stage would be
to consider the time periods over which they might require reassessment of the other competencies. Clearly, in considering this action, the company had concerns about the retention of skills and the capacity of the operators to perform at the appropriate level following assessment and initially being judged as competent. This clearly has implications for the current concept of CBTA systems, which generally do not include a reassessment process, and perhaps also reflected on the confidence the Training Manager had in the learning effectiveness of the system and the assessment instruments used to make the judgement. Clearly this also related, in this industry, to the inability of the operators to use and practice some of the knowledge and skills on the job because many were only required for emergency situations.

The use of refresher training in the CBTA system

As indicated above, the operators had recognised that more training was required following the competency-based assessment process, to ensure that they retained the level of skill and knowledge required for the job. As a result, the operators in Plant 1 had reinvigorated the previously conducted refresher training and had established a more rigorous and formal refresher training program. The operators in Plant 2 were still engaged in training as part of the CBTA system, but recognised that they should also engage in refresher training.

More recently the company had also realised that the refresher training should become an ongoing and integral component of the CBTA system, and had commenced to influence the scheduling and content of some of the training days.

Preferred learning approach in the workplace

Generally the operators preferred the ‘buddy’ system learning approach. The questionnaire responses suggested that the operators generally preferred an approach where someone explained the job to them. They indicated this was especially so if the person was another operator. However, they also indicated their learning would be enhanced if this instruction was combined with reading print-based materials, which included job instructions, or some classroom training. But the combination of computer-based learning and someone else providing an explanation was not seen to be as beneficial as the other combinations. They also indicated that, while learning in a training room at the workplace was preferable to the training being provided at the workstation, practicing the job in the workplace at the workstation was preferable to practicing in a training room at the workplace or elsewhere.

However, during the interviews the operators also indicated that they valued the group based learning approach, which was adopted in the refresher training, because it enabled them to learn from their colleagues and to contribute in a non-threatening environment.
Limits on the range of skills which can be performed on-the-job

The special nature of this industry meant that limited opportunities were provided in the daily work for the operators to perform all the tasks required for the job. Consequently, problems arise in creating the opportunities for the operators to practice the knowledge and skills required in an environment of this type, even though many tasks, such as emergency shutdowns, can be critical. The operators cannot get ongoing on-the-job experience in this type of activity, because it doesn’t happen often and the situations cannot be induced to allow training, because of the cost and danger of doing so. This situation lends itself to the provision of refresher training through simulation or other means, to ensure that the knowledge and skills are reinforced and practiced to aid retention. This is particularly so for the special emergency situations which might arise.

The role and position of competency-based training in the broader company environment

The operators were a significant part of the workforce on the site. Initially, the purpose of the CBTA system was to increase the knowledge of the operators, then its purpose was influenced by the major hazard facilities regulations and it became a means by which the company could meet its obligations and prove that its operators were competent to perform their job.

No direct links appeared to be made between the implementation of the CBTA system and the potential to enhance competitiveness through improved safety, quality and productivity. The Training Manager held the view that it was a ‘given’ that providing training contributed to increased productivity and quality. Nevertheless, it did not appear that providing the training was linked to any company strategy to enhance productivity and quality or to produce a safer environment.

The emergence of the major hazard facilities regulations raised the importance and status of the CBTA system within the company. This occurred simply because it was being implemented at that time, and because the managers could see it provided a ready means for the company to satisfy some of the requirements of the regulation. However, it was not the only training in which the operators where engaged. Other departments, for example the health and safety team, provided specialist training activities that formed part of the company’s overall corporate training, such as safety training programs provided to the whole company workforce. These special safety training programs were not part of the CBTA system. It is not clear why this training was not an integral part of the CBTA system, which included modules related to safety. This training might have been conducted separately, simply because another department was ensuring that its responsibilities were satisfied, or it might have been for similar reasons to the refresher training, to ensure the special skills and knowledge was retained. This could suggest that the other department was not confident of
the outcome of the CBTA system or it might have had concerns about the retention of the knowledge and skills. This training was not formalised nor was any assessment conducted on its outcome.

Overall, the CBTA system did not appear to have a significant role in the company, despite the number of employees involved, and appeared to attract little interest from the senior managers. The emergence of the major hazard facilities regulations raised the level of interest of the senior managers in the system.

The value of introducing a CBTA in a workforce of very experienced operators

Most of the operators didn’t think they had learnt anything. However, some indicated the assessment of the competencies in itself raised their awareness and identified the standard at which they should perform the role. Observations by others suggested the operators had in fact improved their performance, and were more aware of the performance expected of them and consequently paid more attention to the detail of the performance.

No formal measures were introduced to measure any changes as a result of the CBTA system. Therefore, it was not clear whether the company gained any value by introducing the CBTA system with a workforce of experienced operators, other than being able to satisfy its obligations under the major hazard facilities regulations. It was also not clear whether the operators claimed they had not learnt anything because of personal factors. That is, whether as experienced operators they believed they knew all there was to know about the job, and therefore were not prepared to acknowledge they had learnt from the CBTA system. Equally, it was not clear whether the managers’ perceived performance changes were real or simply made to justify the time and effort put into the development of the system. However, Plant Supervisors, the training coordinators, the Training Manager and some of the operators provided anecdotal evidence of improvement in performance, but none could directly attribute this to the implementation of the CBTA system. Some operators felt they had been marginally more productive as a result of the implementation of the CBTA system, but most felt there was little change.

It would appear on this basis that the company did not gain any significant value, or at least was unable to identify any significant value, from the implementation of the CBTA system in relation to the improved performance of the experienced operator workforce in Plant 1 and Plant 2. The significant value for the company was that it had established a formalised training regime that had provided the means by which they could show that their operators were competent to perform their job.
Case Study: Company B

The Company

Company B is an Australian company, which is a subsidiary of a USA based multi-national, and is a manufacturer of a range of products including chemicals and products based on the processing of crude oil. The company has been in operation for over 100 years, but undertook a number of mergers in the early growth stages of its operation. The manufacturing plant used for this study commenced operations in the late 1940’s and operated under the one company until the late 1990’s, when a further merger occurred.

The company undertook a number of major expansions to its manufacturing plant in the 1950’s and a further expansion occurred in the early 1970’s, all of which considerably extended its range of products. A significant upgrade occurred in the plant in the late 1990’s, with the introduction of newer processing technology. Soon after this, the merger occurred. Through rationalisation and sharing of resources, this merger was expected to enhance the ability of the former companies to be effective global competitors in an industry that was increasingly competitive.

Many of the manufacturing plant’s operators were employees during these more recent expansions and upgrades and remained as operators after the recent change in ownership of the company.

The total manufacturing plant is organised into three Zones, each having a number of major plant Units. The overall plant is operated as a single entity, with the activities and operations of the Zones integrated and controlled, to enable an effective and efficient throughput and output of the range of plant products.

Each Zone has a Zone Production Manager (ZPM) who is responsible for 5 shift teams of around 10 plant operators, each with an operator designated as the Zone Team Leader (ZTL). Approximately 30 operators are responsible for the operation of the plant in each shift.

Each Zone has a nominated training coordinator. The three training coordinators operate as a team and form the Training Department for the Zones. This team is responsible for the development, implementation and administration of the majority of the training provided for the operators within the plant, which includes the implementation of the CBTA system.
The Context

The ‘boundary’ of the Case Study for Company B was identified as encompassing the CBTA intervention that occurred for the plant operators in the three Zones of the company’s manufacturing plant. This included the external and internal factors that influenced the decision-making in this intervention.

Company B had brought about changes to its workforce in the early 1990’s, as it sought to be globally competitive, and had undertaken a process of restructuring the role of its employees in plant management and plant operations. The plant operators in this study were directly impacted by these changes.

The changes broadened the scope of the role of the plant operators and required them to take responsibility for job functions previously undertaken by the supervisors and head operators. The changes also required the acceptance and use of new technology to assist in the operation of the plant. These changes were accompanied by new and more flexible remuneration arrangements for the plant operators and a reduction in the number of employees operating and supporting the operation of the plant.

As part of this change a new centralised control system building was established which brought the operators from each Zone into the one control room. Prior to that, up to five separate control rooms had operated with little contact between the operators of each Zone and, despite a certain degree of dependence by Zones on the output of other Zones, there was no integration of the plant’s overall operation. The associated change in new technology included the progressive introduction of a digital control system for each Zone to replace the former pneumatic control boards. More recently, a computer controlling system was introduced, which controlled the operating parameters of each individual Unit, such as temperature, pressure and flow levels. This replaced the requirement for the plant operators to actively monitor the operation of each Unit and use the digital control system to make manual day-to-day adjustments to maintain the correct temperatures, pressure and flows to ensure the output was to specification.

The need for the plant operator to monitor and manually control the Units through the digital control system was reduced even further by a very recent technological introduction. This was an additional computer controlled system ‘layer’, which monitored the overall performance of the whole plant. This system optimised the operation of each Unit through monitoring the product input and output of each Unit and specifying new operating parameters to optimise the overall product output. However, some operators indicated that if a significant problem occurred in the operation of the plant, and the operating parameters of the Units moved outside a certain range, then the two over-riding computer systems could no
longer control the plant and they would shut down. This then required the operator to manually manage the emergency situation using the digital control system.

The more recent change in company ownership had also brought about considerable cultural change for many of the current employees. The new partner in the merger brought with it a range of management systems, tools and performance specifications and standards for the operation of the plant, which were considered to be far more rigorous than those used by the previous owner. In addition, the new management systems required extensive documentation and recording to provide an audit trail of all activities within the plant, which was sometimes monitored by staff at the international headquarters of the company.

At the time of commencing the interviews in early 2002, the plant had approximately 150 operators. Redundancies had occurred over at least the last ten years, when the restructuring commenced to reduce the operator workforce. In 1999 the plant had approximately 200 operators. It was reported that a further 15 redundancies would be sought in the near future. No new appointments had been made in the past ten years and the current operators, who were all male, had been employed for between 10 and 35 years, but many were considered to be close to retirement.

Over the years of operation, the company had adopted a view that it could employ people from a variety of skill and knowledge backgrounds and produce people capable of operating the Units in the plant through the initial training program. Consequently, the operators came from a variety of previous work experiences including tradesmen, teachers and clerical workers. Despite the planned redundancies, early in 2004 the training coordinators were expecting some new employees in 2005.

Soon after the most recent company merger a major explosion occurred in the Longford Gas Plant, Victoria, in September 1998, which heightened government awareness of the safety requirements of manufacturing plants of this nature (See Appendix G). As a result, the Victorian State Government issued the Occupational Health and Safety (Major Hazard Facilities) Regulations, 2000 that identified manufacturing plants of this nature as major hazard facilities and provided regulations for their operation, which directly impacted on both the company and the plant operators.

The Zones’ Training Department, and other departments within the company, delivered some training to the operators that was not part of the CBTA system. This was seen as corporate training, which arose through the company’s corporate requirements. In the mid to late 1990’s, prior to the current training coordinators’ involvement with the training department, the training budget had been cut to a minimum as a budget cost cutting strategy. This level of funding continued for the subsequent years.
Prior to the most recent merger, it was considered that the culture of the operator workforce was such that, as a group, they would not have accepted any requirement to assess their competency in work-related skills and knowledge. The company was considered to be a “unionised working environment”, which influenced many of the decisions at the time.

**Role of the Plant Operator**

In very broad terms, the plant operator was responsible for keeping the manufacturing plant operating effectively and efficiently. The functions required to perform the role had changed with the introduction of the ‘triple layered’ computer control systems. Previously, the operators monitored and controlled the plant’s performance using the digital control system to ensure it operated within normal and acceptable parameters, efficiently and effectively used the raw materials and resources, and achieved a product outcome within specifications. The control function involved making changes to the plant’s operating equipment, either through automatically controlling the operation or physically attending to and changing plant controls, such as opening and closing valves and shutting down and starting up equipment to change the conditions and the product outcome. Following the elimination of the supervisory positions, the operators were responsible for managing and organising the maintenance and repairs of plant equipment to ensure the plant’s effective operation. The introduction of the extended ‘triple layered’ computer control system reduced the requirement for controlling the plant’s operation under normal operating conditions, and the operator was then mainly responsible for overseeing the operation of particular Units within the plant. The third layer of the computer control system achieved the effective and efficient use of resources and optimised the product output, which was now outside the control of the operator. However, the operator was directly responsible for the control of emergency situations, generally when services such as power and steam failed, and the upper two layers of the computer control system could no longer control the situation and shut down. One operator commented that many of the operators now simply considered themselves as manpower to fight the emergency fires. In one Zone, operators were involved in managing the delivery of the raw product to the plant and managing the finished product through sampling, blending, storage and delivery, rather than overseeing the manufacture of the product. While the operators generally operate in the one Zone, they could be shifted, through personal application or by management decision, to any Zone or to any Unit within a Zone.

**Previous Training Experience**

Most of the operators had undertaken an initial training program, but in all cases this was more than 10 years ago. The initial training involved a six week classroom-based program on basic knowledge related to the operation of the plant. This involved some basic chemistry and the mechanical skills and procedural knowledge for operating the plant. The classroom-based training was followed by four to five weeks in the plant shadowing a senior operator in
a one-to-one training arrangement on a particular Unit. This shadowing of a senior operator was known as the ‘buddy’ system. No formal assessment was required on completion of the program and the operators were allowed to operate independently when they considered that they were capable of doing so. Following the restructuring and redundancies that had occurred, the company no longer had the capacity to provide ‘buddy’ system training, which required operators doubling up on Units. The resultant training approach for existing operators, who needed to learn to operate a different Unit, was to spend time with another operator learning to operate the new Unit, while still operating the current Unit. Following the initial training, the extent of further training depended on the Zone in which the operators worked. Some operators had little training following their initial training; others had considerable training mainly related to specialist requirements for the operation of their Unit.

During the period of the Federal Government Training Guarantee Levy, which operated from July 1990 to June 1994, the company developed an induction and development program for new operators, for which it sought and gained accreditation status from the state vocational education and training system. The company became a private provider under this vocational education and training system and delivered the training program to some of the newly employed operators. The training program included a number of modules from accredited TAFE programs and was delivered by some of the current operators who had gained formal Train-the-Trainer qualifications. At a later stage the company became a Registered Training Organisation (RTO), but did not deliver any programs.

Training was also provided when the new computer control systems were first introduced, although the extent of this appeared to be limited. In addition, the company allowed the operators unrestricted use of the Internet about 3 years prior to the introduction of the CBTA system, which provided an opportunity for some operators to become familiar with the use of computers and to search for information.

Some irregular and infrequent training also occurred for emergency situations. The frequency of this training increased from 1998, after the Longford Gas Plant explosion, until the period when the CBTA system was introduced, but it was still irregular.

Over this period of time there was a series of different arrangements for the Training Department. At one stage it was considered by the operators to be a training empire. It had a large budget and it initiated grand and expensive schemes, such as the production of a series of video laser discs, but the size of the training department at any one time was dependent on the company’s economic situation. The resultant training programs were intermittent and lapsed or changed in nature depending on the size and management of the training department. During this period there appeared to be no clear plan about what training the operators should receive other than the initial training.
Most of the training in the later stages, prior to the CBTA system, was provided for two specific purposes. The first was specific training delivered as a reaction to rectify identified major problems in operations. The second was for certification that certain specified groups were required to have, and maintain, in accordance with relevant occupational health and safety regulations or legislation. Previously, any certified training had been provided through the ‘buddy’ system with no formal assessment, but in the two years prior to the introduction of the CBTA system, this had become more structured with formal knowledge-based training and assessment and a field-based assessment.

**Description of the Case**

**The Planning Decision Stage**

*Identified needs and problems*

*What factors prompted the decision to implement a CBTA system?*

The need to develop a new training system for the operators was influenced by the following three internal factors:

- the training coordinators taking action to reassess their role, after becoming disillusioned with their current role;
- a request for some higher level specialist training from senior operators in the role known as Boardmen, and;
- a senior production manager, who wanted the operators to be competent in the operation of their Units and encouraged the training coordinators to pursue a competency-based approach.

In late 1998, the Training Department was re-established and comprised one training coordinator assigned to each Zone, each of whom had been a former operator. The management’s general instruction to the training coordinators at that time was to increase the skills of the operators. This resulted in a short-term training schedule for the operators, which was based on reactions to management concerns about product faults or equipment damage. The training coordinators were requested to develop and provide training to reduce or eliminate the number of incidents of this nature. The training coordinators became disillusioned with this role, and at a planning activity early in 1999 decided that they needed to be more proactive in their approach to training the operators. However, having made this decision, they did not know what form this proactive approach should take.

At about the same time the training coordinators received requests from the ‘Boardmen’ for higher level specialist training. The ‘Boardmen’ were senior operators who in some shifts were exclusively in control of the operation of a plant Unit through the digital control system
console, which was still known as the ‘Board’. The Boardmen had moved up through the ranks of the operators based on their seniority and experience, but had received no special training for their role, other than the basic training provided to all operators. Their desire for specialist training was expressed as a response to the change to a more sophisticated ‘triple layered’ digital control system, but was possibly also a desire, based on earlier times, to re-establish their higher status within the ranks of the operators. The Boardmen wanted to do higher level training, but had not clearly identified the training they wanted. The training coordinators analysed the request from the Boardmen, determined that they wanted specialist knowledge in control systems associated with the new digital control system, and attempted to find suitable existing programs.

The training coordinators’ general initiative to provide a proactive training regime was supported by one key senior production manager, who is no longer with the company, but was well recognised in the global company. He had previously expressed the desire to use competency-based training to enable all the operators to become competent in the operations of their particular Unit. At this stage the training coordinators did not know what it was that they wanted to do, but despite this, the senior manager encouraged them to pursue their idea. The senior manager had previously worked in the company’s USA plants, and he proposed that a study team visit the company’s plants in the USA to determine whether appropriate training systems existed and to assess their suitability for implementation in the Australian plant.

In addition, an external factor also began to influence the company’s thinking. While no special regulations had been issued at the time, it was well known that the 1998 explosion at the Longford Gas Plant was being attributed to a lack of appropriate training for the operators.

Initially, the purpose for seeking a new system was to satisfy the desire of the training coordinators to be more proactive, to increase the knowledge of the operators and to provide higher level training for the Boardmen. Planning to satisfy this initial need commenced with a benchmarking process on what was available in other company plants in Australia and the USA. As a result, a team of three people visited company plants in the USA in September 1999. Among other things they saw the operation of the company’s on-site University for all levels of training. The team was impressed with the concept of a company University, the range of courses available and the content and extent of the learning material, but they did not like the delivery method. One of the training coordinators was a member of the study tour team, as he had shown initiative and leadership in the training coordinators’ drive to develop something different. He became the key training coordinator in the future decision-making and development of the new system.
The visit to the USA and the local visits to other company sites, encouraged the key training coordinator to broaden his initial concept for a training regime to one which delivered the learning material through the company’s intranet.

In developing the concept further, the training coordinators considered the past training and learning experience of the Boardmen, and believed they had two problems in relation to providing higher level specialist training. One, they didn’t know the current knowledge and skill level of the Boardmen, and two, few had undertaken a formal industry training program and most had not undertaken any formal learning since they left school more than 20 years ago. Further, the position of Boardman was no longer universal in the structure as some shifts had embraced restructuring and established team-based approaches which eliminated a designated Boardman position by sharing the position of operating at the ‘Board’ or console amongst the team. However, the training coordinators did find through the study tour that there was a high level training program in the USA for these specialist operators. The training coordinators had to then consider whether the Boardmen were capable of undertaking such a program and whether there was value in investing in it. In developing their broader system plan, a further consideration was that all the operators had been employed for a minimum of 10 years, with some up to 35 years, and all had done some initial training, but most had not done any formal training or schooling since leaving school. None had been formally assessed over their period of employment and consequently the company had neither a record of their performance nor any formal mechanism by which it could establish the skill level of the operators.

Late in 1999, the initial purpose shifted to incorporate a management requirement to determine and document the level of competency of each of its plant operators, consistent with the policy requirements of the dominant partner to the recent merger. This company policy was developed as a direct result of the Longford Gas Plant explosion, and it required documentary evidence of all the training programs provided to the operators, the names of those who attended or participated in the training, and an assessment of the competence of each operator. In addition, the policy specified that no operator could be responsible for the operation of a Unit in the plant unless shown to be competent to do so. Now the new system to be implemented not only had to deliver the required training, but more importantly for the management, it was to incorporate a process for assessing and recording the competence levels of the operators.

Prior to this time, Company B had no systematic training approach, had not assessed the outcome of any training and could not identify the level of competence of any of its plant operators. Much of the previous training, as indicated above, had been implemented using the ‘buddy’ system. Many in the company believed this had provided an inconsistent approach to the development of the skills and knowledge required. Also, the level of competence of each operator was unknown and was largely based on the information passed
on by the particular ‘buddy’ with whom they had worked and the skills they had then managed to develop through on-the-job incidental learning. This inconsistency of operation was further exacerbated by the reluctance of the operators to read and follow procedures and their reliance on the methods learnt on the job and used for many years, which often varied from one operator to another. Further, where uncertainty existed, an operator would ask a colleague rather than read the procedure.

All these factors influenced the company’s need to identify and provide a systematic training and assessment system for its operators. At this early stage, no consideration had been given to the introduction of a CBTA system as a solution for these needs. However, a number of years prior to the current intervention, there had been discussion in company committees about doing competency-based training and ensuring that all the operators were competent. And, as indicated above, the senior manager who encouraged the training coordinators to pursue their idea had also expressed this view.

When the concept of competency-based training was initially raised the company had 200 operators and no systems were in place to effectively manage such training and the concept lapsed. However, there was now a more pressing need for the company to determine and show that its workforce was competent to operate the plant, as a result of the recommendations from the 1999 Royal Commission on the Longford Gas Plant explosion. As the previous training arrangements had not allowed the company to determine the competence of its workforce, it was determined that a new and different arrangement was required. The later introduction of the major hazard facilities regulations in June 2000 confirmed the need for the company to select a CBTA solution.

The company decided, given the various factors which were impacting on it, that it should bring all the operators up to the level of a tradesperson and then provide the higher level training for the Boardmen.

An initial planning process had commenced soon after the return of the study tour group using a person from the USA parent company to facilitate a ‘brain-storming’ or DACUM session, to determine what it was the operators needed to know. A key group of company people, including some plant operators, participated in this session. This curriculum-based work was documented, but was never fully completed.

In an attempt to further develop the concept and to attract an organisation that could support the preferred intranet delivery method, the training coordinators approached a number of TAFE Institutes and discussed the programs available to meet the needs identified through the DACUM session. Through this discussion they discovered that a Chemical, Hydrocarbons and Oil Refining Industry Training Package, Code PMA98, existed for the process manufacturing industry operators and it provided competencies for the industry. Later discussions revealed that an Australian Qualifications Framework (AQF) also existed.
and as part of this, the Training Package PMA98 provided for competency-based qualifications, leading to the awarding of recognised Certificates. As a result, the training coordinators sought interest in a joint arrangement from three TAFE Institutes; selected because various company staff had some previous program delivery experience with them. Following interviews, representatives of the successful TAFE Institute commenced as educational consultants in January 2000.

As indicated above, the company had been an RTO, but had decided its business was not to be a training organisation and had let this registration lapse. The decision to jointly work with a specialist RTO to develop the new system, such as a TAFE Institute, was based on this philosophy. It is probable the training coordinators also recognised they did not have the skill, knowledge and experience to implement the new system. While one had been a primary school teacher prior to becoming an operator, none had any significant experience in designing and developing a training system, especially one associated with a Training Package.

Given the company’s requirement for a systematic training and assessment system to demonstrate the operators’ level of competence, and based on the advice of the educational consultants, the training coordinators decided the company would implement a CBTA system. The CBTA system was to be based on the process manufacturing industry training package PMA98, with its workplace competency-based approach, rather than attempting to develop the work from the earlier DACUM session.

Initially the training coordinators decided the CBTA system would start at the Certificate III level and not include Certificates I and II. However, when considering the previous formal learning experiences of all the operators and on the advice of the educational consultants from the TAFE Institute, it was proposed that the CBTA system should commence with Certificate I and proceed through to Certificate III. It was planned that the higher level training requested by the Boardmen would then form the basis of a Certificate IV. The decision to commence at a Certificate I level, and also offer Certificate II, was reinforced by the availability of government funding, which would fund the CBTA system development and some of the TAFE Institute’s delivery.

The training coordinators’ concept at this stage was based on their initial thinking that the CBTA system should be associated with each of the plant’s operating Units, and the operators should be shown to be competent to operate these Units. They considered this was the company’s business requirement. To confirm the decision to use the industry training package, the training coordinators sought advice from the TAFE Institute consultants on whether the training package was sufficiently flexible to enable the company’s business needs to be met through the Certificates. They were advised that this was the case, and as a
result work commenced in January 2000 on planning and structuring the CBTA system based on the industry training package and the AQF levels Certificate I, II and III.

The visit to the USA identified a number of different approaches to the provision of training for the operators. Based on the study tour groups’ observations, and on the advice gained from the USA plant visits, it was determined that the knowledge and skills gained by the operators would not be linked to salary scales and participation in the CBTA system should be voluntary.

The company conducted a formal Launch to market the CBTA system, following which the operators were asked to volunteer to participate in the system. The management and the Union participated in the Launch, by each giving a presentation in which they gave their support for the CBTA system and encouraged the operators to participate. Operators who wished to participate were asked to enrol in the CBTA system immediately after the Launch. The recruitment process was managed jointly by the TAFE Institute and the training coordinators. The CBTA system was promoted as an industry-based program that was nationally recognised and its completion would therefore enhance transferability of employment within the industry. The advantages of participating were highlighted, especially that it would develop skills and knowledge required for future employment in the industry.

The operators were told involvement in the CBTA system was not compulsory, but some operators indicated they felt compelled to be involved. The operators were strongly encouraged to be involved on the basis that the qualifications gained would be needed in the industry in the future and successful completion would provide a nationally recognised qualification. Operators who had not volunteered at the Launch were strongly encouraged to participate by the ZPMs, the ZTLs, the training coordinators and the educational consultants. The operators were advised that government funding was available to the company for participants who were not tradespeople. As expressed in the interviews, the operators’ reasons for agreeing to participate varied. This included believing they could learn something from the CBTA system; supporting the recruiting efforts of their ZTLs; securing the government funds for the company; maintaining social contact with colleagues who had volunteered, and maintaining job security in a period of redundancies. None of the operators reported direct peer pressure and some explicitly indicated this was not a factor in them deciding to participate.

A little over 85% of the operators signed up. Generally, it was considered the older workers who were close to retirement did not want to be involved, although it was also reported that some operators with language difficulties decided not to be involved. The percentage of operators involved has increased since the beginning of the CBTA system due to retirement and redundancies.
Company expectations for the outcome of the CBTA system

What were the expected outcomes from the introduction of the CBTA system?

There were mixed views on the expected outcomes from the introduction of the CBTA system. Some of these views had been formed after the CBTA system had been introduced and when people within the company had realised its potential. Some had been shaped by the external influences that impacted on the company after the CBTA system had commenced.

The key training coordinator initiated the CBTA system to increase the knowledge of the operators and expected this would occur. Underlying this was the expectation that all operators would reach the level of a tradesperson and this would provide the basic level of knowledge and skill for the Boardmen to progress to higher levels.

No documentation was prepared or presented to the operators to indicate what the CBTA system was about, the content or intent of the CBTA system or how it was to be implemented. In addition, no documentation was provided to the operators to outline any features of the CBTA system, such as the RCC process, any appeal arrangements, assessment processes, availability of alternative processes for those who were disadvantaged etc. Probably as a result of this, the operators interviewed generally had a negative view about the company’s purpose for introducing the training and assessment. Generally the view was the company had not provided adequate training in the past and was simply covering itself against any claims, which might arise through accidents, and was creating a situation where it could place the blame for incidents on the operators. One ZTL had a more positive view about the purpose of introducing the CBTA system, which was to increase the skills and knowledge of the operators to enable them to meet the future job requirements of a more technologically driven industry.

Some managers not directly involved in the development of the new CBTA system, but who had a strong interest in its success, expressed various views on the purpose of the system. A ZPM indicated the purpose of the CBTA system was to “up-skill the workforce” and to provide “sustainability”, whereby new operators could be employed and trained more quickly and to a higher level than in the past. In addition, he believed the CBTA system was about retaining and capturing corporate knowledge on the intranet system, as the more experienced operators retired or took redundancy packages. Finally, he also believed it was about providing consistent content and standard of training through the structured system. As a result, he expected consistency in the operators’ performance. That is, he required all operators to implement the correct procedures and for those on the same Unit to be thinking and performing the tasks in a common manner from shift to shift. Another ZPM also held this latter expectation. The ZPM considered operational safety was an important outcome, but productivity was not considered as an outcome and if it occurred, it would be a bonus. An HR
manager, appointed after the commencement of the planning and structuring decision-making stage, reinforced the company’s thinking that the purpose of the CBTA system was “to be able to demonstrate that our operations group were competent to carry out the tasks that we requested them to do.” An underlying belief was that the benefit from this would be improved safety and increased quality and productivity, but these were not the primary outcomes expected from the CBTA system. Further, in comparing the ‘buddy’ system training with the new CBTA system, he intimated that the purpose for its introduction was also to provide a consistent approach to training, which was more professional and systematic than that which had applied in the past.

The views of these managers were consistent with those of the training coordinators who initiated the CBTA system, however some new concepts such as the ‘sustainability’ of the operator workforce and the capturing of existing knowledge and experience had emerged. These concepts were based on underlying needs that existed at the time of the initiation of the new CBTA system, but they were not expressed at that time and they were not the needs which directly influenced the initiation or the planning and structuring of the CBTA system. However, they were concepts formed at a later stage based on the perceived potential value of the structure surrounding the CBTA system.

The key educational consultant considered the company had two expected outcomes. The first was to increase the operators underlying knowledge of the operation of the overall plant and, the second, to provide more specific knowledge about the particular Units on which they operated to allow them to operate safely and to be more efficient and productive.

Some company expectations emerged during the implementation of the earlier stages of the CBTA system, which had implications for the implementation of the system. The first of these came through a policy that specified an operator could be transferred to another production Unit, but was required to become competent on the new Unit before being given the responsibility of operating the new Unit. The second, and later expectation, was the senior management requirement for achieving flawless performance and operating to correct procedures.

**The planned CBTA system**

**What CBTA system was planned?**

**The competency ‘definition’, scope and complexity**

As indicated above, the training coordinators initially decided they would start at the Certificate III level and not undertake Certificates I and II. The training coordinators’ initial concept was that the CBTA system should relate to the production Units in the plant and the requirement for the operators to become competent to operate the Units. They considered
the basic business requirement was for the operators to gain the knowledge required to operate their Units competently. Their view was focused on practical training, and the knowledge directly related to the plant’s hardware and the practical ‘hands-on’ aspects of the operator’s role and not the broader competencies identified in the training package, which they considered were “a bit fluffy” or used as “fillers”.

The adoption of the training package competencies, and the opportunity to obtain government funding for the first two certificate levels, influenced the training coordinators’ thinking and broadened the planned CBTA system to include the Certificate I and II. At this stage the training coordinators had not been thinking of ‘sustainability’ and the possibility of new entrants to a company which was planning further redundancies. However, their thinking was influenced by other emerging views on the capacity of the CBTA system to satisfy some previously existing needs that had more recently been highlighted, but had not been included in their initial thinking. That is, the capacity of the CBTA system to provide a more consistent training content compared with the ‘buddy’ system and a more consistent approach to the operation of a Unit. Consistent with satisfying these needs, the training coordinators decided the CBTA system would set a minimum requirement. All operators would be required to achieve this minimum requirement to enable a consistent approach to the operation of the plant.

The educational consultants had recommended that the company should adopt the national industry training package competencies and qualifications within the AQF. This was partly recommended to ensure the company had full coverage of the operator role, as expressed in the training package, and the outcome could be recognised by any external organisation as an appropriate standard for the industry. As a result, the coverage and scope of competencies for the operator role was extended beyond the company business requirements, which had been developed during the earlier DACUM session. The concept was to include a combination of the appropriate competencies from the national industry training package to award certificates, which would also reflect the company’s business requirements.

The process to recognise current competencies

The training coordinators and the educational consultants had agreed that the CBTA system would commence at the Certificate I level. A major reason for this decision was to gain the funding for providing the training. It was expected that all the operators could readily show they were competent at the basic level of Certificate I, but it was necessary to formally assess and record the outcome as evidence for the funding authorities that the training had been provided at this level. At this stage the training coordinators perceived the provision of the Certificate I was of little value. To ensure it did not impact too much on the overall
implementation and to achieve this in the most cost-effective manner, it was determined that a RCC process would be used.

There was also a secondary consideration which influenced the decision to offer the Certificate I and to assess it using a RCC process. This was the operators’ previous involvement with structured and assessed training. The training coordinators considered that if the Certificate I was offered and assessed it would enable the operators to ease into the CBTA system and to experience success in the early stages. Further, it was considered that this was a practical way in which the company could show the operators it acknowledged their skills and knowledge developed over the years.

Yet, despite this demonstration of recognising the operators’ skills and knowledge, no RCC process was planned for later levels of the Certificate program. The training coordinators had decided all participants should be exposed to the learning materials for these levels and then formally assessed. The key training coordinator required "a fair dinkum process" for the Certificate II, which perhaps reflected his view of the rigour of a RCC process, but also reflected the influence of the external major hazard facilities regulations on the decision. As a result, it was determined that all operators should complete Certificates II and III by completing the learning program and then completing the associated assessment.

**The assessment processes and instruments**

In the planning decision-making stage it was decided the TAFE Institute educational consultants would develop the assessment instruments, as the TAFE Institute was responsible for awarding the qualification. However, as the TAFE Institute had no industry experts, the assessment process was to be a joint approach. The educational consultants would assess the knowledge components and the company would assess the job performance. It was decided to use the ZTLs as the assessors to give the CBTA system credibility, internally and externally. The ZTLs were senior operators who worked on the shift and were responsible for the performance of the operator team. In this respect they had the opportunity to assess the performance of each operator over a period of time. Further, the ZTLs were seen as experts on particular Units within their Zones, although some recent appointments across Zones meant that in some cases a Team Leader was new to that Zone and was not necessarily considered an expert.

Having decided the ZTLs would be the initial assessors it was also decided that consideration would be given in the implementing decision-making stage to the possibility of broadening the assessor group following the initial delivery to all operators.
The learning approaches

The training coordinators had indicated a preference for the learning materials to be available through the company intranet. This was based on the key training coordinator's observations during the USA study tour and their previous problems with storage and updating of the printed materials for other training programs. They were concerned they would be unable to effectively manage the large quantity of learning materials for the Certificates if the materials were in a printed format. In addition, problems had been experienced with attendance at classroom-based training other than for those on day shifts. As a result, they decided all operators, particularly when they were on night and weekend shifts, should have ready access to the training material. This was planned to allow learning during all shifts, but also to allow the operators to review the material on demand so they could refresh and maintain their knowledge and skills.

The key training coordinator stated that the time constraints on the opportunities for the operators to train had pushed them to use the intranet for the learning materials. He expressed some reservations about the use of a computer-based approach with the operators, who were generally inexperienced learners and whom he perceived were unlikely to accept this method of learning. But he believed the company had no option because of the limited opportunities available for training.

Learning materials were available from previous training programs in a variety of media. These were predominantly print-based, but included some video laser discs and films. Additional material in a variety of media was also readily available from the company's university in the USA. All the relevant learning material could be readily converted to a digital format, which also influenced the decision to use the intranet. They had decided that using a digital format would enable them to readily integrate existing materials, save on the resource development time and costs and provide more effective management of the learning materials.

The decision on the learning approach to be adopted was based purely on the administrative and management advantages of this approach. Little consideration was given to the most effective learning approach for the operators and whether the operators would learn effectively using this approach.

The operators were increasingly required to use computers for administrative functions as well as for monitoring the plant's operation and they were becoming more familiar with the use of computers. A number of computers were available in the control room for administrative purposes, which could be made available for training. These computers would provide readily accessible learning materials, including during weekend and night shifts as planned. Weekend and night shift access was particularly advantageous, as these were quiet
times when the operators often engaged in passive activities to pass the time. Training would not normally be provided at this time and any use of the time for training would be a bonus for the company.

Therefore it was planned that the learning material would be available through the company’s intranet, because it would be readily accessible and it could be managed, developed and delivered more cost-effectively. It was planned that the learning materials would only be developed for the Certificate II and III level, based on the decision to offer a RCC process for the Certificate I.

The Structuring Decision Stage

The structured CBTA system

What CBTA system was structured?

Why did the enterprise want a CBTA system of this type?

The key training coordinator took the initiative and the leadership role in developing the CBTA system with the educational consultants. No formal planning documentation was developed to guide the overall structure of the CBTA system. The key training coordinator had developed ideas from the USA visit and from the decisions made in the planning stage. Based on these ideas and decisions, a CBTA system was structured at the same time as it was implemented. The key educational consultant described the overall process as “a natural evolution with respect to changing conditions, embracing the Australian Qualifications Framework, embracing the hazards regulations.”

Based on the planning decision to use the intranet, it was decided to use a commercially available software package for the development and delivery of the CBTA system and to rely on its development for improvements, rather than attempt to develop customised software for the company. The company already had the infrastructure for e-mail, so delivery of the CBTA system using the existing computers would not require much change.

Based on the funding arrangements and the urgency of having something in place to meet regulatory requirements, the plan was to develop and deliver one Certificate level per year. This planned development time, which was partly self imposed through funding submissions and training agreements, was ambitious and appeared to be a plan to rush through the development and delivery at all cost, particularly a cost to the initial quality of the CBTA system. The CBTA system was structured and implemented in stages based on the delivery of one Certificate level each year. The Certificate I was assessed in 2001 through a RCC process, the Certificate II was then structured in 2001 and fully implemented in 2002, followed by the Certificate III structuring in 2002 and the implementation completed in 2003. As a
result, recycling decision-making occurred during and after the structuring and implementation decision-making stages for each certificate level and changes occurred in the planning and then the structuring and implementation of the later levels.

In hindsight, the HR manager felt that a lot more planning could have been done at the “front end”. This view was formed on the basis that the company began to realise the additional outcomes and benefits that could be gained through the CBTA system during the implementation phase, which caused changes in direction.

The competency ‘definition’, scope and complexity

In the planning decision-making stage the company and the external consultants had agreed that the CBTA system would be based on the industry training package competencies. The plan to provide recognised qualifications required the Certificates to be structured using the training package competencies. The key training coordinator expressed concern in the structuring decision-making stage about the rigid structure and requirements for each certificate in terms of the number of core units and the total number of units required. He considered bureaucrats who didn't know what was happening in the workplace had developed the format. However, no decision was made to deviate from the original decision at this stage, and structuring of the certificates was based on the training package scope and competency requirements.

The Certificate I was structured in 2000 using the competencies from the training package. The capacity to select specific competency units was limited because the Certificate I comprised seven compulsory core competency units and one elective competency unit.

The Certificate II was structured in 2001 by selecting competencies related to the business requirements from what was available in the training package. The ZTLs, the training coordinators and the educational consultants jointly selected the competencies from what was available in the training package, based on the critical functions in the operator’s role. The “fillers”, that were considered of little use, were avoided. Eight company modules were established using the competency units selected from the training package. These included critical activities such as issuing work permits, operating in confined spaces, pipeline gas testing, preparing equipment for emergency responses and using computers.

The Certificate III was structured in 2002 commencing with a two-day workshop. The participants comprised the training coordinators, the educational consultants, ZTLs and some experienced operators. The workshop attempted to develop aims and objectives for the Certificate III, but did not clearly specify the competencies. The training package was used as a guide and an unsuccessful attempt was made to develop the competencies associated with the requirements for operating each plant production Unit.
The structuring of the Certificate III was a significant shift from the previous focus of selecting the competencies available from the training package, to focusing on the requirements for operating the Units. This shift appeared to occur, partly as a result of the changed thinking of the training coordinators, based on the initial company requirements, and partly due to their increasing confidence and experience and the difficulties experienced in structuring the Certificate III with the training package as the focus, rather than the job requirements. The training coordinators’ focus shifted from selecting training package competencies to satisfy qualification requirements, to considering the tasks required for operating the plant Units. This was a critical shift in thinking for the company in terms of customising the CBTA system to suit the actual job performance and the company’s business requirements, rather than satisfying the requirements for qualifications. That is, the focus shifted from the educational requirements, driven and shaped by the TAFE Institute, to the company’s needs, shaped by the increasing influence of the company on what was required.

The company had identified, in an informal manner, the tasks to operate the Units, but had not identified the competencies required to operate the Units. The company then proposed modules to cover the perceived knowledge and skills required for the tasks to operate the Units. To maintain the integrity of the qualification to be issued, the educational consultants then undertook a best-fit mapping process of the training package competencies for a Certificate III against the modules and the tasks to be performed on each Unit. However, the competencies specified in the training package did not fully cover or describe the modules specified. For example, a module on economics was developed to assist the operators to understand the economic issues facing management and the management decisions made in relation to financial and remuneration matters and the processing of product. None of the training package competencies mapped to this module.

The mapping process identified one competency unit associated with initiating continuous improvement, which was required as a core unit for the Certificate III, but was not included in the modules or tasks and appeared inappropriate to the training coordinators. However, in acknowledging the need to maintain the integrity of the qualification, the competency unit and its meaning were analysed further. As a result, the training coordinators’ focus was broadened and an additional competency was added to those identified as being required for the tasks to operate a production Unit and appropriate content was incorporated in the modules.

Despite the matching process to identify the competency units for the Certificate III, no documentation appeared to have been provided to the operators to clearly identify the competency units, the elements or the performance criteria required. The key training coordinator believed the operators did not need to know the competencies or the performance criteria. He saw the operators as practical hands-on people, who would react negatively to
things they would perceive as unnecessary, and believed they were not interested in the associated "paper work" of an activity.

The ZPMs were not involved in the structuring of the competencies, but expressed their expectations that the scope of the competencies should be such that a person who could demonstrate they were competent, would be able to operate a Unit according to procedures. They had different views on whether problem solving and trouble shooting competencies should be included. Neither manager interviewed was aware of whether the things they required were included in the competencies. The key educational consultant indicated he was structuring the CBTA system so it provided the underlying knowledge required for the job and to enable problem solving, however, emphasis was not being placed on the learning of procedures.

**The process to recognise current competencies**

In the planning decision-making stage it had been decided no RCC process would be available for the Certificate II or Certificate III. However, it was decided that a RCC process would be structured for the Certificate I.

In the structuring decision-making stage the educational consultants decided the RCC process for the Certificate I should be undertaken using a questionnaire. The operators would not be required to demonstrate any of the skills through physically performing the job functions.

There was no consideration of an appeals process and no documentation was developed to outline the policy on the RCC process. As indicated previously, the decision to implement a RCC process was partly to show the company recognised the operators were competent, but also so this could be formally recorded, the company needed to formally demonstrate that the operators were competent. The company’s philosophy of acknowledging the existing knowledge and skills of its operators did not carry over into the higher levels of the Certificate, despite the operators’ years of experience. In hindsight, one training coordinator considered a RCC process should have been planned for the Certificate II. However, the reason for this was not that the operators’ skills and knowledge should have been acknowledged and recognised by the company. The reason was more pragmatic, and based upon the notion that the developmental time required for this level would have been reduced, therefore allowing more time to develop the computer-based Certificate III.

The underlying reasons for not offering a RCC process at the Certificate II level appeared to be the training coordinators’ uncertainty about the operators’ level of competence and whether a recognition process would have been sufficiently rigorous to satisfy an external inquiry or audit.
The assessment processes and instruments

In the structuring decision-making stage the training coordinators and the educational consultants discussed the form of the assessment process and considered a number of modes for collecting evidence of operator competence. This included whether assessing only the job performance was appropriate or whether a number of methods would be used in combination, such as multiple choice questions, written questions, talking through the process by walking around the plant, and demonstrating the competency. They decided the underlying knowledge would be assessed by written tests, which would be combined with either a physical performance of the job or an oral description of the procedure to demonstrate competence.

In the structuring decision-making stage it was decided the assessment instruments for the Certificate II would be paper-based. The training coordinators decided five of the modules in the Certificate II related to critical competencies in the operator’s role. It was decided annual or biennial assessment would be required for these critical competencies to ensure the operators maintained the skills and that this could be demonstrated and recorded. The assessment instruments comprised a knowledge-based assessment using ‘filling in the gap’, multiple choice and essay type questions for all eight modules and a “Field Assessment” for the five modules considered to be critical.

The decision to reassess the critical competencies was a company decision and not one imposed by external regulation. However, the decision was influenced by the issues which emerged as a result of the Longford Gas Plant explosion and the company’s concern to ensure it could demonstrate the competence of its operators in these critical activities. It was also decided that once the operator initially demonstrated competence, the tasks that were not deemed critical would not be assessed again.

In the structuring decision-making stage for the Certificate III it was decided that the assessment would be based on the tasks directly associated with operating specific plant production Units. The assessment was to comprise an electronic knowledge-based assessment using multiple choice questions, some ‘open ended’ and ‘fill the gap’ questions on procedures and a Field Assessment for the particular Unit selected for study by the operator. It was decided in the structuring decision-making stage, that the competency units the operator required to be awarded the Certificate III would all be contained within the common modules studied by all operators, plus the one specific module that each operator completed on the selected production Unit. This could be the production Unit on which he worked or another one on which he chose to study and be assessed. Consequently, an operator assessed as competent on the competencies from the common modules and one production Unit, would be awarded the Certificate III.
It was decided there would be no formal assessment of individuals or groups for activities such as fire training, which was conducted by another department and considered to be outside the scope of the CBTA system.

Knowledge of the major operating procedures for each Unit was planned to be included as part of the knowledge-based assessment for the Certificate III. These were the operating procedures to respond to the major causes of Unit failure in the plant, for example cooling water failure, power failure or steam supply failure. However, it was decided they would only assess whether the operator knew where the correct procedure could be found and could read from the procedure. To do this, the operator would be asked to respond to a number of open-ended questions, which required a response that was a phrase from the relevant procedure. It was expected that in using this ‘open book’ approach, the operator would locate the correct procedure and at least read that part of the procedure from which the answer was to be taken.

A decision was made to mainly use multiple choice questions for the Certificate III because the responses could be machine corrected. The experience with questions in the Certificate II had highlighted that insufficient resources were available to cope with the correction of open ended and essay type questions. However, the assessment of the current operating procedures for the production Units were generally to be treated using open-ended and ‘fill in the gap’ type questions.

To be judged as competent on the knowledge component for the major operating procedures, it was decided an operator would require a 100% correct response rate to about 15 questions. Other less critical aspects required an 80% correct response rate on a series of between 30 and 40 multiple choice questions for each Unit. A pragmatic decision was made to set less than a 100% correct response rate for all knowledge-based assessments, because they believed the operators would never finish the program. The decision to set an 80% correct response rate for non-critical aspects was based on the leeway they believed was provided in driver licence tests, where they judged competent performance was as critical as competent performance in their industry. They believed this response rate, on a test with 30 to 40 questions which could take about one hour, provided sufficient evidence to judge the person’s competence on the knowledge component of the assessment.

It was decided the Field Assessment for each Unit would cover most of the major functions of the production Unit. As determined in the planning decision-making stage, the ZTLs were to be appropriately trained and would be responsible for assessing each operator’s competence from the job performance at the Field Assessment. This was considered to provide credibility for the assessment outcome and also to provide a practical solution, given the ZTL worked on the shift with the operator and could observe his performance over a period of time. This arrangement also allowed a Field Assessment to be readily organised for the operator.
The key training coordinator believed the two modes of collecting evidence, using a knowledge-based assessment and a field assessment, were necessary and sufficient. He believed the assessment of the underlying knowledge through multiple choice or written questions would be sufficient to satisfy the requirements of the major hazard facilities regulations, which was his concern. But he also considered the company business requirements would require the operator to demonstrate to an expert, in some other manner, that he was competent to operate the Unit to which he had been assigned.

No documentation was developed at the structuring decision-making stage concerning the process to be adopted for assessment. Further, no discussion appeared to have occurred at the structuring stage in relation to sufficiency of evidence or on implementing an assessment process which would satisfy the recognised principles of assessment, validity, reliability, flexibility and fairness. However, one aspect discussed and decided upon was that the written assessment should be presented well, to show the company was serious about the CBTA system and to enhance the likelihood of the participants taking the assessment.

The learning approaches

Although it was decided in the planning decision-making stage that all the learning material would be on the intranet, in the structuring decision-making stage for the Certificate II it was decided that there was insufficient time to fully establish the overall framework for this within their funding deadlines. Therefore it was decided the learning materials for the Certificate II would be print-based booklets for each of the eight modules, supplemented by existing electronic reading materials on the intranet. It was also decided that the framework would be fully developed when work commenced on the Certificate III and then all the learning materials would be presented in a digital format on the intranet.

The educational consultants and the key training coordinator had lengthy discussions on the learning approach to be taken with the operating procedures. The educational consultants considered a learning process was required and the operators should learn the procedures well enough to be able to reproduce the correct performance responses when required. The key training coordinator considered the procedures were “black or white and that it was not about interpreting the procedures.” The key training coordinators did not require the operators to learn, recall and perform the procedural steps in response to the situation. As a result, the learning approach decided upon was aimed at the operator being able to successfully locate the correct procedure and being assessed, as indicated above, on where it was located and being able to read the content. Consequently, the operators were not required to learn the procedures to enable near automatic correct responses, particularly in emergency situations. This decision was inconsistent with a senior management initiative and expectation, expressed at a later stage, which required the achievement of flawless performance and consistency in operator approach.
There were mixed views about the extent to which the operators should know and be able to respond using the correct procedures. Some operators indicated that in an emergency there was no time to find and read the procedures. This was particularly so if there was a power failure, both from the point of view of the speed of the response required and the inability to access the procedure on the computer. In such emergency situations operators reverted to the procedures they had learnt on the job over a period of time. These procedures being the idiosyncratic procedures the managers were trying to eliminate to achieve a consistent approach. A ZTL indicated there was no need to learn these procedures as everyone was experienced and should know how to do it. In contrast, operators complained of the ongoing changes in procedures and their inability to keep up with the latest procedures. This highlighted the difficulty in learning the procedures to provide a near automatic response, but also highlighted the failure to take the opportunity to provide consistent and correct performance by linking the procedural changes to the training and assessment process.

**Refresher training**

As indicated above, a decision was made to reassess the operators for the competencies covered by five critical modules in the Certificate II. For some operators this was likely to require them to undertake refresher training. Although not linked to this decision, the planning decision to adopt an intranet-based system was partly based on providing the operators with ready access to the learning materials to enable them to refresh and maintain their skills and knowledge. Unfortunately, a decision was made in the structuring decision-making stage to provide the Certificate II in a paper-based format. This would make the task of refreshing and maintaining these skills for reassessment more difficult, because the learning material was not as readily accessible to the operators in this format and highlighted the lack of initial planning.

However, the decision made in the structuring decision-making stage to provide intranet-based learning for the Certificate III, did support the implementation of the previously established company policy that required an operator to demonstrate he was competent on a particular Unit before operating that Unit. Under this policy, those who returned to a Unit after a long absence were also expected to undertake refresher training and be assessed as competent to operate the particular Unit. Similarly, consistent with the above company policy, the intranet-based system would enable an operator who was assigned to a new Unit to readily transfer by accessing the learning material and the assessment instruments for that particular production Unit.
The Implementing Decision Stage

The implemented CBTA system

What CBTA system was implemented?

Participation in the CBTA system was voluntary and therefore little support or encouragement was provided in the system for those who had difficulty participating through language problems or other learning impediments. There were no obvious features of the system designed to support people with any learning difficulties, although it was known that some operators had language difficulties.

As indicated previously, the CBTA system was implemented in stages. The Certificate I was assessed in 2001, the Certificate II was fully implemented in 2002, followed by the implementation of the Certificate III which was completed in 2003. Recycling decision-making occurred during and after the implementation of each stage and changes occurred in the planning and then the structuring and implementation of the later levels.

The CBTA system was implemented as structured, so that by doing the common modules and one module on a specific production Unit, an operator would be able to learn and be assessed on all the Certificate III competencies. For this to occur, all the training package competencies required for the qualification were mapped against the common modules and one production Unit. Under these arrangements an operator was not required to be competent on more than one production Unit to be awarded the Certificate III.

However, a major setback in the implementation was the inability of the training department to develop modules for all the production Units. It was intended that the CBTA system would include modules for all the Units to cover the job role of all the operators, but modules were only developed for about half the production Units in the planned time and within the funds available. However, by mapping all the Certificate III competencies to the common modules which were completed, and to one production Unit, the training department was able to meet its obligations under the funding arrangements as all operators were able to complete the three levels of the Certificate. The key training coordinator indicated they had underestimated the size of the task, which was “huge”, and they would need to repeat the effort given to the Certificate III level to complete all the Units. Consideration was being given to how this could be achieved to complete the system.

The competency ‘definition’, scope and complexity

In the initial stage of the structuring decision-making stage, based on the advice of the educational consultants, it was decided the CBTA system would be based on the training package competencies and the delivery of three levels of the Certificate program. Little
thought appeared to have been given in the structuring decision-making stage to how this would be implemented, and how this would relate to the company’s business requirements and the actual operation of the plant. The CBTA system competencies implemented for the Certificate I were based on the training package competencies as structured. Similarly, the competencies for the Certificate II were primarily focused on the relevant and critical competencies identified in the training package grouped together as a set of eight modules. However, by the time the company came to the structuring and implementation of the Certificate III, as indicated above, the company business requirements together with the major hazards facilities regulations had reshaped the key training coordinator’s thinking. The training coordinators moved back to their original concept of basing the system on the operation of the plant production Units. Consequently, this shaped the structure of the modules and the associated learning materials and assessment for the Certificate III. This structure was based on modules for operating particular production Units, with the underlying knowledge, functions and tasks, together with some common knowledge-based modules, such as Economics and Hydrocarbon Chemistry. The company did not clearly identify the competencies for the Certificate III. The educational consultants mapped training package competencies against the module content. These competencies were then used by the educational consultants as a guide for the assessment to maintain the integrity of the qualification that was to be awarded.

The process to recognise current competencies

No documentation was developed in the structuring stage to outline the RCC process for the operators. A RCC process was implemented for the Certificate I. Participation in this process was the first acknowledgment that an operator was willing to participate in the CBTA system. The process was implemented using a questionnaire, with about 60 questions, which was created by the educational consultants to cover the competencies for the Certificate I in Process Plant Skills. Around 90% of the participating operators responded by providing written answers to the questions on the printed questionnaire. The others preferred not to provide written answers, and in a one hour interview provided verbal responses to the questionnaire. The operators who provided written answers were subsequently interviewed for 10 to 15 minutes to clarify any outstanding issues and to question them in more detail to verify that they had demonstrated competence with respect to the Certificate I. As structured, no RCC process was implemented for Certificates II and III. However, an informal recognition process appeared to be introduced in the Certificate II level, which received informal acknowledgment by the HR manager, the key educational consultant and the training coordinator, although it was never formally recognised. The ZTLs often appeared to introduce an informal recognition process by using their discretion and basing their judgement on their prior knowledge of the performance of an operator, rather than requiring a formal Field Assessment process to judge and report that an operator was competent. The Certificate III also had elements of an informal RCC process similar to that described for the
Certificate II, but this was possibly not as pronounced, nor was it informally recognised. In this case many of the operators used the multiple choice computer generated tests as pre-tests and used several attempts to learn the answers and reach the percentage of correct answers required on the test. There was also a strong possibility that an informal recognition process had been applied for the demonstration of competencies through the Field Assessment.

The assessment processes and instruments

The assessment process implemented for the Certificate II was based on written questions and on the performance of specified tasks in the plant known as a “Field Assessment”. The written questions were in a booklet and required written responses to be entered by the operator. These responses were to be provided in the operator’s own time and were generally completed in the quiet shifts at night or the weekend. The response provided was sometimes the individual’s response or, in some cases, a group of operators discussed the question and agreed upon a common response that was entered by each individual in the group. Some operators indicated they found the group discussion process to be beneficial and a good way of learning from others, and were disappointed this was discontinued for the Certificate III because of the more individualised assessment process created by responding on the computer.

The booklet also included a Field Assessment section that identified the areas to be assessed. For example, a Field Assessment on the module on Work Permits was based on three competency units associated with ‘issuing a permit’, ‘working in accordance with the permit’ and ‘monitoring the permit work’. However, the Field Assessment didn’t specify any details about the training package competency units covered and only referred to them by their Code at the end. The Field Assessment was in a checklist format used in a holistic manner to assess the overall area of Work Permits. The five areas, Permit Application, Permit Preparation, Permit Issue, Monitor Conditions and Permit Return, were identified. A series of between one and four questions was posed in each area as performance criteria for the assessor to consider, and to signify a response to the question in the form of whether the operator was competent or not yet competent.

The educational consultant or a training coordinator assessed the knowledge-based responses in the Certificate II booklet. The Field Assessment was assessed by the operator’s ZTL. The ZTL was required to sign the booklet to indicate the operator had been judged to be competent or not yet competent, prior to the completed booklet being forwarded to the training department for assessment of the written responses. Following the assessment, the educational consultants provided feedback on the outcome. All of the assessors were qualified as workplace assessors through the successful completion of a Certificate IV in Assessment and Workplace Training.
The assessment for the Certificate III was based on written questions, generated from an electronic database, for the underlying knowledge and a Field Assessment based on the specific production Unit in the module. The knowledge questions were generally in a multiple choice format and were randomly generated for each assessment instrument. As indicated previously, using multiple choice questions was decided upon because the responses could be readily assessed and the overall outcome recorded by computer. A separate paper-based Field Assessment booklet was produced for each of the production Units covered. The Field Assessment booklet for the Certificate III was in two parts. Part A was the Field Assessment on the Unit and in the first column listed a number of subsections under the main headings of “Major Components”, “Unit Operations” and “Major Incidents/SHE”. Any relationship between the training package competency units and the subsections was not shown. The second column was headed “Assessment Task”, which contained statements against each subsection that could serve as performance criteria.

The Field Assessment was implemented to incorporate the assessment of a number of training package competencies. These included assessing the operator’s performance in accordance with specific Unit operating procedures, such as start-up and shutdown of two items of equipment in the production Unit, the handing over of the Unit to the following shift and the operation of a compressor. In addition, the areas covered included monitoring the process and being aware of the product quality specifications, troubleshooting process problems in the Unit, as well as identifying areas of major hazards and the control measures required.

The key educational consultant viewed the Field Assessment as the core part of the assessment and indicated the knowledge-based assessment was “almost redundant” in the sense that it was “not aimed directly at competency-based assessment.” From the point of view of the operators who were interviewed, the emphasis in the assessment process appeared to be on the underlying knowledge. They believed greater emphasis was placed on the assessment of the underlying knowledge, through written and verbal responses, than on a formal assessment process involving a practical demonstration of skills or a verbal description of the tasks that would be performed in the plant. This view was, perhaps, consistent with that which would be expected from people who were more practically oriented than theoretical, and who were not experienced in formal assessment processes. However, it also supported a number of other things that emerged from the interviews. These were that the extent of development was greater for the assessment of the knowledge-based component than for the Field Assessment, the time to administer and respond to the knowledge-based assessment was also greater than the time required for the Field Assessment. The emphasis on the knowledge-based component might have been because of the initial purpose, which was to increase the operators’ knowledge, and the nature of the industry, in which it was difficult to physically demonstrate the competencies. The latter is particularly so for emergency situations, which, unless simulated, can cause major disruption to the production
if start up and shut down procedures are demonstrated, or can incur high costs. Further, the apparent implementation of an informal RCC process for the Certificate II Field Assessments, and perhaps for the Certificate III, might have decreased the number of formally arranged practical performance assessments and the apparent emphasis on practical demonstrations. That such an informal recognition process was in place was implied by the key educational consultant and was recognised by the HR manager. Finally, the balance between the components of assessment was also noted by one ZTL, who said there should have been more “people judged on their physical competencies out in the field rather than just their ability to retain information and answer questions on a test paper.”

For both the Certificate II and III, the extent to which ZTLs used a formal assessment process for the Field Assessment at a set time and performance, compared with making a judgement of an operator’s competence based on an observation of their previous job performance, is unknown. However, it appeared that both methods had been used, depending on the ZTL. Some of the ZTLs interviewed described a formal process where an individual was taken through a skills based assessment process in the plant. Others inferred that they knew the performance levels of the people they worked with and no formal demonstration of the skills was required.

Some operators vaguely recalled undertaking a task for assessment in the plant. Some could not recall any assessment process based on the performance of tasks in the plant. Some indicated that the assessment by the ZTL was based on an interview in an office where they responded to questions and provided verbal answers to describe a process. Other operators clearly remembered a final assessment process for the Certificate III, which required a demonstration of competence in the plant.

The manner in which the operators used or prepared for the written assessment process varied considerably. One operator indicated that he used the written tests for the Certificate III as a form of pre-test, working through the initial tests to identify what he didn’t know and then using the learning materials to follow up on those sections. Some of the operators interviewed indicated they, or others they knew, had used the manner in which the questions were presented and the feedback provided to achieve the required score without reference to any learning material. The operators who used the latter method reported that they used a trial and error approach and remembered the correct responses from the feedback. Although the questions were randomly generated, with the knowledge an operator possessed from experience and by remembering sufficient of the correct answers on repeated questions, he was generally able to achieve the required percentage after two or three cycles of the process.

Some the operators complained about the problems they encountered with the questions and answers. They believed some of the answers were technically incorrect or out of date.
Generally the operators were frustrated by the system. The problems they experienced included having to enter what they believed to be an incorrect response to achieve recognition from the computer that the answer was correct; dealing with unintelligible questions; having to log off part way through an assessment because of work requirements, and then having to repeat the assessment at a later stage with no recognition of the work done previously. Others were concerned about access difficulties because of the lack of available computers.

One very experienced operator, who had commenced the CBTA system simply to allow the company to gain the funding for a participant and had gone no further than Certificate I, had assisted the educational consultants to develop and verify the answers for the subsequent Certificates. He indicated that many of the questions and answers were wrong, despite having spent many hours developing questions with the consultants and verifying and correcting answers. He and others commented that the educational consultant who had written up most of the questions knew nothing about the industry. It was also claimed that many of the answers given to the educational consultant by other operators or the training coordinators were incomplete or incorrect.

Most of the operators interviewed expressed the view that a culture had been established among the operators of just getting the correct answer by any means, rather than learning and gaining the knowledge. In the Certificate II, this involved sifting through the learning material to find the appropriate phrase to use to respond to the question in the assessment booklet or working in groups. In the Certificate III, this involved memorising the correct answers gained from the computer feedback or provided by friends.

The ZTL was responsible for assessing the operators in his team on the Field Assessment for Units within his Zone. In this respect, each ZTL set the standard by which he judged whether a person in his team was competent. However, as indicated above, the level of documentation on identifying a competency, whether in the training package or otherwise, and the associated performance criteria and evidence guides was limited. Therefore, the standards used by ZTLs on the same Unit, but responsible for a different shift team on that Unit, could be quite different from each other. The potential for using different standards was highlighted by the key training coordinator, when he expressed the view that some assessors required different amounts of evidence than others. However, he considered that was appropriate because ultimately it was the responsibility of the ZTL to ensure his team members were competent.

One ZTL expressed the view that he had his standards, which might be low or high compared with another ZTLs standards, but as the person responsible for the Zone he would assess each person based on his standards. However, his apparent lack of reference to any documented standards for the assessment supported the view of the HR manager, who
stated that reference to standards by the ZTLs might be a bit lax in this process. The probable difference between the competency standards of the ZTLs would impact on the reliability of the assessment. That is, the reliability with respect to the comparability of assessments made on two or more people for that Zone, given that a different ZTL is responsible for the assessment of each shift team in that particular Zone. Given the lack of any documented performance criteria or evidence guide for the Certificate II, and the lack of any evidence guide for the Certificate III, the reliability of the assessment across the shift teams is likely to be low. Further, the differences in standards could also lead to inconsistent performance on the same Unit across shifts and problems with shift changeovers, which was something the senior managers were attempting to eliminate.

According to one training coordinator, issues of reliability, validity and fairness of the assessment had not been given much consideration. Some informal arrangements were said to exist, whereby someone who was uncomfortable with a potential assessor could seek another one, however none of this was documented. This training coordinator also stated that there were no significant problems with language and literacy. However, despite this view, some ZTLs did state that the probable reason for some operators not volunteering to participate in the CBTA system was because of language and literacy difficulties. Further, unrelated to the implementation of the CBTA system, this situation had been acknowledged previously because classes had been conducted to assist with language and literacy for some people as part of the earlier training department programs.

No formal appeals process had been considered in the planning and structuring stages and none was implemented.

The assessment processes implemented were as outlined in the structuring decision-making stage. Multiple choice questions required 80% correct response rates on a series of 30 to 40 questions, with the exception of the major operating procedures in the Certificate III, which required a 100% correct response rate. The assessments for these were introduced as open-ended or ‘filling the gap’ type questions that required a correct response, which was a phrase from the relevant procedure.

**The learning approaches**

The initial planning decision was to provide the materials through the intranet, however it was decided in the structuring decision-making stage to develop print-based material for the Certificate II. These were mainly taken from existing print-based materials. Some of the reading material for the Certificate II was taken from digital sources and was available on the intranet. However, the learning materials that were web based still involved reading from the computer screen. The learning materials for the Certificate III were all on the intranet, but
based on the earlier experience, the presentation was improved to increase motivation and included a broader range of media with photographs, captions, video clips etc.

The learning approach implemented for the Certificate II included the use of print-based materials for individual learning, but also included formally arranged class sessions during training days and evening shift sessions for material which was found to be difficult.

Operators also reported on informal learning arrangements whereby shift teams discussed the learning materials, but as indicated above, primarily to determine the responses required for the assessment process. However, operators found this to be an effective and beneficial learning approach in a supportive and non-judgemental learning environment. This process was discontinued for the Certificate III, where operators generally operated individually at the computer, although some sharing occurred at times. At least one operator requested the Certificate III learning materials in a paper-based format to enable these discussion groups to continue, but this was not supported by the training coordinators.

Some operators expressed concerns, similar to those raised in relation to the accuracy of the assessment questions, in terms of the accuracy and effectiveness of the learning materials. Operators who had previously been in the training department and had basic Train-the-Trainer qualifications had raised some of these concerns. Therefore, it could be assumed that they had some theoretical and practical knowledge and experience on which to base their claims. However, although the concerns appeared genuine and were expressed by others, there was possibly a hint of jealousy and internal politics in their responses, which might have influenced their comments.

The time-lines created for the overall project were very short and much of the developmental work was very rushed allowing little time for review and improvement of the learning material. Also, as a result of the short time-lines and the unexpected size of the task, the learning material and the corresponding assessment was only developed for half the expected production Units.

The developers recognised that not all the operators would be comfortable with computer-based delivery of the learning materials and that it was not necessarily the most effective learning mode for the operators. This proved to be the case, as most of the older workers interviewed claimed not to be computer literate and stated that they preferred to learn using the ‘buddy’ system, or in a group or classroom situation, or at least using paper-based learning materials. However, the responses to the questionnaire indicated that many operators were comfortable with the use of computer-based delivery if it was enhanced by someone being available to provide explanations. Many of the operators interviewed raised the concern that no help was available if you could not understand the computer-based material. However, despite the concerns and reservations expressed, the training coordinators believed that the operators should learn how to use the computer as part of the
overall CBTA system, because they would increasingly have to use computer technology in the future. Further, the operators were currently required to use the computer to conduct basic business administrative activities and to refer to procedures, so many were becoming more familiar with their use.

Some operators indicated they found it easier to use the computer-based materials than the paper-based booklet, as they could readily navigate around the intranet site to access material required for responding to the assessment instruments. Some operators also indicated that the use of graphics, videos and other formats in the presentation of the learning materials for the Certificate III enhanced their learning. One operator also referred to the advantages of gaining ready access to the material and the opportunity to review the material. Finally, the ZTLs considered the level of most of the operators’ computer literacy had increased as a result of the use of the intranet for the learning materials.

There was an expectation that some operators would not continue with the CBTA system due to the increasing difficulty and the mode of presentation. This had not happened by mid 2003, but the progress of a number of operators had stalled in the early stages of the Certificate III. In one Zone the lack of access to computers had contributed to this lack of progress.

Most operators commented that the most effective learning approach for them was the mentor or ‘buddy’ approach previously used. They also considered there should have been more hands-on training in the learning program for the Certificates.

As indicated in the structuring decision-making stage, the key training coordinator and the educational consultants disagreed on the learning that should occur in relation to the procedures. The key training coordinator’s view prevailed in the implementation stage and consequently, the only thing to be learnt was where the correct procedures were located and how to access and read them. However, the Field Assessment required a demonstration or simulation of the procedures to be followed in the operation of the equipment in the Unit, but did not require any demonstration of the procedures required for emergency situations. Although these procedures were reported to change frequently, often without the operators knowing, no refresher training or process was incorporated in the system for learning the new procedures.

**Refresher training**

No formal refresher training was implemented. An operator could refresh his own skills by accessing the original learning materials for reassessment purposes. The extent to which this occurred is unknown. Some operators considered that it was critical to conduct refresher training on many aspects of the job, particularly for emergency situations, as they lost the skills required unless they were used on a frequent basis.
The internal and external factors which influenced the decision-making

What internal and external factors influenced the decision-making?

The internal factors

Staff characteristics

In the planning decision-making stage, the company was mainly concerned about raising the operators’ level of knowledge of the plant operations, and providing a basis for higher level specialist training. However, during the structuring and implementing stages of the Certificate II and III, the company’s managers became increasingly concerned about the inconsistent and sometimes idiosyncratic manner in which the operators performed their role. The company’s increasing concern about inconsistent operations culminated early in 2003. This was demonstrated by the pressure being placed on the operators, through verbal and written instructions, to read and operate to procedures. It was also demonstrated in internal inquiries, which required operators to justify their actions in terms of the current procedures, and through the company’s attempts to dismiss some employees who had created incidents through not applying correct procedures.

At the planning and structuring decision-making stages the training coordinators decided to provide the CBTA system through the intranet because of the difficulties of providing the training to different shifts and for other administrative reasons. However, most of the operators preferred a learning approach other than the computer-based approach that had been adopted for the Certificate III. Many indicated their preferred method was a combination of the mentor or ‘buddy’ system, because of the practical hands-on nature of the learning and the ongoing support available, the use of print-based materials and working in a group where ideas were shared and discussed.

Changing operations and resources

The plan to increase the knowledge and skills of the plant operators was partly driven by the company’s underlying program of reducing the number of plant operators and the supervisory roles. It was recognised that there were fewer operators and each had to be more self-reliant and knowledgeable about the Unit they were operating. Further, they were increasingly being required to be knowledgeable about other Units, because of the necessity to transfer operators to other Units or to other Zones as the workforce was reduced.

The change to digital control systems had changed the role of the operators, placing greater emphasis upon the use of technology and less on the physical changes made in the plant, such as opening and closing valves. The complexity of the digital control systems had also
increased from 1993, when the restructuring commenced, to around 2002 when the two and three layered control systems were introduced to optimise the operation of the total plant. Some operators saw this as requiring them to adopt a whole new and different framework for their thinking and problem solving, from a practical and physical inspection to an analysis and understanding of the indicators on the control panel.

The demand from the Boardmen for higher level specialised training came as a result of the restructuring of the operator workforce, which eliminated both the supervisor and head operator positions. The ZTL was to replace these two positions, but this role moved toward a supervisory role. As a result, the Boardmen were concerned because they increasingly became responsible for making significant operator decisions previously made by the positions that had been eliminated. While many were reluctant to take on this additional responsibility, they all believed they needed higher level training to protect them from creating major incidents and to support this new level of responsibility.

**Union involvement**

In the planning decision-making stage the Company and the union agreed that participation would be voluntary. As a result, the operators’ union delegates provided positive support throughout the planning and structuring decision-making stages and considered the new development was good for the workforce. The company advised that the CBTA system was not initiated to influence individual redundancy decisions and the company and the union agreed that failure to participate would not impact on an operator’s employment status.

The operators were encouraged to participate by both the company and the union. They advised the operators that they were highly skilled and well paid, and if they left the industry they would have no qualifications and no recognition for what they had done. The operators were also encouraged to participate on the basis that the qualification would be required by the industry in the future and was nationally recognised. The operators participated for many reasons, including a desire to learn, or because colleagues and the union supported it, or they felt compelled to participate because it was claimed to be required for the future.

Most operators indicated they and others had approached their involvement with the attitude that it was something that had to be done and they would get it ‘over with’ as quickly as possible. As a result, most found the quickest and easiest method for completing the assessments.

Despite the decision to allow participation on a voluntary basis, many of the operators were sceptical about the reason the company had provided the CBTA system. They believed the company had provided it to cover itself because of the major hazard facilities regulation. They believed successful participation in the CBTA system would allow the company to blame the operator for an incident, if a mistake was made in any area in which the operator had
been assessed as competent to perform the task. All were aware that in 1998, an operator involved in the Longford Gas Plant explosion was blamed by his company for causing the explosion.

As indicated above, one of the points on which the CBTA system was sold to the operators was that on successful completion they would receive a nationally recognised qualification. However, the qualification had not been recognised by another plant within the company when a number of operators had a job interview. All the participants were aware of this and as a result were disillusioned with the CBTA system. The motivation to continue was reduced for those who still had to complete the Certificate III.

The union made no attempt to link the achievement of specified CBTA system outcomes with remuneration levels. The union delegates provided suggestions for improving the initial communication of the system to the operators, but they had no direct or apparent impact on other changes or the overall direction at any decision-making stage in the CBTA system. However, the key educational consultant was cognisant of the potential influence of the union when he made the decision that an acceptable RCC process should be implemented. Further, some stakeholders, including representative operators who were union members, where involved at certain decision-making stages to select the competencies and determine the content to be included in the CBTA system.

**Management**

A senior manager influenced the initial planning decision-making stage by providing encouragement for the training coordinators concept and approving the study tour to the USA. The training coordinators used this initial support from the senior manager to launch their plans to develop a proactive training regime and to gain some resources from the company. This senior manager left the company soon after the study tour.

At the planning decision-making stage, the key training coordinator sought approval from senior management for participation in the system to be voluntary and an assurance that failing to become involved or participating unsuccessfully in the CBTA system, would not influence future decisions on employment or redundancy. This was forthcoming, however this position changed slightly in the recycling decision-making stage early in 2004 when the management developed a structured classification and remuneration system, which restricted promotion and specified qualification levels for each of the classifications based on the qualifications in the CBTA system.

After the study tour, the senior management’s level of interest in the planning and structuring decision-making stages appeared to be minimal and was described by the key educational consultant as a passive interest. This was seen as a positive feature by the HR manager, who felt that if strong support had been given and any pressure had been applied by senior
management, then the rate of voluntary participation by the operators would have been less. Interviews with some of the operators, who had a strong negative view of the motives of the managers in introducing the system, provided evidence in support of this view. Generally, the senior managers’ level of interest during the implementation decision-making stage was to show visitors the impressive visual aspects of the computer-based system. However, in the latter stages of the implementing decision-making stage of the Certificate II, the senior managers also imposed some conditions. They required that records of participation and performance in the CBTA system should be maintained, which was already the case. This required participants to sign attendance records for training sessions and to indicate that they had completed modules as recorded.

Middle managers in the corporate area of the plant initially showed little interest. As the Certificate II program was structured and implemented, some middle managers realised the potential of the system to provide benefits for their area of responsibility. In particular, during the structuring stage of the Certificate II, the senior and middle managers realised how the CBTA system could assist them to meet the requirements of the major hazard facilities regulations by recording and demonstrating the competency of the operators. In the structuring decision-making stage, the developers’ discussions and reference to the use of procedures, highlighted to the departments responsible that many procedures were outdated and required revision. In the implementing decision-making stage, the communication channels and record management systems established for the Certificate III delivery, were used by middle managers from other departments to communicate issues related to safety, health and the environment (SHE), provide advice on relevant training, and communicate the development of new procedures.

The training coordinators’ perception of the views held by the senior managers also influenced their decisions in the structuring and implementing decision-making stages of the Certificate III. This included the significant decision to make the operating Units the focus of the Certificate III. As indicated previously, this was a significant shift from an educational qualifications focus on the training package competencies towards the company’s business requirements.

The ZPMs showed a close and positive interest during the planning and structuring decision-making stages and applied some pressure to encourage operator participation. This pressure was applied through the ZTLs and resulted in additional volunteers who wanted to show support for their ZTL. The ZPMs were responsible for production in their Zone and had an interest in the outcome, but were not significantly involved in the implementing decision-making stage.
As indicated previously, the training coordinators assessed their role early in 1999. At that time they decided to become more proactive, rather than providing training at the request of managers as a reaction to plant incidents perceived to have been caused by poor operator performance and a deficiency in the initial training.

The training coordinators had previously been employed as operators and elected to take on a role in the training department, which was re-established in 1998. Only one of the three had any educational qualifications, being a former primary teacher. Some operators commented on the training coordinators’ apparent lack of education and training skills and knowledge. In some cases this comment came from operators who had previously been in the training department and held previously recognised train-the–trainer qualifications. They expressed the view that inappropriate assessment and learning approaches had been adopted for the adult learners involved. Other operators commented on the hard work and effort put into the introduction of the CBTA system and expressed their support for the people involved. Sometimes an operator qualified these comments, by indicating he was concerned for the training coordinators’ sake, that their effort had not produced a better quality outcome.

To some extent, the views of a number of operators about the motives and expectations of the training coordinators in initiating the system reflected the existence of a competitive attitude within the company. The multi-national company harboured and encouraged a competitive approach within the complex internal political environment of each plant, and between the individual plants which formed the international company. Within the plant, individuals competed and were seeking kudos, promotion and financial recognition for certain achievements. Some held the view that in developing the CBTA system, the key initiators simply expected to achieve kudos and enhance their opportunities within the company. This underlying view was held by peers of the developers and many of the operators interviewed, who resented the glamorous and highly visible aspects of the project that were award winning and received high praise and recognition from management. They were particularly resentful that this praise had been provided, when in their view the glamorous aspects were achieved at the expense of the scope and accuracy of the underlying content and the effectiveness of the CBTA system, which they perceived were issues that seemed to be of no concern to the senior managers. As indicated above, the concept and direction of the CBTA system was initially shaped by the training coordinators to suit the views of the senior production manager, who supported their original concept and the study tour, and was seen to have the internal power to increase their kudos. The training coordinators also saw the successful completion and high level presentation of the CBTA system as an important outcome for their future in the company, irrespective of its actual outcome for the business.
However, the training coordinators were also conscious of the need to strive for a quality product and, because of their experience with the operators, coping with a critical audience. They were fully engaged in the task and, as expressed by the key training coordinator, they were “maxed out” because of the workload and the time-lines. Some of those who were critical of the quality of the CBTA system also pointed to the tight deadlines and the level of resources available as a reason for this outcome.

By mid-2003, when the bulk of the Certificate III level had been completed, the training department had been reduced to one training coordinator supported by the educational consultant, who was reviewing and improving the CBTA system. Subsequently, efforts to promote the CBTA system in the Asia-Pacific have caused an increase in the training department numbers. Collaborative efforts between the company’s plants in the Asia-Pacific region have expanded the concept to now include learning material for the Certificate I and to extend the CBTA system to incorporate the requirements of other plants.

**The external factors**

**Major hazard facilities regulations**

A major impetus was provided for the development of the CBTA system soon after it was commenced with the implementation of new state government regulations for areas designated as major hazard facilities. The Victorian State Government had introduced the Occupational Health and Safety (Major Hazard Facilities) Regulations, 2000, as a direct result of the major gas explosion at the Longford Gas Plant. However, the company and the training coordinators were aware of the circumstances in late 1998 when the explosion occurred, and any development from that time would have been done with this knowledge.

The major hazard facilities regulations required the company site to be registered and the company and the plant operators to comply with a number of strict regulations. Among these was the requirement for the company to provide the plant operators with information, instruction and training (“Occupational Health and Safety (Major Hazard Facilities) Regulations,” 2000). This was to be in relation to the hazards in the plant, the major incidents which could occur, the control measures to be applied, the contents of a “Safety Management System” and all other things that were necessary for the employees to perform their work in a manner which was safe and without risk to health (“Occupational Health and Safety (Major Hazard Facilities) Regulations,” 2000). In addition, the company was required to ensure that the information, instruction and training was “recorded, monitored, reviewed and revised in order to remain relevant and effective.” (“Occupational Health and Safety (Major Hazard Facilities) Regulations,” 2000).
However, the major hazard facilities regulations also placed some responsibility on each employee and specified the “Duties of employees at major hazard facilities”. The regulations required, among other things, that the operators must follow the procedures relating to the prevention and control of major incidents and take corrective action under those prevention and control and emergency procedures, even if such corrective action could interrupt the operation of the major hazard facility ("Occupational Health and Safety (Major Hazard Facilities) Regulations," 2000).

When the regulations were introduced, the senior managers saw the company’s involvement in the implementation of a CBTA system as a bonus. They could see that the system could readily be used for complying with the training requirements and for demonstrating that the operators were competent against national standards. This caused a significant shift in the purpose and importance of the implementation of the system and renewed and heightened the senior and middle managers’ interest in its potential and direction. As a result, the importance of the system had increased and the company then used its implementation as a means for satisfying its obligations for some sections of the regulations. Further, the company established an internal department responsible for ensuring that the company complied with the regulations. This department identified and documented all the information required to satisfy the regulations for each plant Unit. The relevant material was then included in the learning material for that particular Unit. The key educational consultant estimated that at least 20% of the material presented in the Certificate III was directly related to the implementation of the regulations.

The increasing importance placed on operating to procedures by the senior managers and the pressure being placed on the operators, through verbal and written instructions, to read and operate to procedures, could also be partly explained by the heightened interest caused by the introduction of the regulations. Similarly, the selection of the critical competencies in the Certificate II and the requirement for them to be assessed on an annual and biennial basis could also be explained by the regulations’ requirements.

**Funding sources**

In the structuring decision-making stage the training coordinators identified as many Federal and State government funding sources as they could find to support the concept. Gaining external funding was critical for the development and implementation of the concept. This was also critical for getting management approval for the introduction of the CBTA system. Without this funding the project would not have been developed.

Funding was sought early in the structuring decision-making stage for the CBTA system, and the scope of the system was dependent on the funding available. The company obtained a number of undisclosed government grants. The major source of funding appeared to be the
Federal government incentives provided through the New Apprenticeship Program, because many of the operators had no formal qualifications. As a result, the company encouraged as many operators as possible to participate, because it gained funding for each participant who had no previous qualifications. These operators were registered as trainees and the company was able to access the funds provided as an incentive under the New Apprenticeship Program. Some of the training was also provided through the funding provided by the State government to the TAFE Institute for delivery to apprentices and trainees. In each year of the CBTA system the company made its normal budget contribution to the training department to cover the employment costs of the three training coordinators, plus appropriate goods and services. This was reported to be in the order of $150,000.

Some initial planning was undertaken to gain the funding, and through the training agreements and other funding submissions, a commitment was made to provide one level of the Certificate each year. These commitments established deadlines for completion of the work and all of the commitments were honoured, including the provision of a Certificate III program, despite the inability of the training coordinators to include all the plant's production Units in the system. These commitments also assisted the training coordinators to maintain their focus on the task and to maintain the energy levels required for them and the educational consultants to continue to work productively on the CBTA system.

In return for the funding, the company and the training coordinators were accountable to appropriate government authorities for training agreements entered into for each trainee, and were required to report on performance and outcomes to all the funding providers. The company had not made a significant contribution, which partly explained the management's initial passive interest, but the key training coordinator indicated he sometimes gained the support of the management to remove internal barriers by suggesting it would cost the company money if a target was not achieved.

Joint training arrangement discussions with other company plants in the Asia-Pacific region commenced early in 2002. These progressed to collaborative developments for operator training and the provision of some initial funding by each plant. Early in 2004 it was expected that the plant in this study would play a major role in that development. Consequently, the training department would continue to be able to fund the developmental work to maintain and improve the CBTA system in its plant through this funding source.

**External consultants**

The company engaged a TAFE Institute to provide external educational consultants and to use the TAFE Institute's status as an RTO for assessment and certification purposes. The TAFE Institute issued the qualification gained by the operators. As indicated previously, the TAFE Institute educational consultants recommended that the company should use the
industry training package and associated qualifications. The TAFE Institute’s role was to provide experienced educational consultants capable of assisting the company to develop a CBTA system. The educational consultants set up the intranet structure, put the available learning materials on to the intranet, created the assessments instruments, oversaw the assessment process and awarded certificates based on the assessment process and the demonstration of competence. The TAFE Institute was responsible as an RTO for ensuring the national training system requirements for the awarding of Certificates were satisfied.

The assessment instruments caused the operators considerable frustration and most of the problems with them were attributed to the responsible educational consultant’s lack of industry knowledge and experience. A number of operators assisted in the development of the assessment instruments with questions and correct responses, and then with checking and verifying the responses required for each assessment instrument. Despite this approach, the operators’ believed the lack of experience displayed by the consultant caused incomplete responses to be accepted and incorrect responses to be entered into the system. The time available to undertake the development and the verification process, due to the deadlines, was also seen as a factor that contributed to the error rate.

External contacts

The planning decision-making stage was influenced by the senior production manager’s knowledge of the University operated by the parent company in the USA. As a result of this prior contact, the senior manager supported the study tour to the USA plants and the associated University as a benchmarking process. This initiative provided impetus for the development of a significant training response to the company’s needs.

The impact of the internal and external factors on the decision-making

How did these internal and external factors impact on the decision-making?

The competency ‘definition’, scope and complexity

The original rough concept formed by the training coordinators was broadened as a result of the study tour to the USA and this directly influenced the training coordinators to plan a system based on the tasks performed by the operators, as determined at the initial DACUM session. However, the educational consultants significantly influenced the concept by introducing the company to a national competency-based system. By recommending, and then implementing, a structure based on the national industry training package they thrust upon the company the competency definition, scope and complexity inherent in the training package. The support readily given by the Union for the training package and its national recognition, also influenced the company’s acceptance of the recommendation and the inherent competency definition, scope and complexity.
The TAFE Institute, through its status, knowledge and experience, influenced the initial structuring of the system with its educational focus on assessing for qualifications within the training package competencies. This focus, and the training coordinators’ initial need to increase the knowledge of the operators, appeared to have influenced the emphasis on the underlying knowledge of the competencies. This in turn was probably influenced by the characteristics of the operators, who were experienced practitioners, but had little training or understanding of the underlying knowledge associated with their role.

The educational consultants and the training coordinators selected the initial competencies from the training package for the Certificate I and Certificate II, based on those which best fitted the perceived role of the operator. However, they selected competencies to satisfy the qualification rules specified in the training package, rather than developing the job role. The training coordinators’ lack of experience in working with training packages appeared to have limited the degree to which they could make input to the initial structuring decision-making stage to shape the process and the competencies to fit the company’s business requirements.

The capacity of the training coordinators to provide input in the initial stages was also influenced by the apparent lack of any significant planning by either the educational consultants or the training coordinators. The resultant lack of broad discussion within the company, about the potential of the CBTA system and its outcomes, seemed to have caused the training coordinators to follow the lead provided by the more experienced TAFE Institute consultants in structuring and implementing the Certificate I and Certificate II. Further, the initial purpose for the system, which emphasised developing the underlying knowledge of the competencies, probably focused attention on the training package and its requirements in this initial stage, rather than on the role of the operators and the competencies required for them to competently perform that role.

Increasingly, the training coordinators and the senior management realised the CBTA system’s potential to satisfy a number of business requirements, which caused a significant shift in focus in the structuring and implementing decision-making stages of the Certificate III. The training coordinators’ shift towards satisfying the business requirements during the implementing decision-making stage of the Certificate II, and prior to the structuring and implementing of the Certificate III, refocused on the production Units in the plant and the role of operating these Units. This was a significant shift by the training coordinators towards acknowledging the job role and the company’s business requirements, rather than selecting competencies from the list in the training package to satisfy qualification rules. The senior management’s realisation was driven by a greater awareness of what could be done in the system and also by their knowledge of the Longford Gas Plant explosion and the requirements of the resulting major hazard facilities regulations. This shift was the first indication that the senior management recognised the useful role of the CBTA system.
As a result of the shift, the training coordinators and the company business requirements had assumed the leading role in the implementing decision-making stage and the developers were now providing module learning material that was company specific and not always related to the training package competencies. The CBTA system was now based on what an operator needed to know to operate particular Units, but the specific competencies required had not been identified. In this situation the educational consultants were now mapping the training package competencies against the competencies they perceived were required to operate the particular Unit.

At no stage were the competencies specified for the job, nor was the opportunity taken to identify and specify any competencies that were unique to the company’s job role and which were not reflected in the training package.

**The process to recognise current competencies**

The decision to implement the RCC process for the Certificate I was mainly influenced by the funding requirements. The TAFE Institute needed to record the performance of the participants at this level to meet its contractual requirements with the State government. Further, the traineeship funding incentives and the associated Training Plan provided by the company would have required the operators to commence at this level. However, this latter point could not be verified as access was not made available to this documentation.

The decision to implement the RCC process was also influenced by the characteristics of the operators. Most had not been assessed in a formal sense in the last 20 years and many had developed their skills and knowledge from learning on the job. The introduction of a RCC process was influenced by the perceived need to ease the operators into the CBTA system and the desire of the company to show it acknowledged the skills and knowledge developed over the years. Nevertheless, no RCC process was formally implemented for the Certificate II and Certificate III. It appeared that the key training coordinator had influenced this decision, because he wanted to show the CBTA system had a rigorous assessment regime to ensure that it would satisfy external scrutiny. This approach was probably reinforced by the nature of the competencies selected for the Certificate II. They were considered to be critical competencies and were to be assessed on an ongoing basis. The importance of these competencies, and the need to reflect this in the approach to both the operators and any external audit, probably influenced the decision to undertake what might have appeared to be a more rigorous training and assessment approach. However, as indicated previously, an informal process of recognising current competencies appeared to have been adopted by some of the ZTLs.
The assessment processes and instruments

The assessment process was the responsibility of the TAFE Institute as an RTO. As indicated above, the original purpose of increasing the underlying knowledge associated with the performance of the job appeared to have caused the CBTA system to focus on the knowledge-based components of the competencies. This resulted in an assessment approach that appeared to focus on the underlying knowledge components. This was evident in the use of booklets for responses in the Certificate II and the use of extensive computer generated tests and assessment in the Certificate III. In particular, while the assessment approach for the Certificate III included one Field Assessment on the production Unit, it did not appear to be as significant as the knowledge-based assessment for the common modules, which might be partly explained by the difficulty in conducting practical assessments in the plant.

The decision to use computer-based assessment was partly influenced by the key training coordinator’s view about the level of administrative resources required to manage the assessment function using any other media, given the resources available in the training department to undertake the task. This decision was also influenced by the decision to present the learning materials on the intranet, resulting from the training coordinators’ desire to make the material readily accessible for teams working on shifts across seven days a week and 24 hours a day.

The decision to adopt multiple choice questions was influenced by the same drivers. That is, to provide machine assessment to minimise administrative resource requirements and to enable the assessment and its subsequent feedback to be available at any time across all shifts. Having decided to use multiple choice questions, a decision was then made about the number of questions to be included in the assessment to provide sufficient evidence to judge whether a person was competent on particular competencies. The decision to adopt a 100% correct response rate for the multiple choice questions for some competencies was influenced by the company designating these competencies as critical, mainly for safety, health and environmental reasons. Similarly, the Field Assessment required the person to be competent on all the components. Further, for these critical competencies the company determined that the operators would be reassessed on an annual or biennial basis depending on the competencies degree of importance. Although this was a company decision, because of the critical nature of the particular competencies, the decision would have been significantly influenced by the major hazard facilities regulation. The regulation does not require ongoing assessment, but it does indicate that the training provided should be “reviewed and revised in order to remain relevant and effective” (“Occupational Health and Safety (Major Hazard Facilities) Regulations,” 2000). The company’s decision to reassess some competencies was significant for CBTA systems. However, other than designating the competencies as critical,
the reason for the company making this reassessment decision is unknown. It might have been because it supported the view that a person’s skill levels could decay over time, or it might have been because it wished to protect itself under the existing regulations, or a combination of both.

The assessment decision for the competencies not considered critical was based on a comparison with the assessment for a licence to drive a car. The granting of a driver licence was considered to be an important and critical assessment decision, but it did not require 100% correct performance. On that basis, a similar allowance was made for error and a response rate of 80% was decided upon for the assessment of the knowledge component of these competencies.

The learning approaches

The focus on the knowledge-based component of the competencies was also reflected in the decisions about the learning approaches.

The computer-based approach was influenced by the operators’ work patterns and the training coordinators’ desire to make the material readily accessible for teams working on shifts across seven days a week and 24 hours a day. The decision was also influenced by the training coordinators’ view that the training department would not have the resources required to manage the delivery and update of materials using another media, for example, delivery and assessment using print-based materials. This was particularly so because of the high level of knowledge-based content.

The learning approach for the Certificate II was influenced by the capacity of the training department and its inability to provide a computer-based approach within the time and resources available. As a result, print-based materials were used, supplemented by some computer-based reading material, and classroom sessions for sections found to be difficult. However, the administrative requirements to manage the training delivery and assessment reinforced the training coordinators’ view on the need to provide a computer-based approach.

Clearly, the decision to adopt a computer-based approach for the delivery and assessment process was not influenced by the preferred learning approaches of most of the operators. Although aware that the majority of the operators would not prefer a computer-based approach, because of their age and previous learning experiences, the training coordinators proceeded with the planned pragmatic approach based on their capacity to deliver and manage the system and its future sustainability. As a further part-justification for the approach they used, the training coordinators indicated the operators were increasingly using computer systems in their job and would increasingly face further technological developments and therefore had to learn to cope with the technology.
An example of how the operators would prefer to learn was provided when some of the shift teams initiated group discussion learning approaches to support the paper-based approach used in the Certificate II. This was an approach that suited the learning style of many of the operators and was one of the preferred approaches. A hands-on practical approach was also a preferred style for this group of people, who generally considered themselves as people who learnt by practical demonstrations and not by reading from books or other media.

The learning material content for the Certificate II was influenced by the need to provide the underlying knowledge for the competencies identified from the training package. The content for the Certificate III was influenced by the shift in focus to the operation of the Units and the associated knowledge to operate the Unit, but also included knowledge-based modules on Economics, the Environment and Hydrocarbon Chemistry. The special department introduced to ensure that the company complied with the major hazard facilities regulations had identified the potential of the CBTA system to assist its task and included the relevant material in the learning material for the particular Unit. For example, this included a corrective action report requirement to develop learning material on “embrittlement”, as a result of the Longford Gas Plant explosion. At least 20% of the material presented in the Certificate III was directly related to the implementation of these regulations.

The Recycling/Outcome Decision Stage

The impact of the changes

What impact did the changes to the CBTA system have on the expected outcomes??

The company had not documented a plan for the introduction of the CBTA system. However, the developers had a general concept in mind for some aspects of the CBTA system when they commenced to structure and implement the CBTA system. During the structuring and implementing decision-making stages, the internal and external factors identified above impacted on the original concept causing on-going recycling decision-making within these stages. The CBTA system evolved as it reacted to the various factors that impacted upon it. The process could perhaps be described as an ‘action learning’ process with the direction of the implementation guided by the developers’ evolving concept and the factors impacting on it at the time.

Consistent with the concept of ‘action learning’, but also consistent with the Conceptual Framework recycling decision-making stage, the company management was about to commence a review in mid-2002 of where the company was going in the future, but specifically, where it was going in the next 5 years. Part of that process was to consider what kind of operator was required for the future and what skills and knowledge would be required. Among other things, this was seen as an opportunity to reflect upon whether the CBTA system was going to provide the required outcome. However, consistent with the lack of
initial planning, this process was about to commence when many of the operators had completed the Certificate II, but were yet to embark on the Certificate III.

The outcome expectations of the many stakeholders were changing as the CBTA system was being structured and implemented, and as a result, an ongoing recycling process occurred to align the development with the enhanced expectations. The implementation of the CBTA system also had some unexpected outcomes, such as highlighting the deficiencies in the procedures and the need to change and update them. These ongoing changes in the CBTA system were partly a symptom of the lack of initial planning and broader consultation on the outcomes and the way in which it could assist other areas within the company. Initially, many people, including the senior managers, had not fully comprehended the potential of the CBTA system. Increasingly, managers began to see the potential of what was being done and established new expectations. Shifts in direction occurred as the system was used to support another initiative or the work of other departments. The purpose and content evolved with this realisation and the consequent change in expectations.

The company’s CBTA system was introduced from Certificate I through to Certificate III. Each level was developed and delivered following the previous level. As a result, a recycling decision-making process occurred following each level of delivery and also within the structuring and decision-making stages of each level.

Involvement in the CBTA system was voluntary, but as the senior management increasingly took an interest in it and the performance of the operators, pressure was placed on the operators to provide a flawless performance and to operate according to procedures. The senior managers had perceived that full participation in the CBTA system could lead to improved performance and decided to build incentives for operators to participate in a new career and remuneration classification structure. The new structure incorporated levels of classification that could only be accessed by gaining a particular Certificate level qualification and other work experience. Most operators completed the Certificate III in 2003. The new classification structure was being prepared for announcement and implementation by early 2004. In addition, consideration was being given to the development of a Certificate IV. This was the original concept for Boardmen training, but it was now included within the new classification structure.

The new structure required operators to gain qualifications to move to new classifications that were equivalent to some of the existing classifications. These levels could have been achieved previously through experience in the job. Operators who were currently in a particular classification would need to complete the qualification required for that classification, and the following classification, before they could proceed to the next level.

The training coordinators’ initial concept was that the system would be associated with the plant production Units and the operation of these Units. However, learning materials and
assessment instruments were only developed for about half the Units, because no detailed planning was done and the scope and size of the task was underestimated. The company was able to satisfy its commitment to deliver the Certificate III using the Units completed, but CBTA was not available for those Units that were not completed. In order for the company to implement its policy of not allowing an operator to transfer to a Unit unless he had been assessed as competent to operate that Unit, the remaining Units needed to be completed. Operators with prior experience were still operating these Units. In order for the company to demonstrate that all its operators were competent to operate the particular Unit to which they were assigned, the remaining Units needed to be completed.

The CBTA system had provided the majority of the operators with a Certificate III, but it had yet to fully satisfy the company’s later expectation that it could demonstrate the competence of all its operators. The ability to satisfy this expectation was limited by the voluntary participation and the inability to develop the system for all the production Units. The company was tackling the first issue by introducing the new classification and remuneration structure and was also assisted in its resolution of this issue by the retirement of operators and the redundancy program. In early 2004, the training department was seeking to resolve the second issue by assessing how it could complete the CBTA system by including all the production Units, and was determining the resources available for this. The opportunity to gain income through the Asia-Pacific region expansion was likely to provide access to some additional resources.

Further, no learning materials were developed for the Certificate I as this was completed using a RCC process. However, despite pending redundancies, the company was beginning to consider new employees for the future. The TAFE Institute educational consultant had commenced to plan for the development of the Certificate I materials. These would also form part of the materials required for the Asia-Pacific region development. Despite these shortfalls, the CBTA system development was potentially of major benefit to the company. The key training coordinator considered the CBTA system would provide savings in the time normally required to training the new entrants to be fully productive operators, compared with the previous training method, with a consequent reduction in employee costs and delivery costs and increased productivity.

Finally, a further benefit was to be gained through a more recent recycling decision made in early 2004 to capture the company’s ‘corporate knowledge’ vested in the experienced operators, many of whom would soon be leaving the company. A decision was made to take a number of these senior operators off the shift team and use them to assist in reviewing and improving the learning materials and the assessment instruments so that their knowledge gained through experience could be captured in the materials.
The competency 'definition', scope and complexity

Recycling decision–making occurred during the structuring and implementing decision-making stages of the Certificate III which shifted the focus of the CBTA system as indicated previously. The Certificate III was based on the knowledge required to operate the production Units, rather than the competencies required. As indicated above, the educational consultants mapped the training package competencies against the learning material content for the knowledge to operate the specific Units. This focused the CBTA system on the job role and the company’s business requirements, rather than relying on selecting competencies for qualifications from the training package.

The recycling decisions increasingly moved the CBTA system towards satisfying the company’s needs, rather than assessing for qualifications based on the training package competencies. However, it also appeared that this shift in focus for the Certificate III began to focus the system on the knowledge-based content associated with each Unit. Consequently, the company moved away from identifying the competencies required for the job and the standard at which they should be performed. The perceived competencies were mapped on to the modules as a secondary process. As such, the CBTA system appeared to move more towards a curriculum-based program, which identified the knowledge required and, perhaps by implication, the knowledge-based learning outcomes, rather than a competency-based system requiring the demonstration of competencies to specified standards. In this respect, perhaps the CBTA system began to mirror the curriculum-based approach of the parent company’s University, which had been admired by the study tour members, and in a sense was the benchmark model within the company.

While this shift would not impact negatively on the initial expected outcome, which was about increasing the operators knowledge, it could impact negatively on the expectation that the operators would be shown to be competent to operate their Units, subject to the process of assessment used as indicated below.

The process to recognise current competencies

The RCC process was implemented as planned. During the implementation of the Certificate II and the Certificate III an informal RCC process appeared to have been implemented by some ZTLs and the operators. However, there was no formal RCC process considered in any recycling decision-making despite the apparent informal acknowledgment that this was occurring.
The assessment processes and instruments

The company set the response rate for correct responses, by which they judged a person as being competent on the knowledge-based content of the Certificate III, at 100% for the critical competencies and 80% for the other competencies. No changes occurred in relation to this through the recycling decision-making, however, a decision was made to monitor the level of operator performance and slowly raise the response rate for those assessment instruments currently set at 80%. This decision was caused by the key training coordinator’s uncertainty about whether the level initially established, which was developed in an arbitrary manner, was sufficient to ensure the level of performance required. The decision was also a way in which the key training coordinator could justify the initial arbitrary decision by proposing that it could always be raised later.

An initial decision was made to use the ZTLs as the workplace assessors, but at the time of that decision it was proposed that this could be extended to include the operators’ peers. Following the completion of the Certificate III, a number of operators sought the opportunity to become assessors and were encouraged by the key training coordinator to complete the required training independent of the company. On successful completion of the Assessment and Workplace training qualification these operators were recognised as part of the workplace assessment team for performing future assessments.

The learning approaches

No changes were made to the formal learning approaches due to recycling decision-making at the completion of the three levels. However, following the introduction of some materials on the intranet for the Certificate II and the initial development of materials for the Certificate III, it was identified that the presentation of the computer-based learning materials needed to improve to increase the motivation of the operators. As a result, a broader range of media was introduced to the intranet material including photographs, captions and video clips.

Some shift teams independently identified the need for a different learning approach, which they initiated towards the end of the CBTA system implementation when some of the operators were still involved with the Certificate III. This involved the construction and use of models of the plant equipment. This supplemented the existing learning approaches and was used in a group discussion learning approach which used ‘What if?’ type questions and used scenarios to discuss and determine what action should be taken in certain situations. The operators considered these sessions were a valuable learning opportunity and, it was claimed, the type of training approach they had been seeking for years.
The effectiveness of the CBTA system implementation

Was the system implemented effectively?

Inadequate planning and structuring decision-making appeared to have the most significant impact on the effectiveness of the implementation of the CBTA system. The failure to conduct a more extensive initial planning process, including a consultation process that outlined the concept and sought broader input from the stakeholders, appeared to limit the effectiveness of the implementation of the CBTA system in a number of ways.

Much of the change in direction for the Certificate III during the implementation decision-making stage appeared to occur because of the poor initial planning on the purpose and outcomes of the CBTA system. In the planning and structuring decision-making stages, this included the lack of any clear identification of the competencies required for the job, the business requirements that were to be satisfied and the planned outcomes. As a result, the initial lack of interest by senior managers and their subsequent realisation that the system’s implementation had the potential to satisfy many other business requirements, including the requirements of the major hazard facilities regulations, brought about many changes during the structuring and implementing decision-making stages.

The changes in direction caused an unnecessary waste of time, which was a significant resource in this development. A more adequate initial planning process would have allowed the developers to more accurately assess the resources required to develop the CBTA system. Early identification of insufficient resources would have allowed the developers to seek additional resources or make appropriate modifications to the plan, which might have included modifying the expected outcomes, staging the implementation or other appropriate strategies. An initial assessment of the resources required would have enabled the development of cost-effective strategies in the structuring decision-making stage, such as a RCC process for at least the competencies in the Certificate II, which were not considered to be critical. This would have released resources for the development of the Certificate III and provided a more cost-effective development and implementation.

A more comprehensive planning-decision making stage would also have included the management in the initial planning, possibly emphasising the need to focus on competent operator performance on the Units from the beginning, and therefore enabling the allocation of available resources to include all the Units in the CBTA system. The initial CBTA system implementation, as indicated above, only included about half of the 22 Units. More comprehensive planning would have quantified the time available for developing each module and reduced some of the time used for high quality presentation techniques, allowing more time to ensure the quality and accuracy of the content. This planning could have established more realistic time-lines and commitments for the funding arrangements. This might have
allowed the modules to be developed over a longer time period, perhaps eliminating some of the quality issues perceived by the operators.

In the initial planning the company should have analysed the operators’ role and developed and specified the total competencies for the role. The use of training package competencies was an effective process, but initially identifying and specifying the competencies for the overall role would have enabled the identification of other business requirements that needed to be included, and would have established a framework for the later development. In addition, and equally important, it would have clearly outlined the competency standards for the operators, enabling them to focus their learning and performance on the competency standards, which was likely to ensure more effective learning and performance to standards. In this respect, the management’s requirement for flawless performance, which was expressed at a much later time than the initial planning, might have emerged at an earlier time. At the time when the initial planning should have occurred, managers were at least considering the need for consistent performance from the operators. This might have been sufficient to steer the competencies and the learning towards developing the knowledge and skills required to achieve consistent operator performance. Instead, it was simply decided at a later stage that an operator only needed to locate and read the procedures. This reduced the focus on the procedures, failed to change the approach and attitude of the operators who resented using the documented procedures, and failed to consider an outcome which strongly emerged as a management requirement at a later date. This failure reduced the effectiveness of the CBTA system and the performance of the operators. Also, this probably contributed to the failure to link the process of updating procedures with the learning and assessment processes to ensure performance using the latest version of the procedures, which also limited the effectiveness of the CBTA system.

The initial planning should also have documented the purpose for introducing the CBTA system, the processes to be used and the structures to be implemented, the job competencies and the roles and responsibilities of all concerned in the process. This would have assisted in reducing or eliminating the negative feelings that many of the operators had about the purpose of the system and their participation. These negative feelings reduced the operators’ motivation and were highly likely to have reduced the operators’ learning effectiveness.

Consideration of the assessment principles such as reliability, validity, fairness and flexibility in the structuring and implementing decision-making stages might also have increased the system’s effectiveness. Such principles might have enabled more operators to participate, particularly those who had learning disadvantages, thus increasing the system’s effectiveness by enabling the company to show that all its operators were competent, and that the assessment process was robust and reliable. Consideration and inclusion of an appeals process in the documentation, which is a common element in CBTA systems, might have
assisted to improve the motivation of the operators, although none of the operators interviewed raised concerns about the fairness of the assessment process. The cost-effectiveness of such practices could have been considered at that time, but not considering them had the potential to limit the effectiveness of the implementation.

The flexibility of the CBTA system was considered in one sense, by structuring and implementing access through the intranet. However, a computer-based learning approach was not the preferred learning style of many of the operators and was likely to have reduced motivation and learning effectiveness. Other additional cost-effective learning approaches to enable access could have been considered in the initial planning by negotiating arrangements with the operators. For example, the group discussion learning approaches, initiated by the operators at a much later stage and favoured by many operators, were cost-effective as they were conducted in downtime such as evening and weekend shifts. They could have been combined with the computer-based delivery to enhance the learning of many of the operators. Further, the initial planning and negotiation with the operators might have increased the emphasis on demonstrating competence and reduced the knowledge-based emphasis, which would have increased the motivation of the operators who preferred hands-on approaches and could have emphasised consistent performance using the correct procedures.

Finally, the deadlines set by the company for the introduction of the CBTA system reduced the time available for broad consultation, planning and structuring and contributed to the ongoing changes being made during implementation. However, some of the change in direction also occurred as managers reverted to the previous reactionary training policy of fixing a problem as it emerged. On reflection, the key educational consultant considered that these changes were a positive aspect of the implementation process, in that the company was shaping its CBTA system to meet its own needs, rather than simply adopting the generic competencies in the training package. While this could be considered to be partly true, and some evolution was likely to have occurred as the company became more familiar and confident with what was emerging, it would have been a much more effective process had the planning occurred initially.

The impact of the CBTA system

What evidence is there that the implementation of the CBTA system impacted on the expected outcomes and improved competitiveness and productivity?

Consistent with the Conceptual Framework and the methodology, a form of Kirkpatrick’s model was used as the framework to identify the impact of the implementation of the CBTA system. This allowed an examination of the impact of the intervention in relation to the expected outcomes and the overriding aim of improved competitiveness and productivity for CBTA systems, as expressed by the NTB (National Competency Standards-Policy and
Guidelines, 1992). The four levels of the Kirkpatrick Model develop a sequence of data for analysis, which contributes to the overall response to the research question.

**Level 1:**

*Do the participants enjoy the training and does it encourage and motivate the participants to engage willingly in further training and demonstrate the newly acquired competencies on-the-job?*

Initially many of the operators were reluctant to become involved and were not happy to be doing the training. However, it was reported that about 30% of the operators were keen to learn more, readily accepted the training and had a positive attitude towards it.

Generally, training was accepted by the operators if it was considered to be relevant to their job. Often the operators judged that the training was not relevant and were reluctant to do it. Once the CBTA system was established, although much of it was considered not to be relevant by the operators, many saw it as a challenge and were determined to successfully complete it. However, they were also keen to do it quickly so that it was no longer something that they had to do. During the delivery of the Certificate III, the failure of an associated company plant to recognise the qualification at job interviews reduced the motivation of those operators who had not completed the Certificate at the time, and reduced the perceived relevance for doing the training. A ZPM observed that the operators had not been happy at the beginning, but as they became familiar and understood what was happening, a dramatic change had occurred and they had developed a positive attitude towards the training.

At a later stage, some operators demonstrated that they were happy to do training which was not necessarily directly relevant to their job, by independently doing additional training to gain workplace assessor qualifications.

**Level 2:**

*What changes in competency levels (skills, knowledge and attitude) occurred following the implementation of the training?*

Some operators gained some knowledge from the system. Generally they reported that these were small things about which they had not previously been aware, but overall they did not feel they had learnt anything of significance. In some cases operators felt the CBTA system had refocused them and sharpened their thinking on particular matters. In particular, some reported that the combination of doing the training and the management’s pressure on flawless performances and working to procedures, had made them more conscious of the procedures and where they could be found. In one case, because of a Field Assessment for one operator, more significant learning occurred for a whole shift team when it became aware of the location of an emergency shut down button that had more recently been fitted and very
A ZTL believed some operators had learnt about sections of the plant they thought they understood. He believed the operators’ problem solving skills had improved, including his own, because the best operators had been used to guide the learning materials development and all the operators were increasing their knowledge as a result. This was demonstrated by the operators being less reliant on him for solving problems and taking more responsibility for their Units. However, he believed this was because of the CBTA system, but he had observed this improvement over the last four or five years and the CBTA system had only been operating for about 2½ years.

A ZPM believed that the operators’ had improved their knowledge, which they demonstrated by the increased level of questioning about plant operations and the detail contained in the questions. In addition, he believed that a new learning culture had been created among the operators, who in many cases were motivated to learn. The number of operators who independently completed the Assessment and Workplace Training qualifications was a demonstration of this new culture.

**Level 3:**

Did the trainees improve their job skills?

Most operators did not believe their job performance had changed. However, as indicated above, one ZTL believed the problem solving skills of his shift team had improved. Another ZTL said he was not convinced that any improvement had occurred as a result of the CBTA system and believed more mistakes had been made in the last three years than in previous years. He attributed this to the increased pressure in the job, the additional requirements because of the digital control systems and the removal of the supervisors and head operators.

A ZPM noted an improvement in operator performance and indicated that since the operators had completed the training the number of incidents and product recalls attributed to a lack of knowledge had reduced. He also believed the operators performed in a more “professional manner”. This was demonstrated by their questioning of what could go wrong in certain situations and taking appropriate preventative action. In addition, they were more aware of the correct procedures and were beginning to perform the tasks consistent with the correct procedures. He attributed this solely to the training and believed it assisted the implementation of the new management initiative requiring ‘flawless performance’. This initiative, as indicated previously, had been supported by considerable management pressure on the operators and some disciplinary action against a couple of operators considered responsible for incidents through not working to the correct procedure.
Are the trainees given the opportunity to demonstrate the specified competencies on-the-job?

The operators were not prevented from demonstrating the full range of competencies on the job and, in fact, were required to take on the full range of functions within the role. But the nature of the role often meant that the opportunity to perform a specific function for a particular operator occurred very rarely or in some cases not at all.

Have the trainees demonstrated the competencies and maintained the specified levels on-the-job following the implementation of the training?

There were no direct comments from operators about whether skills were temporarily lost through not being used, but some did indicate that their learning had refreshed their knowledge. As indicated above, the nature of the role was such that many job tasks were not used in the normal course of the working period and could easily be forgotten.

The company had recognised the potential for the skills and knowledge of the operators to decay over time and had introduced a reassessment process for the competencies considered to be critical for safety, health and environmental reasons.

Level 4:

What evidence is there that the implementation of the training had an impact on the organisation's expected outcomes?

Achieving the Company's Expectations

It was not easy to determine whether the training coordinators' initial expected outcome of increasing the operators' knowledge had been achieved. The RCC process for the Certificate I only assessed the prior knowledge and skills of the operators. The developers believed that by providing training for the Certificate II and III they would increase the operators' knowledge. However, as there were no prior measures of the operators' performance or level of knowledge, it would be hard to determine whether any learning had occurred as a result of the CBTA system. The operators were judged to be competent based on an assessment of the knowledge components and their performance in the Field Assessment, however it is not known whether the CBTA system increased their knowledge. Most operators believed they had not learnt anything from the training, although none of those interviewed indicated they had achieved the response rate required on the written assessments without recourse to the learning materials, despite many reporting they had used the written assessment in the form of a pre-test. This would suggest they had learnt something from the learning materials. Managers also reported that the operators had learnt from the training.

The training coordinators had an underlying expectation that they would bring all the operators up to the level of a 'tradesperson' so they could then proceed to higher level skills if
required. Further, the company made commitments through training agreements and other funding requirements, in support of this underlying expectation, that it would develop and deliver a CBTA system which would enable the participating operators to successfully complete the Certificate III in Process Plant Operations. Although not stated initially, the operators probably did not expect all operators to achieve at this level. Later comments appeared to confirm this view. However, the expectation was partly achieved at the time of the study, to the extent that the operators who participated were achieving at the Certificate III level, which is considered to be at a tradesperson level on the AQF, although it is not known whether all operators eventually completed the Certificate III.

The expectations of the senior managers evolved during the development of the CBTA system. These included the expectation that the company would be able to demonstrate that its operators were competent to perform their job, as assessed by a formal process consistent with its objective of satisfying the major hazard facilities regulations. However, the actual outcome, whereby the majority of operators satisfied the requirements for the Certificate III, did not produce the outcome required by the senior managers. The actual outcome did not demonstrate that all the operators were competent to perform their job. The operators assigned to the Units for which no training and assessment had been developed were unable to demonstrate their competence on these Units. Similarly, the operators who had not participated, or had not fully satisfied the requirements of the CBTA system, were unable to demonstrate their competence. This expectation could only be satisfied when all the production Units had been included in the CBTA system and when the entire operator workforce had successfully participated in the CBTA system for the Units to which they were assigned.

An expectation, which was a secondary driver in the initial stages, was extended and became increasingly important for the senior managers. Initially this was expressed as a need to achieve consistency in the way the operators performed the job. That is, they expected all operators to implement the correct procedures and for those on the same Unit to be thinking and performing the tasks in a common manner from shift to shift. Increasingly the senior managers expected and demanded that the operators performed according to the correct procedures. To the extent that the operators needed to demonstrate performance against these procedures in the Field Assessment, the expectation that the operators could perform using the correct procedures was satisfied. However, whether this expectation was satisfied through the operators replicating this correct performance during their day-to-day operations, was unknown. The attitude displayed by some operators suggested that this would not normally occur, as most believed that the procedures learnt over the years of experience were more appropriate. The informal RCC process that occurred in some cases, where some assessors used their prior knowledge of the performance of specified job tasks to judge that a person was competent, was only likely to reinforce the existing patterns of performing the tasks. Further, this practice of recognising prior performances for judging competency would
not highlight the standard at which each task should be performed, and was therefore unlikely to bring about any changes in behaviour. In addition, two approaches adopted within the CBTA system were not conducive to learning to perform according to procedures and to changing previous behaviour. The first was the developers’ requirement that the operators simply locate and read the correct procedure. The second was the practice adopted by some operators of treating the assessment as a process of simply scanning the procedure to find the correct phrase to fill in the response. Some operators commented on the lack of hands-on training and assessment, which is relevant to this expectation. More emphasis on the assessment of a demonstration of a simulated response in the field using the correct procedures might have brought about some change. However, some operators believed the more recent approach taken by the management, of holding inquiries and blaming the operators for not operating to procedures, had brought about a bigger attitudinal change in the workforce and the consequent reading of the procedures than was achieved through the CBTA system.

One ZPM had outlined an expectation not identified by others, which was to capture the “company’s corporate knowledge” that had developed over a period of time. He had this expectation because he was aware that many senior operators were leaving the company and taking with them skills and experience built up over many years. By documenting this knowledge, he believed that much of this could be captured for the future. To some degree, this had been captured in the learning materials by using some of the senior operators to assist with the development, but this was not seen as sufficient to fully and accurately capture the knowledge and skills contained within the workforce. This was particularly so because of the tight deadlines for the original development and the inability to take people off shift, some of whom were also participating in the CBTA system. The increased capacity provided through the expansion of the system into the Asia-Pacific enabled a decision to be made in early 2004 to take some of the senior operators off shifts. These operators would be used to assist to improve and expand the existing learning materials, which would enable this outcome to be achieved.

**Competitiveness, productivity and quality improvements**

Additional company expectations emerged as the CBTA system was being introduced. The HR manager and the ZPMs included some underlying outcomes. These were to improve safety, increase quality and productivity, which were consistent with those identified by the NTB (*National Competency Standards-Policy and Guidelines*, 1992).

Most operators believed they had not become more productive as a result of the training and assessment. Further, they did not believe any of the other operators had shown any improvement in productivity, with one or two indicating the opposite might have been the case as there had been a number of mistakes recently. The latter comments related to the more
recent management initiative, where incident inquiries were conducted and some operators were disciplined.

In general, the company’s main indicators were suggesting an improvement in the overall business outcomes. But over the period of time in which the CBTA system had been implemented the company had introduced a number of initiatives, all of which were designed to improve overall performance. As a result, it was not possible to attribute all of this improvement in performance to the implementation of the CBTA system. However, a ZPM reported that the CBTA system had assisted to increase productivity by enabling the recently planned reductions in the workforce to occur because of the improved attitude, skill levels and general confidence of the operators. Further, he believed the system had improved productivity by assisting the workforce reduction program by providing the capacity to train operators to become competent in the operation of a new Unit and removing much of the anxiety of being transferred to a new Unit. A ZTL indicated the company had not assessed the contribution of the CBTA system, particularly in relation to the number of incidents or any other measure. However, he believed a measure that should be considered was that from 1993 the number of operators had decreased from around 210 to 145 with an increase in product output of around 42% over that period. He considered much of this had occurred because of the operators, although he acknowledged that management and engineering initiatives had occurred over that period of time. However, other ZTLs contributed the significant improvement in productivity and quality to the technology that had been introduced over that time.

**Use of formal mechanisms to measure the impact**

The company regularly maintained many formal business performance measures related to productivity, quality and safety, but none attempted to directly identify the impact the CBTA system might have had on these measures.

The ZPMs and the training coordinators acknowledged that any attempt to formally measure the impact of the CBTA system on productivity, quality and safety would be extremely difficult. This was particularly so when other significant changes, such as the introduction of new control systems, special initiatives to improve performance against procedures and significant reductions in the workforce had been phased in over a long period of time to improve productivity and quality.

**Use of anecdotal methods to measure the impact**

The ZPMs and some of the ZTLs provided anecdotal evidence of improvement in performance, but none could directly attribute this to the implementation of the CBTA system. As indicated above, a ZPM reported an improvement in performance partly due to the implementation of the system was the decrease in incidents attributed to a lack of knowledge.
He also reported on the improvement in business performance measures, but because of all
the other changes and initiatives, he could not determine the extent to which this had
changed as a result of the implementation of the system.

Unexpected Outcomes

Some outcomes reported by a ZPM were not among the company's expected outcomes.
These related to changes in the operators. They included the development of a learning
culture within the group; the improved ability to learn and be receptive to learning new things;
the development of interests in new areas of work; and the general increase in interest shown
by asking detailed questions about the work. Evidence of the establishment of a learning
culture was reported, whereby about 40 operators independently took on further study to
become accredited workplace assessors and trainers. This was an unexpected outcome
which increased the training and assessment capacity of the company and increased the
understanding of competency-based approaches for further development.

In addition, the establishment of a CBTA system brought unexpected benefits. These
included a more effective system for disseminating information, particularly procedures, and a
platform for delivering all training to a range of employees within the plant, including the
capacity to provide training for new operators and for operators assigned to new Units. The
extent to which the broader dissemination of information was effective as a communication
tool was unknown. The operators were aware that the electronic system was used to
disseminate information, but showed an initial reluctance to want to read the material. The
CBTA system also had the capacity to capture the corporate knowledge of the senior and
competent operators and this had been acted upon in the recycling decision-making stage to
improve the quality and effectiveness of the learning materials and the assessment
instruments.

The establishment of the CBTA system, as a template for further delivery, was also seen as
an important investment as it had created a sustainable training and assessment system
which could be managed and maintained with less training coordinators than the previous
arrangements. As a result, the company had reduced the number of training coordinators
from three to one. However, the company was also able to use the expertise of those
involved in the development of the system due to another unexpected outcome, which was its
capacity to offer the system to other company plants in the Asia-Pacific region on a fee basis.
Recent planning was examining whether the new expansion of the CBTA system into the
Asia-Pacific region could assist the company to fully achieve its original expected outcomes,
by providing the resources to fully develop the system to include all the production Units in a
cost-effective manner. Further, the process of expanding the CBTA system and marketing it
to the other plants had introduced the requirement to enter into joint planning to meet the
needs of the other plants. This process had the potential to highlight the need to develop and
document the process and to improve on the reliability, validity, fairness and flexibility for future users. Consequently, this unexpected development had the potential to significantly improve the CBTA system and to satisfy the expectations that were not satisfied in its initial implementation.

**Explanation and Building of Knowledge**

**The conceptual framework**

As discussed in Chapter 2, two competing theories of change were identified; the planned change model and the emergent learning approach. The approach adopted in this case was described above as an action learning approach. While the approach could not be described as a planned change approach, neither does it fit the description of the emergent learning approach. It would appear to be somewhere between the two approaches, but perhaps lying closer to the emergent learning approach. Nevertheless, the Conceptual Framework adopted for the study was able to describe the process that occurred with this intervention. Each of the Conceptual Framework stages was employed as the intervention was planned, structured, implemented and recycled, with changes in direction occurring as a result of the internal or external factors which emerged. The Framework identified the degree to which planning occurred and its impact in limiting the development in the first cycle of the Conceptual Framework, but recycling or outcome decision-making provided feedback which compensated for the lack of initial planning and brought about changes in the strategies and the actions. Although the developers had not identified any specific stages for the development of their intervention, and despite the apparent lack of planning and structure in this intervention, the Conceptual Framework provided an appropriate structure within which actions could be classified and the case study developed.

**The Kirkpatrick Model**

The Kirkpatrick Model also provided an appropriate framework within the Conceptual Framework to collect data on the impact of the intervention. Through its four levels, the model provided a framework for the collection of evidence as a measure of the learning which had taken place over a period of time, the opportunities provided to use this newly learned knowledge and skills in the workplace and the results obtained through this process. Although quantitative data was not available from the company with which to make an assessment of the impact of the intervention, the Kirkpatrick Model allowed for the ordered collection of anecdotal evidence to provide some insight into the impact of the intervention. This has been used where appropriate in the propositions below.
The propositions

The study established a series of propositions in relation to the manner in which the CBTA system would be introduced in an enterprise. The following outlines the implementation of the CBTA system in Company B in relation to those propositions.

Proposition 1

The enterprises will implement a CBTA system to achieve productivity, safety and quality improvements to enhance their competitiveness.

Enhancing the company’s competitiveness was not expressed as the initial purpose for implementing the CBTA system. Once the initial decision-making stages had begun, and the system’s potential became clearer, some senior managers expressed a secondary or underlying expectation which included productivity and quality improvements, but this was not seen as the primary purpose for the implementation. Another underlying expectation, expressed by the training coordinators and some of the senior managers after the process had commenced, was to achieve greater consistency in the procedures used by the operators for performing the job. Possibly quality and safety issues were underlying this expectation, but the company did not explicitly identify them. Further, the issuing of the major hazard facilities regulations, which was a major safety health and environmental requirement, did not appear to cause any explicit safety related expectations for the system. As a result of the regulations, the senior managers viewed the CBTA system as a ready means for demonstrating the competence of the operators and for complying with the regulations.

There seemed to be an implicit view among the managers and the training coordinators interviewed, that providing training was good and that some benefits would occur as a result. These benefits were not clearly specified. However, if and when the outcomes were specified, they were often expressed as a change in operator behaviour and their knowledge and skill levels and not as a requirement to improve productivity, quality and safety.

Generally, the company could not be considered to have implemented the CBTA system to achieve productivity, safety and quality improvements to enhance their competitiveness.

Proposition 2

The enterprises will implement a CBTA system that is unique to the enterprise and strongly influenced by external and internal factors specific to the enterprise.

The company commenced a process of benchmarking and observation in the planning decision-making stage to identify the form of the new training system. Following the study tour it commenced a DACUM process to identify its requirements. At this stage it was on the path of attempting to develop a unique program. Its desire to deliver training using the
intranet caused it to seek support from outside the company. As a result, a TAFE Institute became involved as an ‘external factor’ and steered the company towards the national industry training package. By developing qualifications within the framework of the training package, consistent with the AQF, the system was potentially similar to others, but the company developed a unique CBTA system within this framework. This was influenced significantly by the internal factors specific to the enterprise, but also by an external factor that was specific to the industry sector, specifically the major hazard facilities regulations.

The company made no attempt to learn from the implementation of CBTA systems in other enterprises to guide the implementation or to determine appropriate features for the system. The only external input in this respect came from the TAFE Institute. The training coordinators were fiercely proud of the system they had created and they and some senior managers viewed it as a benchmark for others to achieve, despite having little knowledge of what other systems were in existence. The training coordinators initially developed a broad concept, which was shaped by a number of factors in the planning decision-making stage. Although the process used by the developers could be tracked through the stages of the Conceptual Framework, no detailed planning or structuring occurred and no documentation was produced which identified any formal stages used in the change process.

The process of introducing the intervention was a very pragmatic action learning approach. Little consultation was undertaken to identify the expected outcomes of the key company stakeholders to shape the initial planning and structuring. An action learning process was adopted, based on resolving issues as they emerged and changing actions and approaches as new requirements emerged through internal or external factors. This was a pragmatic approach that relied on recycling decision-making and changes in direction throughout the structuring and implementing decision-making stages.

Generally, the company had implemented a unique CBTA system that was strongly influenced by external and internal factors specific to the enterprise.

**Proposition 3**

The enterprises will implement a pragmatic CBTA system using a narrow skills-based approach giving little attention to higher order competencies; the requirement for transferability of skills and knowledge to new situations and environments; the assessment principles and issues or the learning approaches that could optimise learning effectiveness and retention of competencies.

Adopting qualifications from the national industry training package prevented an approach which was too narrow and pragmatic, but the training coordinators did consider that many of the competencies were ‘fillers’, clearly not pragmatic competencies. The core competency structure of the training package ensured a broader system coverage and on at least one occasion closer analysis of a core competency stimulated further thinking and the eventual
acceptance of a continuous improvement competency that had originally been rejected. The
need for higher order competencies was not commonly supported by those who influenced
the direction of the system, but problem solving and trouble shooting competencies were
included, at least because they were included in the training package. However, the structure
of the system for the Certificate III reflected a more pragmatic approach, which ignored the
competencies required and placed its emphasis on the knowledge-based aspects perceived
to be required to operate a production Unit. However, this generally suggested that the
developers were tending towards something more than a simple narrow skills-based
procedural approach.

The developers gave no specific consideration to enhancing the capacity of an individual to
transfer and apply skills and knowledge to new situations and environments when selecting
the competencies for the system. The company initially selected competencies from the
training package related to the specific tasks to be performed in the job. Indeed, with the
development of the Certificate III, the company became more job or Unit specific and did not
consider transferability and adaptability to new situations, even for the transfer of an operator
to a new production Unit. The company had determined that when an operator transferred to
a new production Unit, the operator would be required to show that he was competent to
operate that Unit by using the learning materials to the extent required and successfully
completing all the assessments.

The developers gave no consideration to the assessment principles of validity, reliability,
fairness and flexibility. The developers adopted a pragmatic assessment approach, with the
major driving factors being to ensure the assessment process was administratively
manageable and funding commitments were honoured by delivering specific Certificate
levels. The RCC process at the Certificate I level was partly adopted for cost-effective
reasons. However, little consideration was given to including a RCC process in the Certificate
II and III. The decision not to include a RCC process was influenced by the perceived lack of
robustness of the process and the desire to implement a system that was perceived to be
more credible for external audits. Separate knowledge-based assessment and field
assessments were used. The latter appeared to use a holistic approach in the sense that a
number of competencies were covered in the one assessment event, but a checklist
approach was used for recording competency for separate parts of the event. Decisions had
been made about correct response rates for the knowledge-based assessments based on the
 provision of sufficient evidence to judge that the individual was competent. However, no
consideration was given to the reliability of the Field Assessment, where it was specifically
stated by one of the key developers that different assessors required different kinds and
quantities of evidence on which to make judgements. Evidence guides were not developed to
increase the reliability. The approach taken was to leave the evidence requirements, the
standards and the judgement to the individual ZTL on the basis that he was ultimately
responsible for how his team performed.
The developers decided upon a pragmatic learning approach using a computer-based system, because it allowed the operators to gain ready access to the materials at all times and reduced the resources required to manage and deliver the learning. However, the developers were forced to make a pragmatic decision to use a print-based approach for the Certificate II, because they did not have the time or resources to establish an intranet system at the time. While the developers were aware that the operators were unlikely to prefer a computer-based approach, which was generally the case, no consideration was given to adopting learning approaches that would optimise learning effectiveness or retention. No consultation or discussion occurred with the operators to determine their preferred approaches or any other more appropriate approaches, nor was any attempt made in the Certificate III to supplement the learning with any other approaches. However, when the print-based approach was used in the Certificate II, difficult sections were supplemented with classroom sessions. The operators created alternative approaches to learning for the Certificate II. However, in these cases, this was often driven by a pragmatic decision to complete the assessment instruments as quickly as possible by relying on the collective knowledge of the group, rather than to provide effective learning approaches. Nevertheless, many operators indicated they found this an effective way in which to learn and it was one of their preferred approaches. In most cases the operators preferred a practical based, one-on-one, learning approach such as the previous buddy system.

Generally, the company had implemented a pragmatic CBTA system, which was based on job-specific competencies, but had given consideration to higher order competencies as they related to the job. However, no consideration had been given to assessment principles, the transferability of skills to new situations and environments or to learning approaches that could optimise learning effectiveness and retention of competencies.

Proposition 4

The enterprises will improve the CBTA system using an evolutionary process of resolving system issues as they arise over time.

As indicated above, the initial CBTA system was implemented with an action learning process involving an evolutionary process of resolving issues in all decision-making stages as they arose. On completion of the initial implementation, further recycling or evolutionary processes were about to occur to improve the initial CBTA system. These included developing learning materials and assessment instruments for the Certificate I for new entrants; developing learning materials and assessment instruments for the production Units not included in the initial implementation; improving the quality of the learning materials and assessment instruments in the Certificate II and III; and extending the system to other plants in the Asia-Pacific region.
Generally, the company relied on an action learning approach with ongoing recycling decision-making and evolutionary processes to improve the CBTA system, by responding and resolving the emerging issues as they arose over time.

**Proposition 5**

The enterprises will identify the perceived benefits of the training by observing improvements in employees’ job performance, but will have no formal evaluation mechanisms to determine if the expected outcomes have been achieved through the CBTA system.

The company had not developed any structure to identify the benefits of implementing a CBTA system. The company’s initial expected outcomes were to increase the knowledge of the operators and to prove that the operators were competent to satisfy its obligations under the major hazard facilities regulations. From the company’s point of view these outcomes could be measured by the individual assessment of the operators. Therefore, no other measures were required. However, the underlying expectation of improving productivity and quality could not be assessed in this manner. When questioned, some managers identified perceived changes or improvements in operator performance, which they partly attributed to the CBTA system, but none could specify that these improvements translated to improved productivity, safety or quality. Equally, they also identified inadequate performances where incidents had occurred.

The company had no formal mechanisms to determine if the expected outcomes had been achieved. The only measures were the assessment instruments used. As indicated previously, there seemed to be an implicit view among the managers and the training coordinators that providing training was good and that some benefits would occur as a result. However, these benefits were not formally identified or measured nor was any attempt made to link improved performance in the workplace to improved productivity or quality.

**Themes and Concepts Identified in the Case**

The purpose of the study was to build theory in relation to the manner in which CBTA systems are implemented in workplaces. This case study investigated why the company introduced a CBTA system; the features that have been implemented; the decisions made by the company when planning, structuring and implementing the system; the reasons for its decisions and the factors which influenced them. In addition the case study identified the company’s expected outcomes and the impact of the implementation of the system.

The insights gained from the case study of this company can add to the process of developing theories about the training needs of enterprises, the factors which influence the decisions of enterprises when implementing systems and the impact of implementing such
systems. The themes and concepts arising from the data can also contribute to the
development of this broader knowledge.

The themes and concepts arising from the data in this case study include:

The drive for more training was partly initiated by the operators

The drive for more training was initiated by the senior operators or Boardmen through their
request for higher level training, although this was supported by the training coordinators’
concurrent desire to provide a proactive training approach.

The specification of competencies as a base or datum requirement for the job

The key training coordinator introduced the concept that the CBTA system was to establish a
minimum skills and knowledge requirement. This implied that the company’s current
standards were only entry level requirements and that further ‘stretching’ of the knowledge
and skills was required to demonstrate higher level performances, presumably through
practice on the job. The key training coordinator reinforced this notion when he suggested
that the correct response rates for the knowledge-based assessment would be raised over
time. This could impact on the reassessment of current operators, but would mainly impact
on new entrants. However, the company had not specified standards for higher level
performance form its more experienced operators, but the planned provision of a Certificate
IV qualification for the Boardmen could be seen as a means of raising the knowledge and skill
levels for experienced operators.

The approach to implementing the CBTA system

The developers adopted what was described as an action learning approach. This involved a
concept or vision of a large-scale implementation that was not supported by adequate
planning. As a result the initial structuring decision-making was limited and the concept was
developed as recycling decision-making occurred within the structuring and implementing
decision-making stages. Consequently, the developers had embarked on a large-scale
implementation without fully appreciating the size of the task and the level of resources
required for completing the task. They were then committed to this large-scale project
because of the commitments they had made to achieve the funding for the intervention. Their
lack of appreciation of the size of the task forced the developers into implementing a large-
scale resource intensive project without any consideration of staging the implementation.
Little documentation was developed as the intervention progressed and no documented
information appeared to have been provided to senior managers or the operators relating to
the purpose of the intervention or the features which would be incorporated in it. The
completion of the large-scale project fell short of the vision, because not all production Units
were included.
The initial development in the Certificate I and II was not focused on the company identifying the role of the operator, but was focused on selecting competencies to satisfy qualification rules from those specified in the industry training package. No attempt was made to identify whether there were any specific company competencies required for the role, which might not have been selected because they were not specified in the training package. The initial focus was clearly on the competencies required to complete the Certificates to ensure that the funding commitments were honoured. In the Certificate III planning and structuring decision-making stages a significant change occurred and the focus shifted to identifying and delivering the knowledge-based learning materials required for the operation of the plant Units. No competencies were identified for the operator to operate the production Unit, but the training package competencies were mapped as a secondary exercise against the learning material content. The Field Assessment was initially compiled based on the competencies mapped against the learning material content for operating the Unit, and then supplemented with additional assessment requirements to ensure all the competencies required to complete the Certificate III were assessed.

Overall, it was a very pragmatic approach based on implementing the concept and resolving issues as they occurred. The approach appeared to emphasise the content of the learning material, which was focused on the knowledge required for the role, rather than a practical demonstration of the competencies. Further, little emphasis appeared to be placed on the standards required and the operators were not made aware of the competencies or the standards, at least at the Certificate III level.

**Retention, periodic assessment and ongoing performance levels**

The company determined that it needed to reassess those competencies considered critical to the performance of the role and for which the safety, health and environmental consequences were high. This implied that the company might have been concerned about the retention level of these skills and the capacity of the operator to perform at the appropriate level after the initial assessment. This has implications for the current concept of CBTA systems, but perhaps also reflected on the confidence the developers had in the learning effectiveness of the system and the assessment instruments used to make the judgement. This need for reassessment could also be related to the inability of the operators in this industry to use and practice all of the knowledge and skills on the job, because many were only required for emergency situations. However, in this particular situation the competencies being reassessed in this situation were critical, but they were also competencies which would be used fairly regularly by the operators.

**The use of refresher training in the CBTA system**

Although only used to a limited extent, refresher training was available for all operators because of the intranet delivery approach. Its use was dependent on the operator, but the
only time it might be formally required would be when the operator was about to be reassessed on the critical competencies.

Preferred learning approach in the workplace

Generally the operators preferred a hands-on learning approach with a one-on-one mentor or ‘buddy’ system. However, group discussions - learning from peers and the sharing of knowledge in these discussions - was also a favoured mode of learning for this cohort of operators. The operators initiated a group discussion approach, but an approach initiated more recently included scale models of the plant in ‘What if?’ scenarios and discussions on the corrective actions or procedures required in certain situations.

Limits on the range of skills which can be performed on-the-job

The special nature of this industry meant that limited opportunities were provided in the daily work for the operators to perform tasks based on all the skills and knowledge required for the job. Consequently, problems arose in creating the opportunities for the operators to practice the knowledge and skills required in an environment of this type where it was difficult to engage in every task, even though many, such as emergency shutdowns could be critical. Work experience was not available for this type of activity which infrequently occurred and the situation could not be induced to allow training, because of the cost and danger of doing so. This situation lends itself to the provision of refresher training through simulation or other means, to ensure that the knowledge and skills are reinforced and practiced to aid retention. This is particularly so for the special emergency situations which might arise.

The role and position of competency-based training in the broader company environment

The operators were a significant part of the workforce in the plant. Initially, the senior managers had little or no involvement in the development of the training for this group, and as described by one developer, only showed a “passive interest” in the development. The broader training for this group was initiated by the training coordinators and initially appeared to create minimal interest within the company. Direct links were not made between the implementation of the CBTA system and the potential to enhance competitiveness through improved safety, quality and productivity. There was an implicit view that providing training was worthwhile and would provide benefits, but these benefits did not initially extend beyond increasing the knowledge and skill levels of the operators. The provision of training was not central to any company strategy to enhance competitiveness or to produce a safer environment. The CBTA system was unlikely to have been developed within the company had government funds not been available for its implementation. The emergence of the major hazard facilities regulations raised the importance and status of the CBTA system with the senior management. This occurred simply because it was being implemented at that time.
and because they could see that it provided a ready means for the company to satisfy some of the requirements of the regulation.

**The value of introducing a CBTA system in a workforce of very experienced operators**

Most of the operators didn’t think they had learnt anything. Some suggested that they learnt some minor things they had previously forgotten. Generally, they believed there had been no change in their performance and that of their colleagues as a result of the system. Some managers suggested there had been changes in performance that could be partly linked to the training. Attitudinal changes had also been described, such as a greater interest in the job and increased awareness of their own performance.

No formal measures were introduced to measure any changes as a result of the system. Therefore, it is not clear whether the company gained any value by introducing the CBTA system with a workforce of experienced operators. It is also not clear whether the operators claimed that they had not learnt anything because of personal factors, and that as experienced operators they believed they knew all there was to know about the job, and therefore were not prepared to acknowledge they had learnt from the system. Equally, it is not clear whether the managers’ perceived performance changes were real or simply made to justify the time and effort put into the development of the system.

However, observations were made by managers, team leaders and some operators that had the operators not participated in the training, the company’s workforce reduction program would not have been implemented as successfully and the resulting productivity gains might not have been so readily achieved. Further, it was suggested the more recent initiative, requiring flawless performance and consistent operating performance from the operators, was also aided by the CBTA system.

It would appear that the company did not gain any major value, or at least was unable to identify any major value, in relation to the improved performance of the experienced operator workforce from the significant effort required to implement the system. However, it appears that it did gain some value from the operators’ participation in the CBTA system, whereby it enhanced the effectiveness of other significant initiatives.

The company also gained significant value from unexpected outcomes. That is, a systematic and sustainable training and assessment system had been established for the future and for the Asia-Pacific region, the corporate knowledge and skills of the experienced operators was being captured, and a learning culture was emerging among the operator workforce. In addition, the senior managers had also developed an increased interest in learning and training and its importance within the company.
Case Study: Company C

**The Company**

Company C is an Australian company which is a subsidiary of a multi-national company and is a designer and manufacturer of automotive equipment and accessories. The company employs approximately 600 people. The company has an integrated and documented total quality management system for its operations and products, which complies with the requirements of ISO 9001:2000 and QS-9000.

The international company was founded in 1899. Many branches of the company were established internationally and the Australian subsidiary was established in 1961 on its present site. The manufacturing section of the company is organised into eight departments. Three of these are responsible for goods and product storage and the other five departments specialise in the manufacture of a particular automotive component. A number of different versions of this automotive component are manufactured by the company, each designed to specifications for a particular model of car. A number of production lines operate within each department. Each production line within a department produces one version of the automotive component manufactured by that department. The overall plant is operated as a single entity and workers can be transferred from one department to another or from one line to another within a department.

Each department has a Group Leader or department manager, a Senior Team Leader, a number of Team Leaders on the production lines and production operators. Each department has a training budget for all its employees and the Group Leader is responsible for the allocation of employees to the training programs and activities conducted within the company by the Training Department.

A Training Department is responsible for the provision of training for all employees in the company. This department is responsible for the development, implementation and administration of all the training provided for the production operators within the plant, which includes jointly implementing the CBTA system with the department Group Leaders.
The Context

The ‘boundary’ of the Case Study for Company C was identified as encompassing the CBTA intervention that occurred for the production operators in one department in the manufacturing plant. This included the external and internal factors that influenced the decision-making in that intervention.

The Federal Government, under the banner of the ‘Structural Efficiency Principle’, was attempting to make the Australian workforce highly skilled and flexible in order to meet the new demands and challenges and to make Australian industry more competitive. The Federal Government’s approach was based on increasing the skill levels of the worker through training, changing industrial Awards and restructuring to gain the flexibility required in the enterprise workforce. In particular, the metal industry union covering the company’s production operators was a forerunner in driving this change for its members and was supported in its endeavours by the metal industry employers association. The purpose for changing the industrial Awards was to establish skill related career paths, multi-skilling and broad-banding within the industrial Awards. Consistent with the Government’s approach, in the mid-1990s unions and employer bodies were introducing Award changes and new work structures involving multi-skilling of the work force in many manufacturing plants, including Company C.

Company C went through considerable change in the late 1980s and the 1990s related to reductions in the workforce, reducing costs and increasing competitiveness. As an original equipment automotive component manufacturer it was required to implement quality systems and meet the demanding requirements of supplying quality components for the just-in-time manufacturing approach adopted by Australian car manufacturers. These changes were made at a time when the company needed to remain highly competitive and guarantee a supply of components to meet the car manufacturers increasingly demanding requirements. Many of the production operators in this study were directly impacted by these changes.

The changes included the introduction of new technology, new work systems and quality control arrangements, all of which depended on increasing the skill of the individual operator and placed greater responsibility on those in that role. The company workforce was highly unionised, but very dependent on the actions of the central union organisers who conducted all the negotiation with the company on behalf of the operators.

Across the manufacturing plant the company had a large number of long-term workers who were employed in the 1960s, many of whom were refugees from Asia. Most of these people still had English language problems, which restricted their capacity to benefit from the competency-based training and to advance through the linked industrial Award classification structure. Normal replacement employment practices had continued through the 1960s to the
mid 1990s, at which stage the company took on a larger number of new employees than normal in a time of expansion which was supported by state and national government incentives to employ trainees. The trainees were employed under traineeship arrangements and trained in a range of competencies in accordance with the company’s training requirements and its training commitment under this arrangement.

Instead of achieving a multi-skilled workforce, the employment practices adopted, combined with the manner in which the company implemented the CBTA system through to 2002, resulted in the company finally having a workforce with at least three different levels under the classification structure. One group comprised the long-term operators, who refused to participate or who were unable to participate or benefit from the training because of language difficulties and remained on their existing classification. The second group were all classified at the highest operator level and comprised the newer employees, who completed a traineeship, and other existing operators who had gained full recognition for the required competencies. The third group comprised those existing operators who were part trained and in a middle classification level and could not gain access to opportunities to progress further. The outcome of this situation was that the company had operators working side by side on the same job at different rates of pay, and the newer operators were on the highest classification with many long-term operators restricted from achieving this level. This situation caused considerable discontent among the operators with the company and the CBTA system.

The department, which was the subject of this study, had a Group Leader who was the senior supervisor and was fully responsible for the operation of the department and the performance of the department employees. This included the allocation of budget resources to training and the provision of training opportunities to individual members of the department. The remaining management structure for the department comprised a Senior Team Leader, who supported the Group Leader in administrative functions, and a number of Team Leaders, each of whom was responsible for a number of production operators. When the interviews were conducted for this study, approximately 55 production operators were employed in the department.

**Role of the Production Operator**

The department was responsible for producing one type of automotive component, but made this component to a number of different designs, one for each model of car made by their customers. To achieve this, a number of production lines operated in the department each making a particular design of the product. The operators were assigned to the production of the product from one of these lines.

Prior to the CBTA system being implemented the company structured its operator work force to include General Hands, Assembly Operators and a Jumper. The company had intended to
introduce a multi-skilled workforce that allowed the operators to perform any of the jobs on the production line. Under these arrangements the different function and classification of operator would no longer apply.

The functions of the operators on the production line included providing the raw materials to the production line from the store; manufacturing the product from the raw materials; assembling the product; testing and quality checking the product; packaging and dispatching the correct quantity and type of product to the warehouse for storage or immediate delivery to the car manufacturer.

The shift to a multi-skilled workforce had not been effectively implemented at the department level and, at the time of the study interviews, the three different roles identified for the production operator had been re-established. These different roles were no longer formally recognised within the company, but had been re-established by the department Group Leader to achieve the level and quality of production required from the department. One role was the assembly operator who worked on the line manufacturing the component and assembling the final product. An assembly operator was generally capable of performing more than one function on the line and could be rotated through a number of different functions depending on the extent of the operator’s skills. A second role was the ‘jumper’ who could perform any function, on any equipment, in any team on the line. The jumper assisted or replaced operators on the line if there was a problem or when an assembly operator needed to leave the line for a toilet break or for other reasons. The third role was the general hand who received the parts from the store and supplied the line with parts, moved the parts bins around the lines as required, moved the finished products to the warehouse and generally assisted in line changeovers from one design component to another. All of these tasks were considered by the company to be the role of the production operator with no distinction based on the function performed.

The Team Leaders were also production operators and generally supervised the overall performance of a team on the production line, assisted when problems arose and did sample quality control and measurement audits. The jumper assisted the Team Leader in this role when not required as a replacement on the line.

The Senior Team Leader supervised all lines in the department, assisted with problem solving and supported the Group Leader with administrative and management functions.

**Previous Training Experience**

Generally training was provided on a needs basis when an operator changed roles. This occurred on the occasions when operators transferred from one department to another or from one function to another within a department. Training was then provided for the operator until the person was capable of performing the new function at the level required.
Except for these circumstances, no specific job related training was provided to existing employees.

Specific job training was provided when a new employee came on to the line. A jumper, a team leader or another experienced operator provided the specific job related training by teaming or doubling up with the learner at the workstation on the line and showing the learner how to perform the function. The training was provided using a hands-on approach with the learner practicing the tasks to be performed until the trainer and the learner agreed that the level of skill required to perform the function at an acceptable level was achieved. No formal background knowledge was provided as part of that training. The knowledge passed on to the learner was dependent on the experienced operator doing the training and was specifically related to performing the procedural tasks required at the workstation. However, as indicated above, some of the operators had language difficulties, and in this case they simply learnt by copying the actions performed by the trainer. Generally, however, these operators stayed on the one job and rarely transferred to another job.

As well as the specific needs based training, prior to the CBTA system being introduced, some formal training occurred in relation to occupational health and safety and discrimination in the workforce. English language training was also provided out of work hours for those who wished to participate, but many operators who could have benefited from this did not take this opportunity, sometimes for cultural or family reasons. The company had a policy of not forcing operators to undertake training and participation in training was voluntary.

The Enterprise Bargaining Agreement

The introduction of the CBTA system was driven by the conditions of the Enterprise Bargaining Agreement (EBA) negotiated in 1996 with the representatives of six central unions. In particular, the metal industry union representing a large number of the employees in the company, strongly negotiated for the inclusion of a CBTA system, which was linked with a career structure and payment based on the skills required by the employee. The metal industry union and the metal industry employers association had previously linked skills and a career classification structure with payment rates in the industrial Award, and this arrangement carried through to the EBA negotiated with the company and the resultant industrial Award for the production operators. In this situation, one EBA was negotiated for all the employees in the company, but the arrangements which linked the classification structure and the skills and knowledge applied only to those employees who operated under the metal industry industrial Award, which included the production operators. The other unions involved in the negotiations had not previously established a link between the skills and knowledge required for the job and the salary rates, and were unable to have this included in the EBA. However, the provision of a CBTA system applied to all the company’s employees covered by the EBA.
The central metal industry union and the metal industry employers association had negotiated many such agreements across the metals industry and both bodies fully supported the concept of a career structure and payments linked to skills and knowledge. Agreements established after 18 March 1996 were linked through the metal industry industrial Award to the National Metals and Engineering Industry Competency Standards and the company was required under the EBA conditions to implement the system in accordance with the endorsed Implementation Guide (National Metals and Engineering Industry Competency Standards Implementation Guide, 1999).

The company first became aware of competency-based standards through its industry employers association in 1993, when the competency standards were being developed. They were consulted, along with other members of the employers association, on the competency standards. However, it was not until the EBA negotiated in 1996 that the company became directly involved in a CBTA system.

The company adopted the CBTA system because it had been negotiated as part of the EBA. Other companies were also going to implement the system and the metal industry employers association, upon which the company relied heavily, and the relevant union were promoting its use. The company was in a highly competitive industry and needed to avoid industrial disputes and to follow other companies to ensure that it remained competitive and maintained its contracts with the car manufacturers.

The company had made two attempts at implementing a CBTA system with its clerical workers, but the employees resisted its implementation because it was not linked to a salary structure. When the CBTA system was introduced to the production operators it received some resistance, but planning commenced for its implementation in 1996.

**Traineeship Program**

The CBTA system commenced in November 1997 with the initial audit of the operators’ skills. A Traineeship program was also commenced in November 1997. The participants in this program were new employees. The company required additional employees at this time and was advised by a TAFE Institute about the state and national government subsidies available if it employed these new operators through the traineeship scheme. The company needed to employ a significant number of new employees and was heavily recruiting late in 1997 and into the following year. It saw the traineeship program as a good opportunity to readily gain employees with a higher level of skills, compared with its previous practice of employing unskilled or semi-skilled employees, and to gain government funding for the training. The company commenced the traineeship program with a group of ten trainees. Over the next three years, it implemented a total of 12 traineeship groups as it employed new operators.
Description of the Case

The Planning Decision Stage

Identified needs and problems

What factors prompted the decision to implement a CBTA system?

The establishment of an EBA drove the need for the company to introduce a CBTA system. Underlying this was the company’s need to remain highly competitive in relation to others in the supply of components to the car manufacturers. Other companies were entering into similar agreements and the company could not wait to assess the impact of this in the highly competitive environment in which it operated. The company appeared to have little choice other than to agree to the introduction of a CBTA system through the EBA negotiations, because of the pressure from the union and the employers association and the commitment of its competitors to such a system.

The company had not identified its specific needs in relation to the introduction of such a system and was heavily influenced by the metal industry union and the metal industry employers association in determining what could be achieved through the introduction of the CBTA system. The company relied heavily on the metal industry employers association and was advised by the association that it would get benefits from the concept of multi-skilling, which was also included in the EBA as well as career structure arrangements. As a result, the company expected that if it implemented the CBTA system it would gain a multi-skilled flexible workforce. The company expected that it would have 300 people, all highly skilled, all highly flexible, so that people could be transferred across production lines and departments within the manufacturing plant as required by the company to meet its business requirements.

The company had documented that the purpose of the CBTA system was to:

- provide the company with a multi-skilled flexible workforce;
- recognise variations in skills and abilities and reward accordingly;
- provide a career structure for operators.

The company had not initiated the concept of multi-skilling, but believed there were advantages and benefits to be gained from having a highly flexible workforce and embraced the concept. The company expected there would be productivity gains as a result of this change.

To a large extent the planning decision-making stage for the company occurred in the EBA negotiations. The broad agreements reached in these negotiations formed a significant part of the planning for the CBTA system. Further, the industrial Award arising from the EBA
mandated the implementation of the CBTA system to be in accordance with the endorsed National Metal and Engineering Competency Standards Implementation Guide 1997, available at the time. Consequently, the company’s introduction of the CBTA system relied on this Implementation Guide, which outlined the steps required for the implementation of the CBTA system. The steps listed for the introduction of the system in the Implementation Guide were: Consultation, Matching Skill Requirements to the Competency Standards, Skills Audit and Implementation.

The company’s planning decision-making stage was brief and did not fully explore or plan the features of the CBTA system, because the company reacted to the pressure from the metal industry employers association, the union and the employees to implement the CBTA system as quickly as possible. As a result, the company did not explore or plan for approaches such as job reorganisation or redesigning of work, which the company could have used to gain the maximum benefit from the introduction of such a system. The company’s requirement was that each operator in a department had the skills to perform every job in that department. It appeared that there was no exploration to determine whether this would be a more effective arrangement than the existing arrangement or whether some concept of multi-skilling within the existing three levels of operator would be more effective.

The EBA had linked the use or the requirement to use the skills and knowledge for a particular job with a classification structure. This arrangement had the potential to provide pay increases to the operators, so the pressure from the union to commence quickly was based on the need to deliver pay increases to the operators quickly. Equally, the employees wanted the training and assessment as quickly as possible so that they could get to the next level of payment. The focus of the CBTA system for the employees quickly became the level of payment that could be achieved through the system and not the level of skills and knowledge that could be achieved.

The company decided that the operators’ participation in this CBTA system would be voluntary, despite its expectation of achieving productivity through the multi-skilling of all operators and the union’s desire for all operators to be assessed and receive training to increase their skills and knowledge. Some operators decided not to participate in the CBTA system.

**Company expectations for the outcome of the CBTA system**

*What were the expected outcomes from the introduction of the CBTA system?*

The company expected that it would multi-skill its operators and gain a flexible workforce that would improve the company’s productivity and quality. The expectation was that each operator would, at the least, be able to do each of the jobs in their department and, over a period of time, the jobs in other departments. They expected that there would be no
restrictions on the availability of skilled people, which would allow the company to quickly shift its operators from one job to another to meet its business needs and the demands of the car manufacturers. It was expected that the capacity to move the workforce to meet these needs and to provide additional replacement and back-up operators when required would increase the productivity of the company.

The Group Leader and the Team Leaders expected changes in job performance as a result of the CBTA system. They expected that the operators would develop problem solving skills and improve their team work. In addition, they expected that the operators would develop quality assurance skills, with the operators constantly checking machine settings and the product and understanding the implications of their actions on the quality of the product. They held this expectation because quality was important for a vehicle component that was visible and the car manufacturer expected a high level of quality.

The planned CBTA system

What CBTA system was planned?

The competency ‘definition’, scope and complexity

It had been determined through the EBA that the competence of the operators would be assessed using the National Metal and Engineering Industry Competency Standards. The initial concept was that all the operators would be competent to perform all the tasks in the department in which they worked. This was a pragmatic approach formed through the implementation of the EBA, which was based on multi-skilling the workforce and a classification and payment arrangement based on the operator exercising or being required to exercise certain skills and knowledge in the job.

The competency standard definition or description had been determined by using the National Metal and Engineering Industry Competency Standards. It was decided in the planning decision-making stage, consistent with the Implementation Guide, that the scope of the competencies would be those competencies that were directly required for all the jobs performed in a particular department. The concept of multi-skilling had extended the scope beyond that required for one job within the department, but did not broaden the scope beyond that required for all the jobs.

The company decided that the competencies identified for each department would relate only to the jobs in that department and would not be linked to, or based on, the requirements for any particular qualification. Through the EBA and the Implementing Guide, these competencies were linked directly to a point system and a classification structure.
The process to recognise current competencies

In the planning decision-making stage, consistent with the five step plan in the Implementation Guide, it was decided that the operators would be assessed against the identified competencies to determine the skills and knowledge they currently possessed. It was decided that this was to be done by a series of annual audits. The first of these would be to recognise the current competencies. The initial audit was to determine the relevant skills and knowledge each operator possessed. This was to occur for two reasons. First, it would identify the operator’s training requirements, and second, it would determine the classification level and the rate at which the operator would be paid. The Implementation Guide showed how the competencies for which the operator was assessed as being competent directly translated to a number of points, which then translated to a classification and level of payment for each operator. As indicated above, it was decided that participation in the CBTA system was voluntary and audits would only be conducted on those who wished to participate. Further, once a competency had been recognised, it would not be assessed again and the points gained and the classification received would be assigned to the operator until they were increased in subsequent audits.

The assessment processes and instruments

As indicated above, it was decided that assessment would be through a series of annual audits. The subsequent audits had the same purpose as the initial audit and were to identify the training requirements and determine the level at which the operator would be paid. No decision had been made in this stage about who would assess the competencies or how the process would occur.

The learning approaches

No decision was made in the planning decision-making stage about the learning approaches to be adopted. The company had been closely following the steps in the Implementation Guide, which was silent on this matter. It appeared that the company made no decisions in relation to the learning approaches because it assumed the learning approaches previously used would continue to be used. That is, an operator would be assigned to a new workstation on the production line and would receive instruction from the jumper or another operator. In this manner, it was expected that the operator would eventually develop all the skills and knowledge required for any job within the department.
The Structuring Decision Stage

The structured CBTA system

What CBTA system was structured?

Why did the enterprise want a CBTA system of this type?

Consistent with the requirements in the Implementation Guide, the company commenced a consultation process with groups of ten, and all employees received a briefing on the overall system prior to any action to implement the CBTA system. The employees were advised that the CBTA system was a joint company and union initiative. The briefings outlined the steps for implementation and advised the employees that the company would work with each individual to discuss their skills against a list of skills required for the job. The employees were advised that the purpose of the exercise was to identify the skills that they possessed and to identify the training required to develop all the skills required for the job.

A Competency Standards Steering Committee (CSSC) was established comprising representatives of the management, including the human resources (HR) department, the Group Leaders, the Shop Stewards, and the employees. The CSSC was responsible for developing the policy and guidelines within the framework of the EBA and for overseeing the implementation. Central union representatives were not directly represented on the CSSC and took no direct role in the implementation of the CBTA system.

The operators placed pressure on the Shop Stewards who were members of the CSSC, because they wanted to start as soon as possible to gain points to increase their payment. Consequently the CSSC moved quickly to develop the policy and guidelines without the employer representatives fully identifying the potential to reorganise the workforce or redesign the jobs and the potential risks and problems of implementing the system with the policy established.

The competency 'definition', scope and complexity

In the EBA negotiations, which formed the basis of the planning decision-making stage, the company and the union agreed that the CBTA system would be based on the National Metal and Engineering Industry Competency Standards. In the structuring decision-making stage, it was decided to determine the required competencies by identifying the tasks performed in each department and then mapping the competencies against each of these tasks. A Working Party comprising the Group Leader, Shop Stewards, employees and representatives of the management was established in each department for this function. Each Working Party was to conduct a skills analysis and list the tasks required for the jobs in their department. These lists were to be presented to the operators to gain feedback on the
coverage and to reach agreement that they were the tasks required in that department. The Working Parties did not consider making any changes to the way the work was done in this process. They simply analysed the jobs to identify the tasks that were currently performed in those jobs.

Once agreement had been reached the competency standards from the National Metal and Engineering Industry Competency Standards were mapped against the identified tasks and they formed the competencies for that particular department. The competencies included applying quality systems and working with others in a team, which included discussing problems and their resolution and proposing and discussing suggestions for improvements within the team. No decision was made to link these competencies with any particular qualification or to extend the coverage over a number of departments. Consequently, there was no attempt to broaden the scope of the competencies beyond those directly related to the performance of the required tasks in the job.

**The process to recognise current competencies**

In the structuring decision-making stage, consistent with the Implementation Guide example, it was determined that the initial audit process would comprise a self-assessment component. Under this process the operators would receive a list of the competencies required for the department and they would mark those for which they believed they were competent. This list of self-assessed competencies was then to be verified and was passed to the Team Leader, who would also mark the list to indicate the competencies for which the operator was observed to be competent. Finally, the Team Leader and the Group Leader were to discuss the list and determine the claimed competencies that they would allow. This list was then to be forwarded directly to the HR department for processing and payment adjustments, if required. The HR department would then provide the first feedback to the operator on this process by indicating the competencies for which the operator was considered to be competent, the points achieved as a result and the resultant payment level.

It was decided that the operators would not be asked to demonstrate any skills on the job, unless the Group Leader and the Team Leader were in doubt about whether the operator was competent on a particular competency. No other forms of assessment appeared to have been discussed or considered at this time. It also appeared that no discussion occurred about whether the Team Leader or some other person should become a qualified workplace assessor.

It was decided that an appeals process would be included as recommended in the Implementation Guide. The purpose of this was to resolve any disagreement resulting from the assessment process. The process planned required an operator to appeal to the HR department within 14 days of receiving the audit decisions, if the operator felt that he or she
had been treated unfairly or disputed the outcome. The process then required a meeting to be established between the appellant and the Group Leader and Team Leader responsible for the decision. If the issue was not resolved at this level, and the operator wished to proceed with the matter, then the process required the operator to act within 14 days and to write to the HR department, specifying the grounds for the appeal and requesting a review. The process then required the HR department to form a Department Review Committee, comprising the Group Leader, the Team Leader or an expert from the department, the Shop Steward and a qualified workplace assessor from the HR department, to consider the appeal and resolve the issue.

As indicated previously, the reason for the initial audit was to identify the training requirements and determine the level at which each operator would be paid. The EBA placed this requirement upon the company and the audit assessment process was structured in a very pragmatic manner to achieve this outcome with very little additional cost to the company.

**The assessment processes and instruments**

In the planning decision-making stage, it was decided that there would be an initial audit process and then an annual audit process. In the structuring decision-making stage, consistent with the earlier decisions, the annual audits were structured to occur in exactly the same manner as the initial audit with the same capacity to appeal against a decision. No other forms of assessment appeared to have been considered and no intermediate assessments were to be made between the annual audits. All operators in a department were to be assessed at the same time, irrespective of the time when they might have satisfied the criteria for being judged as competent. Once a competency had been claimed it was not to be assessed in subsequent audits.

The company was attempting to implement the process at minimum cost without providing additional resources in a very competitive environment. It would appear that at this early stage the company was already thinking, like the employee, in terms of the requirements of the EBA and the Implementation Guide and the link between the competencies and the payment. The company did not appear to be thinking in terms of the needs of the business and its capacity to bring about any improvements in the way in which the work was done. Further, despite its expected outcomes, the company did not appear to display any desire to conduct additional audits to recognise an individual’s skills and knowledge to motivate the operators to provide the expected productivity and quality improvements. Perhaps this was because the company was structuring a system based on a concept that was initiated by the union and the industry employers association and it was not something that the company had thought about in terms of the future of its business. The company appeared to give insufficient thought to the manner in which the CBTA system could be structured to provide maximum benefit to the company.
Consistent with the pragmatic assessment approach structured for implementation, the company made no decision to train any of the people who were to be assessors. Each Team Leader was considered to be an ‘expert’. The company decided that it would only conduct a formal assessment of a demonstration of the competencies on the job, if required in an appeals process. The Team Leader was to judge whether the person was competent and could perform the task at the standard required, based on the Team Leader’s observations of the operator over a period of time.

**The learning approaches**

As indicated above, no decision was made in the planning decision-making stage about the learning approaches that would be adopted. Similarly, no consideration appeared to be given in the structural decision-making stage to identifying any new learning approaches or changing the learning approaches previously used by the company.

**The Implementing Decision Stage**

**The implemented CBTA system**

*What CBTA system was implemented?*

The CBTA system implemented for existing employees was generally consistent with the decisions made in the planning and structuring decision-making stages, which were based on the steps outlined in the Implementation Guide and the company’s previous practice. Participation in the CBTA system was voluntary and not all the operators participated. Training was offered to all the existing operators, but many declined to take the training.

However, the company deviated from the system structured in the structuring decision-making stage when it provided a CBTA system for its new recruits. As indicated above, in a period of heavy recruiting the company decided to implement a traineeship program just after the initial audit was taken of the existing employees. The traineeship program was provided through a TAFE Institute as a recognised provider. The conditions of the training agreement, as part of the traineeship arrangements, required the trainees to undertake a recognised qualification. A total of 12 traineeship programs were implemented for approximately 120 operators over a three year period. The traineeship program was only offered to new employees.

**The competency ‘definition’, scope and complexity**

It was decided in the structuring decision-making stage that the scope of the competencies would only include the competencies that mapped against the identified tasks required in each department. These competencies were taken from the National Metals and Engineering
Industry Competency Standards. However, with the decision to employ new operators under a traineeship arrangement this situation changed.

The traineeship program competencies went beyond those required for one manufacturing department, but did not include all the competencies required for all the departments. The scope of the competencies had been broadened for the new employees compared with that for the existing operators, because they were required to complete a qualification with specified requirements. Under these arrangements the new employees had the opportunity to become competent in a wider range of competencies than initially planned for the existing operators and consequently could achieve a higher classification and payment rate. However, all the traineeship competencies were related to jobs within the manufacturing departments and did not broaden the scope of the competencies beyond the company’s requirements.

The competencies required for each department were updated over a period of time. It appeared as though these changes were identified and decided upon by the Group Leader and the Team Leader prior to the implementation of each audit, rather than through the original Working Party structure. Over a period, some competencies would be added to account for new technology or new ways of doing a task and others would be deleted. The company’s quality certification under QS 9000 provided one situation that caused a broadening of the scope of the competencies during the implementation of the system. In 1997 a quality audit identified a ‘non-conformance’ because the operators did not have the knowledge required to perform a task known as ‘Statistical Process Control’. As a result, this task was included in the task list for all departments at the next audit and the relevant competencies ‘Performs Basic Statistical Quality Control’ and ‘Apply Statistical Process to Monitor Production’ were mapped against it.

The process to recognise current competencies

The initial audit for the existing employees was implemented as decided in the structuring decision-making stage. This was implemented by forming groups of ten operators and providing each operator with a detailed assessment booklet for their department. Three trainers from the HR department, who were qualified workplace assessors, provided instruction to each group and assisted the operators to perform a self-assessment against the competencies in the booklet. The trainers assisted the operators to do a self-assessment, but did not verify the assessment. Following the operator’s self-assessment, the Team Leader did an assessment of the operator’s competence and then the Group Leader verified the competencies marked for each operator in discussion with the Team Leader. None of those directly involved in the assessment process was trained as an assessor. However, if required, the qualified assessors in the HR department were available under the procedures for the Appeals process.
The outcome of the initial audit process was discussed between the operator, the Team Leader and the Group Leader to resolve any problems. Some of the operators were concerned about the conditions the company had placed on the competencies that could be claimed. The Implementation Guide and the industrial Award specified that competencies possessed by the person would be recognised if they were used on the job or required by the company to be used on the job. The company had interpreted this to mean only those competencies that were required for the department in which the person currently worked. In some cases, operators who had worked in other departments for significant periods of time were concerned that competencies they possessed from working in the other departments were not recognised, because they were not on the list for the department in which they currently worked. In this situation, long-term operators who were new to a particular department considered they had been unfairly treated in the initial audit. Other conditions applied, as explained in the next section, which the operators considered to be unfair.

The initial audit process structured for the existing employees was not used for the new operators who were involved in the traineeship program. The first group of new employees commenced their traineeship at about the same time as the initial audit, but no RCC process or initial audit was conducted prior to them commencing the traineeship program. No RCC process was applied for subsequent new employees who participated in the traineeship program. However, operators employed after the traineeship program ceased were treated the same as the existing operators.

**The assessment processes and instruments**

The subsequent audits for the existing employees were implemented as decided in the structuring decision-making stage, but at approximately 15 month intervals, commencing from the initial audit in November 1997, rather than on an annual basis.

The subsequent audits commenced with the HR department providing each eligible operator in a department with a personal assessment booklet. The booklet only included those department competencies on which the operator had not been previously assessed as competent. The operators were given two weeks to conduct a self-assessment using the personal assessment booklet provided. The operators read through the booklet and marked the tasks that they could do. The booklet was then forwarded to the Team Leader and the Group Leader who assessed and verified the competencies, as indicated in the process for the initial audit.

The booklet contained an introductory section in which the operator’s details, such as his or her name, the department, the operator’s classification, the operator’s employee number and the name of the Team Leader and the Group Leader were entered. The introduction also provided a “Questions You May Want Answered” section which provided questions and
answers that related to the process and also described the steps required for the operator to complete a self-assessment. Each Unit of Competency had two parts in the booklet.

The first part was headed by the competency title, for example, “Competency: Apply quality systems”. This was followed by the first “Element” with the list of “Criteria” for that element. Under the “Criteria” was a list of the tasks performed in the department, which related to that competency. The tasks were headed by a question “Can you do these tasks?” This pattern was repeated for each “Element” in the “Unit of Competency”. The operator’s task was to respond on each “Unit of Competency” page to the question, “Can you do these tasks?” by placing a mark against those tasks which he or she could do. A place was provided next to each task for the Team Leader and Group Leader to also make a mark to verify whether the operator could do the task.

The second part was on a new page and followed each Unit of Competency and was headed, “Summary of Competency Standard”. This page allowed a record to be entered against the “Unit of Competency” listing any “Element” within that “Unit of Competency” and the details of training that had occurred for that “Element”. A second section of this page allowed a record to be entered listing any “Element” and the details of any assessment that had occurred for that “Element” as part of the audit process. Such an assessment would only be required if the Group Leader had required a formal physical assessment to take place to verify that the operator was competent in performing the tasks for that “Element”. A section on the page was provided for the Group Leader to sign, when required, that the operator had been assessed as competent for that Unit of Competency and had been awarded “Full Competency”. Additional “Units of Competency” followed these two parts and repeated this two part pattern.

Finally, the booklet contained a “Skills Audit Summary” on the last page that identified all the “Units of Competency” required for the department that had not been previously recognised for the particular operator. A response was recorded against each “Unit of Competency” as a summary to reflect the outcome of the self-assessment and the verification process. This list was modified in subsequent audits to reflect the additional competencies recognised and the updating and changing of the competencies required in the department.

Some operators, who had previously been recognised in an audit as possessing all the competencies required for the department, might find that other competencies had now been added. In a subsequent audit, he or she could claim further competencies for recognition and accumulate the associated points. The operators accumulated points for the competencies recognised, which enabled them to progress towards a higher classification. Under these arrangements, an operator also retained the points previously allocated for the competencies that had been deleted. These accumulated points could be claimed for classification purposes and payment rates. However, as indicated, when new competencies were added
the operator could gain additional points and progress towards a higher classification. This sometimes caused inequitable situations which caused operator discontent. For example, as a result of a quality system audit, it was discovered that all operators needed to do the task, Statistical Process Control. This task and the associated competencies were added to the list of competencies required for all departments. Training was initially provided for this task, which allowed some operators to gain additional points to improve their classification. However, due to a change in the way the work was organisation, it was no longer a quality system requirement for all operators to do the task. The company ceased the training for all operators. This left a group of operators who no longer had the opportunity to develop the skills and knowledge required for this task and to accumulate the points to move to a higher classification, which disadvantaged them, compared with some of their colleagues. However, the task was still listed as a job required in the departments, so the associated competencies remained on the list for all departments. The inability of the operators to claim these competencies, because they lacked any opportunity to develop the skills and knowledge, became a barrier which prevented them from moving to a higher classification comparable with some of their colleagues.

Another condition appeared to disadvantage operators who had moved to a new department following the initial audit, unless they were classified at the highest level prior to making the transfer. For example, operators who were new to a department would not be assessed until they had been in the job for at least three months. Under this condition the operators had to wait for the next audit conducted after the three months had elapsed, before they could be assessed. Similarly, a new operator, who was employed after the traineeship programs had ceased, would not be assessed until he or she had been in the job for at least three months, irrespective of whether or not they had performed similar tasks in their previous employment.

A condition that competencies previously recognised would not be reassessed appeared to be to the operator’s advantage. If the operator stayed in the one department the points for these competencies accumulated and contributed to the operator’s total point score, irrespective of whether the competencies were required or not. Any additional competencies recognised in that department were added to the existing point score to determine the appropriate classification level for the operator. Further, the operators would not be reclassified if they changed to a new department and would remain on the classification they had gained in their previous department. However, they were then restricted because they could not move to a higher classification until they had achieved all the competencies required in their new department for their current classification level. At that stage they became eligible to move from their current classification to a higher classification.

The basis of the company’s assessment approach was that the Team Leader would assess the operator by observing each operator perform the job over a period of time. The Manager, Training and Recruitment acknowledged that each Team Leader would have their own view
about what was a competent performance and no training, joint discussion or other activity had occurred to assist the Team Leaders in making this judgement. A Team Leader stated that it was possible to judge the competence of the person through working with them and perhaps helping them at certain stages. The Team Leader also stated that based on experience, it was possible to observe a person over time and determine if they were competent in the job. If the Group Leader doubted the judgement of a Team Leader, a demonstration of the performance could be requested to allow the Group Leader to make a judgement and verify that the operator was competent. However, the Group Leader was not a qualified workplace assessor and was not an ‘expert’ in the job. Nevertheless, the Group Leader was well aware of the quality of the product outcome required.

The Team Leader and the Group Leader had not trained as qualified workplace assessors, despite their central role in the assessment process. The company decided that it would train the three trainers in the training department to become qualified workplace assessors. These qualified assessors were available, as required, for assessment tasks throughout the manufacturing plant. However, the arrangements established for the assessment process only required a formal assessment of an operator by a qualified assessor if an operator had appealed against a decision. In this case, the Review Committee established to hear the appeal could call for a formal assessment to resolve the issue. The Manager, Training and Recruitment stated that this had never occurred and the company had never conducted a formal assessment of this nature. The Manager stated that any differences were usually resolved at the Group Leader, Team Leader and operator level, through a discussion held to explain the disputed decision.

The assessment process used for the operators involved in the traineeship CBTA system was different from that used for the existing operators. The trainees were involved in an assessment process provided on-site by a TAFE Institute in conjunction with the company. The TAFE Institute, as the registered provider, was responsible for the assessment function and the issuing of a qualification. The TAFE Institute assessed the knowledge components of the competencies as part of the overall delivery of the traineeship program using written tests and work related assignments in the company’s classroom. The trainee operator was then required to perform a series of tasks in a number of departments and was assessed by a qualified workplace assessor from the TAFE Institute, who was accompanied by an ‘expert’ from the relevant department.

The EBA and the resultant Award classification structure required that, following the awarding of a specified qualification, a person was to be automatically classified at a specified level linked to that qualification. Under these arrangements all the operators who successfully completed the traineeship program were classified at the highest classification for the position of operator. These operators could not move to a higher classification in the operator role. Therefore, although they took part in the annual audit, the process was redundant as far as
the company and the operators were concerned, as no additional competencies gained at the operator level would provide a higher classification and payment rate.

After the first and second ‘annual’ audits the company was experiencing difficulty in getting operators to readily move from one job to another to satisfy its business demands. The operators’ reluctance to go to a new location was probably due to a number of factors. First, the audit conditions appeared to penalise an operator who transferred to a new department. Second, the operators had to learn a set of new tasks before they would be eligible for a higher classification and they had to establish themselves in a new team. As described above, if an operator moved to a new job, he or she retained the classification currently held. But the operator would then have to show that he or she was competent, by accumulating points for the competencies in the new department, before being eligible to progress to a higher classification within that department. For operators already on the highest classification, transferring to another department did not present a problem in this regard, but for others this condition created an additional barrier to gaining a higher classification. Whether for these reasons or others, the company found that the operators refused to move as required to satisfy the business demands. Consequently, the company believed that the concept of multi-skilling was no longer worth pursuing if it could not be implemented. On this basis, the company made a significant decision and changed its intention to multi-skill the operators and restricted the capacity of the operators to claim more competencies and consequently, to increase payment rates.

To curtail the implementation of the system, the company established a number of additional conditions on conducting an annual audit. The purpose of the conditions was to restrict the operators’ access to higher classifications and higher payments to prevent cost increases. One condition was that the operators had to perform a task for at least 12 months before a competency could be ‘claimed’. This condition was imposed to prevent an operator who occasionally performed a task, whether competently or otherwise, from having the competencies recognised. However, this condition also created another barrier for a person who had moved to a new job and already had a three month period before an audit could be conducted, but now had to wait for at least 12 months after starting in the new department to claim some competencies.

The learning approaches

It was the company’s intention to provide each operator with the opportunity to gain on-the-job training that would allow them to become competent in the full range of skills and knowledge required in the department in which they worked. Following the initial audit, training gaps were identified for each participating operator and training commenced to enable the operators to develop the competencies required. The organisation and provision of this training was the responsibility of the department Group Leader.
Subject to work requirements, arrangements commenced within the department to move operators to new workstations to provide on-the-job training using the Jumper as the trainer. For health and safety reasons the operators already rotated through a number of specific jobs on the production line. Operators sometimes changed to another production line within the department as part of this roster. The company’s original intention was to extend this process and over a period of time rotate all the operators through all the jobs in the department to enable them to become competent in all the jobs. Training was to be organised for each operator as they moved into a new job on the line. In this manner the operators would become skilled in all the jobs in the department and would be multi-skilled as originally intended and classified at the highest level available for the department. This process had commenced, but progressed slowly because of the requirements of the production line, which was highly sensitive to changes because of the demands and targets placed on its output by the car manufacturers using just-in-time assembly processes.

The majority of the training was provided on the job using the Jumper or Team Leader as the trainer. However, some tasks with a substantial knowledge component, such as Statistical Process Control, required classroom training.

The company’s intention and process changed, as indicated above, after the first two annual audits when the company was experiencing difficulty in getting operators to readily move from one department to another to satisfy its business demands. The operators, supported by the union, refused to move and the company believed that the concept of multi-skilling was no longer worth pursuing if it could not be put into practice. The company curtailed its intentions to multi-skill all the operators and restricted the movement of the operators to any new jobs within their existing departments to restrict the capacity of the operators to claim more competencies and consequently to increase their payment. In this way, the company was able to reduce the increase in its wages payments and better manage its costs. This change was driven partly by the cost the company was going to incur to train the operators, but more importantly was driven by the cost the company was going to incur for a multi-skilled workforce which it could not use to its advantage. At this stage, the Group Leaders began to carefully manage all new learning opportunities for all the operators. Learning opportunities were only made available to operators when the company required an additional person to perform a particular job.

Other implementation problems had previously emerged with some of the long-term operators, many of whom were refugees employed in the 1960s. Many in this group refused to undertake training and resisted any attempt to rotate them in the job. Most had English language problems and were content to stay at their current workstation at their current classification, therefore they refused any training. Others within the long-term operator group had refused to take up any off-the-job classroom training because they believed they were experienced operators and did not require any training. At a later stage, when these
operators realised they needed the training to claim the competencies, the training had been restricted and they could no longer access the training required to claim the competencies. In particular, many operators had not participated in the initial training for the ‘Statistical Process Control’ task and were disadvantaged compared with their colleagues, because they could not achieve the same classification without this training.

However, the new employees involved in the traineeship program had received the full training required under the traineeship training agreement, including training for the ‘Statistical Process Control’ task. They were provided with the opportunity to work in all the jobs required, enabling them to develop the competencies required to satisfy the requirements of the training agreement and to gain the TAFE Institute qualification. In addition, the trainees participated in the learning program provided on-site by the TAFE Institute and the company. This involved classroom-based training for the knowledge components, practical assignments that were done in the classroom and the workplace, and practical on-the-job training provided by the Team Leader or a Jumper. The classroom training used a teacher-centred approach using overhead projector slides and videos, but also included scenario based approaches, particularly customer relations scenarios, where the trainees had to discuss and demonstrate how they would respond to certain situations. This was supplemented by visits to various areas of the factory to discuss issues and sometimes to set the conditions for an assignment. Some English language training was provided as part of the traineeship program. The English language training included note taking and communication skills.

The company’s restrictions on the training for the existing operators meant that some operators had received some training to satisfy the identified gaps in skills and knowledge, but others had none prior to the restrictions being applied.

The internal and external factors which influenced the decision-making

What internal and external factors influenced the decision-making?

The internal factors

Staff characteristics

In the planning and structuring decision-making stages the company decided that it would multi-skill the workforce. At that time, the skills and knowledge possessed by the operators was mixed, but the operators had never been formally assessed. Most operators had been employed as unskilled or semi skilled workers and had learnt the skills and knowledge required through on-the-job training.
A large group within the older long-term employees had been rotated through many jobs and departments in the manufacturing plant over a long period of time and were skilled in most of the jobs in the company’s manufacturing plant. However, there was a significant number of older long-term employees who had not been rotated through the full range of jobs in the company and were content to operate on a more limited range of jobs. Most of this latter group were employed in the 1960s and had come to Australia as refugees and still had poor English language skills.

Most of the production operators had come to Australia from countries without an English language background. The company required all work related communication to be in English, but some groups had formed within departments where the main form of communication was in their native language. The company had provided English language classes over a period of time for the operators. Most of these had been outside of working hours and not all the operators had elected to be involved in these programs.

As part of the CBTA system, some classroom-based training was initially offered to the operators within the existing workforce, but those with poor English language skills were not able to benefit from such training and did not take up the offer. Other long-term experienced operators did not take up the offer because they believed they already had the skills required to perform a wide range of jobs. Many of the newer existing employees, who were employed prior to the traineeship program, wished to participate in the training to improve their position and many of them had the opportunity to participate, but others waited until places were available in the training classes.

The new operators who were employed from 1997 through to 2000 were employed as trainees and each had a training agreement with the company, which provided training through a TAFE Institute. The traineeship program enabled these operators to gain the competencies required to do most jobs in the departments.

Consequently, the newer operators generally had a higher level of job-related skills and knowledge than many of the operators employed prior to 1997. In addition, this difference in skills and knowledge was recognised in the audit process. The outcome of this process was that many of the long-term employees were on a lower classification than their newer colleagues and were paid at a lower rate.

In the period from the initial audit until about the third audit, training was still being scheduled for participating operators who had not been trainees, to achieve the competencies they still required. As a consequence of the different training opportunities provided, the mixed degree of participation in training and the different levels of on-the-job experience, the audit process resulted in operators receiving mixed classifications levels and correspondingly different payment levels.
Had the company provided the training as intended, then most of the operators would have become multi-skilled and would have provided the flexible workforce that the company had expected. However, the operators did not want to be used as a flexible workforce and refused to be transferred to another job and in some cases refused to do additional training required for the job. The Manager, Training and Recruitment reported that the union supported this resistance to transfer and the company was unable to achieve the transfers it required. As a consequence, the company curtailed its training, placed conditions on the audit process and restricted further gaining of competencies. This action created a workforce with mixed classification levels and correspondingly different payment levels. This situation caused considerable unrest and resentment among the operator workforce, because people doing the same job were paid at different rates and newer employees were paid at a higher rate than most of the long-term employees. In addition, many of the long-term operators were restricted in gaining promotion to Jumper and Team Leader, because they did not have the recognised level of competencies required, and these jobs were often filled by the newer employees.

**Union involvement**

The union Shop Stewards, as company employee union representatives, were involved in the committee structures formed for the implementation of the system and were to be represented on any committees formed for any appeals or formal assessment processes. The Shop Stewards were on the CSSC which oversaw the introduction of the CBTA system and established much of the policy for the processes to be implemented. These employee union representatives came under pressure from the operators, because of the time involved in setting up the system. The operators wanted the system to start quickly so they could begin to claim competencies and increase their rate of payment.

The Shop Stewards had little further involvement in the introduction of the system. Following the establishment of the policy, the main role they fulfilled was to act as a contact point for any operators who were in dispute with the company. When an operator was in dispute with the company the Shop Stewards generally relayed a request for help to the central union organiser who came on to the site to resolve the problem with the company.

**Management**

The company management was involved in the initial EBA negotiations and agreed with the concept of multi-skilling the workforce and using competency standards for assessing the metal workers, which included the production operators.

Most of the managers involved in the initial EBA have left the company and the current senior managers were employed after the initial negotiations. Further, the current senior managers were not involved in developing the company policy for the initial implementation. These
senior managers were beginning to seriously question the concept of multi-skilling and the policies for implementing the system, and were seeking ways of bringing about changes in the next EBA to alleviate the problems.

The former Group Leaders, who were not involved in the EBA negotiations, supported the concept at the time and were responsible for assisting with the initial implementation of the system in their departments. However, most of the current Group Leaders have been employed since the system was initially implemented. As the system continued to be implemented under the original arrangements and policies, the new Group Leaders became increasingly concerned that it was not meeting the business needs of the company and was not supporting the cost-effective use of the workforce in their department. They had also experienced difficulty in transferring operators within departments and to other departments to meet the changing business demands. As a result, they restructured the workforce in their department to meet their requirements and initiated the changes which curtailed the implementation of the system as it was originally intended.

The external factors

Industry employers association involvement

A major impetus for the development of the CBTA system was the outcome of the negotiated EBA. The industry employers association, in which the company was a member, was working within a national movement of employer organisations and unions that were seeking to reform the training system as part of the national training reform agenda. The employer organisations and unions were working towards the development of a training system, which they believed would be more relevant to the needs of industry. The industry employers association and the union, with which the company was involved, were at the forefront of this change. As a result, the company, as with others in the industry, was under external pressure from the industry employers association and the union to bring about change. Similar EBAs were being negotiated and agreed upon across the industry. A significant structure was established for the industry at a central level within the industrial relations system, to guide the implementation and to monitor its outcome across the industry. An Implementation Guide (National Metal and Engineering Competency Standards Implementation Guide, 1997) was linked to the industrial Award and a National Oversighting Committee was established under the terms of the Award to resolve disputes related to the implementation of the Award and the associated CBTA system.

The industry employers association and the union initiated this reform because they believed that, “costly and outdated procedures were common in the work environment, and there was no career path for many workers.” (p.4)(National Metals and Engineering Industry Competency Standards Implementation Guide, 1999) As a result, the employers association
and the union had agreed upon a classification structure that was linked with skills development. The purpose of this was to increase the skill base of the workers in the industry and to provide a career structure which was linked to classifications to provide an incentive for the workers. At the same time, the employer had the opportunity to redesign and reorganise the manner in which work was done to increase efficiency and productivity. To aid the process of redesigning the work and enhancing the skills of the workers, the industry employers association promoted the concept of multi-skilling the workforce. In support of this concept and enhancing the workers skills, a set of national competency standards was developed by the industry under the management and guidance of the employers association and the union to identify the skills and knowledge required in the industry.

With these external developments, and the pressure from both the employers association and the union, the company appeared to have little option but to participate in the EBA negotiations and to accept the concepts underlying the agreement and the resultant industrial Award. The outcome of this required them to implement a CBTA system of some form, which complied with the Award and the Implementation Guide.

Central union involvement

As indicated above, the union and the industry employers association were at the forefront of the movement to reform the training system as part of the national training reform agenda. The union and the industry employers association had jointly worked towards the development of a classification structure and implementation guidelines for a CBTA system. The central union was heavily involved in the EBA negotiations, but thereafter had no involvement in the implementation of the system in the company, other than coming on to the site to resolve an individual’s issues with the system. The company was resentful that the central union had not been more involved and had not taken some responsibility for the dysfunctional system that had eventuated. In this respect, the company considered the union had achieved its aim of increasing the payment rates of the operators by including these requirements in the EBA, and had then provided no additional support.

The Manager, Training and Recruitment stated that the union had overseen the implementation and intervened when things went wrong from an individual worker point of view, but provided no solutions or assistance to resolve the problems that emerged. As a result, the company believed that the implementation had produced a company versus worker situation. The central union only became involved when requested by a Shop Steward as a result of a dispute, and had then only taken action to resolve the individual dispute. Otherwise, all involvement by the union in the implementation of the system had been through the company Shop Stewards. The company acknowledged that it was under considerable pressure from the union, because of the impact any industrial action could have on reducing production and the significant impact this has on its customers and their just-in-time.
approach. As a result, the company often resolved an issue in a manner that disadvantaged it on that particular issue, in order to secure the overall goal of maintaining its production levels to meet the customers’ demands. Consequently, the company was resentful that the central union had not assisted it to resolve some of the system issues to reduce the need for disputes. Despite the joint development of the system by the industry employers association and the union, the company’s resentment was only directed at the union.

**External customers’ quality system**

The environment in which the company worked was very competitive. In some cases a number of companies supplied the same component to the same customer, which was produced to meet the customer’s design. Each of these companies had to remain competitive and meet the required targets to retain the quantities in their future contracts. The company’s main customers, the car manufacturers, required all their component suppliers to have certification or accreditation for specified international standard quality systems. As a result, the company was required to achieve and maintain that accreditation if it wished to remain a supplier in a very competitive environment. As indicated previously, an audit of one quality system required the company to train all its operators in Statistical Process Control, because of a change in the way the work was done on the production lines. The company commenced action to comply with this requirement and the management planned to train all operators in Statistical Process Control. However, the process was then managed through a computer system and changes to the job role meant that the task was no longer a part of every operator’s role. The management ceased the training for all operators, although the competency still remained on the list as a task that was required on the production line.

This change in business needs and the associated quality system had caused a change in the training and assessment arrangements, which had a significant impact on the operators. As a result of this development, some operators had a skill recognised that provided them with the opportunity to move to a higher classification and others were denied this opportunity, because the training was no longer available. This one development was a significant cause of discontent for many of the operators, because under the conditions set by the company it created an impassable barrier to a higher classification for many operators.

**Funding sources**

In a time of heavy recruiting in late 1997 the company saw the opportunity to access government funds for its training. By employing new operators as trainees the company accessed state and national government funds provided as an incentive. The company saw this as a good opportunity to get a more highly skilled employee and also to get government funds to train them. The availability of government funds was an important factor in
influencing the company’s decision to employ the new operators as trainees. The implication of employing the operators as trainees had not been considered at the initial intake, because it was still the company’s intention to train all the employees to achieve the competencies required to perform the tasks in the department. The initial impact was that the new operators who completed the training were paid at a higher classification than many of the existing operators who had recently participated in the initial audit. This did not cause the company concern, because at that time it had not made a decision to restrict access to training and the recognition of competencies. However, after the heavy recruiting and the traineeship programs, all the successful participants were at a higher classification and pay rate than many of the existing operators, because the existing operator training was implemented with as little disruption to the product output as possible, and had been very slow. Placing a learner on the production line had the potential to slow up production and to produce more rejects, which the company and the other operators wished to avoid, therefore the introduction of the on-the-job training had progressed slowly. Further, many of the available training opportunities had been provided to the trainees, because of the company’s commitment to provide their training. The company received in the order of $300,000 for the training of its trainees and therefore had a significant commitment to ensure that all the trainees finished their program through access to on-the-job training opportunities.

The decision to employ operators as trainees had not occurred in the initial planning or structuring decision-making stages, but had been made when the opportunity was presented. This decision, combined with the decision to curtail training for the other operators, produced a payment rate differential among the operators, which was also a source of major discontent among many of the operators.

External consultants

The company became aware of the opportunity to employ new operators as trainees through the TAFE Institute. The company then engaged the TAFE Institute to provide the traineeship program through classroom-based training. The company provided the on-the-job training. The qualification gained by the trainee was provided through the TAFE Institute, which was responsible for the assessment of the trainee, but relied upon the company’s advice in assessing whether the operators were competent on the job. The TAFE Institute had no other involvement in the implementation of the CBTA system.

The impact of the internal and external factors on the decision-making

How did these internal and external factors impact on the decision-making?

The original concept of multi-skilling and introducing competency standards linked to a classification and payment structure was totally influenced by the EBA, which in turn was
strongly influenced by the industry employers association and the central union for metal workers. The concept was not one that had been considered by the company until the EBA process, despite it being aware of the development of industry competency standards at an earlier stage. Consequently, the involvement of the industry employers association and the central union in heavily promoting the concept had a major influence on the company and the direction it took.

**The competency ‘definition’, scope and complexity**

The industrial Award and the associated Implementation Guide heavily influenced the planning and structuring decision-making stages. The Implementation Guide required competencies from the National Metals and Engineering Competency Standards to be used. These were adopted and mapped to the tasks performed in the department to establish the competency definition and the scope of the competencies included for each department. The company Working Parties identified the tasks required in each department, which formed the basis for the scope of the competencies for each department. The extent to which the national competency standards influenced this scope is unknown, however it appeared they did not contribute to any broadening of the scope after the Working Parties had identified the tasks required in each department. The Working Parties appeared to select just those competencies that mapped to the job tasks and did not attempt to broaden the skills and knowledge of the operators beyond those directly required for performing the jobs in the department.

The company reviewed the tasks and the associated competencies required for each department prior to each audit process. As a result, tasks were added or deleted to produce a current list of the competencies required for the department. The changes in the list over a period of time reflected the changes in the way in which the work was done from 1996 to the current period. In 1997 the scope of the competencies was directly influenced by a quality system audit, which extended the scope and required all operators to perform the Statistical Process Control task. In other periods, changes in technology and manufacturing equipment, moving from manual to automated tasks and changes in the component design produced changes in the manufacturing processes and the tasks required in the department.

The TAFE Institute’s promotion of the traineeship scheme influenced the company’s decision to employ its new operators as trainees. This decision was also heavily influenced by the opportunity to access the significant government funds provided as an incentive to employ trainees. The decision to employ the new operators as trainees extended the scope of the competencies for these new operators compared with the existing operators. The traineeship program committed the company to offering a Certificate II qualification. The structure of this qualification required the company to offer a broader range of competencies to these new operators than was originally planned for the existing operators. The scope of the
competencies extended beyond that required for one department and enabled the trainees to become competent in the tasks required for most departments.

**The process to recognise current competencies**

The initial audit was essentially a RCC process for the existing operators. The industrial Award and the associated Implementation Guide directly influenced the inclusion of an initial audit. This was required under the implementation guidelines to classify the operators and identify training needs. The company appeared to have implemented an initial skills audit process that was consistent with and probably directly influenced by the example process given in the Implementation Guide.

However, there was no RCC process for the new operators who participated in the traineeship program. These operators went directly into the program which covered all the competencies required for the Certificate II qualification. The lack of provision of any RCC process was directly influenced by the manner in which the TAFE Institute implemented the traineeship program.

**The assessment processes and instruments**

The subsequent skills audits conducted by the company were implemented in the same manner as the initial audit. In this respect the process used was directly influenced by the example given for the initial skills audit in the Implementation Guide. The subsequent audits were eventually conducted for all the company’s operators. However, the new operators initially participated in an assessment process conducted by the TAFE Institute with the assistance of the company. The TAFE Institute determined the process for assessing the trainees, which was influenced by their requirements for the issuing of the qualification. These assessments were scheduled to enable the TAFE Institute to complete its assessment for each trainee in the time period required, rather than using the proposed annual audit schedule. Following completion of the traineeship assessment the former trainees participated in the subsequent audits in the same manner as the other operators.

**The learning approaches**

The learning approaches to be used were not decided upon in the planning or structuring decision-making stages. The learning approaches adopted were the same as those used in the company’s previous training. It would appear that the approach used had been influenced by this previous experience, which generally provided a cost-effective approach for learning the competencies required and was consistent with the hands-on learning approach preferred by the operators interviewed.
The Recycling/Outcome Decision Stage

The impact of the changes

What impact did the changes to the CBTA system have on the expected outcomes?

The original expectation was that the company would multi-skill its operators and gain a flexible workforce that would improve the company’s productivity and quality. The implementation process outlined in the Implementation Guide was adopted to achieve these outcomes. However, while implementing the system for the existing operators, the company decided to employ its new operators using the traineeship scheme. The new approach provided the company with a cost-effective means to train the new employees to the level required for achieving a flexible multi-skilled workforce. However, this change significantly impacted on the achievement of the expected outcomes. Its implementation limited the on-the-job training opportunities for the existing operators, as these were primarily made available for the trainees to the detriment of the existing operators. This significantly impacted on the opportunity to multi-skill the existing operators and created the resultant differential in classification and payment rates, which commenced the long-term operators’ discontent with the company and the demise of the CBTA system.

In the recycling decision-making stage, the Group Leaders perceived that the concept of multi-skilling was not consistent with their business needs and had significant budget implications if all the operators were paid at the highest classification, without any significant productivity improvements. As a result, the Group Leaders decided to informally restructure their departments with three categories of operator with roles similar to those that existed prior to the attempt to multi-skill the operators. They determined the number of operators required in each category and defined the competencies for the role in each category. They offered training only when needed to maintain numbers in each category. All other training was ceased. The payment differentials, which existed as a result of the previous training and audits, remained unchanged and the discontent among the operators increased as long-term, experienced operators no longer had the opportunity to reach the payment rates of a newer, less experienced operator. Potentially this restructure was very significant in terms of its impact on the company’s original expected outcomes of multi-skilling each operator and gaining a flexible workforce. However, by this time the company had abandoned any expectation of achieving a multi-skilled flexible workforce and had curtailed the implementation of the system.

The company had decided that the CBTA system could not be implemented as originally intended to achieve the expected outcomes. The company had identified the need to change the structure of the workforce from that proposed, and reverted to the former structure. The company believed that the current EBA prevented it from formally structuring the
competencies into three categories of operator and conducting audits to provide recognition for these categories and remunerating the operators accordingly. The company decided that the CBTA system was not flexible and required change, but considered it was unable to implement the appropriate recycling decisions to achieve the flexibility or the structure required within the current EBA. It had therefore made a significant recycling decision to seek to bring about changes to the overall system through negotiating new arrangements for the next EBA.

The company had previously decided to curtail the implementation of the CBTA system having decided that it no longer wished to achieve a multi-skilled flexible workforce. The company’s decision to curtail the implementation of the system had the potential to save costs, but ensured that the company could no longer achieve its expected outcomes. In addition, the discontent caused by the changes had the potential to reduce the operators’ productivity, which would impact on the company’s underlying expectation that it would increase its productivity through the implementation of the system.

The competency ‘definition’, scope and complexity

The competencies were initially implemented as planned and structured. However, the company reviewed the scope of the competencies for each department prior to each audit, which resulted in tasks and competencies being added or deleted from each department’s requirements. This recycling process occurred because of the changes that emerged in the way in which the jobs were performed during the ongoing implementation of the system. As a result of these changes in the way things were done, some of the original competencies on the department’s list were no longer required and a new scope of competencies was specified.

It would be expected that the company had generally made these changes to improve the way in which the work was done and consequently to improve the productivity and quality. It would also be expected that the consequent changes in the scope of the competencies would have no significant impact on the original expected outcomes of multi-skilling its operators and gaining a flexible workforce. To achieve multi-skilled operators the company simply needed to provide further training over a period of time for all the operators. However, each of these changes contributed to the operators’ discontent and perhaps their reluctance to participate as a flexible workforce. As a result, this discontent had the potential to reduce the productivity of the operators, which would impact on the company’s underlying expectation that it would increase its productivity through the implementation of the system.

The process to recognise current competencies

The initial audit was a RCC process and was implemented as planned and structured. The subsequent audits conducted each year also operated as an initial audit for new operators or
people who had changed their roles and wished to have their competencies recognised. Therefore this sequence of audits had established an ongoing RCC process in the system for new operators, similar to the initial audit process. There were no changes in the RCC process implemented and therefore no changes to impact on the achievement of the expected outcomes.

**The assessment processes and instruments**

The annual audits were implemented as decided in the planning and structuring decision-making stages. However, as indicated above, they were conducted at between 14 and 17 month intervals, rather than conducted annually as decided in the planning decision-making stage. This had an impact on the operators and probably added to their discontent. Had they been able to have their competencies recognised at 12 month intervals they might have received increased payments at these intervals and received increased total remuneration over a period of time. The company made financial gains by extending this period. This would have some impact on the underlying expectation of improving productivity in terms of cost per unit produced. However, it is unclear whether this occurred to allow the company to make these gains or for other reasons, such as the administrative requirements to prepare for conducting an audit.

The extension of the periods between the audits is unlikely to have had any impact on the competencies developed by the operators and therefore the multi-skilling of the operators. The operators would have developed the competencies as part of their normal work activities and were keen to gain the competencies as quickly as possible to increase their remuneration. The audit was the time when the competencies were formally recognised, but was generally not the time when the competency standard had been achieved. However, the extension of the periods between the audits was a factor that contributed to the operators’ discontent with the system and might have impacted on their work performance and therefore the expectation of increased productivity.

**The learning approaches**

The company had implemented learning approaches based on those it had used in previous training. No recycling decision had been made to change this approach. However, as indicated previously, a recycling decision had curtailed the learning opportunities for the operators by restricting movement to new jobs, from which additional competencies could be gained, in an attempt to restrict the operators from claiming additional competencies. Restricting the learning opportunities had a significant impact on the company’s original expected outcomes of multi-skilling the operators and gaining a flexible workforce. The curtailing of the training opportunities meant that the expected outcomes could no longer be
achieved. This also had the potential to limit the company’s expected productivity. However, at this stage the company no longer wished to achieve these outcomes.

**The effectiveness of the CBTA system implementation**

*Was the system implemented effectively?*

The CBTA system was not implemented effectively. The Manager, Training and Recruitment stated that the implementation should have been postponed, but the company had reacted to pressure from the Union, the industry employers association and the operators and acted quickly using an Implementation Guide that was not fully developed.

The company had agreed to an EBA, which was established for the industry and contained concepts such as multi-skilling and the development of a flexible workforce. The company had then responded to the requirements of the EBA without any significant planning and structuring related to these concepts or its business needs. No consideration had previously been given to these concepts or the advantages of implementing them, particularly in relation to its business operations. Similarly, it did not appear that the company had considered how it could best implement the concepts and maximise any benefits it could gain from such an arrangement.

The opportunity was provided in the EBA implementation guidelines for the company to redesign jobs and to reorganise the way in which it worked. The company appeared to have ignored this opportunity and did not use it to plan and analyse whether different arrangements might have been more appropriate to the company’s business needs. The company appeared to have accepted that the benefits identified by the industry employers association and the union would readily apply to its operation without making any structural changes. The company had accepted the concept that all operators would have the same level and range of skills and knowledge to form a multi-skilled workforce and that this would meet their needs and provide the flexibility required for their operations. The company expected it would increase its productivity and the capacity to more readily meet the customers’ increasingly demanding requirements.

The concept of multi-skilling the workforce was not initiated by the company. It had been imposed by the external organisations through the EBA. As a consequence, the company failed to conduct an adequate initial planning process to relate the concept of multi-skilling to the structure of the company and identify the advantages of its implementation. As a result, there was no plan for maximising the benefits and achieving the expected outcomes. The industrial relations issue associated with the implementation dominated the planning and structuring decision-making stages. The company simply followed the steps in the Implementation Guide as an industrial relations exercise, without creatively thinking about how it could take advantage of the opportunities provided. The workforce was highly
unionised and it appeared that the company’s approach was heavily influenced by this high degree of unionism. The company was aware of the influence of the union in the industry and had a strong desire to avoid industrial disputation. The company was particularly sensitive and vulnerable to any issues which interfered with its production and its capacity to reach the target output for delivery at a specified time for the customers’ just-in-time manufacturing approach.

Similarly, the company’s operator workforce did not initiate the concept of multi-skilling and therefore some of the operators were reluctant to become multi-skilled. Some operators were content with their current job and did not want to be multi-skilled and transferred to other jobs in the manufacturing plant.

The company assessment process was a self-assessment process, which was then verified by both the Team Leader and the Group Leader, neither of whom were qualified workplace assessors, and did not involve any questioning or other processes to assess the underlying knowledge. In this sense the assessment might not be considered to be effective, as the evidence available could be perceived to be limited. However, the Team Leader would have observed the operator performing the task many times, was considered to be an expert, and would have knowledge of the quality of the product output from the operator’s performance.

This provided a range of evidence on which to make a judgement, and from the company’s point of view, producing a quality product in an efficient manner was the criterion on which they would place the greatest weighting. In addition, the assessment was cost-efficient in that all the audits used the same process and were conducted for all operators at the one time. Further, the company did not conduct assessments on an individual basis when the operator believed he or she had achieved the standard required on a particular competency, which might have involved a more costly process. In this manner, the approach adopted was very pragmatic and could be considered to be very cost-effective. However, the assessment approach emphasised the accumulation and counting of points gained over the year, rather than emphasising the enhancing and recognition of the skills and knowledge of a person and the period when the skills and knowledge had been achieved to a certain standard. The concept of an audit or deficit approach performed on an annual basis also seemed to emphasise what had not been achieved, rather than a recognition of what had been achieved at the time of its achievement.

The degree to which the audit approach contributed to the operators’ perceived attitude of counting points and competencies to gain higher payment rates, rather than the achievement of new skills and knowledge is not known. The extent to which this approach might have contributed to the system becoming dysfunctional is also unknown. However, this approach is likely to have contributed to the system becoming dysfunctional, which prevented the company from implementing the system effectively and achieving its original expected outcomes. If this was the case, then in this sense the pragmatic approach might not have
been cost-effective, because of the cost of implementation and the lack of any significant beneficial outcome. The sense in which this was not cost-effective, would have depended on the extent to which the implementation would have provided the expected benefits, had it been implemented as first intended.

The CBTA system that was structured and implemented appeared to be fragmented and split into a training component and a separate and mainly unrelated assessment component. This fragmentation was demonstrated by the separation of the judgement of performance made during the training component from the audit process to recognise competencies, which was made at some other time after the training. That is, the operators were required to be trained to develop the new skills and knowledge for the changed work practices. The learning approach used was to train the operators on-the-job with the support of a trainer for the period of time required to ensure that the operator had reached a level of competence sufficient to meet the quality standards and the production outputs required. In this process, some judgement needed to be made to determine when the operator was competent and the trainer’s support and feedback could be withdrawn. This judgement process was in practice prior to the introduction of the CBTA system. However, this judgement, that the person was competent to perform independently at the standard required, had a similar purpose to the assessment process normally found in a CBTA system, that is, to judge whether the person was competent. Clearly, this judgement or assessment was not seen as a part of the CBTA system and was not recorded in any manner, because a separate audit process was included in the CBTA system to recognise competence. This separation appeared to emphasise that the audit had a separate and mainly unrelated function. That is, it was not about whether the operator was competent to perform the job, but was simply a process for classifying the operators and determining the payment rates.

The provision of these separate processes with a similar purpose demonstrated that the CBTA system had not been implemented effectively. Further, in terms of the impact of the CBTA system implementation, an assessment process that judged competence near the time of its achievement was more likely to focus on the acquisition of skills and knowledge and provide motivation to perform at that standard than an audit to determine payment rates. The audit function presumably motivated the operators to gain increased payments, but solely focused on this aspect and not the standard of performance to be achieved and maintained.

The company took advantage of the opportunity to gain government funding to train new operators under the traineeship scheme. At the time of doing this the company intended to fully train and multi-skill all of its operators. In implementing the traineeship program the company appeared to not consider, or effectively plan and manage, the implications of the differential pay rates that would result as an outcome of the traineeship program. On completion of the traineeship program all the trainees received payment rates greater than those received by most of the existing operators. At the time, the company might have seen
this as a short term problem. However, when the company curtailed the training and assessment opportunities of many of the existing or long-term operators it compounded the problem, which caused considerable discontent among the long-term operators. The extent to which this initial pay rate differential and the associated discontent contributed to the initial reluctance of the operators to transfer within and between department is unknown, but for some operators it must have been a contributing factor. As a result, the provision of the traineeship program was likely to have been a factor that influenced the sequence of events leading to the company curtailing its training and assessment practices, which contributed to the system becoming dysfunctional. The company acknowledged after the event that the provision of the traineeship program had created a “class system” within the operator workforce. However, the reluctance of a group of operators to become involved in any training also contributed to this “class system”.

The implementation would have been more effective if the company had used the planning and structuring decision-making stages to analyse its business needs in relation to the operators’ role to ensure that the concept of multi-skilling all the operators satisfied its needs. The company should also have considered the implications of requiring all operators to be multi-skilled, in terms of the capacity and willingness of some of the operators to undertake additional training and to transfer to other jobs within the manufacturing plant. The company should have developed its existing practice for determining whether a person was competent, rather than the concept of an annual audit. This would also have allowed a more holistic or integrated approach to the assessment and focused on achieving the skills and knowledge required and performing at the standard required.

With a better use of the planning and structuring decision-making stages, the company could have effectively used the traineeship program for existing operators, as well as the new operators, and managed its impact more effectively. However, the company was considerably restrained in its planning and structuring decision-making stages by the EBA, which was determined externally and also determined the outcomes required, before the company had analysed the best approach for its business needs. The EBA and its conditions restricted the effectiveness of the CBTA system implemented, however, the company could have achieved far more within these arrangements.

As a result of the manner in which the CBTA system was implemented, the outcome for the company and the operators was a dysfunctional system that satisfied neither the company nor the operators and caused considerable discontent and lack of goodwill. Consequently, the company was looking for ways to change the next EBA to remove the barriers for developing a system that it believed would meet its business needs.
The impact of the CBTA system

What evidence is there that the implementation of the CBTA system impacted on the expected outcomes and improved competitiveness and productivity?

Consistent with the Conceptual Framework and the methodology, a form of Kirkpatrick’s four level model was used as the framework to identify the impact of the implementation of the CBTA system. This allowed an examination of the impact of the intervention in relation to the expected outcomes and the overriding aim of improved competitiveness and productivity for CBTA systems, as expressed by the NTB (National Competency Standards-Policy and Guidelines, 1992). That is, to increase the competitiveness and productivity of Australian industry, which was also an underlying expectation for the company. The four levels of the Kirkpatrick Model develop a sequence of data for analysis, which contributes to the overall response to the research question.

Level 1:

Do the participants enjoy the training and does it encourage and motivate the participants to engage willingly in further training and demonstrate the newly acquired competencies on-the-job?

Generally, the operators interviewed enjoyed being trained and were willing to participate in the training. However, the Manager, Training and Recruitment estimated that initially 70% of the operators cooperated with the implementation and were willing to participate in the training, 10% resented being involved and another 20% were ambivalent about their involvement. By the time of the second audit the willingness to participate had improved to 80% cooperating, with 10% still resentful and 10% still ambivalent about their involvement.

The operators interviewed generally participated in the training because they wanted to improve their skills and knowledge and their job opportunities. They also indicated most of their colleagues were happy to do the training, although there was a group of long-term employees who did not wish to participate. Some of these long-term operators did not want to train as they were happy in their current job and did not wish to change. In addition, some of the experienced operators decided not to participate in the training because they believed they already possessed the skills and knowledge to do the job. However, some of the experienced operators were also resentful of the operators who were going to the training. They were particularly resentful of the new operators who were doing the traineeship program. At a later stage, when the company began to curtail the training activity, a group of participating experienced operators was denied the training for the Statistical Process Control. This group was then resentful of the new operators who had gained the Statistical Process Control competencies through the traineeship program.
Some of the experienced operators had received recognition at the initial audit for the competencies required at the time for the highest classification and did not require additional training. Any resentment expressed by this group was likely to be because the new operators were given time off the production line to attend the training and would gain the competencies more quickly than learning through experience on the job.

The Group Leader and the Manager, Training and Recruitment also referred to a group of long-term operators who wanted to stay in their current job, had no aspiration for higher levels and simply did not wish to participate in any training. The Group Leader believed that the major motivation for those who had participated in the training was the extra payment that they expected to receive. However, he also indicated that some of the operators embraced the training and enjoyed the fact that they had learnt more.

However, despite this general interest in participating, by the time the company had curtailed the training opportunities, there was considerable discontent among at least those operators who could no longer progress to higher payment rates.

**Level 2:**

What changes in competency levels (skills, knowledge and attitude) occurred following the implementation of the training?

A Team Leader indicated that the long-term operators did not go to the knowledge-based training to learn more; they just wanted to participate so the competencies they had learnt on-the-job would get recognised. As a result, he did not believe they had learnt much from the knowledge component of the training. There was no direct assessment of the knowledge components of the competencies, so there was no way to verify what had been learnt. The only assessment was through the annual audit process, which made no attempt to assess the underlying knowledge for a competency.

Those operators who participated in the traineeship program believed they had learnt from the program and developed the competencies required for a wide range of jobs. As a result, they believed they were capable of performing all the jobs in the department. One operator believed she had acquired the knowledge from the traineeship program to develop problem solving skills, communication skills and the ability to work with others in a team. Based on this knowledge and her subsequent practice in the workplace, she believed she had learnt to work more effectively with others and to solve problems. Some of the trainees had developed their skills to a level whereby they had eventually moved on to Team Leader and Jumper positions in the department involved in the study and in other departments.

It would appear, as would be expected, that the new operators who participated in the traineeship program had developed new skills and knowledge from that training. It is not
clear however, whether the more experienced operators had gained much from any knowledge-based training on the underlying knowledge of the competencies. Generally, operators who were assigned to new jobs received on-the-job training from the Jumper or another skilled operator, until they were perceived to be capable of performing the job to the standard required without additional support. On this basis, it would be expected that the operators in this situation had gained the skills and knowledge required for that job, if they were allowed to continue in the new job beyond the training period.

**Level 3:**

*Did the trainees improve their job skills?*

A Team Leader stated there was no noticeable improvement in the way the operators performed in their job as a result of the training. However, he believed that he had benefited from the training and was now able to communicate better with people.

None of the operators interviewed felt they had improved as a result of the training. Many considered they were competent prior to the introduction of the system, based on their experience on the job. Most also felt there had been no change in their colleagues' performance on the job. However, one operator had noticed some improvement in the job skills of her colleagues, particularly in using the correct manual lifting procedures.

This lack of observable change in job performance for at least the new operators is puzzling. It would be expected that those who participated in the traineeship program, and who had developed new skills and knowledge from that training, were able to improve their job skills as a result. However, this would depend on the degree of transferability from the classroom training to the job. It would also be expected that the operators assigned to new jobs, and who were trained until they were perceived to be capable of performing that job to the standard required without additional support, were able to show they had improved their job skills.

It would not be clear however, whether the more experienced operators who had only participated in knowledge-based training had improved their job skills.

*Are the trainees given the opportunity to demonstrate the specified competencies on-the-job?*

The original intention was that the operators would become multi-skilled and would get the opportunity to demonstrate all the skills learnt on the job. However, once the company curtailed the implementation, few operators were given the opportunity to learn and work in each job within the department.

The new operators who had participated in the traineeship program had the opportunity to learn and develop the skills required for all the jobs in the department. However, not all of
them were given the opportunity to demonstrate this wide range of skills and knowledge on
the job. Some of these new operators worked in the Jumper role and were given the
opportunity to demonstrate all the skills learnt over a period of time. But when the company
curtailed the rotation of operators around all the jobs in the department, others who had
developed all the skills required for the job in the department were no longer able to
demonstrate those skills.

Clearly, those operators who had not developed all the competencies required for the
department and were restricted from the opportunity to gain any additional competencies,
were more likely to be able to fully demonstrate their more limited range of competencies on
the job. However, their capacity to demonstrate the full range of the skills and knowledge
they possessed was dependent on the jobs through which they were rotated on the
production line.

In general, the company had changed its intention and no longer wanted each operator to
develop the full range of competencies required and to use them in the department. Further,
the company had no intention of providing the opportunity for each operator to use the full
range of skills he or she possessed, no matter how limited they might have been, except to
meet business requirements. The company had determined that each operator required a
more limited range of skills and knowledge than originally intended, and deliberately planned
and managed the situation to keep the operators in jobs where they were only required to use
a limited range of competencies.

Have the trainees demonstrated the competencies and maintained the specified levels on-the-job
following the implementation of the training?

Some of the more experienced operators, who had been rotated through a wider range of
jobs prior to the introduction of the CBTA system and the subsequent constraints, believed
they had lost the skills for the jobs they no longer performed. In particular, a Team Leader
who had participated in all the jobs, and had all the required competencies, believed she had
lost the operator skills she no longer used. Other operators, who had previously worked in
many jobs in the department, did not believe they had lost the skills, but believed they would
be slower and would require refresher training to do the jobs they had not done for a while.

The company was not concerned about the retention of operator skills for roles they no longer
required the operator to perform. The company was only concerned about the retention of
the skills required to perform the jobs through which the operator was rotated and the
achievement of a quality product and the target output.
Level 4:

What evidence is there that the implementation of the training had an impact on the organisation's expected outcomes?

Achieving the Company's Expectations

The company curtailed the extent of the CBTA system implementation from that originally decided upon in the planning and structuring decision-making stages. The company had expected that the CBTA system would allow it to achieve a multi-skilled workforce with a resultant improvement in workforce flexibility and productivity. However, because the operators resisted attempts to transfer them to other jobs, the company no longer believed that it could achieve the original expected outcomes and changed its expectation. As a result, the training was curtailed and was only provided when a replacement operator was required for a specific job. The company aimed to limit the cost of the implementation as much as possible. This was managed by controlling the capacity of the operators to reach higher payment rates, while restructuring the role of the operators to limit the training requirements and maintain the level of productivity and quality required for cost-effectively meeting its production targets. The company controlled the capacity of the operators to reach higher salary rates by curtailing the training opportunities and placing conditions on the recognition of competencies and the Group Leaders changed the structure to support the new expectations. With these arrangements the company would be unable to gain the workforce flexibility that it originally expected. Therefore, the implementation of the CBTA system did not achieve the company's original expectations.

Competitiveness, productivity and quality improvements

The company had expected to improve its productivity and quality through multi-skilling the workforce. The curtailing of the CBTA system implementation prevented the multi-skilling of the workforce and potentially impacted on the capacity of the company to improve its productivity and quality. There was no indication that there had been any improvement in productivity and quality as a result of the curtailed implementation. However, some operators had increased their awareness of the quality requirements for the product, and as a result believed they had increased the quality of the product. The company did not perceive any increase in quality or productivity as a result of the curtailed implementation.

Use of formal mechanisms to measure the impact

The company had not introduced any formal measures to measure the impact of the CBTA system on the company's expected outcomes. The Implementation Guide used by the company in the planning and structuring decision-making stages did not propose any process
to measure whether the expected outcomes had been achieved. As a result, the company
did not consider this matter in the decision-making stages.

The company had established targets to satisfy customer orders, which related to the quality
and quantity of components to be delivered at specified times. These targets were
maintained through improved work practices including new technology, new quality systems
and operator incentive schemes. The CBTA system was not directly linked to achieving these
targets.

**Use of anecdotal methods to measure the impact**

One Team Leader believed the performance of the operators had not changed as a result of
the system implementation and as a result the productivity had not improved. Another Team
Leader indicated that she was not able to determine from her observations whether there had
been an improvement.

Some operators believed the training had caused them to become much more aware of the
need to maintain the quality of the product and the impact that their job had on that quality.
As a result, they believed the product quality improved as an outcome of modifying and
improving their work behaviour. This improvement was partly attributed to the training and
partly due to a change in the way in which the quality of the product was assessed. The jobs
on the production line had changed, and rather than relying on a final inspection to detect
rejects, each operator had become responsible for ensuring the quality of the product before it
passed down the production line. Another operator believed, as a result of the training, that
he had improved the quality of his output and he worked more quickly, having learnt how to
do the job more efficiently.

Formal business performance measures related to productivity, quality and safety were
regularly maintained, but none attempted to directly identify the impact the CBTA system had
on these measures. The Group Leader acknowledged that any attempt to formally measure
the impact the CBTA system had on productivity, quality and safety would be extremely
difficult. This was particularly so when other changes in the way in which the work was done
had been introduced over the same period of time, including changes to the quality systems,
the introduction of new technology and the changed design of the components being
manufactured.

**Unexpected Outcomes**

The company had not expected that the implementation would become dysfunctional. The
company had not expected that the operators would be resistant to change, which would
prevent it from maximising the flexibility of the workforce. The company had not expected
that the operators would focus on the achievement of higher payment rates, rather than
developing and acquiring skills and knowledge. However, both the union and the company had used the capacity of the CBTA system to increase payment rates as a motivational factor in gaining the support of the operators for the EBA and their participation in the CBTA system.

The Group Leader indicated the focus of the operators was simply on the points they could accumulate from the competencies and the associated payment rate. The operators’ focus was not on their capacity to enhance their skills and knowledge or to become involved in a wider range of jobs across the manufacturing plant. The Group Leader also believed the manner in which the company promoted and implemented the system had contributed to the view that payment rates were central to the implementation.

The system was structured and implemented in a manner that tended to disadvantage operators who shifted across departments. Further, the system was structured such that, having achieved the points and the related payment rates, these rates would not be reduced if the operator did not use all the competencies that had been recognised. As a result, some operators refused to use competencies that had been recognised, sometimes because they claimed they had lost the skill through lack of practice or had medical problems, and could no longer perform at the required standard. Many operators provided similar reasons why they could not do a job or would simply resist a transfer to another job.

The EBA classification structure and the associated industrial relations issues became the focus for both the company and the operators when implementing the CBTA system. It was this focus, precipitated by the operators’ reluctance to transfer to another job, which appeared to cause the curtailing of the implementation of the system that produced the unexpected outcome of a dysfunctional system.

The outcome of the implementation included a high degree of discontent among the operators, because of the differential pay rates that applied across the operator workforce and the loss of opportunities to reduce the differentials. The system had also produced a workforce that was not willing to be used in a flexible manner by being shifted from one job to another. The company had not expected outcomes of this nature from the EBA and the implementation of the system.

**Explanation and Building of Knowledge**

**The conceptual framework**

As discussed in Chapter 2, two competing theories of change were identified; the planned change model and the emergent learning approach. The approach adopted in this case had the elements of a planned change model process implemented through a structured framework. However, the planned change process was not executed well, because the
company's vision, goals and outcomes had not been sufficiently planned to ensure an effective implementation of the change.

The Conceptual Framework adopted for the study was able to describe the process which occurred with this intervention. Each of the stages in the Conceptual Framework was employed in this case as the intervention was planned, structured, implemented and recycled, with some changes in direction occurring as a result of the internal or external factors which emerged. The Framework allowed the identification of the limited degree to which decisions had been made in the planning and structuring decision-making stages, mainly because of the Implementation Guide. The Framework allowed the identification of the recycling decisions implemented by the company when it became clear that the original expected outcomes would not be achieved, and new goals were then established for a different outcome and the expected outcomes were modified.

The developers had not identified any specific stages for the development of their intervention, other than the prescribed steps in the Implementation Guide, but despite the limited planning and structuring decision-making in this intervention, the Conceptual Framework still provided an appropriate structure within which actions could be classified and the case study developed.

The Kirkpatrick Model

The Kirkpatrick Model also provided an appropriate framework within the Conceptual Framework to collect data on the impact of the intervention. Through its four levels, the model provided a framework for the collection of evidence as a measure of the learning which had taken place over a period of time, the opportunities provided to use this newly learned knowledge and skills in the workplace and the results obtained through this process. Although quantitative data was not available from the company with which to make an assessment of the impact of the intervention, the Kirkpatrick Model allowed for the ordered collection of anecdotal evidence to provide some insight into the impact of the intervention. This has been used where appropriate in the propositions below.

The propositions

The study established a series of propositions in relation to the manner in which the CBTA system would be introduced in an enterprise. The following outlines the implementation of the CBTA system in Company C in relation to those propositions.
Proposition 1

The enterprises will implement a CBTA system to achieve productivity, safety and quality improvements to enhance their competitiveness.

The company's need to enhance its competitiveness was an underlying driving factor in the decision to implement a CBTA system. The main driving factor was the strong promotion by both the metal industry union and the industry employers association of the use of competency standards and the implementation of a CBTA system through EBAs established across the metals industry. The inclusion of competency standards in the industrial Award, established by EBAs for the metal industry, had been negotiated over a period of time between the metal industry union and the industry employers association. These bodies initiated this process with the aim of integrating education and training with the use of skills in employment to enhance the skills base in the industry. In doing so, the two bodies believed that gains could be made in reorganising work, enhancing the skills of the workers and creating labour flexibility within an enterprise. They believed that the introduction of competency standards would improve the skills of the workers and increase their efficiency and productivity. However, they also believed that to maximise the productivity, efficiency and flexibility which could be gained, the enterprise required a structured approach to work reorganisation and training in the relevant skills (National Metals and Engineering Industry Competency Standards Implementation Guide, 1999).

The company was under some pressure from the two bodies to support the industry-wide implementation of the competency standards and a CBTA system through the EBA. The company was also under pressure from the car manufacturers to retain their contract by providing a quality component at a competitive price and on target. The company accepted the proposition made by the two bodies, that gains could be achieved through enhancing the skills of the workers and multi-skilling the workforce, and by implementing the CBTA system it expected productivity and quality improvements as an outcome.

The company had implemented a CBTA system, as a result of the external pressure, but had accepted the concept that improved productivity and quality could be achieved as a result, which would enhance its competitiveness.

Proposition 2

The enterprises will implement a CBTA system that is unique to the enterprise and strongly influenced by external and internal factors specific to the enterprise.

The company implemented a system that was strongly influenced by an external factor specific to the industry rather than just to the enterprise. This external factor applied similarly to all the companies within the metal industry. Other external factors, such as the highly
competitive environment also applied, at least to all the suppliers of components to the car manufacturers. The combination of these external factors strongly influenced the implementation of the system and many of the features in the system. It could perhaps be said that the system and its implementation was not sufficiently influenced by the internal factors specific to the enterprise and this was partly the cause for the system becoming dysfunctional.

The company implemented the system using an Implementation Guide, jointly developed by the metal industry union and the industry employers association, as required by the terms of the EBA. As a result, the company was strongly influenced by this external factor and the overall features implemented were strongly influenced by the Implementation Guide, which probably meant that the system contained elements common to those found in other companies within the metal industry. For example, the linking of competencies possessed to points and a classification structure and salary scale, the use of annual audits and the audit process, and the use of competency standards from the National Metals and Engineering Competency Standards. As a result, the overall system implemented was unique to the enterprise, but the system was likely to contain broad elements that could be found in other companies in the same industry, because of the common use of the Implementation Guide.

Within that external framework, the details of the system were mainly influenced by the internal factors specific to the enterprise. The Company did not appear to have any clear vision or plan of what it wanted to achieve or how it would achieve it, other than multi-skilling the workforce and gaining a flexible workforce. In addition, the planning decision-making stage was influenced by the need to implement the system quickly, because of the pressure placed upon the Working Parties by the operators and then the Shop Stewards. The company’s planning also appeared to be limited to following the required steps in the Implementation Guide, perhaps as a result of the need to move quickly, but also because this was a new experience and few had any experience in implementing the process. Perhaps, because of this inexperience, and by moving through the prescribed steps quickly, the company did not take the opportunity in the early steps to consider any reorganisation of the work in the department. As a consequence, it appeared that the company did not consider whether any gains could be achieved by reorganising the work and redesigning the operators’ role. There was little recycling decision-making during the early stages of the implementation. This could suggest that the company had still not developed a clear vision of what it wanted to do or perhaps that it was unable to move too much within the bounds of the Implementation Guide for fear of industrial issues emerging. However, the company made a significant recycling decision when it was part way into the implementation and had conducted two annual audits. At this point the company perceived that the implementation of the intended multi-skilled workforce was not going to result in the flexible workforce that was expected and they entered into a recycling decision-making stage and changed their goals and the
expected outcomes. The implementation was then curtailed and the company restructured the departments to provide three levels of operator in each department.

Generally, the outcome was a CBTA system that was unique and was strongly influenced by external factors specific to the industry and internal factors specific to the enterprise.

**Proposition 3**

*The enterprises will implement a pragmatic CBTA system using a narrow skills-based approach giving little attention to higher order competencies; the requirement for transferability of skills and knowledge to new situations and environments; the assessment principles and issues or the learning approaches that could optimise learning effectiveness and retention of competencies.*

The company was guided by an Implementation Guide and was required to select competencies from the National Metals and Engineering Competency Standards. However, it had the freedom to determine the job for which it would select the competencies and the scope of competencies. The company was implementing a system based on multi-skilling the workforce, but it took a pragmatic approach and initially limited this to multi-skilling workers within a department, rather than across a number of departments. However, the company did include some higher level competencies in those required for the department. The scope of the competencies went beyond procedural competencies and included developing problem solving skills, quality system skills and working effectively in teams. This selection of a broader scope of competencies for each operator possibly occurred for a number of reasons. One, because the company was required to select from the National Metals and Engineering Competency Standards, which provided a wide scope of competencies for the metals industry from which to select and included higher order competencies. Two, because the company scope was wider than just the one job in the department and included a number of jobs that required these competencies. Three, because the quality systems implemented by the company, because of its customers and the competition, required the operators to be involved with quality systems and structures to promote continuous improvement.

The competencies were not broadened beyond the initial scope for the operators, except for the operators who undertook a traineeship program. In this case the competencies were not limited to those that directly related to the performance of all the jobs required in one department, but included competencies required across a number of departments. The scope of the competencies was broader in this case because the company needed to select the competencies based on the structure of the qualification provided under the training agreement, to which the company was committed through the traineeship program.

The company gave no specific consideration to enhancing the capacity of an individual to transfer and apply skills and knowledge to new situations and environments when selecting the competencies. As indicated above, the competencies adopted were related to the
specific jobs performed within a department and included some higher order competencies that related to those jobs. No consideration was given to selecting any competencies that might aid the operator in transferring to another role in another department of the company or beyond the company.

The company developed a very pragmatic assessment approach. This involved a self-assessment with a verification process. This approach was very cost-effective, in the sense that it did not incur significant additional costs, it did not significantly disrupt the work on the production line, it did not require additional personnel and it did not require any special or formal performance of the competency on the production line. Within this structure the company appeared to have given little or no consideration to assessment issues such as reliability, validity, fairness or flexibility. However, while consideration was not given to the overall assessment approach, holistic approaches were used in the sense that the Team Leader’s verification was based on the overall performance of the job and the associated competencies, rather than on any checklist approach. Further, the assessment process involved one ‘expert’ person observing the performance of each operator in the workplace team over a number of performances of the same job, and each individual in the team in a defined range of jobs. This approach would enhance the validity and reliability of the assessments for the individual operators and across that team. The process required other Team Leaders to make observations of a different team performing a different defined range of jobs. The extent to which the Team Leaders rotated to be responsible for a team on a new range of job is unknown. If this had occurred, and a different Team Leader had assessed the same range of jobs over a period of time, then the reliability across the Team Leaders’ assessments might be low. This would occur because no assessment training was provided to the Team Leaders and no discussion appeared to have occurred between Team Leaders on what constituted a competent performance in a particular job.

The company adopted a very pragmatic learning approach. This was to support learning as it had done prior to the CBTA system, which was to place an operator in a new job and provide training support through an experienced operator, who might be the Team Leader or the Jumper or a colleague. Generally, the training was in the procedural tasks required for the job and included the provision of procedural knowledge passed on by the trainer. The operator learnt from repetition of the task on the job. For a few competencies, classroom-based approaches were used to provide the underlying knowledge. The company appeared to give no consideration to the learning approach to be adopted in the planning and structuring decision-making stages. The company also appeared to have given no consideration to the underlying knowledge of most of the competencies and how it might best be learnt. As a result, there appeared to be no formal consideration of the most effective learning approaches for the operators. However, most of the operators interviewed indicated that they learnt more effectively from on-the-job training with support from another operator, than from classroom-based training. However, while on-the-job training at the workstation is
considered to be an effective way to train, it is recognised that it is limited if it uses a behavioural approach with repetitious practice of the sequences, which emphasises the procedural knowledge rather than leading to a competent performance. Similarly, such an approach is also considered to limit the retention of the skills and knowledge. However, this was not an issue that was considered by the company when it continued to adopt this learning approach for the operators.

Generally, the company had implemented a pragmatic CBTA system, which was based on job-specific competencies required across all the jobs in a department, but had given consideration to higher order competencies as they related to the job. However, no consideration had been given to assessment principles, the transferability of skills to new situations and environments or to learning approaches that could optimise learning effectiveness and retention of competencies.

**Proposition 4**

*The enterprises will improve the CBTA system using an evolutionary process of resolving system issues as they arise over time.*

As indicated above, the company adopted an approach that closely followed the steps and examples in the Implementation Guide and as such appeared to put in place a very structured process. Over a period of time problems emerged and the system was not operating satisfactorily for either the company or the employees, but an evolutionary process was not put in place and these issues were not resolved at the time. However, the issues eventually became of sufficient concern to the company that it curtailed the implementation process and made a significant change to what was intended.

Generally, the company adopted a very structured implementation process, which did not include an evolutionary process of resolving issues as they arose over time.

**Proposition 5**

*The enterprises will identify the perceived benefits of the training by observing improvements in employees’ job performance, but will have no formal evaluation mechanisms to determine if the expected outcomes have been achieved through the CBTA system.*

The company had not established any structure by which the benefits of implementing a CBTA system could be identified, even in a qualitative manner. Inadequate performance would have been identified when poor quality product occurred, but no other process was in place. The Group Leader, Team Leader and operators interviewed generally believed that little improvement in performance had been observed after the training. This was even said to be the case with the new operators who had undertaken the traineeship program. This perhaps highlighted the point that no formal process was in place to measure the change and
the difficulty in identifying a change by observation over the period of time for which the training occurred, unless some reference point in time had been established for each individual. The measurement of improved performance was also compounded by the problem of knowing when the person under consideration first began to perform at the standard required, when the annual audit was conducted at some independent time. Some individual new operators identified an improvement in their own performance, but most operators, many of whom were experienced prior to the introduction of the system, suggested that no change had occurred in their performance.

Generally, the company had not considered or implemented any formal or informal mechanisms to determine if the expected outcomes had been achieved. The company measured the quality of the component and the achievement of targets on an ongoing, order by order basis. But these measures were not related to the training that occurred within a particular production line or department to determine if any change had occurred in productivity or the quality of the component.

Themes and Concepts Identified in the Case

The purpose of the study was to build theory in relation to the manner in which CBTA systems are implemented in workplaces. This case study investigated why the company introduced a CBTA system; the features that have been implemented; the decisions made by the company when planning, structuring and implementing the system; the reasons for its decisions and the factors which influenced them. In addition, the case study identified the company’s expected outcomes and the impact of the implementation of the system.

The insights gained from the case study of this company can add to the process of developing theories about the training needs of enterprises, the factors which influence the decisions of enterprises when implementing systems and the impact of implementing such systems. The themes and concepts arising from the data can also contribute to the development of this broader knowledge.

The themes and concepts arising from the data in this case study include:

The drive for more training was initiated by external bodies

The drive for the training came from the metal industry union and the industry employers association. These organisations jointly promoted the use of competency standards and a CBTA system for implementation across the metals industry. These organisations believed that the introduction of competency standards, reorganising work and providing relevant training would improve the skills of the workers in the industry and increase their efficiency and productivity.
The approach to implementing the CBTA system

The company adopted a CBTA system because it was required to do so under the conditions of the EBA. The implementation of such a system, based on the concept of multi-skilling the workforce and a classification structure, was thrust upon the company by the central metal industry union and the industry employers association. The company had agreed to a CBTA system as a result of an EBA, which was being negotiated in a similar fashion across the metals industry. The company had neither considered the use of such a system prior to this requirement nor how it might satisfy its business needs.

The company introduced the system using the steps outlined in the Implementation Guide, however it performed these steps in a perfunctory manner. Given that the company had to introduce the system, it did not appear to take the time to consider how the system could be introduced to meet its business needs. Opportunities were not taken to reorganise and redesign jobs to maximise the benefits from the introduction of the system. The planning and structuring decision-making stages were simply used to follow the Implementation Guide and establish the structures required for introducing the system.

Consequently, the company had embarked on the implementation of the system without fully appreciating the outcomes that could be achieved. The company had accepted the concept promoted through the EBA negotiations that a multi-skilled flexible workforce could be achieved, which would enhance the company’s competitiveness through improved productivity and quality. The company had not considered how it could ensure that its workers would adopt the concept of a flexible workforce and accept a transfer from one job to another. The manner in which the company introduced the system reinforced the operators’ view that it was simply an exercise to gain salary increases through accumulating sufficient points from the recognised competencies.

The company failed to use the planning decision-making stage to develop its own concept of how the system could benefit the company. Had it done this, it could have structured the system to meet its needs. It could also have developed a process to convince the operators of the benefits of the concept for the company and for the operators. It could have outlined the benefits and advantages for the operators of increasing their skills and knowledge for the future and fully participating in the training and the opportunity to learn and transfer between jobs. In failing to do this, an attitude developed within the company that the system was simply about gaining additional payments and not about becoming a flexible workforce to meet business needs.

The company compounded the problem by providing a traineeship CBTA system to new operators without appearing to fully explore the consequences. This created differences in the payment rates between some of the long-term operators and the newer operators and
discontent with the system arose among the operators. This discontent possibly contributed to the operators’ reluctance to fully participate and transfer to other jobs.

The company perceived that the implementation of the system was not going to achieve its expected outcomes and curtailed the implementation. At this stage the company gave consideration to its business needs and informally established three levels or roles for the operators, which it maintained through restricting the training opportunities of the operators. However, the different payment rates were well entrenched in the company at that stage and operators worked next to others in the same job, who were paid at higher rates. The discontent with the system was still strongly held by the operators, particularly those who were restricted from increasing their payment levels. At this stage the system had become dysfunctional and no longer appeared to provide any benefit to the company or the operators.

Overall, the company took a very pragmatic and perfunctory approach to the introduction which resulted in a system which was implemented in a cost-effective manner, but which then became dysfunctional and of little or no value to the company or the operators.

Retention, periodic assessment and ongoing performance levels

The company had no concerns about the retention of the operators’ skills. The company had periodic audits, but they were not implemented to reassess competencies, as competencies previously recognised were not assessed again. Under the system established through the EBA, once a competency had been achieved it was assumed that the operator retained that competency and payment would continue to be made for the competency. Some operators had indicated that they lost a skill if it was not practiced. Other operators considered that they had not lost a skill, but initially they would be less efficient in the job requiring the competency, however, these operators believed they would soon increase their efficiency with practice and reach the speed levels required.

The company was not concerned about the loss of competencies, because in the normal course of the job the operators practiced all the competencies required for that particular job. The company was concerned about maintaining the operators’ job performance levels, because of the customer targets. However, it was not concerned about the potential loss of performance levels in jobs that an operator no longer performed.

Preferred learning approach in the workplace

Generally the operators interviewed preferred the learning approach provided by the company. That is, an on-the-job learning approach with the Team Leader, Jumper or another operator providing instruction or support. It appeared that the company had not considered the learning approaches that could be used in the CBTA system in any of the decision-making stages and simply continued with the approach used previously. It would appear that the
company believed that this approach provided the outcome required and possibly it was aware that the operators preferred this approach.

The on-the-job training generally focused on the procedural tasks required for the job without any consideration of the underlying knowledge, other than that passed on by the trainer to enable replication of the procedure. The operator then learnt through repetition of the task on the job. This approach to training was limited, particularly as it emphasised the procedural knowledge. The company did not appear to give any consideration to the underlying knowledge of most of the competencies and how the skills and knowledge might best be learnt to enhance the capacity of the operator to develop a competent performance.

The role and position of competency-based training in the broader company environment

The operators formed a significant part of the workforce in the manufacturing plant. The company had negotiated an EBA that contained agreements on CBTA systems for a large part of the company workforce. This meant that as a training concept a CBTA system had a central focus for managers and workers at least in the manufacturing plant and for clerical workers. Senior managers had been involved in the initial negotiations and had accepted the conditions of the EBA. Other managers were involved in its introduction and they were aware that it had become dysfunctional and were looking for ways to change the arrangements in a future EBA. All Managers supported the introduction of the CBTA system as part of the EBA, but equally all had some responsibility for the manner in which it was introduced and its eventual outcome. On this basis, the introduction of the CBTA system in this case study was a central part of the company’s training activity and conceptually had a recognised position and role in the development of the workers skills and knowledge. However, it was not a system that was initiated by the company and was not linked strategically to the company’s business outcomes.

The value of introducing a CBTA system in a workforce of very experienced operators

Many of the operators interviewed indicated they had not learnt from the CBTA system. For some of the experienced operators most of their training was prior to the introduction of the system and their main involvement was through the initial audit. They would have received recognition as having possessed most, if not all, of the required competencies through the initial audit. Therefore it is unlikely that this group of operators would indicate that they had learnt as a result of the introduction of the system.

For other experienced operators, some new job opportunities would have been available where training was provided in the periods between the initial audit and the second and third audits. This was planned to enable the operators to develop those competencies not recognised in the initial audit. Although it was intended to provide additional job opportunities for training in this period, the provision of the job opportunities did not appear to be extensive.
and many were used for the traineeship program participants. As a result, the training for existing operators appeared to have been slowly implemented. Once the company had decided to curtail these job opportunities then even fewer opportunities were provided for training. Some experienced operators in this group might have indicated that they had learnt as a result of the system being implemented. However the extent of the learning would have been limited.

Other less experienced operators would also have experienced difficulty in gaining the job opportunities to gain access to the training required to increase their skills and knowledge over this period. Therefore, this group might also have indicated they had not learnt anything as a result of the introduction of the system.

Some experienced operators indicated they had increased their awareness about achieving a quality product and the way in which they performed their job impacted on this quality. But this change in awareness was attributed partly to the introduction of a new quality system and the resulting change in job roles and partly to the associated on-the-job training. None indicated the assessment process had made them any more aware of the standards at which they were required to perform their job. Therefore, none had indicated that any changes in performance or attitude had been brought about by the assessment process.

No formal measures were introduced to measure any changes as a result of the system. Therefore, it is not clear whether the company had gained any value by introducing the CBTA system with a workforce of experienced operators. Further, the Team Leaders and Group Leader had not indicated any significant change in the performance of the operators as a result of the introduction of the CBTA system.

It would appear that the company did not gain any major value, or at least was unable to identify any major value, in relation to the improved performance of the experienced operator workforce from the introduction of the CBTA system. However, any benefit that might have been achieved through the training of the experienced operators was limited to the extent that the company curtailed the implementation from what had been intended.

The concept of an audit and the linking of competencies to classification and payment rates

The initial audit provided a reasonable process by which the company could assess and recognise each operator’s current competencies and identify the training required for the operator to become fully competent. However, continuing this process for the subsequent audits raised a number of issues in relation to the CBTA system implemented and its effectiveness.

The concept of conducting an audit for all operators in the department at the one time, irrespective of what training they might have undertaken and when it had occurred, clearly
separated the training component from the assessment component of the system. The components were separated both in time and in apparent purpose. That is, the assessment component was no longer directly related to the development of the required skills and knowledge and the point where it could be recognised that the required skills and knowledge had been developed by the operator and performed at the required standard.

During the training process, the company informally signified to the operator when the job performance was at or near the required performance levels, by advising that the operator was allowed to perform the function without further support from the Jumper or a colleague. However, the operator would not have been formally advised when the performance was at the standard required for the competency and would not have considered or identified the standard required for the competency until the documentation was received for the next audit. This approach was not conducive to a skills development and recognition process related to knowing the standard at which the task should be performed and recognising the point of achievement of that standard of performance. Under these arrangements the point of achievement of the performance at the appropriate standard is not celebrated or recognised by either the company or the operator. Under these arrangements emphasis is not placed on the standard of the performance or the achievement of the performance. Consequently, the focus of the operator is not on the achievement of the performance at the required standard at the time when it is recognised.

The separation of the training component and the assessment component and the failure to focus on the performance at the required standard suggests to the operators and the company that the audit has a different purpose. In this situation, it is probable that the focus in the minds of all concerned is simply on the audit as a process for the classification of the operators to determine the payment rates. This view was supported by many of those interviewed. The manner in which the audits were conducted and linking the recognition of the competencies required with a classification structure, reinforced the concept that the audit was simply about determining the points that had been accumulated towards the next reclassification. The significant separation of the point of time when the performance of the competency was achieved at the required standard, from the point of time when it was recognised, further reinforced the concept that achieving recognition for the competencies was simply a process for accumulating points towards increased payment rates.

The concept of an annual audit was not linked in the minds of the operators, and probably the company managers, with the concept of an assessment for the purpose of determining whether a person was competent to perform a job. The assessment approach emphasised the accumulation and counting of points gained over the year, rather than the enhancing and recognising of the skills and knowledge of a person and the period when the skills and knowledge had been achieved to a certain standard. The degree to which the audit approach contributed to the operators’ perceived attitude of counting points and competencies to gain
higher payment rates, rather than the achievement of new skills and knowledge is not known, but the accumulation of points was an issue raised by all the people interviewed.

However, these issues are not necessarily a symptom of linking the required competencies with a classification and payment structure, but are a symptom of the manner in which the assessment process was implemented. Nevertheless, it is likely that this is an issue for the implementation of CBTA systems. That is, the provision of automatic reclassification and increased payment rates, based on achieving specified competencies, will detract from the focus of competent performance and the development of the skills and knowledge to competently perform a job at the required standard. The linking of the recognition of competencies and classification would be more readily managed by a company if it was part of a structure that signified the minimum competencies required before being eligible to proceed to a higher classified position when it became available. This would also promote the concept of developing and enhancing skills and knowledge rather than accumulating points. However, such a structure would not be as effective for readily gaining employee payment increases across the workforce as negotiated by the union in the EBA.
Conclusion

The Study

The purpose

The purpose of the study was to build knowledge and theory in relation to the implementation of competency-based systems in the workplace by investigating specific enterprises that had implemented competency-based systems. The study sought to determine why enterprises implemented a CBTA system; what features they implemented; the factors that influenced the features; the decisions made by enterprises when planning, structuring and implementing the system; and the impact of the implementation of the system on the expected outcomes including the enterprises' competitiveness and productivity.

It was expected that the insights gained through the investigation would add to the process of building knowledge and developing theory about the implementation of competency-based systems, the factors which influenced the decisions of the enterprises when implementing systems and the impact of implementing such systems.

The study was based on the argument that there appeared to be a need to increase the knowledge and understanding of the CBTA systems being implemented in Australian enterprises (Mulcahy & James, 1999). It was proposed that gaining knowledge and understanding about such things as the needs of enterprises, the internal and external factors which influenced their decisions when implementing systems and the impact of implementing such systems would assist researchers, industry planners and policy makers to better understand how their plans and policies were being implemented in the workplace and to understand the factors which influenced the implementation. It was proposed that this knowledge and understanding would assist them to plan, develop and implement systems, which could be adopted in the workplace environment of an enterprise to achieve the planned outcomes. Further, it was proposed that this would provide a basis for further development of policies and planning at a national, state and enterprise level to provide for effective and efficient enterprise based training systems.

The strategy

The general procedure in this study was to use a case study research strategy, following Yin’s (2003) argument that… "In general, case studies are the preferred strategy when 'how'
and 'why' questions are being posed, when the investigator has little control over events, and when the focus is on contemporary phenomenon within some real-life context” (p.1). An individual ‘case of interest’ was defined as a specific enterprise. The ‘bounded system’ required to provide the focus within each case was then specified as the CBTA system planned and implemented in that enterprise. Multiple cases were used based on Yin’s (2003) advice that the multiple cases could be used in a manner similar to multiple experiments, and then a ‘replication’ logic could be followed to build the knowledge and theory (Yin, 1998, 2003). That is, the function of the multiple case study strategy was to develop and build theory based on replication and not to create empirical or statistical generalisations through increasing the sample.

The cases

Three enterprises agreed to participate in the research, and the three cases were selected in order to enable replication. The goal in each case study was to expand and generalise theories (analytical generalisation) consistent with the conceptual framework outlined in Chapter 2 and attempt to replicate the findings to build and expand the limited theoretical base for the implementation of CBTA systems in the Australian workplace.

The three companies were all classified under the state training system as being in the manufacturing industry. However, two were in the chemical, hydrocarbon and refinery sector, and the third was generally classified as being in the metals industry sector. Consequently, the three companies provided an opportunity to generalise on a replication basis within the manufacturing industry category, despite the relatively different nature of their operations. Under these arrangements replication was tested for the two companies within the same sector, and then tested against a different sector. Testing the replication within and across the sectors was consistent with Yin’s (2003) advice of applying a ‘replication’ logic as for multiple experiments.

Comparing the Cases

The final process for the study was the comparison of the propositions and the themes and concepts that came from the individual case studies. This comparison process was also consistent with the ‘replication’ logic of the multiple case strategy (Yin, 1998, 2003) achieved through the use of the multiple case studies. That is, the comparisons were not made to create empirical or statistical generalisations, but to identify the extent of replication in the three cases and apply an analytical generalisation process to develop and build theory. The process of comparing cases helped to identify the themes and concepts that were common across the cases and the degree to which each case supported the study propositions. This was an important process that allowed analytical generalisation and the building of theory. This was the primary purpose for using the case study strategy, to generalise from
propositions to 'theory', analogous to the way it is possible to generalise from experimental results to theory (Donmoyer, 1990; Eisner, 1997; Punch, 1998; Silverman, 2000; Slavin, 1992; Yin, 2003).

**Explanation and Building of Knowledge**

**The conceptual framework**

As discussed in Chapter 2, two competing theories of change were identified; the planned change model and the emergent learning approach. A planned change model usually had a structured framework commencing with a clear vision and the setting of goals, or identifying the expected outcomes, and a planned approach to achieving the change and the outcomes. An emergent learning approach employed an action framework in which a powerful, but emerging vision was relied upon to guide the change with the implementation dependent on the continual feedback and readjustment of the strategies and actions.

The Conceptual Framework developed for this study described the anticipated processes of the intervention of change, in the form of the CBTA system, for each of the three companies.

Company A and Company C were described as having adopted a planned change model approach. Company B was neither described as having a planned change model approach nor an emerging learning approach. It appeared to be somewhere between the two approaches, but closer to the emergent learning approach.

The manner in which the three companies introduced the intervention of change suggested that the two theories of change were not discrete approaches, but that a continuum existed from a planned change model through to an emergent learning approach. The change model continuum could be explained in terms of the Conceptual Framework used in this study by the degree to which each of the decision-making stages was employed. The position on the continuum depended on the degree of emphasis placed on each of the planning and structuring decision-making stages and the degree of recycling decision-making that occurred in the intervention of the change. A planned change model intervention was described as one where emphasis was placed on the planning and structuring decision-making stages, with little or no recycling decision-making. Recycling decision-making, if it occurred in this model, occurred mainly on completion of the implementation after an overall evaluation of the outcome. The emergent learning approach was described as one in which a powerful vision was developed at the planning decision-making stage, but with little if any structuring decision-making and with recycling decision-making occurring throughout the intervention as the outcomes of decisions were identified in an action learning approach. Therefore, the degree to which each of the planning, structuring and recycling decision-making stages is used can determine the position on the change continuum of the particular approach used.
The Conceptual Framework used in the study was able to describe the process which occurred in each company and enabled the four decision-making stages to be identified for the intervention of the CBTA system in the three companies. It was clear that there was considerable variation in the extent and degree to which each decision-making stage was used by each company. It was also clear that the position on the change model continuum for any specific company was dependent on the unique combination of the internal and external factors for that company. These factors included the knowledge and experience of the developer or initiator of the CBTA system, the clarity of the vision, goals and expected outcomes, the extent of external influence on the steps required for the implementation and the level of funds available annually for the implementation.

The Kirkpatrick Model

Although quantitative data was not available from any of the companies with which to make an assessment of the impact of the intervention, the Kirkpatrick model allowed for the ordered and logical collection of anecdotal evidence to provide some insight into the impact of the intervention.

The study used Kirkpatrick’s Four Level evaluation model subsumed within the recycling or outcome decision-making stage to identify and examine any evidence of an impact on the outcomes, including improved competitiveness and productivity. As outlined in Chapter 5, the model is normally used for evaluating a specified, finite training program conducted away from the workstation (Kirkpatrick, 1998a). Through its four levels the model provided a measure of the learning which took place over a period of time, the opportunity to use this newly learned knowledge and the skills in the workplace and the results obtained through this process. This concept makes the model compatible with the concept of workplace situated competency-based training, where the learning occurred both intentionally and incidentally and where the learned knowledge and skills were generally able to be directly applied to the job.

However, as outlined in Chapter 5, measuring the impact of a CBTA system is different from measuring the impact at the end of a specific, finite time, group training session, because of the different nature of the delivery method.

The propositions

A set of study propositions was established based on the insights from the literature review. The purpose of the study propositions was to guide the direction and development of the study and the data collection processes based in a case study research strategy as described by Yin (2003). The process of comparing cases enabled an identification of the themes and concepts that might have been common to the cases and a comparison of the degree to which each case allowed analytical generalisation in building theory. The following compares
the three companies in relation to each of those propositions and through this process allowed some analytical generalisation.

**Proposition 1**

The enterprises will implement a CBTA system to achieve productivity, safety and quality improvements to enhance their competitiveness.

None of the companies directly expressed the view that they were implementing the CBTA system to achieve productivity, safety and quality improvements. None of the companies directly identified improvements in productivity, quality and safety as the expected outcomes or linked the expected outcomes to improvements in productivity, quality and safety. Two of the companies indicated that their initial purpose for implementing the system was to increase the knowledge and skills of their operators. Company A, when pressed, indicated that productivity and quality improvements were underlying expectations and that if the company provided any training then it was “a given” that it expected productivity and quality improvements as an outcome. Productivity and quality improvements emerged as an underlying expectation at a later stage for Company B, when the senior managers became more aware of the potential of the system being implemented. However this was not expressed as the initial expected outcome.

In both Company A and Company B, the primary purpose for providing the CBTA system shifted during the intervention from increasing the knowledge and skills of its operators to one of ensuring that the company could satisfy externally imposed regulations. This was to be achieved by showing that its operators were competent to perform their job at industry recognised standards. However, improvement and consistency in the operators’ performance increasingly became an important requirement for Company B. It was expected that such improved performances would reduce incidents that had the potential to cause environmental, health and safety problems.

Company C was heavily influenced by external factors in its decision to implement a CBTA system. Prior to this external influence it had shown no intention of implementing such a system and therefore had not considered or established any expectations for the outcome. As a result of the external influence, Company C accepted the proposition that it would gain increased productivity and quality improvements from the implementation of the system through the provision of a flexible workforce. Company C was also aware that its competitors were implementing a CBTA system under the same conditions. Consequently, the need for the company to implement the system to maintain its competitiveness might have been an underlying driving factor in the decision to implement a CBTA system.

None of the companies had directly expressed or directly related the implementation of a CBTA system with improving or enhancing its competitive position. Nor had they directly
related the implementation of the CBTA system with their business outcomes. For two companies the expected outcome was to increase the skills and knowledge of their operators. These companies both postulated that the provision of training, possibly based on previous experience, was a worthwhile activity and that benefits would occur as a result. One of these companies postulated that the provision of any training would improve productivity and the quality of the company’s products.

In summary, none of the companies directly expressed the view that they had implemented a CBTA system to achieve productivity, safety and quality improvements to enhance their competitiveness. This proposition was not supported.

**Proposition 2**

The enterprises will implement a CBTA system that is unique to the enterprise and strongly influenced by external and internal factors specific to the enterprise.

All of the companies studied implemented a system that was strongly influenced by their external factors. In Company A and Company B the systems were strongly influenced by the introduction of the external major hazard facilities regulations. The system implemented by Company B was also strongly influenced by the level of government funding it was able to access. However, within those external influences, each company developed a system that suited their unique circumstances and was influenced by a combination of external and internal factors. In Company A and Company B the impetus for the intervention was a series of internal factors. The external factors then shaped the manner in which the system was developed and influenced the final expected outcomes.

Similarly, Company C was strongly influenced by dominant external factors, which in this case took the form of two external organisations. The organisations influenced the introduction of the system, its format and the purpose for its implementation through the negotiation of an Enterprise Bargaining Agreement (EBA). The external organisations also provided the steps to be followed for implementation and examples of implementation processes and system features. In this sense, the system that the company intended to implement would probably have been similar to other systems introduced in the same industry. However, the company’s inability to effectively implement the system, even with such external assistance, was related to its internal factors.

None of the companies attempted to learn from the experiences of other enterprises in implementing CBTA systems. Each company obtained external support from a TAFE Institute, but to different degrees and for different purposes.

In summary, all of the companies implemented a system that was unique to the enterprise and was strongly influenced by external and internal factors specific to that enterprise. In the
case of Company C the unique nature of the system was related to its inability to effectively use the guidance provided. This proposition was supported.

**Proposition 3**

*The enterprises will implement a pragmatic CBTA system using a narrow skills-based approach giving little attention to higher order competencies; the requirement for transferability of skills and knowledge to new situations and environments; the assessment principles and issues or the learning approaches that could optimise learning effectiveness and retention of competencies.*

The companies took a different approach to the development of the competencies. However, to some degree each was guided in its selection of the competency standards by the relevant national industry competency standards. Company A implemented enterprise specific competency standards developed by an external consultant who included higher order competencies such as working in teams, problem solving and troubleshooting. Company B was inclined to adopt narrow, pragmatic skills-based competencies related to the procedural requirements of the specific job. However, the company’s selection of competencies was determined by its decision that the operators should gain a nationally recognised AQF qualification. This required the company to select the competencies from the national industry training package. As a result, the TAFE Institute influenced the company to include the higher order competencies required for the qualification, because of the national industry training package qualification rules. Company C had initially planned to develop a multi-skilled workforce based on the skills required for all of the jobs in a department. However, it later restricted the range of skills to just those required for a few jobs within the department. Nevertheless, it was also guided by national competency standards and it included higher order competencies such as problem solving skills, quality system skills and working efficiently in teams.

All the companies selected competencies that went beyond pragmatic skills-based procedural competencies and included higher order competencies, but each was influenced to select the higher order competencies by external factors.

The companies gave no consideration to enhancing the capacity of an individual to transfer and apply skills and knowledge to new situations and environments when selecting the competencies for their systems. None of the companies required the development of competencies that might assist the operators to transfer and apply their skills to new situations and environments. Each company selected only those competencies that were required for the job and did not include broader more generic and higher order skills and knowledge to enhance the operators’ capacity to demonstrate competent performance in new situations and environments.
The extent to which the competencies developed in each company allowed transferability of skills to new situations and environments is not known. No evidence was found to ascertain this. The operators in each company only developed problem solving skills to the extent required in the context of the specific jobs, but in Company A and Company B, these competencies would have been at a standard and degree of complexity which potentially would facilitate transfer to new situations and environments. However, the problem solving competencies required in Company C were at a more basic level, and it is unlikely that the operators would have been provided with a sufficient level of underlying knowledge to facilitate transfer to new situations and environments. Some basic manual skills developed in each company and the computer skills developed in Company A and Company B had the potential to facilitate transfer or be transferable to new situations of a basic nature.

Company A had developed core and generic competencies that could be applied across a number of its plants, but they were still specific to the job. However, Company A allowed operators who elected to do so, to broaden their competencies beyond the company competencies to those required to gain a recognised qualification. This was expected to allow some broadening of the competencies beyond that required for the specific job in that company and might have been pertinent to new situations and environments.

Company A acknowledged the generally recognised assessment principles and developed guidelines for assessments to be reliable, fair, flexible and valid. These guidelines provided some basic advice on the development of assessment procedures, the conducting of assessments to ensure that evidence gathering was appropriate to the situation and that sufficient and authentic evidence was gathered. The guidelines also noted the need to take into account the person being assessed and to explain and negotiate the process with the person. The guidelines also advised that the gathering of evidence using a range of methods and from a range of sources was good practice for ensuring reliability. Company A also decided to use qualified workplace assessors and external qualified workplace assessors had undertaken the majority of the assessments. Company B and Company C adopted assessment approaches with no reference or apparent consideration of issues such as reliability, validity, fairness or flexibility. Company B did not develop a systematic approach or provide evidence guides to assist in the assessment of a performance in the field. It decided to leave the evidence requirements, the standards and the judgement to the individual assessor, who was a Zone Team Leader (ZTL), on the basis that this person was ultimately responsible for how the team performed. The TAFE Institute assessors and the ZTLs shared in the overall assessment process undertaken in Company B. All of the assessors were qualified workplace assessors. Company C did not provide evidence guides, nor did it decide to directly involve qualified workplace assessors in the assessment process.

Generally, the companies appeared to adopt pragmatic assessment processes either to achieve a basic outcome or to provide a quick solution to achieve an outcome. Company A
initially introduced a self-assessment process to achieve a specific outcome. External factors then influenced the company to move to a recognition of current competencies (RCC) process, using external assessors who adopted a ‘desk top’ approach, which was a pragmatic solution to demonstrate as quickly as possible to external authorities that the operators were competent to perform their job. However, the process that was adopted in the second plant was a more formal RCC process based on interviews and a demonstration of the skills and knowledge required. Company B adopted a RCC assessment process for its basic level competencies mainly because it provided a quick and cost-effective solution to meeting its training and funding commitments. However, it did not include a formal RCC process for the competencies in the higher level qualifications. This was also a pragmatic approach, decided upon to enable the developers to get on with the development of the CBTA system so the company could satisfy its deadlines and funding commitments. However, this was partly decided upon because the company had little faith in the rigour of the RCC process and the credibility of its outcome. Company C also developed a pragmatic assessment approach by using a paper-based self-assessment audit process. The self-assessment process was followed by a verification process conducted by a Team Leader who was considered to be an ‘expert’ for that job.

All of the companies adopted an holistic approach to the assessment rather than a checklist. All had generally based their assessment process on the operators’ performance of job tasks, although Company B conducted separate knowledge-based assessment and field assessment components that were not related to each other. Company B’s approach appeared to emphasise the knowledge component assessment, rather than the overall performance of the skills and knowledge required for demonstrating competency, and the rigour of the assessment of a performance in the field appeared to vary considerably depending on the individual being assessed and the assessor.

The practices adopted by the companies were not totally devoid of practices that would be expected to enhance the reliability and validity of the assessments. Generally, each company used the same assessor to assess tasks in a specific area or range of functions. For Company A and Company C the approach included assessments based on judgements of the operator’s performance of the task on the job, and to a lesser degree, Company B employed this practice. In Company B and Company C the internal assessors had the opportunity to observe the operators perform their job tasks over a period of time and could base their judgements on these ‘extended’ performances. All companies used experienced operators or ‘experts’ as their assessors, although those used in Company C were not qualified assessors.

It was clear from the case studies that none of the companies considered the preferred learning style of the participants or other learning approaches that might optimise learning or retention of competencies. The companies generally appeared to implement pragmatic
learning approaches that were mainly based on their organisational or administrative convenience. Company C retained its previous approach to learning, which was cost-effective and required no additional personnel. The companies had previously used a learning approach that relied heavily upon on-the-job training with a one-to-one, trainer to learner approach, sometimes supplemented by classroom training. Both Company A and Company B had concerns about their previous training and learning approach. They were concerned about their inability to control the content of the instruction and the passing on of inappropriate and idiosyncratic work practices by the trainers. Nevertheless, Company A retained its previous training approach; although it also provided the underlying knowledge for the job through classroom-based approaches and the TAFE Institute provided an individualised paper-based approach for some of the operators doing the study required for gaining a recognised qualification. Similarly, Company C retained its previous pragmatic approach, whereby the operators were provided with the learning required for the procedural tasks performed on the job, but little if any of the underlying knowledge required for a competent performance of the job was provided. Generally, this training involved repetition of the procedural tasks required for the job and depending on the trainer’s approach, might have included the passing on of some underlying knowledge. The operators’ generally learnt by example and by repetition of the tasks on the job. For special tasks, some of the operators were given the opportunity to participate in classroom-based training, which provided the underlying knowledge for specific competencies.

Company B adopted a computer-based learning approach for the Certificate III level learning materials, because it provided an organisationally convenient solution to the previous problems they had experienced with print-based systems and access to learning for operators on shifts. The developers were aware that the operators were unlikely to prefer a computer-based approach when they decided to implement it, but no consideration was given to adopting a learning approach that would be preferred by the operators. The operators generally expressed dissatisfaction with the computer-based approach, particularly when no other learning support was provided, and indicated a preference for other learning approaches. Company B emphasised the knowledge-based learning related to the company’s overall operations and included in this the underlying knowledge required for the operators to demonstrate a competent performance on the job.

None of the companies were seeking to inculcate transferability of the skills and knowledge and therefore no consideration was given to learning approaches that might have optimised learning or the transferability of skills and knowledge to new situations. However, Company A and Company B were concerned about the retention of competencies, although they had not given any consideration to the learning approaches that might have enhanced the retention of the skills and knowledge required for maintaining competent performance at the standard required. However, because of their concerns about the retention of the knowledge and skills required to provide a competent performance, the Company A operators in Plant 1 initiated a
more formal and rigorous refresher learning approach than had been used previously for
refresher learning. These operators adopted a scenario group based approach that became
a preferred and apparently effective learning approach for many of the experienced operators.
As a recycling decision the company was beginning to formalise this refresher training to
improve retention of competencies.

Company B had decided to resolve its concerns about the retention of the skills and
knowledge required for the critical competencies by reassessing the critical competencies and
placing the onus on the operators to ensure that they retained the skills and knowledge
through reviewing the learning material. However, the operators were unable to practice
many of these skills as a means for retaining them, because they were only required for
emergency situations and were rarely used in the normal work situation.

In summary, the companies generally implemented pragmatic CBTA systems based on
previous practices or administrative convenience. However, some attention was given to the
inclusion of higher order competencies, but none of the companies gave consideration to
selecting the competencies to enhance the capacity of an individual to transfer and apply the
skills and knowledge developed to new situations and environments. The companies’
attention to assessment principles and issues such as reliability, validity, fairness and
flexibility was mixed. One company acknowledged the need to ensure that assessments
were reliable and valid, whereas the other two had not considered these issues. All adopted
holistic approaches and two companies relied on qualified workplace assessors for the
reliability and validity of the assessments. The other company relied on the use of ‘experts’
for the validity of the assessments. Overall, the assessment processes that were adopted
could have been more rigorous in all of the companies. No consideration was given to the
preferred learning style of the operators or the effectiveness of these learning approaches
and no attention was given to implementing learning approaches that could optimise learning
or enhance the retention of competencies.

The data generally supported this proposition, with the exception of a consideration of the
higher order competencies and one company’s consideration of the assessment principles.

Proposition 4

The enterprises will improve the CBTA system using an evolutionary process of resolving system
issues as they arise over time.

Company A made a number of attempts to introduce a training system, which evolved and
changed as the national training system also evolved and changed. This evolutionary
process was influenced and driven by the Training Manager’s knowledge of the developments
in the training system at a state and national level. As a result, significant planning and
structuring decision-making was evident in the introduction of the CBTA system, which relied
heavily on some of the previous planning and implementation. The company did not move rapidly through these initial stages, but had a long period of planning and structuring that included considerable recycling before the CBTA system was introduced. However, the process of introducing the intervention was a pragmatic one, based on a conservative approach of phasing in the CBTA system plant by plant, according to the level of resources available. This was a deliberate plan, based on both the funding available and the opportunity to learn from the previous implementation, to allow recycling decision-making prior to implementing the system in a new plant. However, the company also used an evolutionary process in the plants in which the system had already been implemented, by returning to these plants and introducing some of the successful features that it had implemented in the system across the other company plants. In this regard, Company A had used an evolutionary process to improve its system in each plant.

Company B used an action learning process by resolving issues as they arose throughout the introduction of the system. Company B rapidly moved through the planning and structural decision-making stages and relied heavily upon recycling decision-making based on the ‘outcome’ or perceived consequences of each decision made in the other three decision-making stages and changing direction as internal and external factors impacted on the intervention. This was a pragmatic action learning approach that relied on recycling and changes in direction during the structuring and implementing decision-making stages. In this sense the process was an evolutionary one. However, when the system had been implemented and all the participants had nearly completed the program, the company commenced another recycling or evolutionary process to improve what had been initially established. This included extending the system to incorporate a Certificate I program for new entrants and to enable it to be used in plants in the Asia-Pacific region.

Company C did not use an evolutionary process and implemented its system by closely following the steps and examples in the Implementation Guide in a perfunctory manner. The company moved rapidly through the planning and structuring decision-making stages with little deviation from the steps and examples provided in the Implementation Guide. Over a period of time problems emerged and the system was not operating satisfactorily for either the company or the employees, but an evolutionary process was not put in place and these issues were not resolved at the time. However, the issues eventually became of sufficient concern for the company that it made a significant change to what it had intended to implement and curtailed the implementation process.

In summary, the two companies from the same industry sector could be considered to have improved their systems using an evolutionary process once the initial implementation was underway; however, this was not replicated in the third company. Therefore, it could not be generalised that companies improved their systems using an evolutionary process of resolving issues as they arose over time. Therefore the data did not support this proposition.
Proposition 5

The enterprises will identify the perceived benefits of the training by observing improvements in employees’ job performance, but will have no formal evaluation mechanisms to determine if the expected outcomes have been achieved through the CBTA system.

Company A and Company B reported that they had observed areas of improved performance, which they attributed to the CBTA system, but they were unable to link the perceived improved performance in the workplace to any improvement in productivity or quality.

Company C generally believed that there had been little change in performance after the training. This outcome could have been expected for the experienced operators in Company C who had undertaken the training. However, the managers had observed the performance of the newer operators who had undertaken the traineeship program and it would be expected that they would observe some improvement in performance for this group as a result of the training, given that they had less previous experience in the job. However, the managers believed that the system was dysfunctional, which might have influenced their view on any improvements achieved through the partial implementation of the system.

Generally, the benefits of introducing the CBTA system were only identified by the managers when prompted, and these were based on observed improvements in the employees’ job performance rather than through any other process. The companies had shown no interest in measuring the impact of the implementation of the CBTA system and therefore no systematic process was used to identify any benefits. None used formal evaluation mechanisms to determine if the expected outcomes had been achieved through the implementation of their CBTA system. The measures used by the companies were the assessment instruments normally applied for each individual in a CBTA system. While each company developed and measured key company performance outcomes, none was linked to the implementation of the CBTA system. None of the companies had taken any action to measure the contribution that the introduction of the system might have had on the performance of the business. However, when the issue was discussed, each company commented on the difficulty of measuring the impact of training on measured outcomes, such as productivity and quality. Generally, the companies appeared to provide training based on their previously held belief, that if it is provided then benefits will accrue, but they had taken no action that might have supported this view.

The data supported this proposition.
Themes and Concepts Identified in the Case Studies

The purpose of the study was to build theory in relation to the implementation of CBTA systems in the workplace. In addition to an analysis of the study propositions, it was expected that the themes and concepts arising from the case studies data would also add to the process of developing the theory about the training needs of enterprises, the factors which influenced the decisions of enterprises when implementing systems and the impact of implementing such systems. The themes and concepts identified are separately discussed below.

The need for a key person with knowledge and support to drive the implementation

Two companies had a key person who had the enthusiasm and drive to continue with the implementation. The process in the other company was driven by the external conditions established through the industrial relations system. In this third company the responsible personnel changed over the period of the implementation, and any commitment to the system that might have existed, dissipated quickly when it was perceived that the system was not meeting the company’s needs.

Company A had a person who was committed to and knowledgeable about the CBTA system being implemented. The person who was the driving force in Company B was not committed to or knowledgeable about CBTA systems. In this case, support was required from educational consultants to advise on the system. As this key person became more confident, he realigned the implementation to what he wanted to implement, causing changes in direction which suppressed the competency-based concept and the use of the competency standards in the system.

The case studies data appears to have supported the notion that for an intervention of change to be fully implemented a key person must drive the change in the organisation. The case studies data also suggested that for a CBTA system to be implemented successfully, the key person needed to be committed to and knowledgeable about such systems, or at least needed the support of others who had that knowledge.

The source of the drive and the desire to initiate a CBTA system

The drive for the implementation of a competency-based system in Company A came from the Training Manager, who was a member of a state industry training advisory body and was therefore aware of competency-based systems through this membership. In Company B, the drive arose from the training department’s decision to link their training activity to a recognised qualification provided through a TAFE Institute. The training department became aware through the TAFE Institute that the qualification was competency-based using recognised industry competency standards. The Enterprise Bargaining Agreement
negotiations and implementation was the driving factor in the implementation of a competency-based system in Company C.

The participants in the CBTA system in each company formed a significant part of each companies’ workforce, both in terms of the number of workers and in terms of the significant and important production role they performed in a manufacturing industry. It appeared that the introduction of a CBTA system for this group of people was not a significant event in any of the companies, perhaps with the exception of Company C, where to a large degree the system had been imposed on that company. However, even in Company C, the implementation of the system was not seen as significant in terms of what it could achieve for the company.

The degree of significance is perhaps also reflected in the fact that, in at least two companies, the CBTA system did not fully encompass all the training requirements for the operators and additional emergency and safety training was provided outside the CBTA system. Further, two companies had initially implemented a self-assessment process. One of these companies supplemented this with a verification process and the other was influenced to change to a formal assessment process with qualified workplace assessors, when the externally imposed major hazard facilities regulations were introduced. The third company initially introduced an assessment component with qualified workplace assessors because it was linked with a TAFE Institute, had gained funds for a traineeship program and was required to provide a recognised qualification for the operators.

The senior managers at the companies were not actively proposing or supporting the implementation of a competency-based system and only took interest in the CBTA system to the extent that it satisfied externally imposed requirements. It could be said that initially they were indifferent to the implementation of such a system. Middle management responsible for company production showed greater interest, but they had not actively proposed the implementation of such a system. It appeared that the implementation of a CBTA system was not a significant event for any of the companies in terms of what it could achieve for the company or its potential to increase the company’s competitiveness through improvements in productivity and quality. No evidence could be found in any of the companies that the CBTA system was effective in improving business outcomes or that the companies valued the system for that reason.

The case studies data appears to suggest that none of the companies initially indicated a strong desire to implement a CBTA system. The data also appeared to suggest that the companies adopted a CBTA system simply because it was the system that was available through the national training system at that time. The case studies data also appears to suggest that at least initially, none of the companies placed much value on the need for a formal assessment process to satisfy its business needs or to determine whether its operators
were competent to perform their job. However, soon after their system was introduced, two companies recognised the benefit of the competency-based assessment concept and the nationally recognised competency standards to satisfy external regulations, with which they had to comply.

The assessment practices used

Each company implemented very different assessment practices. Only one company referred to assessment principles, which included that the assessments must be reliable, flexible, fair and valid and outlined practices for designing and conducting assessments. Two companies included an appeals process for their assessment. All of the companies included a RCC or RPL process, but all differed in the manner in which it was structured and implemented. Only two companies directly involved qualified workplace assessors in the assessment process.

One company emphasised the assessment of the knowledge components of the competencies compared with the assessment of practical demonstrations of the competencies. The other two placed greater emphasis on the practical demonstration of the competencies. The rigour with which the demonstration of competence was assessed appeared to be wanting in at least two of the companies.

None of the companies appeared to conduct any validation processes or any moderation or any internal or external benchmarking processes for their assessments. The degree to which the competencies were documented and detailed the performance criteria, evidence guide and the range of variables for each unit of competence varied considerably. One company had good documentation to guide the assessors; the other two provided little documentation to support the assessment process.

In general, the assessment processes used varied considerably across the three companies with no clearly identifiable common practices evident. The extent to which the assessment processes of each company showed any evidence of what would be considered to be good assessment practice also varied considerably.

The case studies data suggested that the companies did not require a CBTA system with a formal assessment process to satisfy their business needs and that a formal assessment process was only required for externally imposed reasons. The extent to which each company’s assessment practices were rigorous and approached what could be considered to be good practice appeared to reflect the extent to which the external requirement required such an approach. It would also appear that significant improvement would need to occur in at least two of the companies to provide assessment practices that might reflect good practice.
The influence of external factors in shaping or initiating a CBTA system

A specific external factor had a significant influence on the implementation of the CBTA system in each of the companies. The externally imposed major hazard facilities regulations had a significant influence on the CBTA system implemented by both Company A and Company B. The externally initiated CBTA system established through the industrial relations system was the major factor that influenced Company C to introduce the system. In each case this single external factor was the most significant in shaping or initiating the CBTA system.

The externally sourced funding through government incentives also appeared to influence the scope, extent and form of a CBTA system. The system implemented in Company B was significantly influenced by access to a range of sources of government funds. The scope, extent and form of the CBTA system and the implementation process were all strongly influenced by the amount of funds available and the conditions placed on its expenditure. To a lesser degree, government pilot funding commenced Company A on the path to implementing a CBTA system, but it did not appear to be a significant factor in its implementation. However, the lack of additional externally sourced funds appeared to partly influence the decision to implement a more conservative staged approach than that adopted in Company B. Company A’s attempt to participate in the traineeship scheme was resisted by the union, but it is not clear whether the company’s primary reason was to become involved to access the available funds. The data suggested that the amount of available funds influenced the decision by Company C to employ the new entrants as trainees, which significantly influenced the system outcome and appeared to be a significant contributor to it becoming dysfunctional. However, the data also suggested that the company had a need for new employees and would have trained them irrespective of the funds available.

The external competition in the market appeared to have little influence on the implementation of the CBTA system in each company. There was no evidence to suggest that competitiveness was an external factor that influenced the introduction of the system. The three companies had made changes to improve their productivity, quality and competitiveness, but the introduction of the CBTA system was not seen as a significant element in their efforts to bring about these improvements.

The case studies data suggested that, overall, the external factors associated with a company had a significant influence on the implementation of a CBTA system in the company.

The basis for the specification of competencies

Two companies focused on the job requirements to identify and specify the competencies, one developing its own competencies and the other using the national industry competencies. The third company initially focused on selecting the competencies to satisfy the requirements.
for recognised qualifications from a training package, and then changed at a later stage to developing modules and a learning program based on the job tasks, rather than specifying the competencies required to perform those tasks.

The process for determining the competencies to be included in a CBTA system could influence the extent to which the competencies selected represented all the competencies required for the competent performance of the job. Using the national industry competency standards as the prime method of constructing the competencies required for the job, rather than analysing the job, specifying the role and then selecting the appropriate competencies from the national industry competency standards, had the potential to cause competencies required for the job to be overlooked. However, the data suggested that using the national competency standards at some stage in the process to specify the competencies, was likely to cause the developers to broaden their thinking on the breadth of competencies and to include competencies that would not have been considered from the job analysis process.

The case studies data showed that using the national industry competency standards has the potential to broaden the scope of the competencies identified by a company, but the failure to specify the job requirements prior to selecting competencies could potentially lead to overlooking some competencies required for the job.

The importance of retention of competence and the use of refresher training and reassessment

Two companies operated in an industry of a special nature where it was the operators’ responsibility to manage the chemical operations in a production plant. Much of the operation was automated, which simply required the operator to monitor these operations, but there were other functions performed by the operator on a day-to-day basis. However, an important role for the operator was to prevent emergency situations in the plant due to malfunctioning of equipment, power failures or other reasons. These situations occurred infrequently, but required an immediate and correct response to avoid major disruptions or disasters. Early corrective action could avoid potential problems. Due to the infrequent and random nature of these problems, the operators had limited opportunity to perform these functions in a real situation and therefore had limited opportunity to practice on the job. Further, these situations could not be induced to allow training, because of the cost and danger of doing so.

Such a situation in an industry lends itself to the concept of refresher training within a CBTA system. It raises the notion of the retention of skills and knowledge and whether learning should be provided in a manner that reinforces the skills and knowledge to aid retention and whether there is a need to periodically reassess for critical skills and knowledge. This is particularly so for jobs where special emergency and dangerous situations might arise. The response differed in the two companies in this situation. One company had foreseen the potential of reviewing and reassessing competencies at some stage after the initial
implementation, and had incorporated a statement to this effect in its guidelines, but the company had not implemented any processes by the end of the case study period. The operators were concerned about retention of the skills and knowledge they were losing due to lack of use. In particular, the loss of many of the critical competencies that were only required in an emergency situation. Their response was to reinvigorate the refresher training that had previously occurred and to concentrate on the critical response competencies through scenario group discussions. At a later stage the company’s concerns about the retention of skills and knowledge increased and it was thinking of identifying the critical competencies and, at least, reassessing these periodically. Similarly, the second company was concerned about retention of critical skills and knowledge and the capacity of the operator to continue to perform at the appropriate standard. It responded by deciding to reassess those competencies that for safety, health and environmental reasons were critical to the performance of the role.

The case studies data suggests that to resolve this issue both companies took the pragmatic option of reassessing the critical competencies. The operators at one company had initiated enhanced learning opportunities, but neither company had considered a review of their initial learning and assessment approaches to improve the retention of the competencies and to ensure that the operators were competent to perform the job.

The approach to implementing the CBTA system

All the companies introduced their CBTA system by allowing the operators to participate on a voluntary basis. This situation was maintained in each company throughout the period of the case study. This approach had been taken to encourage maximum participation in an environment where the work based skills and knowledge of the experienced operators had not previously been assessed. No comparisons could be made in relation to the effectiveness of this strategy because each company employed the same approach.

Each company had relied upon some external support for the implementation of their system, but this support had differed in nature and extent. In each case the companies had gained support from a TAFE Institute for some part of the implementation of their system.

One company emphasised the competency standards through printed booklets for distribution to the participants, which identified the competency standards for each role. Whereas the other companies appeared to place much less emphasis on the competency standards and tended to only identify the competencies through the assessment documentation.

There were some broad commonalities in the detail of the companies’ CBTA systems, such as each acknowledging the national competency standards, but the manner and extent of use of these national competencies differed in each company. There was little commonality in the range of features implemented by the companies in their CBTA systems or the way in which
they implemented some of the common features, such as the learning approaches and the assessment approaches.

The degree to which each of the companies’ CBTA system was planned and structured appeared to influence the degree to which the system focused on or was aligned with the company’s business needs. Although none of the companies had achieved any significant alignment with their business needs or strategic outcomes.

The case studies data suggests that there was little in common between the way in which the companies implemented the CBTA system. The approach taken by each company to the introduction of the change was dependent on the unique combination of external and internal factors impacting on that company.

**The value of introducing a CBTA system in a workforce of very experienced operators**

In one company, operators who had undertaken a RCC process indicated that this assessment process had raised their awareness of the competencies by identifying the standard at which they should perform the role. Consequently, they reported that their performance on the job had improved, which was also verified through observation by middle managers. However, the experienced operators in each company generally considered their job performance had not improved significantly as a result of their involvement with the CBTA system. This was in contrast to the new entrants in one company who believed that their performance had improved as a result of the CBTA system.

Contrary to the view generally expressed by the operators, in at least two companies, the middle managers indicated the performance of the operators had improved, but they could not directly attribute this to the implementation of the CBTA system. The middle managers in the third company, in which the system had become dysfunctional, observed no improvement in performance. There were no measures of performance change in the companies, other than the observations of the managers and the operators. As a result there was no clear evidence that suggested that the companies had gained any significant value in terms of work performance and improvements in productivity and quality from introducing the CBTA system with a workforce of experienced operators.

The extent to which any reliance can be placed on the observations of the various stakeholders in each company is uncertain. In general, the experienced operators claimed they had not learnt or improved their performance as a result of the system, whereas the managers in two companies observed some improvement in the operators’ performance. It is not clear whether personal factors might have led the experienced operators to deny that their performance had improved or whether the performance changes reported by the managers were real or simply reported to justify the time and effort put into the development of the CBTA system. Perhaps consistent with this latter thinking, in the case of Company C, the
managers reported no change, which might reflect their dissatisfaction with the system and their desire to discredit it.

Despite the degree of uncertainty in the veracity of the data, such uncertainty is most likely to occur where the extent of learning and the changes in performance were not significant. If significant changes had occurred as an outcome of the implementation of the CBTA system, it is likely that the operators would have had difficulty in denying these changes.

Generally, the case studies data suggested that there was little value in involving experienced operators in a CBTA system in terms of any changes in performance and resultant improvements in productivity and quality.

The concept of an audit and the linking of competencies to classification and payment rates

Of the three case studies, only Company C had an arrangement that directly linked the possession of competencies required for the job with an automatic classification and payment system. Company A had classified the operator positions based on the degree of complexity of the job and the associated competencies, but payment was linked to the position held and not the competencies possessed. Towards the end of the study, Company B was also establishing a link between the qualifications or competencies possessed and eligibility for promotion to specified positions. Neither Company A nor Company B had a system by which an operator automatically progressed to a higher level classification and payment on the basis of the competencies possessed.

As a result of the direct linking of the competencies to classification and payment, Company C and its operators appeared to focus on the audit as a process for classifying and determining the payment rates of the operators. This focus appeared to be reinforced by the manner in which the CBTA system was implemented. It would appear that the combination of this focus and other internal factors related to the reluctance of the operators to transfer to new jobs, caused the implementation of the system to be dysfunctional.

Given that the other two companies did not have such an arrangement, there was no opportunity to generalise through replication to build the theory in relation to this concept. Case studies in other Australian companies in the metals industry that had similar arrangements would need to be researched before any generalisation could be developed.
**Developing the Theory**

The knowledge developed by generalising from the propositions and synthesising the themes and concepts arising from this study allow an overall theoretical proposition, as proposed by Yin (2003), on the introduction of a CBTA system in Australian companies.

On this basis it is proposed that:

Australian companies would not link the introduction of a CBTA system, or directly relate the outcome of the system, to improving productivity, safety and quality. Australian companies would be likely to introduce a CBTA system for training purposes, simply because it was the recognised national training system at that time and was promoted by an educational organisation or an industry based organisation that was more closely linked with, and aware of, the national training system. The CBTA system would more likely be implemented and driven by a key person in the company with responsibility for training, rather than the senior managers. It would also be likely that the implementation would be based on the voluntary participation of the participants, would receive passive support from the company’s senior management and would not be perceived as a significant event.

Australian companies would be unlikely to consider the competency-based assessment component of the system as an important feature or requirement for their business needs in the initial planning and structuring stages of the CBTA system. Generally, this assessment component would be included by the companies for external reasons or because it was influenced by an external requirement. This external factor might be the requirement of a regulating body, the requirement to provide a qualification that was recognised beyond the boundary of the company and across the industry, or a binding agreement with an external organisation.

The CBTA systems implemented by Australian companies would be strongly influenced by the external and internal factors specific to each company, and as a result each company’s system would be unique in the way in which it was planned, structured and implemented. It would be likely that the major external factors that influenced the CBTA systems would be common to the industry sector in which each company operated, rather than being unique to the company itself. The unique company response to that external influence would be created by a combination of the company’s external factors interacting with the internal factors. The unique response would be related to the way in which the system was planned, structured and implemented, and would be represented by the design and application of the specific features implemented, and the management and improvement of the CBTA system over the longer term.
Australian companies would tend to rely on some external support for the implementation of their system, but they would not research, investigate or enquire about how others had implemented a CBTA system or have any desire to learn from what other companies had done. Nor would they show interest in determining from other companies the advantages and disadvantages of introducing such a system or the pitfalls in implementing a CBTA system. The companies would mainly base the planning, structuring and implementing of their system on their previous experience and on the advice of any external body contracted to support the implementation.

Australian companies would be likely to adopt competency standards that were the nationally recognised competency standards developed for their industry sector. If this was not the case, then the competencies adopted would be influenced by the national industry competency standards or would be directly mapped or linked to the national competency standards to satisfy external requirements. The competencies that the companies adopted would be pragmatic job-specific competencies, including higher order competencies if they were directly required for the job, such as problem solving and working effectively in teams. The inclusion of higher order competencies would be likely to be influenced by the existence of those competencies in the nationally recognised competency standards and the external factors that impacted on each company. The companies would select competencies that were required for the specific job in the company and would give no consideration to any requirement for an individual to transfer and apply the skills and knowledge to new and unexpected situations.

The companies’ decisions to implement training would not be directly influenced by state and national government funding incentives to provide training. But any funding incentives received would significantly influence the decision to implement a CBTA system and the extent to which the company developed the CBTA system.

The companies would use a pragmatic approach to implementing CBTA systems and the associated features. The systems would often include features that were pragmatic and would save costs, but they would not necessarily be introduced as a cost saving approach. The companies would generally introduce the pragmatic features because they provided a basic practical solution to their requirements. Consistent with this approach, the companies would adopt pragmatic learning approaches that suited their particular circumstances and not necessarily those preferred by the learners. As a consequence, the companies would not consider learning approaches that would optimise learning, transferability or retention.

The companies would not be likely to consider assessment issues such as reliability, validity, fairness and flexibility in developing their assessment processes and practices, but they would be likely to use qualified workplace assessors in some or all of their assessment practices, together with experienced ‘experts’ if required.
The companies would not be likely to clearly identify the outcomes they expected from the introduction of their CBTA systems. Nor would they consider that there was a need to evaluate the impact of the intervention of their CBTA systems, because they would be likely to postulate that the provision of any training would provide benefits for the company and that there was no need to measure those benefits. The companies would also identify the difficulties in measuring or determining the impact of the introduction of the system on their productivity and quality, given the other changes that had occurred in the companies over the same period of time. As a result, the companies would not use any formal evaluation mechanisms to determine if the expected outcomes had been achieved through the implementation of their CBTA systems.

Finally, the companies would gain little value in terms of changed job performance from the participation of experienced employees in their CBTA systems, unless that participation was combined with other improvement initiatives such as the introduction of new technology.

**Implications for Future Research, Policy and Practice**

The study was conducted to determine why enterprises implemented a CBTA system; what features they implemented; the factors that influenced the features; the decisions made by enterprises when planning, structuring and implementing the system; and the impact of the implementation of the system on the expected outcomes including the enterprises’ competitiveness and productivity. It was expected that the insights gained through the investigation would add to the process of building knowledge and developing theories. It was proposed that through this knowledge and understanding the study would identify implications that would assist researchers, industry planners and policy makers to better understand how their plans and policies were being implemented in the workplace and to understand the factors which influenced the implementation.

The study has highlighted a number of issues in relation to the CBTA systems implemented in enterprises and the implications for future research, policy and practice.

**Implications for future research**

The study tested a Conceptual Framework which was shown to adequately describe and classify the sequence of activities which took place when a change was introduced into an enterprise. In particular, the Conceptual Framework has shown that it could describe and classify the introduction of a CBTA system in an enterprise using a case study research strategy. Further, the literature identified two competing theories of change, the planned change model and the emergent learning model. The study findings suggested that the theories of change described are not discrete approaches, but that a continuum existed from a planned change model through to an emergent learning approach. The study also suggested that the continuum on which the change models or approaches could be placed,
could be explained in terms of the Conceptual Framework by the degree to which each of the
decision-making stages was employed.

The study findings raised a number of issues regarding the implementation of CBTA systems in companies which require further research to continue to build theory to guide the future policy and practice for vocational education and training in Australian companies.

These include:

The reason for companies implementing a CBTA system

The study suggested that companies only implemented a CBTA system because it was the current national training system and not because it satisfied their business needs. The study also suggested that none of the companies needed the assessment component of the CBTA system to satisfy their own business needs. Further, the study suggested that the companies implemented the assessment component of their CBTA systems to satisfy the requirements of external factors rather than satisfying their business needs.

This raised fundamental issues about whether companies wanted a CBTA system as opposed to simply providing training for their workforce without the assessment component of a CBTA system. Further research is required to expand on the current knowledge and understanding to determine the reasons companies implement a CBTA system and whether the assessment component is valued and required to satisfy a company’s business needs. This research could also be extended, in relation to the proposal raised below that Australian National Training Authority (ANTA) should extend its influence in industry, to determine the extent of the provision of training in industry that is not based on a CBTA system or a recognised qualification. The research could determine if the companies not involved in CBTA systems or recognised qualifications were aware of the national training system, or whether they choose not to be part of it, and the reasons for this decision.

Measuring the impact of the introduction of a CBTA system

The study suggested that companies do not have an interest in measuring the outcome of the intervention of a CBTA system. The study also suggested that companies do not clearly identify the expected outcomes of such an intervention and they do not formally measure the impact of such an intervention on their business or determine if the outcomes have been achieved. Further, the study suggested that companies do not adopt any measures to determine the changes that might occur as a result of the intervention of the CBTA system. It could be suggested that companies placed a low value on training as shown by the lack of interest in the outcome. However, it was also suggested in this study that companies postulate that providing any training is good and that benefits will occur as a result of that provision. This view might be held by many in the company, but the benefits that are
perceived to accrue from the training and the value placed on these perceived benefits may
differ depending on a person’s position within the organisation. That is, the study suggested
that the senior managers gave no more than passive support for the implementation of the
CBTA system, with its associated training. Whereas, those more directly involved appeared
to place greater value on the need for training.

This raised the issue of what value companies placed on training within the organisation. It
also raised the issue of what pragmatic approaches could be developed to assist companies
to establish business objectives and outcomes for their training and more readily measure
whether these outcomes have been achieved.

Studies have been commissioned by the ANTA to identify the return on investment from
training to convince companies that they should invest in training. In some cases models
have been developed to encourage companies to make their own investigations and to
identify the value of providing training. Such studies are clearly aimed at the senior managers
of companies who make the financial decisions on resource allocations within companies.
But these studies tend to concentrate on macro economic levels across a range of
organisations and do not relate to specific companies. Further, they have concentrated on
the provision and value of training, but they have not investigated the benefit of implementing
a CBTA system in a company, nor developed formal measures for the changes that have
occurred in an enterprise as a result of the implementation of a CBTA system. Further
research is required to develop pragmatic methods which companies can use to determine
the impact of a training intervention, particularly a CBTA system intervention, on its key
business indicators. The development of pragmatic models, which can be cost-effectively
implemented in companies to provide evidence of the impact of such an intervention, will
allow companies to make informed judgements about whether their outcomes have been
achieved. Consequently companies will be able to make informed judgements about the
value of implementing a CBTA system and the associated training and assessment
components.

This study attempted to use the Kirkpatrick Model to provide a pragmatic model to identify the
impact of the intervention of a CBTA system. However, the study has shown that any attempt
to do this for a CBTA system is likely to at least require a time series approach, which must
be planned and implemented as an integral part of the introduction of the system. A planned
approach is required to ensure a process is in place to identify and assess the impact or
influence of other factors and changes in an organisation that occur over the same period of
time as the CBTA system implementation. Such an approach must include an expression of
the expected outcomes, which should directly relate to the company’s key business
indicators. Measures for the four levels of the Kirkpatrick Model must be developed, which
measure the impact of the CBTA system activities and are directly related to the expected
outcomes. These must then be measured at the same time as the company’s business
indicators are measured, which might be monthly, and an assessment made of any changes
in the measures of the four levels and their impact on the expected outcomes. Judgements
must also be made about the impact of other significant changes that occurred in these time
intervals to attempt to isolate the impact of the training. However, there is a major concern
that the degree of complexity of such a model is likely to ensure that companies do not see
any value in implementing it, when they have already formed a view on the value of training
over a long period of operation. It is likely, as suggested by the study, that when making
judgements about the resourcing and provision of training they will base their decision on their
previous experience.

The value of introducing a CBTA system in a workforce of very experienced operators

The study suggested that the improvement in job performance gained from the participation of
experienced operators in a CBTA system was not significant. This raised the issue of
whether a company could gain significant improvements from introducing such a system
when the participants were all experienced workers. Some job improvement was suggested
by the study, which was attributed to the workers becoming more aware of the competency
standards required for their job. This raised the issue of the extent to which a CBTA system
needed to be implemented with experienced workers to gain job performance improvements.
Further research would be required to determine whether significant gains are observed for
experienced workers and whether the same gains could be gained through some awareness
program that enabled the operators to gain insight into the level of performance or standard
required for a competent performance rather than the implementation of a CBTA system.

The importance of retention of competence and the use of refresher training and reassessment

The study suggested that in hazardous industries companies were concerned about the
capacity of the workforce to retain the skills and knowledge to competently perform
emergency responses for workplace incidents at the standard required.

One company in the study adopted a pragmatic solution to the concern by reassessing the
workforce periodically. A second company in the study was also considering this solution.
This solution might well be the most cost-effective and pragmatic approach for a company to
take, however it might present problems for the workforce if adequate opportunities are not
available to practice these competencies in the normal course of the job role. Some simple
additional learning strategies were emerging through refresher learning approaches adopted
by the workers in one company, which were soon to be adopted formally by that company.

In an industry were it is not possible to demonstrate all the competencies and to perform and
practice the associated tasks in the normal course of the job, this situation raised a number of
issues. In such an industry, is a reassessment or periodic audit a necessary feature of a
CBTA system? Is this particularly so for those critical competencies where failure to perform
competently can lead to significant safety, health and environmental issues? Should the companies in this situation implement learning approaches that are more conducive to retention of skills and knowledge? Should the features in a CBTA system include refresher training and a reassessment process, at least for critical competencies, for specific job roles in certain industries? How can a company ensure that the level of competence is maintained at the standard required? The impact on the retention of skills and knowledge suggested in this study, when the skills were not practiced on-the-job, appeared to reinforce the concept that the use of skills in the job role is critical for retention and the achievement of expert performance.

Further research is required to identify whether reassessing is an appropriate and cost-effective solution to such a situation, or whether cost-effective learning approaches designed to ensure understanding and to improve retention would be more effective and reliable for providing a correct emergency response when required.

**Implications for future policy**

The introduction of the national training agenda in 1992 had the overriding aim of increasing the competitiveness and productivity of Australian industry, which included the establishment of industry standard competencies and the concept of competency-based training (*National Competency Standards-Policy and Guidelines*, 1992). The recently established government endorsed national training strategy for 2004-2010 (*Shaping The Future-Australia’s National Strategy for vocational education and training 2004-2010*, 2004) expressed through its vision the maintenance of this original aim of making businesses internationally competitive.

The study findings do not support the notion that enterprises associate the implementation of a CBTA system with an outcome of improving their international competitiveness and their productivity.

Governments and business and industry bodies will need to continue to promote the need for Australian industries to improve their international competitiveness, but they will also need to renew their efforts to convince a broader industry audience of the capacity of a competency-based training system to achieve this outcome. Further, if the national training strategy is to effectively contribute to this aim, then governments and business organisations will need to continue to promulgate the message. They will need to convince and assist companies to express measurable business outcomes for improvement in productivity, quality and competitiveness and to directly link their training design and delivery to achieving these outcomes and to measuring the contribution that training, and the implementation of a CBTA system, makes to these outcomes.
Implications for future practice

The study findings suggested that each company implemented a unique CBTA system shaped by the combination of internal and external factors that impacted on the company during the implementation. The company’s decisions were largely based on previous training experience, sometimes assisted by guidelines or advice provided by external sources. Further, each company’s CBTA system was implemented in a pragmatic manner and used pragmatic solutions and approaches, which showed little if any consideration of assessment issues, such as reliability, validity, fairness and flexibility, transferability and retention of skills and knowledge. The study findings suggested that improvements could be made to the effectiveness of a company’s CBTA system by increasing the workers’ awareness and knowledge of the competency standards that applied to the job. The study findings also suggested that the learning and assessment approaches could be improved to increase the rigour and the effectiveness of workplace CBTA systems.

Improvements are being made to the national training system by ANTA. This has recently included a review of the strategies for the future and a high level review of Training Packages (Schofield & McDonald, 2004; Shaping The Future-Australia’s National Strategy for vocational education and training 2004-2010, 2004). These improvements relate to the fundamentals of an effective national training system on which company training can be based. The ANTA also provides advice, ‘how to’ kits and other support materials to assist registered training organisations to improve delivery services. However, the study findings suggested that some companies did not require their employees to gain a recognised qualification and therefore did not require a registered training organisation for their training delivery. As result, the company’s training was not required to comply with the quality assurance arrangements specified by ANTA for CBTA systems and its provision was outside of the support structures offered by ANTA.

The number of companies providing CBTA in this manner is unknown, however two of the three companies in this study had not required their employees to gain a recognised qualification, although they did link their competencies to the national competency standards. It is expected that a significant proportion of training in the workplace would be conducted outside of the ANTA quality assurance processes. These companies could gain ready access to support material from ANTA, but the study findings suggested that companies did not always seek external assistance to implement their CBTA systems. This raised the issue of how companies that provide training independent of the ANTA quality assurance and support structure could benefit from the ongoing improvements. How could these companies improve their systems to provide effective learning approaches and the rigour required in their assessments to improve the effectiveness of their training? How can ANTA achieve its vision if these companies are not included? The ANTA national training strategy for 2004–2010 did not acknowledge this situation or reflect any support for independent workplace training.
However, a recent ANTA review of Training Packages did acknowledge that employers were not always looking for their employees to gain full qualifications and were increasingly valuing parts of those qualifications or “skill sets” (Schofield & McDonald, 2004). Although in a different sense this report partly recognised, as suggested in the study findings, that company training delivery was not necessarily based on gaining a recognised qualification.

ANTA supports the notion that training improves productivity and quality (Shaping The Future-Australia’s National Strategy for vocational education and training 2004-2010, 2004), but if it is to realise its vision of making businesses internationally competitive, it must encompass those companies that are outside the quality assurance processes and provide more practical support to assist them to implement effective CBTA systems. ANTA and the industry training advisory bodies must expand their influence to include companies that are not interested in providing recognised qualifications, but independently deliver training based on the national competency standards or enterprise competency standards.

ANTA could improve the implementation of CBTA systems in enterprises, whether implemented by a registered training organisation or otherwise, if it commissioned research to identify and provide effective CBTA system models as examples. These models would be designed to incorporate features and use approaches that could be readily implemented by companies, but which included best practice approaches for planning and structuring systems, especially the learning and assessment approaches, to improve the rigour and effectiveness of CBTA systems in companies. This development is required, together with the proposal in the policy implications above, to provide support to those companies that implement CBTA systems outside of the quality assurance processes. The study suggests that support is required for these companies to increase their capacity to implement effective learning approaches and effective and rigorous assessment approaches, if they are to gain benefit from their efforts and maintain a level of performance in the workplace at the national industry standard.

**Conclusion**

This study has contributed to the process of building and expanding the limited theory in relation to the implementation of CBTA systems in an enterprise. Some changes in policy and practice have occurred to the national training system over the period of time since the companies in this case study commenced to implement their CBTA systems. Further changes will continue to occur over time as those responsible for the national training system improve and refine it in consultation with industry stakeholders. But until there is further research with individual companies, many issues in relation to a company’s participation will remain unknown. Without this knowledge the refining and improving of the overall system will
be to no avail if individual companies are unaware of the developments or do not want to introduce a CBTA system or do so in an inefficient or ineffective manner.

Further case study research is required with individual companies to continue to build the theory and to resolve the issues if the vision for vocational education and training is to be realised for Australian companies.
Bibliography


Appendices

Appendix A  Interview Schedule 1-Training
Manager/Consultants/System developers 315

Appendix B  Interview Schedule 2-Training
Manager/Consultants/System developers 318

Appendix C  Interview Schedule-Plant Managers/Supervisors 321

Appendix D  Interview Schedule-Trainees & Workplace Assessors 324

Appendix E  Interview Schedule-Plant Operators 327

Appendix F  Questionnaire 329

Appendix G  Longford Gas Plant Explosion 334

Appendix H  Relationship between the Research Questions and the Planned Data Collection Approaches 335
Appendix A

Interview No. 1

Company:          Title: Training Manager/CBT developers
Interviewee:
Interviewer:      M. Curwood Audio Tape Reference:
Date:             Time: Location:

Introduction

The purpose of this interview is for me to gain an understanding of the competency-based training system developed for your operators.

In this interview I want to get a broad understanding of the program, your expected outcomes, and the impact of its implementation.

In a second interview I want to find out about your reasons for putting this system in place; and the decisions and thinking which occurred during the development; and then the decisions and thinking which occurred during the implementation, and the reasons for including the various features of this system.

The interview is not to test your knowledge of the system or to try to catch you out. It is for me to get a good understanding of what you are doing and why you are doing it, to allow me to develop a Case Study.

To assist me to recall the interview accurately and to ensure I fully understand your responses, I would like to tape the interview. Neither your name nor your position will be mentioned while taping. Only my supervisor and I will have access to this tape and it will be kept in a secure place and its contents will be deleted 5 years after the study has been finally submitted.

Is it OK to tape the interview?

<table>
<thead>
<tr>
<th>Questions</th>
<th>Follow-up Required</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td></td>
</tr>
<tr>
<td>Could you give me a broad overview of your competency-based training system for training in the styrene and polystyrene plants?</td>
<td></td>
</tr>
<tr>
<td>When did the company commence training using a competency-based approach in these plants?</td>
<td></td>
</tr>
<tr>
<td>Could you think back to when the system was first proposed and implemented? What was the reaction of the operators?</td>
<td></td>
</tr>
<tr>
<td>[Was there an adverse action? Was the training welcomed? Did they actively cooperate? What impact do you think their reaction had on the implementation of the training?]</td>
<td></td>
</tr>
<tr>
<td>What was the sequence of developmental stages you went through from the beginning to the implementation of the CBT system?</td>
<td></td>
</tr>
<tr>
<td>[Proposal? Planned structure and features? Implemented structure and features?]</td>
<td></td>
</tr>
<tr>
<td>Needs and Problems</td>
<td>Expected Outcomes</td>
</tr>
<tr>
<td>--------------------------------------------------------</td>
<td>--------------------------------------------------------</td>
</tr>
<tr>
<td>What were the conditions prior to the proposal to implement a CBT system, which caused or influenced the need to change?</td>
<td>At the proposal stage, what were the expected overall company outcomes from the implementation of a CBT system?</td>
</tr>
<tr>
<td>How did you identify the conditions, problems, etc which caused the need to change?</td>
<td>Did these expectations change during the planning and implementation of the CBT?</td>
</tr>
<tr>
<td>How important was it to change and how strong was the support from within the company?</td>
<td>Were these expected outcomes documented?</td>
</tr>
<tr>
<td>Why did the company propose a CBT system?</td>
<td>Has the company checked to see if these outcomes have been achieved? How was that done?</td>
</tr>
<tr>
<td>What were your training objectives when you proposed the implementation of a CBT system?</td>
<td></td>
</tr>
</tbody>
</table>
Are you concerned about the possible loss of skills due to non-use and ‘decay’ of skills and knowledge?

[How do you cope with this? Do you audit the knowledge and skills at any time after the RCC process?]

### Assessment processes and instruments

At the proposal stage, what features were you intending to incorporate in the assessment processes and instruments?

- [Who would assess? Plant managers, team leaders, trainers, external assessors?]
- What assessment approaches?: written and oral tests, workplace observation, simulation, products, assignments, etc
- Assessment instrument properties: reliable and valid? Effective and efficient? Fair and flexible? Assess transferability of skills? Assess higher level skills? Assessment to infer competence at that point in time? Assessment to predict that the worker will be able to reproduce the performance? Why did you choose these features?]

Could you describe how your assessment function is currently organised and carried out?

- [Who assesses? What processes are used in assessing people? Where and how is it conducted? Is this different from what was proposed or planned? If so, why?]

What issues did you consider when deciding who should be the assessors?

### Learning approaches

At the proposal stage, what learning methods and approaches had you intended to use?

- [Why did you select these methods? Timing of training in relation to use; just-in-time approaches; predictive capacities; retention, learning styles of operators, transferability?]

Could you describe the types of learning approaches that are currently available to people in your CBT system?

Why were learning approaches of this kind included in the CBT system?

- [What do you see as the benefits of learning in this way? Is this different from what was proposed or planned? If so, why?]

### Overall system changes

Was the CBT system you first implemented different from what was first proposed?

- [In what way? Why?]

Is the current CBT system different from what was first implemented?

- [In what way? Why?]

In hindsight what issues caused barriers and could have allowed a smoother implementation or a more effective and efficient system if considered earlier?

What documentation exists on the evolution or development of the system since it was first implemented?
Appendix B

Interviews No. 2

Company: | Title: Training Manager/CBT Developers
---|---
Interviewee: | Interviewer: M. Curwood
Audio Tape Reference: | Location:

Introduction

The purpose of this interview is for me to gain an understanding of the competency-based training system developed for your operators.

In this interview I want to find out about your reasons for putting this system in place; the decisions and thinking which occurred during the development; and then the decisions and thinking which occurred during the implementation, and the reasons for including the various features of this system. Is it OK to tape the interview?

<table>
<thead>
<tr>
<th>Questions</th>
<th>Follow-up Required</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Competency definition</strong></td>
<td></td>
</tr>
<tr>
<td>How were the competency standards determined?</td>
<td></td>
</tr>
<tr>
<td>At the proposal stage, in broad terms, what capabilities would you have required from a fully competent operator?</td>
<td></td>
</tr>
<tr>
<td>[Perform skills meeting the company's current and future requirements; Develop problem solving, teamwork and communication skills; Cope by demonstrating skills and knowledge in new and unexpected situations]</td>
<td></td>
</tr>
<tr>
<td>Do your competency standards specify features and performances which would produce this capability in a competent operator?</td>
<td></td>
</tr>
<tr>
<td>[If not, what has not been included? Why?]</td>
<td></td>
</tr>
<tr>
<td>Do you think the company expects the competency standards to reflect future job requirements and competent performance in new and unexpected situations?</td>
<td></td>
</tr>
<tr>
<td>[Does the company have a written definition or description of the elements of a competency standard?]</td>
<td></td>
</tr>
<tr>
<td><strong>Scope and Complexity</strong></td>
<td></td>
</tr>
<tr>
<td>Do you require the training to develop operators with skills and knowledge to allow for future job needs in the plant? Why? / Why not?</td>
<td></td>
</tr>
<tr>
<td>Do you require the training to develop operators with skills and knowledge in higher level competencies, such as, problem solving, innovation, teamwork and good communication skills?</td>
<td></td>
</tr>
<tr>
<td>[Which ones? Why? / Why not?]</td>
<td></td>
</tr>
<tr>
<td>Do you require the training to develop operators with the capacity to transfer their skills to new and unexpected situations?</td>
<td></td>
</tr>
<tr>
<td>[Why? / Why not?]</td>
<td></td>
</tr>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>------------------------------------------------------------------------------------------------------------------------------------------</td>
<td>-----------------------------------------------------------------------------------------------</td>
</tr>
<tr>
<td>Did you plan to develop these broader skills, higher level skills and transferability of skills through the CBT?</td>
<td>[If so, which ones and why? If not, why not?]</td>
</tr>
<tr>
<td>Did you implement a CBT system designed to develop these broader skills, higher level skills and transferability of skills?</td>
<td>[Why? / Why not?]</td>
</tr>
<tr>
<td>What have you done in your CBT system to enable these broader skills, higher level skills and transferability of skills to be developed?</td>
<td>[Has this produced the skills and knowledge outcomes you require?]</td>
</tr>
<tr>
<td>Recognition of current competency</td>
<td></td>
</tr>
<tr>
<td>What features are included in your RPL/RCC process?</td>
<td>[Why have these been included? What do you hope to gain from them?]</td>
</tr>
<tr>
<td>Were there any other RCC features that you had intended to implement in your original proposal?</td>
<td>[Why?]</td>
</tr>
<tr>
<td>What issues did you consider in relation to the features of the RCC process?</td>
<td>[What decisions were made?]</td>
</tr>
<tr>
<td>Assessment processes and instruments</td>
<td></td>
</tr>
<tr>
<td>What things did you consider when planning and deciding on the overall assessment structure and system to be used?</td>
<td>[What issues did you consider? What decisions were made? Systematic approach; holistic; amount of evidence, predictability?]</td>
</tr>
<tr>
<td>When planning the assessment instruments and processes you intended to use:</td>
<td></td>
</tr>
<tr>
<td>• What features did you require?</td>
<td></td>
</tr>
<tr>
<td>• What issues did you consider? Why?</td>
<td></td>
</tr>
<tr>
<td>• What decisions were made?</td>
<td></td>
</tr>
<tr>
<td>[Reliable and valid? Effective and efficient? Fair and flexible? Assess transferability of skills? Assess higher level skills? Assessment to infer competence at that point in time? Assessment to predict that the worker will be able to reproduce the performance?]</td>
<td></td>
</tr>
<tr>
<td>• What things had you planned to do to achieve this?</td>
<td></td>
</tr>
<tr>
<td>Do you feel that you have implemented assessment processes and instruments that are reliable and valid?</td>
<td></td>
</tr>
<tr>
<td>• Effective and efficient?</td>
<td></td>
</tr>
<tr>
<td>• Fair and flexible?</td>
<td></td>
</tr>
<tr>
<td>• Assess transferability of skills?</td>
<td></td>
</tr>
<tr>
<td>• Assess higher level skills?</td>
<td></td>
</tr>
<tr>
<td>[If not, why not? What things did you do to achieve this?]</td>
<td></td>
</tr>
</tbody>
</table>
What things did you consider and what decisions did you make in relation to providing:

- Reliable and valid assessment processes?
- Effective and efficient assessment processes?
  
  [How much evidence? The cost of incompetent performance, gathering evidence on the higher level competencies and collecting a range of evidence; Risk management strategies, such as how critical is the performance?]
- Fair and flexible assessment processes?
- Assess transferability of skills?
- Assess higher level competencies?

<table>
<thead>
<tr>
<th>Learning approaches</th>
</tr>
</thead>
<tbody>
<tr>
<td>What things did you consider when planning and deciding on the learning approaches to be used?</td>
</tr>
<tr>
<td>[Timing of training in relation to use; just-in-time approaches; predictive capacities; retention, learning styles of operators, transferability?]</td>
</tr>
</tbody>
</table>

What decisions did you make in relation to the learning approaches used?
Appendix C

Interview No 1

Company: Title: Plant Manager/Supervisor
Interviewee:
Interviewer: M. Curwood Audio Tape Reference:
Date: Time: Location:

Introduction

<table>
<thead>
<tr>
<th>Questions</th>
<th>Follow-up Required</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td></td>
</tr>
<tr>
<td>Could you please give me a brief overview as you see it of the competency-based training system for operators in your plant?</td>
<td></td>
</tr>
<tr>
<td>What is the general history regarding training and assessment programs for the operators in this plant?</td>
<td></td>
</tr>
<tr>
<td>When did the company commence using a competency-based approach in this plant?</td>
<td></td>
</tr>
<tr>
<td>When the competency system was first proposed and implemented? What was the reaction of the operators at that time?</td>
<td></td>
</tr>
<tr>
<td>[Was there an adverse action? Was the training welcomed? Did they actively cooperate? What impact do you think their reaction had on the implementation of the training?]</td>
<td></td>
</tr>
<tr>
<td><strong>Needs and Problems</strong></td>
<td></td>
</tr>
<tr>
<td>What were the problems or conditions which caused or influenced the need to implement a CBT system?</td>
<td></td>
</tr>
<tr>
<td>Were you involved in identifying the conditions, problems, etc which caused the need to change?</td>
<td></td>
</tr>
<tr>
<td>[How was this done?]</td>
<td></td>
</tr>
<tr>
<td>How important was it to change and how strong was the support from within the company?</td>
<td></td>
</tr>
<tr>
<td><strong>Expected Outcomes</strong></td>
<td></td>
</tr>
<tr>
<td>When the CBT system was implemented, what were the expected outcomes from an overall company perspective?</td>
<td></td>
</tr>
<tr>
<td>[Which of the problems were expected to be overcome or minimised?]</td>
<td></td>
</tr>
<tr>
<td>Have these expectations change during the implementation of the CBT?</td>
<td></td>
</tr>
<tr>
<td>[How? Why?]</td>
<td></td>
</tr>
<tr>
<td>Has the company checked to see if these outcomes have been achieved?</td>
<td></td>
</tr>
<tr>
<td>[How was that done?]</td>
<td></td>
</tr>
<tr>
<td><strong>Kirkpatrick Level 4</strong></td>
<td></td>
</tr>
<tr>
<td>------------------------</td>
<td>--</td>
</tr>
<tr>
<td>Do you feel that the company outcomes have been achieved?</td>
<td></td>
</tr>
<tr>
<td>Do you think the training has had an overall impact on the company productivity and the quality of the products?</td>
<td>[What evidence is there to support your view?]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Scope and Complexity</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>When the CBT system was first proposed, what broad overall range of knowledge and skills was it intended that a fully trained operator should achieve?</td>
<td></td>
</tr>
<tr>
<td>Do you think the CBT system that has been implemented will enable or has enabled each operator to achieve this broad range of knowledge and skills?</td>
<td>[What evidence do you have for saying that?]</td>
</tr>
<tr>
<td>Do the operators need skills and knowledge in higher level competencies, such as, problem solving, teamwork and good communication skills?</td>
<td>[Which ones? Why? Are they required to transfer these and other skills to different situations and jobs?]</td>
</tr>
<tr>
<td>Are these higher level competencies evident in the performance of the operators?</td>
<td>[Which high level skills are evident?]</td>
</tr>
<tr>
<td>Could you describe the type of situations where operators have shown the use of these higher level competencies? Are higher level competencies used by many operators in these situations or used by just a few operators?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Recognition of current competency</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>How does the RPL process operate?</td>
<td>[What features are included?]</td>
</tr>
<tr>
<td>What involvement do you have with the assessment processes?</td>
<td></td>
</tr>
<tr>
<td>Could you describe how the assessment function is organised and carried out?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Learning approaches</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the ways in which the training is provided in the CBT system?</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Kirkpatrick Evaluation Level 1</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you believe the operators have a positive attitude towards the training?</td>
<td>[What evidence do you have for this? Would they prefer to simply get on with their job?]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Kirkpatrick Evaluation Level 2</strong></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you believe the operators have learnt new knowledge and skills as a result of the training?</td>
<td>[What evidence do you have for this?]</td>
</tr>
</tbody>
</table>
### Kirkpatrick Evaluation Level 3

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you observed any changes in the job performance of the operators as a result of the training?</td>
<td></td>
</tr>
<tr>
<td>[Evidence? In what areas did they improve? Does their individual productivity improve? Have they improved the quality of their output? Are they more capable of maintaining a safe operation?]</td>
<td></td>
</tr>
<tr>
<td>Do the operators get the chance to use the full range of skills learnt while in their jobs?</td>
<td></td>
</tr>
<tr>
<td>[Simulations etc for emergencies?]</td>
<td></td>
</tr>
<tr>
<td>Do you believe that the operators can continue to maintain their level of performance at or above the competence standard?</td>
<td></td>
</tr>
<tr>
<td>[Is follow up training and/or further audits of skills planned to check this?]</td>
<td></td>
</tr>
<tr>
<td>Do you think the training has increased the capacity of operators to transfer knowledge and skills to new situations and to perform competently in these situations?</td>
<td></td>
</tr>
<tr>
<td>[What evidence is there to support your views?]</td>
<td></td>
</tr>
</tbody>
</table>

### Overall system changes

<table>
<thead>
<tr>
<th>Question</th>
<th>Answer</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the current CBT system different from what was first implemented? In what way?</td>
<td></td>
</tr>
<tr>
<td>[Why?]</td>
<td></td>
</tr>
<tr>
<td>In hindsight what issues caused barriers and could have allowed a smoother implementation or a more effective and efficient system if considered earlier?</td>
<td></td>
</tr>
<tr>
<td>Do you have any other comments or thoughts about the program that you would like to add?</td>
<td></td>
</tr>
</tbody>
</table>
## Appendix D

### Interview No 1

**Company:**

**Interviewee:**

**Interviewer:** M. Curwood

**Audio Tape Reference:**

**Date:**

**Time:**

**Location:**

### Introduction

<table>
<thead>
<tr>
<th>Questions</th>
<th>Follow-up Required</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td></td>
</tr>
</tbody>
</table>
| Could you please give me a brief overview of what has occurred in this plant in relation to the competency project?  
  *Levels of completion. Competency levels achieved across the operators.* | |
| What is the general history regarding training and assessment programs for the operators in this plant?  
  *Training prior to the introduction of the competency project. Training required since the assessments.* | |
| When did the company commence training using a competency-based approach in this plant? | |
| Could you think back to when the competency system was first proposed and implemented? What was the reaction of the operators at that time? | |

### Needs and Problems

What were the problems or conditions which caused or influenced the need to implement a competency-based system?

### Expected Outcomes

When the competency-based system was being implemented, what do you think were the expected overall company outcomes?

  *Which of the problems were expected to be overcome or minimised?*

Have these expectations change during the implementation of the competency-based system?

  *How? Why?*

Has the company checked to see if these outcomes are being achieved?

  *How was that done?*

### Kirkpatrick Level 4

Do you feel that the company outcomes are being achieved?

Has the training had an overall impact on the company productivity and the quality of the products?

  *What evidence is there to support your view?*
<table>
<thead>
<tr>
<th><strong>Scope and Complexity</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>When the competency-based system was first proposed, what broad overall range of knowledge and skills was it intended that a fully trained operator should achieve?</td>
</tr>
</tbody>
</table>
| Do you think the competency-based system that has been implemented will enable each operator to achieve this broad range of knowledge and skills?  
  \([\text{What evidence do you have for saying that?}]\) |
| Do the operators need skills and knowledge in higher level competencies, such as, problem solving, innovation, teamwork and good communication skills?  
  \([\text{Which ones? Why? Are they required to transfer these and other skills to different situations and jobs?}]\) |
| Are these higher level competencies evident in the performance of the operators?  
  \([\text{Which high level skills are evident?}]\) |
| Could you describe the type of situations where operators have shown the use of these higher level competencies? Are higher level competencies used by many operators in these situations or used by just a few operators? |

<table>
<thead>
<tr>
<th><strong>Recognition of current competency</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Why was an RPL process included? What did you hope to gain from it?</td>
</tr>
</tbody>
</table>
| Could you describe how your RPL process operates?  
  \([\text{What features are included?}]\) |

<table>
<thead>
<tr>
<th><strong>Assessment processes and instruments</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Could you describe how the assessment function is organised and carried out?</td>
</tr>
</tbody>
</table>
| Could you describe the features of the assessment system?  
  \([\text{Assessment methods-observation, written & oral tests, products, simulation observation, etc.}]\) |
| Do you feel that assessment processes and instruments that have been implemented are:  
  \[\bullet\text{ reliable and valid?}\]  
  \[\bullet\text{ effective and efficient?}\]  
  \[\bullet\text{ fair and flexible?}\]  
  \([\text{What things are done to achieve this? If not, why not?}]\) |

<table>
<thead>
<tr>
<th><strong>Learning approaches</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td>Could you describe the types of learning approaches that are available to people in the competency-based system?</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Kirkpatrick Evaluation Level 1</strong></th>
</tr>
</thead>
</table>
| Do you believe the operators have a positive attitude towards the training?  
  \([\text{What evidence do you have for this? Would they prefer to simply get on with their job?}]\) |
<table>
<thead>
<tr>
<th>Kirkpatrick Evaluation Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you believe the operators are learning when they undertake the training?</td>
</tr>
<tr>
<td>[What evidence do you have for this]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Kirkpatrick Evaluation Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Have you observed any changes in the job performance of the operators as a result of the training?</td>
</tr>
<tr>
<td>[Evidence?]</td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Do you believe that the operators can maintain their level of performance at or above the competence standard?</td>
</tr>
<tr>
<td>[Is there any follow up training or audits of skills to check this?]</td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Are the operators given the chance to use the full range of skills learnt while in their jobs?</td>
</tr>
</tbody>
</table>

<p>| |</p>
<table>
<thead>
<tr>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Has the training increased the capacity of operators to transfer knowledge and skills to new situations and to perform competently in these situations?</td>
</tr>
<tr>
<td>[What evidence is there to support your views?]</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Overall system changes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the current competency-based system different from what was first implemented?</td>
</tr>
<tr>
<td>[In what way? Why?]</td>
</tr>
</tbody>
</table>
## Appendix E

### Interview

<table>
<thead>
<tr>
<th>Interviewee Code:</th>
<th>Title: Plant Operator</th>
</tr>
</thead>
<tbody>
<tr>
<td>Interviewer: M. Curwood</td>
<td>Audio Tape Reference:</td>
</tr>
<tr>
<td>Date:</td>
<td>Time:</td>
</tr>
</tbody>
</table>

### Introduction

<table>
<thead>
<tr>
<th>Questions</th>
<th>Follow-up Required</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Overview</strong></td>
<td></td>
</tr>
</tbody>
</table>
| When did you first get involved with the competency-based project?  
*Time period? Were you involved when the program first started?* | |
| What involvement have you had? What sort of assessment has taken place?  
*RPL, Training* | |
| How did you feel when you were asked to be assessed? How did you feel when you were first asked to do the training? | |
| How do you think others felt about the need to be assessed or do training?  
*Did they resent having to be involved? Did they welcome the training? What action was taken?* | |
| Are you being assessed or doing training to gain a Certificate? | |
| **Recognition of current competency** | |
| Could you describe what happened in the RPL assessment process? | |
| **Assessment processes and instruments** | |
| Have you been assessed after doing any training? | |
| Could you describe how the assessment function is organised and carried out?  
*How do you feel about this process? Do you think it is fair for everyone?* | |
| **Learning approaches** | |
| Could you describe the way in which the training takes place?  
*What types of learning approaches are available to you?* | |
| Do you think that there are better ways of learning to do the job?  
*What are they? Why?* | |
| **Kirkpatrick Evaluation Level 1** | |
| Are you happy to be doing the training? | |
| Are the others happy about doing the training?  
*What do you see or hear that makes you say that?* | |
<table>
<thead>
<tr>
<th>Kirkpatrick Evaluation Level 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>What impact has the competency project had on you?</td>
</tr>
</tbody>
</table>
| Have you learnt anything as a result of the program?  
  [What makes you say that? Can you give me some examples of what you feel you have learnt?] |
| Do you feel you have learnt to avoid or fix problems, to work in teams and to easily transfer across to work on new jobs?  
  [What makes you say that? Can you give me some examples of what you feel you have learnt in relation to these things] |
| Do you feel you have learnt to think about and suggest better ways of doing your job?  
  [What makes you say that?]  
  [Can you give me some examples?] |
| Do you feel that you have learnt to operate in a safer manner and have the skills to more safely operate the plant?  
  [Can you give me some examples of what you feel you have learnt in relation to this?] |

<table>
<thead>
<tr>
<th>Kirkpatrick Evaluation Level 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>What changes in your performance do you think has occurred as a result of the competency-based program?</td>
</tr>
</tbody>
</table>
| What changes have occurred in the other operators’ performance as a result of the competency-based program?  
  [What evidence do you have for this answer?] |
| Do you feel you have been given the chance to use all the skills and knowledge you have gained from the competency-based program?  
  [How has this occurred?] |

<table>
<thead>
<tr>
<th>Kirkpatrick Level 4</th>
</tr>
</thead>
</table>
| Do you think that the competency-based program has had an overall impact on the company productivity the safety of the operation and the quality of the products?  
  [What evidence is there to support your view?] |
Appendix F

University of Melbourne

Getting Your Opinion

Company A has implemented training using a competency-based training system and has agreed to participate in the research.

I want to find out your views about the operation of the competency-based program.

It is important for me to find out about the program from those who are or have been directly involved.

Little research has been done in Australia on the competency-based systems which have been implemented in the workplace. Because of your valuable knowledge you will be able to add to the existing knowledge and may influence policy makers and companies in their future developments.

I do not want to test your knowledge of the system or to try to catch you out. I want your honest opinion about the program which will help me to get a good understanding of what you are or have been doing and how you feel about it. It is important to me that you complete this sheet and give me your opinion.

Your participation is entirely voluntary. Your name is not required.

Please take the time to answer the following questions. I will be the only person who will see your response.

No information about your individual response will be made available to your employer.

A code has been placed on this response sheet to identify the company, but no one will know your identity. Please give your truthful opinion as a response, even though you think this may be different from the opinion of others in your workplace. No one will be able to identify what response you have given.

Please place your completed response in the pre-addressed envelope and post it or give it to the person who distributed the questionnaire for posting.

Thank you for your participation,

Maurie Curwood.

In Questions 1 to 5 please tick the box of the answer which best describes you.

1. How many years have you worked in your current position?
   - 3 years or less [ ]
   - More than 3 years but less than 10 years [ ]
   - 10 years or more [ ]
2. How many years were you or have you been involved with training and assessment in the Company A competency program?

- 1 year or less ☐
- More than 1 year but less than 3 years ☐
- 3 years or more ☐

3. Do you have a full time position?

Yes ☐ No ☐

4. What was the highest level of education that you successfully completed in Australia or in another country before the Company A competency program?

- Studied at secondary school level for less than three years ☐
- Studied at secondary school level for three or four years ☐
- Studied at secondary school level for five or six years ☐
- Trade certificate or apprenticeship ☐
- TAFE certificate course ☐
- University course ☐

5. For what percentage of your competency training and assessment program have you been assessed as competent?

- 25% or less ☐
- More than 25% and up to a 50% ☐
- More than 50% and up to 75% ☐
- More than 75% or fully completed ☐

In the remaining section, read EACH statement and tick the box which best represents the strength of your opinion about EACH statement.

1=Strongly disagree; 2=Disagree; 3=No Opinion; 4=Agree; 5=Strongly agree

6. Taking part in the competency training program:

- Has been or was very enjoyable. 1 2 3 4 5
- Enabled me to learn new skills and knowledge related to my job. 1 2 3 4 5
- Enabled me to become competent in the skills required for my job. 1 2 3 4 5
- Enabled me to learn how to do my job better. 1 2 3 4 5
- Enabled me to learn things that are relevant to my needs. 1 2 3 4 5
- Encouraged me to want to be involved in further training and learning. 1 2 3 4 5
- Encouraged me to suggest to others that they be involved in more training. 1 2 3 4 5
7. Before I became involved in the competency program, through experience on the job, I could:

i. Recognise and deal successfully with potential problems or breakdowns in my work. 1 2 3 4 5
ii. Work safely and avoid situations which were unsafe or which could cause injury. 1 2 3 4 5
iii. Work well with others in a team situation. 1 2 3 4 5
iv. Think about what I was doing and suggest changes to improve the standard work procedures for doing my job. 1 2 3 4 5

8. As a result of the training and assessment in the competency program, I learnt how to:

i. Recognise and deal successfully with potential problems or breakdowns. 1 2 3 4 5
ii. Work safer and avoid situations which were unsafe or which could cause injury. 1 2 3 4 5
iii. Improve the way I work with others in a team situation. 1 2 3 4 5
iv. Think about what I was doing and suggest changes to improve the standard work procedures for doing my job. 1 2 3 4 5

9. When doing my job in the workplace, because of the training and assessment, I now can:

i. Recognise and deal successfully with potential problems or breakdowns when they occur in my work. 1 2 3 4 5
ii. Deal successfully with unexpected situations when they occur in my work. 1 2 3 4 5
iii. Operate correctly in an unfamiliar or unusual situation. 1 2 3 4 5
iv. Work using safe procedures to avoid injury and creating dangerous situations. 1 2 3 4 5
v. Work well with others in a team situation. 1 2 3 4 5
vi. Make suggestions to improve the procedures for doing the job. 1 2 3 4 5
vii. Make changes to improve the way I do my job. 1 2 3 4 5

10. When doing my job in the workplace, AFTER the training and assessment program I was able to:

i. Produce better quality products. 1 2 3 4 5
ii. Use new and better ways of doing my work. 1 2 3 4 5
iii. Work more productively. 1 2 3 4 5
iv. Work safer. 1 2 3 4 5
v. Work in a position where I could use all the new skills I had learnt. 1 2 3 4 5
vi. Use some skills, but lost many of the other skills I learnt because I was not using them. 1 2 3 4 5
11. When the training and assessment program was first proposed:

   i. I felt resentful and did not want to participate.  
   ii. I was worried, but decided to participate.  
   iii. It did not concern me whether the training was introduced or not.

12. When the training and assessment program was first offered:

   i. I resisted being involved.  
   ii. I resisted being involved and took action to prevent the program from starting.  
   iii. I was pleased to be involved and participated fully.  
   iv. I was pleased to be involved and helped wherever I could to get the program going.

13. I learn the knowledge and skills required for the job easily, when:

   i. An operator, who is doing the same job, explains the job requirements to me.  
   ii. My team coordinator explains the job requirements to me.  
   iii. The trainer explains the job requirements to me.  
   iv. I practice on my own without having anyone explain the job requirements to me.  
   v. I read the job instructions without having anyone explain the job requirements to me.  
   vi. I read the job instructions and someone explains the job requirements to me.  
   vii. I do classroom training without having anyone explain the job requirements to me.  
   viii. I do classroom training and someone explains the job requirements to me.  
   ix. I read printed learning materials and someone explains the job requirements to me.  
   x. I read printed learning materials without having anyone explain the job requirements to me.  
   xi. I use computer based learning materials and someone explains the job requirements to me.  
   xii. I use computer based learning materials without having anyone explain the job requirements to me.
14. I would learn the knowledge and skills required for the job easily, if:

i. I received training and then I practiced the job in the workplace with advice from another person or a supervisor who has done the job.

ii. I received training and then I practiced the job in the workplace on my own without advice or a supervisor.

iii. I received training and then I practiced the job in a TAFE institution or a training organisation with supervision and advice from the trainer.

iv. I practiced the job in the workplace without prior training, but with advice from another person or a supervisor who has done the job.

v. I practiced the job in the workplace without prior training and without advice or a supervisor.

vi. I practiced the job in a TAFE institution or a training organisation without prior training, but with supervision and advice from the trainer.

15. I would learn the knowledge and skills for the job easily, if I received training:

i. In the workplace at the workstation or console where I do my job and I practiced the job at the workstation or console where I do my job.

ii. In a training room at the workplace and then I practiced the job at the workstation or console where I do my job.

iii. In a training room at the workplace and then I practiced the job on a console or workstation in the training room at the workplace.

Thank you for taking the time to complete the questionnaire and participating in the research. Your opinion is valued and will be used in this research.

Please seal the Response Sheet in the envelope provided and either post it in an Australia Post letterbox or give it to the person who distributed the questionnaire for posting.

Maurie Curwood
Appendix G

Longford Gas Plant Explosion

A major explosion occurred in the Longford Gas Plant, Victoria, in September 1998, which heightened the awareness of the safety requirements of manufacturing plants of this nature. As a result of this explosion two Plant Operators died, eight employees were injured and the gas supply to the State of Victoria was cut for about two weeks. A State Coroner found in 2002 that the company responsible for the Longford Plant had failed to conduct a period risk assessment that could have prevented the incident. Further, the Coroner found there had been a failure to audit for hazards in accordance with the company’s procedures. A Royal Commission on the incident found in 1999 that a failure by the company to adequately train its workers in safety procedures had caused the incident and recommended the company upgrade its training.

As a result of the incident and the Royal Commission finding the Victorian State Government issued the Occupational Health and Safety (Major Hazard Facilities) Regulations, 2000 which identified certain manufacturing plants as major hazard facilities and provided regulations for their operation. These regulations directly impacted on both Company A and Company B in this study.
Appendix H

**Relationship between the Research Questions and the Planned Data Collection Approaches**

<table>
<thead>
<tr>
<th>Why do enterprises implement CBTA systems?</th>
<th>Data Collection Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data sought to answer the research question</strong></td>
<td><strong>Sources of Data</strong></td>
</tr>
<tr>
<td>Identification of the needs and the performance problems; the objectives; importance of the program; how the objectives would satisfy the original needs; the enterprise's concept of CBTA; internal and external influences on the decisions. Identification of the expected outcomes from the CBTA system.</td>
<td>Memos, minutes, internal correspondence on problems in performance and output. Documentation of the proposal (planning decisions). Managers. Key proponents. Consultants.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>What CBTA systems do enterprises implement?</th>
<th>Data Collection Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data sought to answer the research question</strong></td>
<td><strong>Sources of Data</strong></td>
</tr>
<tr>
<td>Identification in the planning decision-making stage of the options considered for the competency 'definition'; scope and complexity; the RCC assessment processes; the assessment processes and instruments and the learning approaches.</td>
<td>Memos, minutes, internal correspondence. Documentation of the planning decision-making stage. Managers. Key proponents. Consultants. Statements of requirements in the planning decision-making stage documentation.</td>
</tr>
<tr>
<td>Identification in the structuring decision-making stage of the features to be included in the system. Identification of the intended competency 'definition'; scope and complexity; and the extent to which higher order competencies where to be included or whether the intent was to predominantly include narrow skills-based competencies related directly to the job roles.</td>
<td>Memos, minutes, internal correspondence. Documentation of the structuring stage. Statements of requirements or samples of features in the structuring decision-making stage documentation. Managers. Key proponents. Consultants.</td>
</tr>
</tbody>
</table>
### Continued: What CBTA systems do enterprises implement?

<table>
<thead>
<tr>
<th>Identification of whether the enterprise intended to recognise current competencies, the RCC process; the assessment processes and the type of instruments the enterprise intended to implement; the intended assessment system, the quantity and type of evidence to be collected, the assessors; the intended learning approaches. Identification of why the system was structured in this way.</th>
<th>Memos, minutes, internal correspondence. Documentation of the structuring stage. Statements of requirements or samples of features in the structuring decision-making stage documentation. Managers. Key proponents. Consultants.</th>
<th>Content analysis of the documentation. Interviews with managers, key proponents, planners and any consultants involved at the time.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification in the implementing decision-making stage of the features included in the system. Identification of the competency ‘definition’, scope and complexity and the extent to which higher order competencies were included or whether the competencies were predominantly narrow skills-based related directly to the job roles. Identification of the RCC process implemented; the assessment processes and the type of instruments implemented; the assessment system implemented, the quantity and type of evidence collected, the assessors used and their training arrangements; the learning approaches implemented.</td>
<td>Memos, minutes, internal correspondence. Documentation of the implementing stage. Managers. Key proponents, planners and employees. Consultants. Documented Units of Competency. Documentation of the features implemented. Assessment instruments and learning materials in use.</td>
<td>Content analysis of the documentation. Interviews with managers, key proponents, planners, employees and any consultants involved at the time. Observation. Employee Questionnaire</td>
</tr>
</tbody>
</table>

### What external and internal factors significantly influence these CBTA systems?

<table>
<thead>
<tr>
<th>Data sought to answer the research question</th>
<th>Sources of Data</th>
<th>Data Collection Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Identification of the external and internal factors that influenced the decisions at each of the four decision-making stages. Identification of how these factors impacted on the decision-making and the features of the CBTA system.</td>
<td>Memos, minutes, internal correspondence. Documentation of the planning, structuring, implementing and recycling decision-making stages. Managers. Key proponents. Consultants. Employees.</td>
<td>Content analysis of the documentation. Interviews with managers, key proponents, planners, employees and any consultants involved at the time.</td>
</tr>
</tbody>
</table>
What impact does the CBTA system have on an enterprise?

<table>
<thead>
<tr>
<th>Data sought to answer the research question</th>
<th>Sources of Data</th>
<th>Data Collection Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evidence of the impact any changes in the system implemented, from that which was planned and structured, had on the expected outcomes. Evidence of the effectiveness of the implementation process.</td>
<td>Managers. Key proponents. Consultants. Employees.</td>
<td>Interviews with managers, key proponents, planners, employees and any consultants. Observation.</td>
</tr>
</tbody>
</table>

**Kirkpatrick Model:**

**Level 1:** Do the participants enjoy the training and does it encourage and motivate the participants to engage willingly in further training and demonstrate the newly acquired competencies on the job?

<table>
<thead>
<tr>
<th>Data sought to answer the research question</th>
<th>Sources of Data</th>
<th>Data Collection Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants’ views on enjoyment, value and relevance of the training. Participants reaction to the implementation of the training. Views of supervisors, managers and team leaders on the attitude of participants towards the training and their motivation to be involved in further training.</td>
<td>Employees. Key managers, supervisors and team leaders. Personnel Records and other company records as available.</td>
<td>Employee questionnaires. Employee interviews. Key manager, supervisor and team leader interviews. Analysis of company records.</td>
</tr>
</tbody>
</table>

**Level 2:** What changes in competency levels (skills, knowledge and attitude) occurred following the implementation of the training?

<table>
<thead>
<tr>
<th>Data sought to answer the research question</th>
<th>Sources of Data</th>
<th>Data Collection Approach</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants’ view on what has been learnt from the training and assessment program. Views of supervisors, managers and team leaders on whether the participants have learnt from the program. Data on total number of units of competence achieved through a RCC process and the total number of units of competency in which the participant was finally judged to be competent.</td>
<td>Employees. Key managers, supervisors and team leaders. Personnel Records/Training report records.</td>
<td>Employee questionnaires. Employee interviews. Key manager, supervisor and team leader interviews. Analysis of training records.</td>
</tr>
</tbody>
</table>
**Level 3:** Did the trainees improve their job skills? Are the trainees given the opportunity to demonstrate the specified competencies on the job? Have the trainees demonstrated the competencies and maintained the specified levels on the job following the implementation of the training?

<table>
<thead>
<tr>
<th>Data sought to answer the research question</th>
<th>Sources of Data</th>
<th>Data Collection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants’ views on the opportunity to use the skills and knowledge and the retention of those skills and knowledge. Views of supervisors, managers and team leaders on the range of skills used and their retention. Data on performance through observation, performance appraisal and other enterprise monitoring. Retraining requirements.</td>
<td>Employees. Key managers, supervisors and team leaders. Participants’ performance. Performance appraisals, team productivity and quality, and other relevant enterprise records.</td>
<td>Employee questionnaires. Employee interviews. Key manager, supervisor and team leader interviews. Analysis of company records.</td>
</tr>
</tbody>
</table>

**Level 4:** What evidence is there that the implementation of the training had an impact on the organisation’s expected outcomes?

<table>
<thead>
<tr>
<th>Data sought to answer the research question</th>
<th>Sources of Data</th>
<th>Data Collection Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participants’ views on whether the implementation of the system had an impact on the expected outcomes and improved the enterprise’s competitiveness and productivity. Views of supervisors, managers and team leaders on whether the implementation of the system had an impact on the expected outcomes and improved the enterprise’s competitiveness and productivity. Enterprise measures on achievement of the expected outcomes. Labour productivity and quality measures. Data on changes to work procedures, ‘Suggestion Box’ activity, etc. Performance at Team Meetings</td>
<td>Employees. Key managers, supervisors and team leaders. Enterprise and team productivity and quality records. Other relevant enterprise records. Observation.</td>
<td>Employee questionnaires. Employee interviews. Key manager, supervisor and team leader interviews. Analysis of company records.</td>
</tr>
</tbody>
</table>
Minerva Access is the Institutional Repository of The University of Melbourne

Author/s:
Curwood, Maurice Robert

Title:
Competeocy-based training and assessment in the workplace

Date:
2005

Citation:

Publication Status:
Unpublished

Persistent Link:
http://hdl.handle.net/11343/38977

Terms and Conditions:
Terms and Conditions: Copyright in works deposited in Minerva Access is retained by the copyright owner. The work may not be altered without permission from the copyright owner. Readers may only download, print and save electronic copies of whole works for their own personal non-commercial use. Any use that exceeds these limits requires permission from the copyright owner. Attribution is essential when quoting or paraphrasing from these works.