The Development of a Tacit Knowledge Spectrum
Based on the Interrelationships between Tacit and
Explicit Knowledge

TIMOTHY CLARKE, M.B.A, B.Eng. (Hons)

Thesis submitted to Cardiff School of Art & Design for the
Degree of Doctor of Philosophy.

2010

Cardiff School of Art & Design
University of Wales Institute, Cardiff
Western Avenue
Cardiff, CF5 2YB, UK
DECLARATION

I declare that this work has not been previously accepted in substance for any degree and is not being concurrently submitted for any other degree.

I further declare that this thesis is the result of my own independent work and investigation, except where otherwise stated.

Finally, I hereby give consent for my thesis, if accepted, to be available for photography and inter-library loan, and for the title and abstract to be made available to outside organisations.

Signed ---------------------------------

Timothy Clarke (Candidate)

Signed ---------------------------------

David Holifield (Director of studies)

Signed ---------------------------------

Prof. Eleri Jones (Supervisor).
DEDICATION

This thesis is dedicated to my wife, Josephine, for her endless patience, support and encouragement along the way and to my children, Tomas, Oliver and Georgia for all the times they have missed out during my research path.
ACKNOWLEDGEMENT

I would like to express my sincere thanks and deep gratitude to my supervisors David Holifield and Prof. Eleri Jones for giving me the opportunity to pursue an attractive research topic and for their guidance, valuable inputs, assistance and encouragement along the way. Their contributions and effective review of the work are also highly acknowledged along with their patience in getting me to completion of this thesis.

I would like to say a special thanks to my colleagues in the Engineering Department for their support and advice, especially Dr. Glyn Pole who I share an office with and has had to endure many hours of discussions on the implications of tacit to explicit knowledge transfer.

Thanks are extended to the companies that carried out the cases studies and all of their employees who agreed to fill in the questionnaire forms and participated directly in the case studies. Thanks are also extended to the senior managers of the companies involved, for the time given in setting up the cases studies and reviewing the results.

Finally, I would like to thank Prof. Colin Chisholm and Dr Margaret Blair for their support and time spent discussing my theories when we have met up at International Conferences.
ABSTRACT

Tacit knowledge is a valuable asset to organisations which is not readily being recognised. Years of experience and understanding of an organisation’s processes, operations and clients, is being lost on a daily basis through the turnover of employees, whether through natural wastage or in these times of recession a cutting back of the workforce. The loss of this information (tacit knowledge) can be critical to the day to day running of the organisation and in many cases it is irreplaceable. Organisations need to capture this knowledge and turn it into explicit knowledge to enhance the future knowledge capital of the organisation.

The undertaking of this thesis is to explore the relationship between tacit knowledge and explicit knowledge and their interaction when converting tacit knowledge into explicit knowledge. A review is carried out of current methodologies available to organisations for the management of tacit knowledge into explicit knowledge. Following the review, cases studies are carried out to test a series of interventions designed to promote understanding of knowledge management and the conversion of tacit knowledge into explicit knowledge. From the findings of the case studies, it can be found that tacit knowledge is not a single entity that can be converted into explicit knowledge, but it can be broken down into elements, which have to be considered independently in order to facilitate the knowledge transfer process.

From evaluation of the research for this thesis, a Tacit Knowledge Spectrum Model is developed to represent the elements of tacit knowledge. The Model gives a clear view
of the complexity of tacit knowledge and the inter-relationship of the elements that make up tacit knowledge. By creating a better understanding of tacit knowledge and its elements and their interaction with explicit knowledge, organisations will be better placed to manage tacit knowledge and their knowledge capital.
# TABLE OF CONTENTS

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Declaration</td>
<td>ii</td>
</tr>
<tr>
<td>Dedication</td>
<td>iii</td>
</tr>
<tr>
<td>Acknowledgment</td>
<td>iv</td>
</tr>
<tr>
<td>Abstract</td>
<td>v</td>
</tr>
<tr>
<td>Table of Content</td>
<td>vi</td>
</tr>
<tr>
<td>List of tables</td>
<td>xi</td>
</tr>
<tr>
<td>List of figures</td>
<td>xii</td>
</tr>
<tr>
<td>Glossary of Acronyms</td>
<td>xiii</td>
</tr>
</tbody>
</table>

## CHAPTER ONE: INTRODUCTION

1.0 Personal Profile 1-2

1.1 Introduction 1-3

1.2 Skills and the Productivity Gap 1-7

1.3 Research Agenda 1-9

1.4 Aims and Objectives 1-10

1.5 Thesis Structure 1-12

1.6 Summary 1-15

## CHAPTER TWO: KNOWLEDGE REVIEW

2.0 Introduction 2-18

2.1 The Importance of Tacit Knowledge 2-18

2.2 Knowledge Creation 2-20

2.3 Tacit & Explicit Knowledge 2-25

2.4 Transferring Tacit Knowledge into Explicit Knowledge 2-28

2.4.1 The Concept of Ba 2-29

2.4.2 The SECI Process 2-31

2.4.3 The SECI & Ba Relationship 2-33

2.5 Summary 2-40
CHAPTER THREE: TACIT KNOWLEDGE IN THE WORKPLACE

3.0 Introduction 3-43
3.1 Meeting the Skills Needs of Employers 3-43
3.2 Modes of Knowledge Production 3-47
  3.2.1 Mode 1 and Mode 2 forms of Knowledge Production 3-48
  3.2.2 Knowledge Production in Mode 2 3-50
3.3. Learning in the Workplace 3-52
3.4 Work Based Learning 3-53
3.5 Tacit to Explicit Knowledge Transfer 3-59
3.6 Integrating Tacit Knowledge Management with Work Based Learning 3-67
  3.6.1 CPD/WBL Toolkit 3-73
    3.6.1.1 Learning Needs Analysis Tools 3-74
    3.6.1.2 Development of Reflective Practice Tool 3-75
    3.6.1.3 The Learning Set and Working Styles Tool 3-76
    3.6.1.4 Barriers to Learning Development Tool 3-77
    3.6.1.5 Tacit Knowledge Tool 3-78
    3.6.1.6 Action Development Tool 3-78
    3.6.1.7 Learning Development Agreement Tool 3-79
3.7 The Development of a Model for Tacit to Explicit Knowledge Transfer 3-80
  3.7.1 The Learning Needs Analysis 3-82
  3.7.2 Development of Reflective Practice 3-82
  3.7.3 The Tacit Knowledge Tool 3-83
  3.7.4 Learning Development Agreement Tool 3-83
3.8 Summary 3-84

CHAPTER FOUR: INVESTIGATING TACIT TO EXPLICIT KNOWLEDGE TRANSFER

4.0 Introduction 4-88
4.1 Methodology

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.1.1 Ethical Considerations of the Case Studies</td>
<td>4-90</td>
</tr>
<tr>
<td>4.1.2 Definition of the Project Framework</td>
<td>4-91</td>
</tr>
<tr>
<td>4.1.3 Learning Needs Analysis</td>
<td>4-92</td>
</tr>
<tr>
<td>4.1.4 The Setting up of the Research Programme</td>
<td>4-92</td>
</tr>
<tr>
<td>4.1.5 Running and Monitoring of the Project</td>
<td>4-92</td>
</tr>
<tr>
<td>4.1.6 The Debrief of the Project</td>
<td>4-93</td>
</tr>
</tbody>
</table>

4.2 Company A

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.2.1 Presentations to Chief Executive and Senior Managers</td>
<td>4-94</td>
</tr>
<tr>
<td>4.2.2 Feedback from Senior Managers</td>
<td>4-95</td>
</tr>
<tr>
<td>4.2.3 Implementation of Project</td>
<td>4-96</td>
</tr>
<tr>
<td>4.2.4 Learning Needs Analysis</td>
<td>4-97</td>
</tr>
<tr>
<td>4.2.5 Setting up of Learning Sets</td>
<td>4-97</td>
</tr>
<tr>
<td>4.2.6 Assessment of Deliverable Outcomes</td>
<td>4-98</td>
</tr>
</tbody>
</table>

4.3 Case Study Results for Company A

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.3.1 Learning needs Analysis Results for Company A</td>
<td>4-99</td>
</tr>
<tr>
<td>4.3.2 Developing Working Codes and practices</td>
<td>4-100</td>
</tr>
<tr>
<td>4.3.3 Barriers to Learning</td>
<td>4-109</td>
</tr>
</tbody>
</table>

4.4 Company B

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.4.1 Presentations to Chief Executives and Senior Managers</td>
<td>4-113</td>
</tr>
<tr>
<td>4.4.2 Feedback from Chief Executive and Senior Managers</td>
<td>4-114</td>
</tr>
<tr>
<td>4.4.3 Implementation of the Project</td>
<td>4-115</td>
</tr>
<tr>
<td>4.4.4 Learning Needs Analysis</td>
<td>4-116</td>
</tr>
<tr>
<td>4.4.5 Setting up of Learning Sets</td>
<td>4-117</td>
</tr>
<tr>
<td>4.4.6 Assessment of Deliverable Outcomes</td>
<td>4-118</td>
</tr>
</tbody>
</table>

4.5 Case Study Results for Company B

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5.1 Learning Needs Analysis Results for Company B</td>
<td>4-119</td>
</tr>
<tr>
<td>4.5.2 Tacit knowledge and the Retiring Employee</td>
<td>4-120</td>
</tr>
<tr>
<td>4.5.3 Barriers to Learning</td>
<td>4-121</td>
</tr>
</tbody>
</table>

4.6 Conclusions

<table>
<thead>
<tr>
<th>Subsection</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.6</td>
<td>4-122</td>
</tr>
</tbody>
</table>
CHAPTER FIVE: THE TACIT KNOWLEDGE SPECTRUM

5.0 Introduction 5-143
5.1 The Elements of Tacit Knowledge 5-144
  5.1.1 The Tacit to Explicit Element 5-146
  5.1.2 The Tacit to Tacit Element 5-147
  5.1.3 The Triggered Response Element 5-149
  5.1.4 The Unknown Tacit Element 5-151
5.2 The Tacit Knowledge Spectrum 5-154
  5.2.1 The Transferring of Tacit Knowledge 5-159
5.3 The Tacit Knowledge Spectrum Model 5-161
5.4 Summary 5-163

CHAPTER SIX: CONCLUSIONS AND FURTHER AREAS OF RESEARCH

6.0 Introduction 6-166
6.1 Review of Objectives 6-167
6.2 The Contribution of the Thesis 6-173
6.3 Limitations of the Research 6-176
6.4 Further Areas of Research 6-178
  6.4.1 The Unknown Tacit Element 6-178
  6.4.2 Investigate the Cost to Return Ratio for Tacit Knowledge Transfer 6-179
  6.3.3 The Knowledge Repository 6-180
6.5 Personal Reflections 6-181

REFERENCES  Ref.-1

APPENDICES

Appendices 1  Extracts from meetings and feedback
Appendices 2  Toolkit
LIST OF TABLES

CHAPTER TWO

Table 1: Two Types of Knowledge 2-27
Table 2: Knowledge Types and Names 2-36

CHAPTER FOUR

Table 3: Staff Profiles 4-100
Table 4: Team Skills and Team Working in a Learning Set 4-101
Table 5: Reflective Practice Attributes 4-102
Table 6: Understanding and Developing of Tacit Knowledge 4-103
Table 7: Operating as a Learning Organisation 4-104
Table 8: Understanding the Value of Work Based Learning 4-105
Table 9: Understanding the Value of CPD 4-106
Table 10: Action Development Planning 4-107
Table 11: Developing Knowledge Based Skills 4-108
Table 12: Staff Profiles 4-123
Table 13: Team Skills and Team Working in a Learning Set 4-124
Table 14: Reflective Practice Attributes 4-125
Table 15: Understanding and Developing of Tacit Knowledge 4-126
Table 16: Operating as a Learning Organisation 4-127
Table 17: Understanding the value of Work Based Learning 4-128
Table 18: Understanding the value of CPD 4-129
Table 19: Action Development Planning 4-130
Table 20: Developing Knowledge Based Skills 4-131
# LIST OF FIGURES

## CHAPTER TWO

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The Ba Model</td>
<td>2-30</td>
</tr>
<tr>
<td>2</td>
<td>The SECI Model</td>
<td>2-32</td>
</tr>
<tr>
<td>3</td>
<td>The SECI and Ba Model</td>
<td>2-33</td>
</tr>
<tr>
<td>4</td>
<td>Four inseparable types of knowledge</td>
<td>2-38</td>
</tr>
<tr>
<td>5</td>
<td>Tacit to Explicit Knowledge Transfer</td>
<td>2-40</td>
</tr>
<tr>
<td>6</td>
<td>Tacit to Explicit and Tacit to Tacit Knowledge Transfer</td>
<td>2-41</td>
</tr>
</tbody>
</table>

## CHAPTER THREE

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>International Comparison of Productivity</td>
<td>3-45</td>
</tr>
<tr>
<td>8</td>
<td>The Work Based Learning Triangle</td>
<td>3-57</td>
</tr>
<tr>
<td>9</td>
<td>WBL Pedagogical Triangle</td>
<td>3-58</td>
</tr>
<tr>
<td>10</td>
<td>Community of Practice Structure</td>
<td>3-60</td>
</tr>
<tr>
<td>11</td>
<td>The Knowledge Capital Model</td>
<td>3-63</td>
</tr>
<tr>
<td>12</td>
<td>Combining of Models</td>
<td>3-65</td>
</tr>
<tr>
<td>13</td>
<td>Unified Staged Model of Innovation</td>
<td>3-66</td>
</tr>
</tbody>
</table>

## CHAPTER FIVE

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>14</td>
<td>Elements of Tacit Knowledge</td>
<td>5-145</td>
</tr>
<tr>
<td>15</td>
<td>The Tacit to Explicit Knowledge Element</td>
<td>5-146</td>
</tr>
<tr>
<td>16</td>
<td>The Tacit to Tacit Knowledge Element</td>
<td>5-148</td>
</tr>
<tr>
<td>17</td>
<td>The Triggered Response Element</td>
<td>5-150</td>
</tr>
<tr>
<td>18</td>
<td>The Unknown Tacit Element</td>
<td>5-152</td>
</tr>
<tr>
<td>19</td>
<td>Explicit and Tacit Knowledge as Two Dimensions of Knowledge</td>
<td>5-156</td>
</tr>
<tr>
<td>20</td>
<td>A Knowledge Spectrum</td>
<td>5-156</td>
</tr>
<tr>
<td>21</td>
<td>Epitomes of Tacit Knowledge</td>
<td>5-158</td>
</tr>
<tr>
<td>22</td>
<td>The Reflective Process</td>
<td>5-159</td>
</tr>
</tbody>
</table>
CHAPTER SIX

Figure 25: The Tacit Knowledge Spectrum 6-173
## Glossary of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Full Form</th>
</tr>
</thead>
<tbody>
<tr>
<td>Abwood Machine Tools Ltd.</td>
<td>AMT</td>
</tr>
<tr>
<td>Engineers Employers Federation</td>
<td>EEF</td>
</tr>
<tr>
<td>Knowledge Management</td>
<td>KM</td>
</tr>
<tr>
<td>Tacit Knowledge</td>
<td>TK</td>
</tr>
<tr>
<td>Explicit Knowledge</td>
<td>EK</td>
</tr>
<tr>
<td>Continuous Professional Development</td>
<td>CPD</td>
</tr>
<tr>
<td>Work Based Learning</td>
<td>WBL</td>
</tr>
<tr>
<td>Department for Work and Pensions</td>
<td>D.F.E.E</td>
</tr>
<tr>
<td>Higher Education</td>
<td>HE</td>
</tr>
<tr>
<td>Level 4</td>
<td>L4</td>
</tr>
<tr>
<td>Small to Medium Enterprise</td>
<td>SME</td>
</tr>
<tr>
<td>Key Performance Indicators</td>
<td>KPI’s</td>
</tr>
<tr>
<td>Retiring Senior Engineer</td>
<td>K</td>
</tr>
<tr>
<td>Masters of Business Administration</td>
<td>MBA</td>
</tr>
<tr>
<td>Bachelor of Engineering – Honours</td>
<td>B.Eng (Hons)</td>
</tr>
<tr>
<td>Higher national Diploma</td>
<td>HND</td>
</tr>
<tr>
<td>National Vocational Qualification</td>
<td>NVQ</td>
</tr>
</tbody>
</table>
CHAPTER ONE:

INTRODUCTION
1.0 Personal Profile

I am a Senior Lecturer within the Engineering Department at the University of Wales Institute, Cardiff. I graduated with MBA from the University of Greenwich in 1997 after previously completing a B.Eng (Hons) Mechanical Engineering from the University of Greenwich.

I started my adult working life in 1980, serving a four year apprenticeship with the Ministry of Defence, where I experienced and gained an understanding of the importance of knowledge sharing and knowledge management in the workplace. From there I worked extensively at home and overseas across a range of engineering disciplines, from the aerospace and automobile sectors through to the machine tool industry.

Over the years, I worked my way through the ranks to senior management positions before taking over as General Manager for Abwood Machine Tools Ltd (AMT) in 1994, a manufacturer of high specification C.N.C grinding machines. During my time at ATM, I completed an MBA, part of which was a dissertation, were I revisited the knowledge management issue, completing my dissertation entitled ‘The Demise of the Apprenticeship System in the UK Engineering Sector’, (1996).

In 2000, I entered the Higher Education (HE) sector, where I became involved in a research group looking at work based learning and knowledge management techniques in the workplace. My previous experiences within the engineering sector, combined
with exposure to knowledge management research, led to the natural progression of wanting to take the opportunity of PhD research to explore knowledge management issues.

1.1 Introduction

In order for companies to compete on the world stage, knowledge management needs to be incorporated into company culture and business strategies. The realisation that knowledge within the company is an asset that needs to be recognised and managed is of vital importance in maintaining a competitive edge in an ever-changing global environment. “It has now been accepted by organisations that knowledge is the true source of power and will increasingly become so as the 21st century progresses” (Burns 2001, p.1).

The management of knowledge and its creation within a company has to become part of the culture of the corporate world. Most companies have a wealth of knowledge locked up in their workforce. Much of this knowledge is personal to particular individuals and if the individual leaves the company, then that knowledge is lost along with the individual. In some cases this loss of knowledge can be critical to the company regardless of the size of the company. It has to be acknowledged that smaller companies are far more vulnerable to this kind of knowledge loss. Companies need to become aware of the need to identify this type of knowledge that is held by individuals,
tacit knowledge and convert it into explicit knowledge, creating an environment where knowledge can be shared among the workforce:

*Tacit knowledge is the component of knowledge that is not typically reportable since it is deeply rooted in actions and involvement in a specific context ... Explicit knowledge is the familiar codified form that is transmittable in formal, systematic language.*

(Polanyi 1966, p.20)

Explicit knowledge can be easily recognised, in the form of books, data, manuals, Internet etc. and is the main source of knowledge transfer for both the educational sector and business sectors:

*Tacit knowledge is a little harder to recognise. Tacit knowledge is deep rooted in actions, procedures, routines, commitments, ideas, values and emotion (Schon 1983). The distinction between tacit knowledge and explicit knowledge has been described in terms of 'knowing-how' and 'knowing-that', respectively.*

(Ryle 1949, p.279)

The demise of the skills base in the engineering sector of the UK has been a major ongoing problem for a number of years. Reports from the Engineers Employers Federation (EEF) suggest that the situation is not improving:

*There is a significant shortfall between the numbers of people on advanced modern apprenticeships (24,000) and the numbers required by industry (36,000).*

(EEF 2001, p.4)

Not only is there a short fall in apprentices, but the EEF reports that 48% of employers in the engineering sector responded that employees in the skilled operative and craft occupations are not fully proficient. Skill shortages for companies can damage business performance in a number of ways; limiting company expansion, product innovation, winning orders, the ability to meet customer demands, controlling operating costs, loss of productivity and also increasing pressure on employees.
From my own experiences in the late 1990’s as general manager of AMT, one of the main factors holding back company expansion was the lack of an available skilled workforce, through skill shortages or skills gaps in the available labour market. AMT had not trained apprentices or invested in training for its employees over a 10 year period. Manufacturing in the UK had declined rapidly and the company was fighting for survival.

The situation experienced by ATM was reflected across the engineering sector and many companies were fortunate to survive the manufacturing decline. When I took over as general manager in 1995, the company had a change in fortunes, as the economy and markets started to pick up. The lack of knowledge management and investment in the skills base in the company became a problem, holding back expansion through skills shortages resulting in major inefficiencies in the manufacturing process.

The skills that were required could not be taught over night, recruitment from the labour market was impossible, due to the low numbers of suitably skilled personnel. The sector as a whole was expanding forcing up wage costs, not only in relation to employing new people but also in relation to maintaining the current workforce. The employees that were in place were so busy trying to fulfil orders that they simply did not have the time to step back and share their skills (tacit knowledge) with fellow employees.

AMT experienced similar problems to the rest of the engineering sector in the UK over this period. As the company down-sized, little thought had been given to the future of
the company, it was a matter of survival. Looking back at the situation, it could be said that if the company had managed their knowledge through the recession and down-sizing, their competitive advantage as the markets expanded would have been greater. From my own conversations at that time with senior management teams across the manufacturing sector; other companies were experiencing very similar problems:

_Much survey evidence points to the fact that skills are lacking internally and in the labour markets at large and that these are focussed around the staff most closely linked with design, innovation and production processes. This does not bode well for future competitive advantage of British engineering._

(EMTA 2000, p.iii)

The situation in 2009 is little improved and the skills gap between industry and the available workforce is still a problem and furthermore:

_today’s uncertain economic and business environment actively discourages long-term investment in skills, innovation and modern machinery_

(EEF 2009, p.11)

As the UK moves further into recession and further down-sizing of the workforce, only time will tell if the lessons taught in previous recessions have been truly learnt.

The understanding and management of tacit knowledge within organisations is an opportunity to help reduce the skills gap and to formalise knowledge held by individuals, which could be permanently lost with the down sizing of the workforce. Tacit knowledge management needs to become established into company culture to improve efficiencies in the good times and to avoid the loss of the knowledge base of the company during the lean times.
1.2 Skills and the Productivity Gap

So why is the up-skilling of the workforce so important? If the UK is to compete with other Western economies and emerging economies, e.g. China and India, it will have to invest heavily in the up-skilling of its workforce. In 2006 the UK government commissioned the Leitch Report on Skills (Leitch 2006), to consider what the UK’s long-term ambitions should be for developing skills to combat these ever-growing threats. The fundamental findings of the Leitch Report point to a direct correlation between skills, productivity and employment:

*Productivity in the UK is low compared to that of comparable countries... the average French worker produces 20% more per hour than the average UK worker, the average German worker 13% more and the average US worker 18% more.*

(Leitch 2006, p.7)

For UK companies to succeed in the face of international competition, depends increasingly on the skilled labour force available to them. Higher levels of skills improve leadership, management and drive innovation. Higher levels of skills are of paramount importance to the UK being able to compete in the global market place; businesses need to be able to draw upon a multi skilled flexible workforce to remain competitive.

Leitch (2006) talks about the need to have more than 40% of the adult workforce qualified to level 4 and above by 2020 (currently 29%), this will mean approximately four million more people attaining L4 qualifications over this period. The longer term aim is to increase further to 45%. Traditional University style on-campus training will not be able to cope with this sort of influx; therefore the workplace is going to have to
become an extension of the HE environment. New partnerships and training models will have to be developed to incorporate organisations into the academic fold to accommodate the expansion in the HE sector.

The development of taxonomy of approaches to knowledge management to deal with the expansion in the HE sector and off campus delivery will need to take into consideration, the implications of tacit knowledge management and its transfer to attain the required skill levels of the government.

The value of tacit knowledge within organisations is not being recognised and a valuable asset to organisations is not being utilised and managed efficiently. The undertaking of this thesis is to explore tacit knowledge and methodologies for managing knowledge within organisations. The research questions that will be addressed by this thesis are:

- What is the current understanding of the relationship between tacit knowledge and explicit knowledge and their interaction when trying to convert tacit knowledge into explicit knowledge?
- What methodologies are currently being used to help facilitate the transfer of tacit knowledge into explicit knowledge?
- Can tacit knowledge be converted into explicit knowledge in its entirety, or is there a more complex argument to suggest that tacit knowledge is it made up of a number of elements that need to be considered independently in order for efficient knowledge transfer to take place.
1.3 Research Agenda

When investigating current literature on the subject of tacit knowledge and explicit knowledge and the methodologies available to facilitate the transfer of tacit knowledge to explicit knowledge, tacit knowledge is treated as a single entity that can be transferred directly into explicit knowledge. It is my belief that this view is far too simplistic. Tacit knowledge is too complex to be treated as a single entity. Further understanding of tacit knowledge and its components is needed. The components that make up tacit knowledge need to be broken down into defined elements that can be represented in a model of the Tacit Knowledge Spectrum, to promote understandings of the complexities of tacit to explicit knowledge transfer.

The role of this thesis is to explore the issues surrounding tacit and explicit knowledge and the methodologies used for tacit to explicit knowledge conversion. The thesis will go on to evaluate current knowledge management techniques and the role of tacit knowledge within these methodologies. From the evaluation of these methodologies, a diagnostic tool will be developed which will assess an organisations approach to tacit knowledge management and its ability to convert tacit knowledge into explicit knowledge.

Case studies will be carried out with engineering companies in the South Wales region, using the diagnostic tool, to promote understanding of tacit knowledge transfer and to establish the elements that make up tacit knowledge. The relationship of the identified elements of tacit knowledge will form the basis in the development of a model to
represent The Tacit Knowledge Spectrum. The aim of the model is to give a graphical representation of the tacit knowledge spectrum, giving an instant visual view of the interrelationship of the tacit knowledge elements and the complexity of trying to retrieve tacit knowledge.

1.4 Aims & Objectives

Aims

The aims of this research are to develop taxonomy of approaches to knowledge management in a number of organisational contexts, to explore the effectiveness of various interventions designed to promote the conversion of tacit knowledge into explicit knowledge within organisations, through Continuous Professional Development (CPD) and Work Based Learning (WBL) techniques and to develop a model to represent the components of tacit knowledge and their interrelationship.

Objective 1

To undertake a critical review of relevant literature, to develop an understanding of tacit knowledge and explicit knowledge and ways in which tacit knowledge can be converted into explicit knowledge.
Objective 2

To investigate organisational approaches to knowledge management and the management of the relationship between tacit and explicit knowledge and to evaluate a series of interventions to investigate tacit to explicit knowledge transfer.

Objective 3

To test a series of interventions designed to promote understanding of knowledge management and the conversion of tacit knowledge into explicit knowledge and to investigate the extent to which tacit knowledge can be transferred into explicit knowledge.

Objective 4

To develop the Tacit Knowledge Spectrum model, to represent the elements of tacit knowledge and their inter-relationships.


1.5 Thesis Structure

Chapter one introduces the topic of research and outlines the aims and objectives of the thesis and the reasoning behind the carrying out of the research in the knowledge management sector. The introduction gives an insight into the issues faced by organisations and the benefits that could be gained from research into tacit knowledge transfer techniques. The research agenda is outlined along with an overview of the thesis.

Chapter two carries out a knowledge review, firstly asking the question of ‘What is Knowledge’. The answer to this question has been the subject of debate for centuries, with some of the earliest readings about knowledge been written by Plato (427 BC-347 BC) in his Socratic dialogues, Meno, Phaedo and Theaetetus. The history of Western epistemology as we know it today stems from the readings of Plato and Aristotle through the developments of Rationalism and Empiricism. Rationalism suggests that knowledge can be obtained by reasoning, as opposed to Empiricism which suggests that knowledge is obtained through sensory experience.

The chapter goes on to investigate the theories of knowledge over the centuries, to the modern day writings of Gilbert Ryle (1900-1976), the British philosopher. Ryle published The Concept of the Mind (1949), in which some of the first references to tacit knowledge can be found. The second question raised in this chapter, is ‘How much Tacit Knowledge can be transferred into Explicit Knowledge’?
Nonaka along with Boiral (2002), Spencer (1996), Torff (1999), Wagner and Sternberg (1986) believe that tacit knowledge can be converted into explicit knowledge and what remains is trivial. Others such Ambrosini & Bowman (2003), Collins (2001) and Chisholm et-al (2005) believe that there is a more complex argument to tacit knowledge. It is the belief of the author that tacit knowledge is not a single entity that can be converted in its entirety but that tacit knowledge conversion is more complex.

Chapter three investigates organisational approaches to knowledge management and the management of the relationship between tacit and explicit knowledge and how tacit knowledge is managed within these models. The chapter looks at Government strategies being adopted, to deal with the emerging economies of the likes of China and India and ways in which up-skilling of the workforce can counter these threats to the British manufacturing base and the economy as a whole. The chapter will investigate how these strategies will effect organisations and the implications for the Education Sector in meeting these strategic government needs.

Chapter four tests a series of interventions designed to promote understanding of knowledge management and the conversion of tacit knowledge into explicit knowledge and to investigate the extent to which tacit knowledge can be transferred into explicit knowledge. It evaluates and further develops the toolkit of Chisholm et al (2006), to help industry recognise the value of knowledge management and the unlocking of tacit knowledge within organisations. The toolkit contains a set of learning tools to support work based learning and continuous professional development of an individual within an organisation.
The chapter goes on and conducts case studies, concentrating on the strengths and weaknesses of transferring tacit knowledge into explicit knowledge and the implications of this knowledge transfer, to the individual and the organisation. The fundamental findings of the case studies are that tacit knowledge can be managed and transferred and that WBL and CPD techniques can aid with that process. The case studies also indicate that tacit knowledge cannot be treated as a single entity and needs to be broken down into composite elements.

Chapter five takes the findings of the case studies and develops the Tacit Knowledge Spectrum Model, to represent the elements of tacit knowledge and their interrelationships. From the analysis of the case study results, it was found that tacit knowledge could be recalled in different forms, tacit knowledge that could easily be converted into explicit knowledge, tacit knowledge that was easier to convert into tacit knowledge and tacit knowledge that could only be recalled through a trigger response. The contribution of this thesis is to identify the different forms of tacit knowledge and represent them in the form of the model of The Tacit Knowledge Spectrum.

Chapter six concludes the finding of the research into the management of tacit knowledge, its transfer and the development of the tacit knowledge spectrum model.

The main objectives of the thesis are reviewed, the major findings are outlined and the contribution of the thesis discussed. The final section of the chapter discusses the observations that have come to light during the writing of this dissertation and identifies areas that require further research that could not be carried out during this research.
1.6 Summary

Tacit knowledge within organisations is a major resource that is generally not recognised or managed within organisations. As the economy slides further into recession, in order for companies to survive and be prepared for the up turn if and when it happens, tacit knowledge as a resource can not be ignored. The mistakes of the 90’s recession need to be avoided by investing in an organisations skills base.

In the UK and world wide, tacit knowledge management within an organisation is an opportunity that is being overlooked by organisations and could go a long way in supporting the up-skilling of the workforce in this difficult climate. Tacit knowledge management is not just for the lean times, by adopting tacit knowledge management techniques and developing company culture to embrace the concept, organisations will be better placed to gain competitive advantage and maintain an efficient skilled workforce.

Tacit knowledge and its transfer needs to be better understood, current theories and publications talk about tacit knowledge as a single entity, this view is far to simplistic and in order to fully benefit from the hidden knowledge and the advantages that could be gained through management of this knowledge, further research and a deeper understanding of tacit knowledge is needed.

Recognition of the importance of tacit knowledge to companies and the development of new methodologies is long over due. It is the intention of this thesis is to investigate tacit knowledge and to gain an understanding of how tacit knowledge can be transferred
and the implication of this process to the individual and the organisations involved. The thesis will develop and test a series of interventions to aid in the management and conversion of tacit knowledge and develop a model to represent the complexities of tacit knowledge in the Tacit Knowledge Spectrum.
CHAPTER TWO:

KNOWLEDGE REVIEW
2.0 Introduction

Most company have long-serving employees, who over the years have built up a vast wealth of knowledge about the company, its clients, its products and the customers that it supplies. These people are of paramount importance to the day to day operation of the company. Organisations have to draw on the wealth of experience and knowledge that has been gained over years by these long-serving employees in order for operations to run smoothly. When problems occur, organisations turn to these employees, who have experienced similar situations and scenarios and often have the knowledge base to sort out the problem. The knowledge that we are referring to, is known as Tacit Knowledge.

The aim of this chapter is to undertake a critical review of current literature and to develop an understanding of tacit and explicit knowledge and ways in which tacit knowledge can be converted into explicit knowledge.

2.1 The Importance of Tacit Knowledge

So why is tacit knowledge so important? Tacit knowledge is developed over time by individuals, through experience and understanding gained from working within an environment.
Day to day experiences of dealing with company procedures, clients, production and customers etc, develops the knowledge base of the employee. This knowledge is not written down in an explicit form but is personal to the employee. The day to day operations of organisations rely heavily on tacit knowledge, but it is seldom acknowledged or managed in any form. The tacit knowledge capital within an organisation is a valuable asset that is not always recognised by the organisation.

The loss of tacit knowledge within an organisation through labour turnover and the loss of skill, usually only comes to the forefront when a member of staff leaves the organisation and a specific problem or scenario arises. A major hole can appear in the skill base of the organisation that is not always easy to fill and in some cases the knowledge base and skills are irreplaceable. With the near collapse of the craft apprenticeship system (a well tried and tested method of tacit knowledge transfer) caused by lack of investment in training during the 1990’s recession, resulting in an ageing skilled workforce within the engineering sector; the need for organisations to investigate tacit knowledge release is paramount:

Companies that have the foresight to embrace the concepts of tacit knowledge release and to share that knowledge within the organisation, will be well placed to gain competitive advantage within their sector in an ever-changing business environment

(Clarke, Holifield, & Chisholm 2004, p.383)

In order for companies to compete on the world stage, knowledge management needs to be incorporated into company culture and business strategies. The realisation that knowledge within the company is an asset that needs to be recognised and managed is
of vital importance in maintaining a competitive edge in a fast changing global economy.

Knowledge management and knowledge creation within a company has to become part of the culture of the corporate world as discussed by Clarke, Holifield & Chisholm (2005, p.125):

Most companies have a wealth of knowledge locked up in their workforce. Much of this knowledge can be personal to individuals, such that if the said individual leaves the company, that knowledge is lost along with the individual. In some cases this loss of knowledge can be critical to the company regardless to the size of the company. It has to be acknowledged that smaller companies are far more vulnerable to this kind of knowledge loss.

Companies need to recognise the need to identify the knowledge locked into individuals, tacit knowledge and create an environment where knowledge can be made explicit and shared among the workforce.

2.2 Knowledge Creation

The first question to ask is ‘What is Knowledge?’ This question has been the subject of debate for centuries, and can be traced back through history to the ancient Greek philosophers. Some of the earliest readings about knowledge and its creation are written by Plato (427BC - 347BC) in his Meno, Phaedo and Theaetetus Socratic dialogues. Western philosophers have generally agreed that knowledge is “justified true belief,” an argument first raised by Plato.
Plato’s epistemology was partly derived from the works of previous philosopher’s, such as Parmenides, Heraclitus and Socrates. Parmenides derived the belief that reality is eternal and therefore all changes must be illusory: from Heraclitus who proposed the doctrine that there is nothing permanent in the sensible world; and from his mentor Socrates who asserted the theory of “idea” or “form”. Plato built up an elaborate body of thought on knowledge from a rationalistic perspective and developed the theory of “idea,” which is a “form” seen through the pure mental eye and the ultimate ideal that the human spirit aspires to know.

Plato argued:

Would not that man do this most perfectly who approaches each thing, so far as possible, with the reason alone, not introducing sight into his reasoning nor dragging in any of the other senses along with his thinking, but who employs pure, absolute reason in his attempt to search out the pure, absolute essence of things, and who removes himself, so far as possible, from eyes and ears, and, in a word, from hinders it from attaining truths and wisdoms? Is not this man, simmias, if anyone, to attain to the knowledge of reality?

((Translated by Fowler 1953, p.229))

Thus, for Plato, the physical world is a mere shadow of the perfect world of “ideas.” Human beings aspire towards the eternal, unchanging, and perfect “ideas” that cannot be known through sensory perception but only through pure reason.

(Nonaka & Takeuchi 1995, p.22)

Aristotle disagreed with Plato and proposed that “idea” or “form” cannot be isolated from a physical object or exist independently from sensory perception. Aristotle went on to argue that “form” has a physical dimension and knowledge of forms is supported by sensory perception. From an empiricist perspective Aristotle argued:

So out of sense – perception comes to be what we call memory, and out of frequently repeated memories of the same thing develop experience; for a number of memories constitute a single experience. From
experience again – i.e., from the universal now stabilised in its entirety within the soul, the one besides the many which is a single identity within them all – originate the skill of the craftsman and the knowledge of the man of science, skill in the sphere of coming to be and science of being. We conclude that these stages of knowledge are neither innate in a deterministic form, nor developed from other higher states of knowledge, but from sense – perception.

(Translated by Mure 1928, p.59)

The history of Western epistemology (epistemology being the philosophical basis of how we know what we know) stems from the readings of Plato and Aristotle through the developments of rationalism and empiricism. Rationalism suggests that knowledge can be obtained by reasoning, where as empiricism suggests that knowledge is obtained through sensory experience.

Thus the two dominant approaches to epistemology, rationalism and empiricism, differ sharply with regards to what constitutes the actual source of knowledge. Another fundamental difference lies in the method by which knowledge can be attained deductively by appealing to the mental constructs such as concepts, laws, or theories. Empiricism, on the other hand, contends that knowledge is derived inductively from particular sensory experiences.

(Nonaka & Takeuchi 1995, p.22)

The French philosopher Descartes took up the mantle in the 17th century developing his theory of Dualism (1641), i.e. that the mind is a non-physical substance. Descartes was the first to clearly identify the mind with consciousness and self-awareness and to distinguish this from the brain. As a Continental rationalist, a philosophical creed that human reason is the source of knowledge, he proposed four general rules for rational thinking:

The first of these was to accept nothing as true which I did not clearly recognize to be so: that is to say, carefully to avoid precipitation and prejudice in judgments, and to except in them nothing more than what was presented to my mind so clearly and distinctly that I could have no occasion to doubt it.
The second was to divide up each of the difficulties which I examined into as many parts as possible, and as seemed requisite in order that it might be resolved in the best manner possible.

The third was to carry on my reflections in due order, commencing with object that were the most simple and easy to understand, in order to rise little by little, or by degrees, to knowledge of the most complex, assuming an order, even if a fictitious one, among those which do not follow a natural sequence relative to one another. The last was in all cases to make enumerations so completely and reviews so general that I should be certain of having omitted nothing.

(Haldane & Ross 1911 cited; Nonaka & Takeuchi 1995, p.23)

Descartes discovered that all beliefs could be questioned except the existence of the questioner – “I think, therefore I am” (cogito, ergo sum), (Haldane & Ross 1911, cited; Nonaka & Takeuchi 1995, p.23)

John Locke, the 17th century English philosopher and founder of British empiricism, was critical of Descartes. Locke proposed a new, ultimately very influential view in that “the only knowledge humans can have is posteriori” (Locke 1689) i.e. knowledge is based upon experience. Locke compared the human mind to a tabula rasa or white paper on which is written experiences through sensory perception as one’s life proceeds. He argued that only experiences can provide the mind with ideas, and that there are two types of experience: sensation and reflection:

*By sensation Locke meant the sensory perception which is the “great source of most of our ideas” and by reflection “the perception of the operation of our mind within us,” which is the other fountain from which experiences furnished the understanding with ideas.*

(Locke 1689, cited; Nonaka & Takeuchi 1995, p.24)
According to Locke, our knowledge of things is a perception of ideas that are in accordance or discordance with each other, which is very different from the quest for certainty of Descartes.

The German philosopher Immanuel Kant brought together rationalism and empiricism in the 18th century. Kant agreed that the basis of all knowledge is experience but did not except the empiricist’s point of view that experience is the sole source of knowledge. “Though all our knowledge begins with experience it does not follow that it all arises out of experience” (Kant 1781, p.41).

Kant argued that knowledge only arises when the logical thinking of rationalism and the sensory experience of empiricism work together. “For Kant, the human mind is not the passive tabula rasa but active in ordering sensory experiences in time and space and supplying concepts as tools for understanding them” (Russell 1961, p.680). Kant believed that we could only know the “phenomenon” - our sensory perception of the “transcendental object” or “thing in its self” which transcends experience. Kant’s philosophy is known as “transcendental idealism” for this reason.

19th century philosopher Georg W.F. Hegel argued that the mind and matter are derived from the “absolute spirit” through a dynamic, dialectical process, the absolute spirit being the highest form of knowledge.

...for Hegel, knowledge begins with sensory perception, which becomes more subjective and rational, through a dialectic purification of the senses and at last reaches the stage of self-knowledge of the Absolute Spirit.

(Russell 1961, p.704)
Gilbert Ryle (1900-1976) was a British philosopher who rejects Descartes theory of the relationship between mind and body in the way that he looks at mental processes as if they can be isolated from physical process. Ryle in his work The Concept of the Mind (1949), in which some of the first references to tacit knowledge can be found, asserted that the workings of the mind are not distinct from the actions of the body in that knowing how to perform an act skilfully is not a matter of being able to reason practically but may also be a matter of putting practical reasoning into action. According to Ryle, “mental processes are merely intelligent acts” (Ryle 1949, p.279). Ryle concludes that: “The distinction between tacit knowledge and explicit knowledge has been described in terms of ‘knowing-how’ and ‘knowing-that’, respectively” (Ryle 1949, p.279).

2.3 Tacit & Explicit Knowledge

Explicit knowledge can be easily recognised, in a variety of forms including books, data, manuals, and the Internet and is the main source of knowledge transfer for both the educational sector and business sector alike. “Tacit knowledge is a little harder to recognise. “Tacit knowledge is deep rooted in actions, procedures, routines, commitments, ideas, values and emotion” (Schon 1983, p.25).

In this case, ‘knowing how’ an embodied knowledge is associated with a person who acts, makes judgements without explicitly reflecting on the principles of the rules
involved. A person works without having a theory of his or her work but nevertheless performs at a high skill level without deliberation or focussed attention. On the other hand, ‘knowing that’ involves conscious accessible knowledge that can be articulated and is highly characteristic of the person actually learning skills through specific explicit instruction. Polanyi (1958, p.27) concluded:

*Thus while this knowledge may be needed to facilitate the acquisition of skills, it can be argued that it no longer becomes necessary for the practice of those skills once the person becomes an expert in exercising them. “It has been suggested that when we require a skill we acquire a corresponding understanding which cannot be articulated”.*

Polanyi in his book *The Tacit Dimension* (1966) outlined the concept of tacit and explicit knowledge. He defines the fact that that tacit knowledge exists through the analogue:

*We can know more than we can tell...Take an example. We know a person’s face and can recognise it among a thousand, indeed a million. Yet we usually cannot tell how we recognise a face we know. So most of this knowledge cannot be put into words.*

(Polanyi 1966, p4)

Nonaka & Takeuchi (1995) expanded on Polanyi’s concept of tacit knowledge to include cognitive and technical elements, and came up with the following table (Table 1.) to distinguish between tacit and explicit knowledge.
Table 1: Two Types of Knowledge

<table>
<thead>
<tr>
<th>Tacit Knowledge (subjective)</th>
<th>Explicit Knowledge (objective)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Knowledge of experience (body)</td>
<td>Knowledge of rationality (mind)</td>
</tr>
<tr>
<td>Simultaneous knowledge (here and now)</td>
<td>Sequential knowledge (there and then)</td>
</tr>
<tr>
<td>Analogue knowledge (practice)</td>
<td>Digital knowledge (theory)</td>
</tr>
</tbody>
</table>

(Nonaka & Takeuchi 1995, p.61)

Nonaka & Takeuchi (1995, p.60), came up with the following findings:

*Knowledge of experience tends to be tacit, physical and subjective, while knowledge of rationality tends to be explicit, metaphysical and objective. Tacit knowledge is created “here and now” in a specific, practical context and entails what Bateson (1993) refers to as “analogue” quality. Sharing tacit knowledge between individuals through communication is an analogue process that requires a kind of “simultaneous processing” of the complexities of issues shared by the individuals. On the other hand, explicit knowledge is about past events or object “there and then” and is oriented towards a context-free theory. It is sequentially created by what Bateson calls digital activity.*

Nonaka & Takeuchi (1995) concluded that tacit and explicit knowledge are not separate entities but mutually complementary entities. Tacit and explicit knowledge interact and exchange with each other through the creative activities of human beings. Human knowledge is created and expanded through social interaction of tacit and explicit knowledge. They call this interaction “knowledge conversion”:  

---

(Nonaka & Takeuchi 1995, p.61)
According to the rationalist view, human cognition is a deductive process of individuals, but an individual is never isolated from social interaction when he or she perceives things. Thus, through this “social conversion” process, tacit and explicit knowledge expand in terms of both quality and quantity.

(Nonaka 1990, cited; Nonaka & Takeuchi 1995, p.61)

2.4 Transferring Tacit Knowledge into Explicit Knowledge

Why do we need to transfer tacit knowledge into explicit knowledge? The knowledge capital within an organisation is a valuable asset that needs to be recognised and managed in order for organisations to maintain competitive advantage. When an individual leaves an organisation, an important wealth of knowledge built up over years of experiences, leaves with that individual. In some cases this loss of knowledge can be critical to the organisation.

Organisations have to recognise the need to identify the knowledge locked into individuals, tacit knowledge and create an environment where knowledge can be shared among the workforce. By continuously updating and renewing tacit knowledge, an organisation will be in a much better position to maintain its strategic flexibility and management of its knowledge capital.

When investigating tacit knowledge to explicit knowledge transfer, there are a number of models that have been developed to aid the transfer of tacit to explicit knowledge, including the following.
2.4.1 The Concept of Ba

Nonaka & Takeuchi (1995) in their book *The Knowledge Creating Company* investigate knowledge creation within companies through the comparison of Japanese and Western business practices. The building blocks of their model, uses the works of Japanese philosopher, Kitaro Nishida (1958), who proposed the Concept of “Ba”. Roughly translated into English, Ba translates as “Place”. The Ba concept can be thought of as “a shared space for emerging relationships” (Nonaka & Konno 1998, p.40). The space created can be physical (office or workshops), virtual (E-space) and mental (shared ideas and experiences). “Ba focuses attention on promoting interactions that aid the sharing of ideas and feedback” (Jones et al. 2003, p.7).

The concept of Ba can be divided into four areas:

Originating Ba – is the first step in knowledge creation, through face to face experiences, individuals share their own ideas and experiences of others, thus the sharing of tacit knowledge.

Interacting Ba – is the place where tacit knowledge is transformed into explicit knowledge, through dialog and formalisation of information (externalisation).
Cyber Ba – is the place where new explicit knowledge is combined with existing knowledge to create a higher level of knowledge throughout the organisation (combination).

Exercising Ba – is the place where explicit knowledge is transformed into tacit knowledge through the implementation of new ideas, training and experience.

Figure 1: The Ba Model

<table>
<thead>
<tr>
<th>Originating Ba (Tacit to Tacit)</th>
<th>Interacting Ba (Tacit to Explicit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Exercising Ba (Explicit to Tacit)</td>
<td>Cyber Ba (Explicit to Explicit)</td>
</tr>
</tbody>
</table>
2.4.2 The SECI Process

In order for an organisation to increase its knowledge wealth, there has to be a transfer of tacit knowledge into explicit knowledge. “we call the interaction between the two types of knowledge “Knowledge Conversion” (Nonaka, Toyama, & Konno 2000, p.9). There are four modes of knowledge conversion:

- **Socialisation** (tacit to tacit),
- **Externalisation** (tacit to explicit)
- **Combination** (explicit to explicit)
- **Internalisation** (explicit to tacit)

Socialisation - is the process of sharing tacit knowledge through shared experiences. A good example of socialisation is the apprenticeship system, where the apprentice gains tacit knowledge from the hands on experience passed on by the apprentice master.

Externalisation - is the process of transforming tacit knowledge in to explicit knowledge. When tacit knowledge is made explicit, knowledge is crystallised allowing the new knowledge to be shared. A good example is a quality circle, which allows employees to make improvements to the manufacturing process, by articulating and sharing tacit knowledge gained on the shop floor through years of experience. By converting tacit knowledge into explicit knowledge, it allows knowledge to be shared.
Combination - involves the conversion of explicit knowledge into a more complex form of explicit knowledge. The explicit knowledge is combined with explicit knowledge already held within the organisation or available externally to generate a higher level of explicit knowledge.

Internalisation - is the process where the explicit knowledge is transformed back into tacit knowledge within the organisation. This is done through training, work study and experience of new working practices. For example, training programs about a company’s organisation and practices can be portrayed to the workforce through documentation or manuals. By reflecting upon the data and processes, the trainees can internalise the explicit knowledge, turning it into tacit knowledge.

Figure 2: The SECI Model

<table>
<thead>
<tr>
<th>Socialisation (Tacit to Tacit)</th>
<th>Externalisation (Tacit to Explicit)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Internalising (Explicit to Tacit)</td>
<td>Combination (Explicit to Explicit)</td>
</tr>
</tbody>
</table>
2.4.3 The SECI & Ba Relationship

Nonaka & Konno (1998) explored the relationship of combining the SECI and Ba concepts. It can be seen from their work, that each of the four knowledge conversion modes has a corresponding Ba.

The SECI process and the Ba theory combine to create a model for knowledge conversion. The model combines the environment and processes required to enhance knowledge conversion. It portrays a cyclic approach, in which tacit knowledge is shared throughout the organisation and as it moves through the model evolving into knowledge capital becomes part of the company culture embedded into the workforce and working practices, i.e. tacit. The process is on going and if managed correctly will result in the growth of the company’s Knowledge Capital.

Figure 3: The SECI and Ba Model
Nonaka & Takeuchi (1995, p.72) refer to this process as the “Knowledge Spiral”:

As noted before, however, an organisation can not create knowledge by its self. Tacit knowledge of individuals is the basis of organizational knowledge creation. The company has to mobilise tacit knowledge created and accumulated at the individual level. The mobilised tacit knowledge is “organizationally amplified through the four modes of knowledge creation and crystallized at higher ontological levels. We call this the “Knowledge Spiral,” in which the interaction between tacit knowledge and explicit knowledge will become larger in scale as it moves up the ontological levels. Thus, organisational knowledge creation is a spiral process, starting at the individual level and moving up through expanding communities of interaction, that crosses sectional, departmental, divisional and organisational boundaries.

Gourlay’s (2006) critique of Nonaka’s theories argues that “knowledge creation through the interaction of tacit and explicit knowledge through four modes of knowledge conversion is flawed. Three of the modes appear plausible but none are supported by evidence that cannot be explained more simply”. He goes on to say that “the evidence adduced in support of the modes of knowledge conversion is either non-existent, anecdotal, or open to alternative explanation” (Gourlay 2006, p.1415).

Gourlay claims that Nonaka only proposed two modes of knowledge conversion, tacit to explicit and explicit to tacit, socialization and combination being modes of knowledge transfer. The other big question raised by Gourlay, is how much tacit knowledge can actually be transferred into explicit knowledge. Nonaka (1995), along with Boiral (2002) Spencer (1996), Torff (1999), Wagner and Sternberg (1986) believed that tacit knowledge can be converted into explicit knowledge and what ever remains is trivial. Others such as Ambrosini & Bowman (2002) Collins (2001) and Chisholm, Holifield,
& Davis (2005) believe that there is a more complex argument as to how much tacit knowledge held by an individual can be converted into explicit knowledge.

Collins (2001b, p.72) concedes much of the debate to those who believe that tacit knowledge can be turned into explicit knowledge but argues “that ‘forms of life’ by and through which we conduct our social practices cannot be make explicit, and thus remain a underlying tacitly known component”

Gourlay (2006) agrees that there are two distinct kinds of knowledge, a view that is widely accepted, but outlines that different labels are used in different disciplines (Table 2.).

Gourlay (2006, p.1426) defines the two distinct types of knowledge as follows:

*Knowledge-how*” covers knowledge that is situated or context dependent in so far as it does not appear meaningful to consider it as ‘knowledge’ apart from someone who knows the situation in which they act.

As opposed to:

*Knowledge-that category covers knowledge in symbolic forms existing independently of individual knower’s; it could be labelled ‘decontextualised knowledge’ and is all explicit in form.*
Table 2: Knowledge Types and Names

<table>
<thead>
<tr>
<th>Discipline</th>
<th>Knowledge-how</th>
<th>Knowledge-that</th>
</tr>
</thead>
<tbody>
<tr>
<td>Philosophy</td>
<td>Knowledge-how: procedural</td>
<td>Knowledge that; Propositional knowledge</td>
</tr>
<tr>
<td>Philosophy (Polanyi)</td>
<td>Tacit knowing</td>
<td>Explicit knowledge; Explicit knowledge; Declarative knowledge</td>
</tr>
<tr>
<td>Psychology</td>
<td>Implicit knowledge; tacit abilities; skills</td>
<td>Explicit knowledge; Declarative knowledge</td>
</tr>
<tr>
<td>Artificial intelligence</td>
<td>Procedural knowledge</td>
<td>Covert knowledge; Overt knowledge</td>
</tr>
<tr>
<td>Neuroscience</td>
<td>Tacit knowledge</td>
<td>Expertise knowledge; Declarative knowledge</td>
</tr>
<tr>
<td>Management studies; Education</td>
<td>Knowledge as process</td>
<td>Knowledge as object</td>
</tr>
<tr>
<td>IT studies</td>
<td>Know how</td>
<td>Know that</td>
</tr>
<tr>
<td>Knowledge management</td>
<td>Tacit; uncultured (forms of life)</td>
<td>Explicit/symbolic</td>
</tr>
<tr>
<td>Sociology</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Gourlay 2006, p.1426)

Knowledge-how is not simply another name for tacit knowledge, as it also covers that explicit knowledge where context is critical to give it meaning. Gourlay draws on an important distinction made by Dewey (1930) with regards to non-reflectional and reflectional experiences. Dewey proposed to distinguish between “non-reflectional experiences, characteristic of everyday living and reflective experiences, typical of the professional behaviour of philosophers and scientists” (Dewey 1930, cited by; Gourlay 2006, P.1427). Knowledge-how is characteristic of the everyday life world. Knowledge-that, is the knowledge of and about things, and is created by the process of ‘reflection and conscious appreciation’. Gourlay (2006, p.1430) regard the two modes of knowledge as consequences of the two general modes of behaviour:

On the one hand we have the everyday life world (Schutz & Luckmann 1974), the world of non-reflective experience (Dewey 1916), wherein we act in a non-reflectional manner; we simply get on with living, acting both consciously and unconsciously with respect to the objects of our conscious (and unconscious) attention. We typically do not think about how we are acting. On the other hand we have the world of reflective experience (Dewey 1916), phases of activity characterised by the
conscious intent and attempt to analyse and describe some other experience or observed events with a view to communicating something to others and perhaps for controlling those events.

When you look at knowledge creation within these boundaries, Gourlay makes the point that, “Knowledge, on this account, is and can perhaps only be managed indirectly through managing behaviour” (Gourlay 2006, p.1431). The broad implication of Gourlay’s hypothesis is that “know-how” is influenced by all the actions we undertake. Whether know-how can be managed by one’s self or by another person is difficult to determine.

Baumard (1999, p.7) talks of likening an organisation to a ‘black box’, with a constant and diverse input and output of information, were managers select a particular information set on which they base their decisions. “Knowledge is primarily exogenous or developed from a base of exterior elements” (Baumard 1999, p.7). According to Baumard’s (1999, p.66) analysis of the Métis of the Greeks reveals four modes of knowledge:

\[ \text{In the first phase the individual appropriates the rules of wisdom through social practice and so constructs 'flair'. At the same time they develop their technical understanding (techne) by appropriating the rules – there is a lateral transfer of knowledge from the collective to the individual. Once this transfer has taken place, the individual assimilates the various lessons: their flair will improve their technical skills as well as their social practice.} \]

\[ \text{In the second phase the individual will penetrate the rules and acquire the hard knowledge that eludes them and prevents them from achieving their goals. To do this they use 'conjectural and oblique knowledge'. Once the individual has realised the extension of their knowledge, they will be able to use skilfully implement their plans to outwit these very rules, now having at their disposal knowledge that is 'polymorphous and rich'.} \]
Baumard (1999) uses the Greek philosophers to distinguish between four forms of knowledge.

- *Episteme* (abstract, generation)
- *Techne* (capability, capacity to accomplish tasks)
- *Phronesis* (practical and social wisdom)
- *Métis* (conjectural intelligence)

*Episteme* can be defined as universal knowledge, this is knowledge that is commonly shared and circulated, taught and preserved. *Episteme* is knowledge about ‘things’ and can said to be ‘heritage’.

*Techne* can be identified as the technical know-how, being able to get things done.
Phronesis is singular, idiosyncratic and cannot be easily shared. It is personal and only has meaning to the individual who lived the experience. “this non-scientific, practical, contextual knowledge is generated in the intimacy of lived experience” (Baumard 1999, p.53). This knowledge is acquired by trial and error, through organizational and environmental learning and is difficult to analyze or test. Baumard (1999, p.54) goes on to say that “conjectural knowledge is furtive, discretionary and simultaneous, it spurns idealizations and established representations – it provides a contrast to abstract generalisations on every point. Where the one is hierarchical, the other is organic, indivisible, encapsulated in action”.

Métis can be described as the knowledge required to escape ‘puzzling and ambiguous situations’, (Baumard 1999, p.54) a combination of conjectural and tacit knowledge.

Although Métis operates within so vast a domain, although it holds such an important position within the Greek system of values, it is never made manifest for what it is, it is never clearly revealed in a theoretical work that aims to define it. It always appears more or less below the surface, immersed as it were in practical operations which, even when they used it, show no concern to make its nature explicit or to justify its procedures... There is now doubt that Métis is a type of intelligence and of thought, a way of knowing; it implies a complex but very coherent body of mental attitudes and intellectual behaviour which combine flair, wisdom forethought, subtlety of mind, deception, resourcefulness, vigilance, opportunism, various skills and experiences acquired over the years. It is applied to situations that are transient, shifting, disconcerting and ambiguous

(Detienne & Vernant 1978, p.14)

Detienne and Vernant (1978) talk about Métis as a ‘way of knowing’ involving wisdom and flair, referring to it as ‘knowledge of ambiguity’
2.5 Summary

As it can be seen throughout this chapter, the question, ‘What is Knowledge?’ is not an easy one to answer. The debate over knowledge and its definition can be traced back to the ancient Greek philosophers, such as Plato and Aristotle. The same debates are still happening today and an agreement has still not fully been reach between academics and modern day philosophers on the true meaning of knowledge.

On reviewing literature on tacit knowledge, it is generally agreed that tacit knowledge is perceived as a single entity that can be turned into explicit knowledge. Tacit knowledge is seen to be converted into explicit knowledge in its entirety (fig. 5). Little consideration is made to a person’s ability to recall tacit knowledge or to process tacit knowledge into an explicit form that can be understood and beneficial to the organisation.

Figure 5: Tacit to Explicit Knowledge Transfer
Further investigation is needed to establish the elements of tacit knowledge and their suitability to be transferred into explicit knowledge. Tacit knowledge needs to be broken down into elements that can be identified and managed individually to facilitate efficient knowledge transfer into both explicit knowledge into forms such as books and literature and tacit knowledge (fig.6) through person to person transfer. Through identifying the elements of tacit knowledge a model can be developed to represent graphically the complexity and interrelationship of the elements that make up tacit knowledge.

**Figure 6: Tacit to Explicit and Tacit to Tacit Knowledge Transfer**
CHAPTER THREE:

TACIT KNOWLEDGE IN THE WORKPLACE
Chapter 3: Tacit Knowledge in the Workplace

3.0 Introduction

The aim of this chapter is to investigate current methods of knowledge management used within organisations and how tacit knowledge is managed within these models. From some initial research, it was apparent that tacit knowledge transfer is usually included within a more complex model. In many cases, the model does not refer directly to tacit knowledge management. There are many situations were I believe tacit to explicit and explicit to tacit knowledge transfer can be said to have take place, without realisation and understanding of the process. Tacit knowledge management, is a by product of the process.

A fuller understanding of the complexities of tacit knowledge and its components would provide an opportunity to integrate with existing models to facilitate an enhanced learning experience. In this chapter, the author will set out to evaluate current methodologies of tacit knowledge transfer and investigate how they can be enhanced through the understanding and management of tacit knowledge.

3.1 Meeting the Skills Needs of Employers

If the UK is to compete with other Western economies and the emerging economies of the likes of China and India it will have to invest heavily in the up skilling of the workforce. The government commissioned the Leitch Report on Skills, published in December 2006 to consider what the UK’s long term ambition should be for developing skills to combat these ever growing threats:
In the 19th Century, the UK had the natural resources, the labour force and the inspiration to lead the world into the Industrial Revolution. Today, we are witnessing a different type of revolution. For developed countries, who cannot compete on natural resources and low labour costs, success demands a more service-led economy and high value-added industry. In the 21st century, our natural resource is our people – and the potential is both untapped and vast. Skills will unlock that potential. The prize for our country will be enormous – higher productivity, the creation of wealth and social justice. The alternative? Without increased skills, we would condemn ourselves to a lingering decline in competitiveness, diminishing economic growth and a bleaker future for all. The case for action is compelling and urgent. Becoming a world leader in skills will enable the UK to compete with the best in the world.

(Leitch 2006, p.1)

The fundamental findings of the Leitch report point to a direct correlation between skills, productivity and employment. Productivity in the UK is low compared to that of comparable countries (fig.7), “the average French worker produces 20% more per hour than the average UK worker, the average German worker 13% more and the average US worker 18% more” (Leitch 2006, p.7).

For companies to succeed in the face of international competition, it will depend increasingly on the skilled labour force available to them. Higher levels of skills improve leadership, management and drive innovation. Bloom et al (2005) conclude that “differences in management practices between the USA and UK, for example, explain 10 -15 percent of the productivity gap in manufacturing between the two countries”. Higher levels of skills are of paramount importance to the UK being able to compete on the global market; businesses need to be able to draw upon a multi skilled flexible workforce to remain competitive.
The UK government has recognised the importance of the skills and knowledge base of the country to the economy and the future competitiveness of the UK. This can be seen through the commissioning of the Leitch report and the publishing of a government white paper – “Skills: Getting on in Business, Getting on at Work” (D.F.E.E. 2005).

Skills are fundamental to achieving our ambitions, as individuals, for our families and for our community. They help businesses create wealth, and help people realize their potential. So they serve the twin goals of social justice and economic success. Those goals are at the heart of the Governments vision for the future. We seek a fair society which ensures that every individual, irrespective of background, ethnicity, gender, faith, disability or postcode, is helped to realize their own capability for learning, and to raise their quality of life. We also seek a dynamic economy where our nation and regional productivity is enhanced through high-skilled, well rewarded employees working in companies committed to long term investments and leading the world in the business sector. To under pin both goals, we are investing heavily in
school, colleges and universities, so that they can equip young people and adults to succeed.

(D.F.E.E 2005, p.1)

There has also been a significant shift in the way that the government is funding skills development. The previous approach to delivering skills has been ‘supply driven’, based on the Government planning supply to meet employer demand. This method has not been successful due to complexities of employee/employer needs and the effective planning to meet these needs. Also under a planned system, the training providers can be inflexible in their approaches as long as they are meet the requirements of the planning, rather than responding flexibly as demands change. Recent reforms have attempted to develop a ‘demand – led’ system, responding to the demands of the employer and employee rather than trying to plan supply. Training providers only receive funding if they meet the needs of their customers.

The Leitch Review (2006, p.12) concluded that:

This sort of approach must be imbedded across the system so that providers only receive funding as they attract customers, rather than receiving a block grant based upon a supply side demand. Building a demand lead system is the only way in which to increase employer and individual investment in skills and ensure that increased investment delivers economically valuable skills.

By adopting a demand-led approach, the Government is allowing organisations and individuals to dictate their training requirements rather than having to fall into line and except the training that the providers are willing to offer. This opens up the opportunity for more training to take place within the working environment, tailored specifically to the needs of the employer and employee.
Leitch talks about having more than 40% of the adult workforce qualified to level four and above by 2020, this will mean approximately four million more people attaining L4 qualifications over this period. The longer term aim is to increase further to 45%. Traditional on campus university education will not be able to cope with this sort of influx; therefore the workplace is going to have to become an extension of the HE environment. New partnerships and training models will have to be developed to incorporate organisations into the academic fold to accommodate the expansion in the HE sector.

*Our higher education institutions need to develop greater economic and social links ... they can and should be drivers of social and economic change, of regeneration and development ... We need employers to be willing to engage proactively ... To raise the qualifications of their workforce and so set them on the road to enhanced opportunities.*

(Rammell 2006)

### 3.2 Modes of Knowledge Production

Individual research activities in universities can be traced back to the early 19th century and earlier. It is only since the end of the Second World War that research has been taken up by universities and become one of their core values. Through out the 20th century, universities have developed methods that have allowed them to generate new knowledge along with their previous remit of preserving and transmitting knowledge.

*The research structures that have been put in place in universities are supported by a set of research practices which ensures that the results are scientifically sound. These research practices set the terms of what shall count as a contribution to knowledge, who shall be allowed to participate in its production, and how accreditation shall be organized. Together, these practices have generated what we know as the*
disciplinary structure of knowledge. This structure, in turn, has come to play a central role in the management and organisations of universities today.

(Gibbons 1998, p.4)

In the mid nineties, Gibbons et al proposed two modes of knowledge production.

Knowledge can no longer be regarded as discrete and coherent, its production defined by clear rules and governed by settled routines. Instead it has become a mixture of theory and practice, abstraction and aggregation, ideas and data. The boundaries between the intellectual world and its environment have become blurred.

(Gibbons et al. 1994, p.81)

3.2.1 Mode 1 and Mode 2 forms of Knowledge Production

Most universities have a model of knowledge production that has a disciplinary basis. The structure provides guidelines for how research should be carried out, what the important problems are how they should be tackled and who should tackle them. It also outlines what should be regarded as contributions to the research field. The model sets out the rules for accrediting new researchers, and criteria for their advancement within an academic environment. “In brief, the disciplinary structure defines both what shall count as “good science” and prescribes, as well, what students need to know if they intend to become scientists. Let us label this mode of knowledge production as Mode 1” (Gibbons 1998, p.4).

Because the discipline structure has been institutionalised within the universities, universities have become legitimises of this type of knowledge production. It can be seen from the growing movement of new methodologies such as Work Based Learning
and Continuous Professional Development, that a second mode of knowledge production has evolved, Mode 2. Critten (2007, p.50) distinguishes between mode 1 and mode 2 as follows:

What they call Mode 1 knowledge was synonymous with the ‘clear rules’ of the academic community which saw itself the repository of ‘valid knowledge’ which had been rigorously tested accordingly to approved methods of ‘scientific inquiry’. In contrast, Mode 2 knowledge reflects the growth of socially distributed knowledge produced and disseminated in and between organisations and professional communities of practice. Gibbons et al helped us recognize that for knowledge to be ‘legitimate’ it didn’t have to be validated by a university... the University still does have a key role in the ‘validation’ process – but this may not be ‘validation as we traditionally know it

Gibbons (1998) specifies the difference between Mode 1 and Mode 2 in the following way:

- In mode 1, problems are set and solved in a context governed by the (largely academic) interests of a specific community. By contrast, in Mode 2 knowledge is produced in a context of application;
- Mode 1 is disciplinary while mode 2 is transdisciplinary;
- Mode 1 is characterised by relative homogeneity of skills, Mode 2 by their heterogeneity;
- In organizational terms, Mode 1 is hierarchical and, in academic life at least, has tended to preserve its form, while in Mode2 the preference is for a flatter hierarchies using organisational structures which are transient;
- In comparison with Mode1, Mode2 is more socially accountable and reflexive.
- In comparison with model1, Mode 2 involves a much expanded system of quality control. Peer review still exists to be sure, but in Mode 2 it includes a wider, more temporary and heterogeneous set of practitioners, collaborating on a problem defined in a specific and localized context.

(Gibbons 1998 cited; Burns & Costley 2002, p.41)
3.2.2 Knowledge production in Mode 2

Gibbons (1998, p.6) identified five attributes to knowledge production in Mode 2:

- Knowledge produced in the context of application
- Transdisciplinary
- Heterogeneity and organizational diversity
- Enhanced social accountability
- More broadly based system of quality control.

Knowledge produced in the context of application – in Mode 1 problem solving is carried out, following the codes of practice relevant to a particular discipline. In mode 2, problem solving is organised around a particular application or problem. Mode 2, knowledge production is reliant on a broader range of consideration and is intended to be useful to a wider range of society. Knowledge is produced under the aspect of continuous negotiation, and will not take place until all the interested parties are satisfied. “Knowledge production in Mode 2 is the outcome of a process in which supply and demand factors can be said to operate” Gibbons (1998, p.6).

Transdisciplinary - Mode 2 is more than assembling a team of specialists to work on a specific problem or application, consensus need to be reached as to appropriate cognitive and social practice. The consensus is driven by the application, and evolves with it. In mode 2 the final solution will involve the input of a multi-skilled team and will be beyond the capabilities of one said individual. Therefore it will be transdisciplinary.
Heterogeneity and organizational diversity – Mode 2 knowledge production is heterogeneous in relation to the experiences and skills that people bring to it. As a body of work evolves, the skills needed within the team change, resulting in a change in team dynamics and personnel. Mode 2 knowledge production leads to an increase in the number of potential sites where knowledge can be created. Knowledge creation moves out of the academic domain and into mainstream working environments. This results in the linking of the working environments through a variety of ways, electronically, organisationally, socially and informally, creating functioning networks of communication. Organisations have to become more flexible to accommodate Mode 2 knowledge production, this intern has resulted in the emergence of new forms of organisations, equipped to respond to the changing and transitory nature of the problems that Mode 2 can create.

Social accountability and reflexivity – growing public awareness of social issues, such as environment, health, communications, privacy etc, have helped the expansion of Mode 2 knowledge production. The growing awareness in the advances of science and technology and their effects on public life, has increased the number of individuals and groups who wish to influence the research process. Social accountability plays a major role in the research process, affecting all areas from definition of the problem and setting research priorities through to interpretation and dissemination of results.

Quality control – quality control in Mode 1 is primarily carried out through peer review, and the careful selection of the persons to carry out those reviews, based on their previous contribution to their disciplines. Quality and control re-enforce one another.
In Mode 2, other influences have to be taken into account, through the context of application, which includes social, economic and political influences.

Further questions are asked, “Will the solution, if found, be competitive in the market? Will it be cost effective? Will it be socially acceptable”? Gibbons (1998, p.9). The quality control processes of Mode 2 is more varied and broad based, but it does not necessitate that it will be of a lower quality, but more of a composite, multi-dimensional kind.

3.3 Learning in the Workplace

It can be seen earlier in this chapter that there has been a shift from the traditional academic methods (Mode1) of knowledge production into using the work place (Mode 2) as an extension of the academic environment. Recent papers published by the Government such as the Leitch report have recognized the importance of skills in the workplace and are now producing policy to support skills development within organisations. As reported earlier, the universities as they stand can not accommodate on campus the large increases of students that are needed to meet Government policy by 2020. The only conceivable chance of meeting these targets is through using industry and organisations as an extension of the academic process.

There are many models used in industry today such as Problem Based Learning, Work Place Learning and Work Based Learning, which require academic input in an off campus scenario. When considering tacit knowledge to explicit knowledge transfer within organisations, within the context of these models, it is felt by the author that a
Chapter 3: Tacit Knowledge in the Workplace

Work Based Learning Model is an appropriate method to facilitate this knowledge transfer. The relationship between tacit knowledge, explicit knowledge and work based learning can be seen through the works of Raelin (1997) which are discussed later in the chapter.

3.4 Work Based Learning

Boud, Solomon and Symes described work based learning in the following manner:

Work based learning is the term being used to describe a class of university programs that bring together universities and work organisations to create new learning opportunities in workplaces. Such programs meet the needs of learners, contribute to the longer-term development of the organisations and are formally accredited as university courses. There is a wide variation in the mix of elements they include, raging from little more than a lightly tailored version of an existing course, delivered in the workplace with some work related assessment activities to programs which focus more closely on the needs of learning in work. At the more interesting end of the spectrum are those programs which depart substantially from the disciplinary frame work of university study and which develop new pedagogies for learning.

(Boud, Solomon, & Symes 2001, p.4)

Boud et al set out six typical characteristics of work based learning program:

First, a partnership needs to be established between an external organisations and an academic establishment. The partnership is required to establish an infrastructure to support learning. Work based learning partnerships usually consist of a formal arrangement such as a memorandum of understanding in which the responsibilities of partners are identified.
Second, learners involved on the program are employees or are in some contractual arrangement with the external organisations. A learning plan needs to be created for each individual engaged in the program and has to be agreed by all parties evolved to ensure that relevant support and resources are put in place. The negotiation of the learning plan enables each party to communicate clearly its needs and gives overall a better understanding and commitment to the program.

Third, the program is derived from the work place and the need of the learner, rather than from a predetermined academic or professional curriculum. Work is the curriculum, as the needs of the organisations do not commonly map on to the disciplinary and professional structures of universities. In order for knowledge to be generated and influence organisations, it must be in a form that can be utilised by the organisations.

Fourth, once the learner has engaged in a process of recognition of current competences and practices, and fully understands their training needs, can the level of the training program be established? It is based on their current requirements and not on their previous educational qualifications. Each individual will undertake their own education program at different levels, dependant on previous educational experiences, training and aspirations. Recognition of prior learning within work based learning programs is usually stricter than other courses involving prior experiential learning. “This focus on current knowledge is needed if realistic learning plans are to be effectively implemented” Boud, Solomon, & Symes (2001, p.6).
Fifth, the main thrust of work based learning is for the learning program to take place within a working environment. The learning program is designed around the needs of the organisation and the learner. The learning program is designed to extend the knowledge base of both the individual and the organisation; this enables managers to see that it is not a self indulgent activity for the individual but contributes to the organisation as a whole. The program is more likely to be supported when the benefits to the organisation can be clearly defined.

Sixth, the learning outcomes of the negotiated program are assessed by the educational institution, with respect to their current academic standards and framework. In order for formal qualifications to be awarded, the learning needs to be recognised to be of sufficient academic standard by the institution as well as being of benefit to the organisation.

When negotiating a program of work, there are a number of points that can’t be negotiated. In most work based learning programs, there is a framework that holds the program together, such as the Proposal and Portfolio. The Proposal and Portfolio enable the student to prepare documentation of their prior learning and develop a learning plan for the project.

Other modules that need to be completed could include strategies and techniques for learning how to learn, through to modules or units at the end of the project, that draw people together to reflect on the findings and how they meet the learning outcomes.
The non-negotiable features of a program are usually process-orientated which support the learners so they can operate effectively in a work based learning environment.

The Leeds University Work-Based learning project describe the bringing together of three fundamental elements, the individual learner, the working environment and the University. “the individual learner, the work context and the academic resources of the University were to make equivalent contributions and to derive equivalent benefits from the outcomes” (Foster & Saunders 1996). The Leeds Model goes on to describe the qualities of work-based learning as follows:

- Problem based – students address two inter-related problems: the problem of managing their own education and professional development and specific problems related to their work.
- Learner managed – learners take responsibility in defining what is being learnt and what is to be done.
- Team based – collaboration between people with different roles and expertise.
- Concerned with performance enhancement – Improved capability at work an explicit criterion for success.
- Innovation centred – an expectation that the accomplishment of the work-based learner will have some distinct, original or creative features. In some cases new knowledge may be generated.
It can be seen from the publications of Boud et al, Foster & Saunders, etc and widely from the academic community as a whole that an agreement has been reached, that work based learning, is a three way partnership between academia, the student/learner and an external organisation (fig.8).

**Figure 8:** The Work Based Learning Triangle

![The Work Based Learning Triangle](image)

Brodie and Irving (2005) through the Centre for Work Related Studies, University College Chester has developed a pedagogical approach for both supporting and assessing work-based learning. “The WBL model examined is based on the inter-relationship and inter-dependency between understanding learning, critical reflection and the identification and development of capability within the WBL context” (Brodie & Irving 2005, p.50). They come up with the following WBL pedagogical triangle (fig.9).
Work based learning can be broken down into three distinct areas, Learning, Critical Reflection and Capabilities, and these have become the focus of the pedagogical approach to work based learning:

- That the student will know what learning is, (learning implies change) – learning theory.
• How to do it best, (the style, approach, fitness for purpose) – learning theory.

• When they have learnt, (description of and reflection about the learning) – critical reflection.

• What there learning is informed by (its validity; how it stands up to scrutiny against outside evidence) – critical reflection.

• What they need to learn (future learning) – critical reflection.

• What they have learnt, know more about, and become more able at doing. (analysis and evaluation of the learning) – capability.

The inter relationship between these three components need to be addressed for work based learning to be successful. Brodie and Irving go on to argue that assessment needs to be carried out in all three areas and require students to apply principles of learning, to identify where learning has taken place and to demonstrate how it was achieved.

3.5 Tacit to Explicit Knowledge Transfer

Saint-Onge’s (2003) research on knowledge creation centres on the concept of ‘communities of practice’ through productive inquiry- productive inquiry, being the dynamic process that is used within communities to learn. Saint-Onge & Wallace (2003, p.xxiv) raises the question “How do you build a community of practice?” and comes up with the following:

Information is accessed from all available sources. Advice, opinions, and insights are offered by practitioners, who validate the information
and offer an approach that is situated in their experience. An idea is refined and crystallized to address the question, then codified as new knowledge and stored in a repository for access at a later date, possibly to answer another query in the same vain.

Figure 10: Community of Practice Structure

(Saint-Onge & Wallace 2003, p.xxiii)

Saint-Onge analyses ‘communities of practice’ from various perspectives through developing thinking from the conceptual to the tactical to the operational (Fig. 10).

Saint-Onge goes on to say that Communities of practice are very effective at turning information into knowledge, as they deal with information on the basis of experience.

The tacit knowledge of the individuals integrates with explicit knowledge to give a greater understanding and integration of the information:

\textit{The best way that we have found to access tacit knowledge is through productive inquiry, getting to the core of an experience and understanding the many facets and nuances based on a need situated in practice. We’ve seen many organizations embark on projects to try and codify tacit knowledge, an effort that at best fruitless. If you put...}
communities of practice in place, tacit knowledge will begin to surface naturally and be shared with the people who really need it. Next to the medieval guild structures of master and apprentice, a multi-generational community is the best way of getting the richness of tacit knowledge.

(Saint-Onge & Wallace 2003, p.67)

In this knowledge era, organisations intangible assets are widely recognised as key to its ability to create and sustain a competitive advantage. Saint-Onge (2003, p.4) says that “an organisation’s intangible assets, its knowledge capital, are what gives it a competitive edge in the knowledge era”. Yet most organisations focus on managing their tangible assets and neglect their intangible assets.

Organisations need to adopt an approach that makes the most of their knowledge capital. The organisation’s knowledge strategy is paramount to the organisations competitive advantage in the market place. “Lack of finance is no longer the bottleneck to stifle business activities; it is providing the capabilities required to create opportunities where financial capital can be applied with an appropriate return” (Saint-Onge & Wallace 2003, p.4) By capabilities, Saint-Onge meant a collection of cross-functional elements – attributes, skills and knowledge- that come together to create the potential for tacking effective action:

- **Individual capabilities**: the attributes, competences, mindsets, and values of an individual within an organisation.
- **Organisational capabilities**: the strategies, systems, structures, leadership and culture that make up an organisation.
“The organisation that fails to put sufficient capabilities in place in response to marketplace changes stands to lose ground, probably at an alarming rate” (Saint-Onge & Wallace 2003, p.6). The inability to identify and generate the required capabilities will result in a loss of competitive advantage. Stalk, Evans, & Shulman (1993, p.26) define capabilities as “a set of business processes strategically understood”. Saint-Onge (2003, p.5) preferred to discuss capabilities in broader terms, to include the full range of assets available within an organisation – intangible assets that are held individually by the employees and collectively by the organisation. Intangible assets can be described in terms of:

- **Human capital**: the attributes, competences and mindsets of individuals who make up the organisation.
- **Structural capital**: the strategies, structures processes and culture of the organisation.
- **Customer capital**: the sum of all customer relationships, defined as the depth, breath, sustainability and profitability of the organisations relationship with its customers.
Saint-Onge goes on to develop the Knowledge Capital Model (fig. 11). The key assumptions that Saint-Onge (2003, p.10) derived from the Knowledge Capital Model is that:

- **The intangible assets of an organisation are made of capabilities and relationships that are built through the exchange of knowledge.**
- **The intangible asset of an organisation forms a system that must be managed through an integrated approach.**

Value creation occurs as knowledge is exchanged among the three types of knowledge capital. Knowledge exchange serves as the basis for accelerating learning and systematic developing individual and organisational capabilities.
It’s pointless to try and manage customer relationships in isolation from the development of individuals and organisation capabilities. All three forms of capital should be developed in an integrated approach, not in isolation:

*By applying these two assumptions to strategies for increasing capabilities leads to significantly different approaches from those generally in place today as remnants to the industrial era. New strategies for the knowledge era focus on ways to increase an organisation’s knowledge capital*

(Saint-Onge & Wallace 2003, p.13)

Nonaka & Takeuchi (1995) investigate knowledge creation within companies through the comparison of Japanese and Western business practices. The building blocks of their model, uses the works of Japanese Philosopher Kitaro Nishida who proposed the Concept of “Ba”. Roughly translated into English, Ba translates as “Place”. Nonaka goes on to develop the theory that knowledge creation through the interaction of tacit and explicit knowledge takes place through four modes of knowledge conversion, Socialisation, Externalisation, Combination and Internalisation (Section 2.3.1).

Jones et al (2003) through the development of the Developing Innovation in Small Companies (DISC) project suggested that the models of Amabile (1983, 1998) West (1990) and Nonaka & Konno (1998) can be combined (fig 12) and developed a Unified Staged Model of Innovation (fig 13)
Figure 12: Combining of Models

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Recognition</td>
<td>Individual Motivation</td>
<td>Vision</td>
<td>Originating Ba Socialisation</td>
</tr>
<tr>
<td>Initiation</td>
<td>Domain-relevant and Creativity Skills</td>
<td>Participative Safety</td>
<td>Interacting Ba Externalisation</td>
</tr>
<tr>
<td>Implementation</td>
<td>Individual skills</td>
<td>Norms for Innovation and Support</td>
<td>Cyber Ba Combination</td>
</tr>
<tr>
<td>Stabilisation</td>
<td>Learning Skills</td>
<td>Climate for Excellence</td>
<td>Exercising Ba Internalisation</td>
</tr>
</tbody>
</table>

Table 1: Key issues at each stage of the innovation process

(Jones et al. 2003, p.9)

This model recognizes the individual, the organisation and the learning or knowledge transfer and outlines the social issues underpinning each stage.
From this combining of the models, Jones et al (2003) developed a tool kit comprising of an innovation checklist plus four tools A, B, C and D.

The checklist is used to assess the organisation in relation to seven key factors underpinning the four stages of the model. The seven factors are: Organisational Climate; Individual Motivation; Team Working; Individual Idea Generation; Action Planning and Resources; Feedback Systems; Evaluating Innovation. The scores from the checklist direct users to the appropriate toolkit.
• Toolkit A – Promoting recognition is composed of three tools designed to aid organisations develop the key factors in initial stages of innovation, namely motivational and organizational culture issues: Dealing with change; Your Working Environment; Identifying Barriers to Change.

• Toolkit B – Promoting Innovation – is composed of three tools designed to help to develop the key skills required in initiation, involving the generation of ideas and promotion of Team Working Skills, i.e.: Working Styles; Creative Thinking; Thinking Styles & Problem Solving.

• Toolkit C – Promoting Implementation – is composed of three tools designed to be used together and developed holistically to develop factors relevant to implementing innovation, namely Action Planning; Employee Development Contracts and Giving and Receiving Feedback.

• Toolkit D – Promoting Stabilisation – presents and evaluation tool which relies heavily on the training literature of Patrick (1992).

3.6 Integrating Tacit Knowledge Management with Work Based Learning.

When you start to compare the Tacit knowledge transfer models of Nonaka & Takeuchi (1995), Saint-Onge & Wallace (2003) or the innovation model developed by Jones et al
(2003b) with work based learning methodologies of Boud, Solomon, & Symes (2001), Brodie & Irving (2005) and Foster & Saunders (1996), it becomes apparent that there is a crossover in their methodologies. One of the three fundamental aspects of work based learning according to Brodie & Irving (2005) and the WBL Pedagogical Triangle is Critical Reflection. “Students reflecting critically on their learning: applying models, establishing validity, applicability, appropriateness”. Nonaka, Toyama, & Konno (2000) along with Jones et al (2003a) talk about the Seci, Ba concept being a reflective process and facilitating knowledge transfer.

Raelin (1997) developed a comprehensive model of work based learning that combines explicit and tacit forms of knowing and theory and practice modes of learning at both individual and collective levels. The model is designed to bring together the epistemic contributions of work based learning and tacit to explicit knowledge transfer, which are typically studied in isolation.

In developing such a model, we need to incorporate two dimensions fundamental to the process of work based learning: theory and practice modes of learning and explicit and tacit forms of knowledge. Since theory can be viewed as a frame in which to challenge the assumption of practice, it makes most sense as a mode of learning when combined with learning.

Raelin (1997, p.564)

Raelin initiates the development of the model at the individual level by displaying four learning types, resulting from the matrix of the two learning modes and knowledge forms (fig 14).
• Conceptualization – this provides practitioners with a means to challenge the assumptions underlying their practices.

• Experimentation – practitioners engage their conceptual knowledge in such a way that it becomes contextualised or grounded.

• Experience – is required to enforce the tacit knowledge acquired in experimentation.

• Reflection – is required to bring the inherent tacit knowledge to the surface, thus contributing to the reconstruction of the meaning.

**Figure 14: A Model of Worked Based Learning at the Individual Level**

![Diagram of explicit and tacit knowledge in theory and practice](image)

Raelin (1997, p.565)

Having explored work based learning at the individual level, Raelin turned to the process of learning within the workplace and in the company of others. Again four
different types of learning are displayed at the collective level, resulting from the same matrix of learning modes and knowledge forms (fig. 15).

- Applied Science – scientists seek to describe and explain social reality through the manipulation of theoretical propositions using the rules of hypothetical-deductive logic.
- Action Learning – where real time experiences, especially problems occurring within one’s own setting, constitutes the primary subject matter.
- Community of Practice – returns knowledge back into its context such that groups learn to observe and experiment with their own collective tacit processes in action.
- Action Science – is called upon to bring the individuals and the group’s mental models, often untested and unexamined, into consciousness.

Figure 15: Model of Work-Based Learning at the Collective Level.

Raelin (1997, p.568)
Raelin (1997, p.572) goes on to say:

This approach recognizes that practitioners in order to be proficient need to bridge the gap between explicit and tacit knowledge and between theory and practice. Work based learning subscribes to a form of knowing that is context dependent.

Raelin combines the prior two models into a comprehensive model of work based learning (fig. 16). The comprehensive model occupies a three dimensional space showing the transitional movement across all three dimensions. “Whether learning by oneself or collectively with others, each of the eight types of learning needs to be bought into consideration if learners are to achieve proficiency and criticalness of their learning” Raelin (1997, p.573).

Figure 16:  A Comprehensive Model of Work-Based Learning
It can be seen from the work of Raelin, that tacit to explicit knowledge transfer has a potential role to play within the work based learning environment which is generally not being exploited with in this field. Tacit to explicit and explicit to tacit knowledge transfer is a by product of the work based learning process. Work based learning can not take place without this transfer or knowledge generation taking place.

Work based learning methodologies recognise that tacit knowledge exists and that it can be turned into explicit knowledge, but the implications of trying to manage this knowledge flow within a work based learning environment is generally over looked. By integrating tacit to explicit knowledge transfer methodology in to work based learning methodology as recognised by Raelin (1997) and Chisholm et al (2006), it is perceived that a better understanding of the knowledge transfer process and the implications of tacit knowledge transfer will take place.

Chisholm et al (2006) developed a toolkit, looking to help industry recognise the value of knowledge management through CPD and Work Based Learning. The tool kit comprises of the following eight tools:

- Learning Needs Analysis Tool
- Development of Reflective Practice Tool
- The Learning Set and Working Styles Tool
- Barriers to Learning Development Tool
- Tacit Knowledge Tool
- Action Development Tool
- Learning Development Agreement Tool
- Learning Development Agreements
The toolkit has been designed to support work based continuous professional development within an organisation, through the delivery of real work based projects, which can be project development, a problem solving study or a change situation leading to targeted outcomes for the organisation and professional development for the employees.

(Clarke, Holifield, & Chisholm 2004)

The tool kit was developed through a collaboration project between The University of Wales institute Cardiff and Caledonian University Glasgow, as part of The Leonardo Da Vinci Community Vocational Training Action Program funded by the EU. The outcomes of the research resulted in the publication, Continuous Professional Development (CPD) by Work Based Learning (WBL) Toolkit (2006), C.U. Chisholm, D.M. Holifield, T. Clarke & M.S.G. Blair.

3.6.1 CPD/WBL Toolkit

The toolkit contains a set of learning tools to support work based continuous professional development of an individual within an organisation. The toolkit has been developed to aid learning through the delivery of a real work based project which can be a project development, a problem solving study or similar, leading to targeted outcomes for the organisation and professional development for the employees. The first tool is designed to evaluate the current position of the organisation in terms of a learning organisation and to indicate which of the tools within the toolkit need to be incorporated into the programme. The tool kit comprises the following tools:
3.6.1.1 Learning Needs Analysis Tool

The learning needs analysis is the mainstay of the toolkit; it gives an overview of the organisation and the individual. The learning needs analysis consists of an eighty question, questionnaire divided into eight sections:

- Team Skills / Team Working in a Learning Set
- Reflective practice attributes
- Understanding and developing tacit knowledge
- Operating as a learning organisation
- Understanding the value of work based learning
- Understanding the value of CPD
- Action development planning
- Developing knowledge based skills.

When analysing the outcomes of the Learning Needs Analysis, a high score will indicate very little knowledge of the subject area, a medium score will indicate some knowledge in the area which will need clarification and reinforcing. A low score will indicate a good knowledge and understanding of the subject area. The scores obtained for each section will influence which of the toolkits will be of most benefit to the organisation or the individual.
3.6.1.2 Development of Reflective Practice Tool

The Reflective Practice tool deals with change in the workplace and is particularly suited to individuals involved in driving change or involved in changes to the workplace. It is aimed at helping individuals develop continuous learning techniques as part of their own development and as a contribution to change in the organisation, through learning processes which are problem oriented and work based. The main focus of the tool is developing the individuals understanding of how the reflective cycle and reflective practice can contribute to effective problem solving. The tool kit has been designed for the individual to assess their own perspective of the value of reflective learning by asking the following questions:

- Do you agree with or understand the need for reflective practice to underpin problem solving, development and change in your organisation?
- Have you or are you considering how using reflective practices will affect your learning development?
- Are you trying to define a clear learning path using reflection to help you deal with problem solving, development and/or change?
- Are you actively taking forward your learning-path to deal with your CPD through the work based problem solving, development and change situations in the organisation?
- Are you able to deliver your learning path according to the target dates agreed as part of it?
In keeping your learning path to target have you actively set out to
overcome any barriers to progress in the workplace environment?

Each statement needs to be considered carefully and if the answer is yes, then the
individual needs to move on to the next statement. If the answer is no to a statement,
this is the stage at which to begin the active learning path process. An answer of no to
statement 1 indicates a significant lack of awareness of the reflective cycle and its value
in driving learning.

Statement 2 indicates the need to consider how reflective practice can contribute to
more effective work based CPD. Statement 3 indicates the need for decisions on the use
of reflection to support CPD through problem solving, development and change in the
workplace. Statement 4 indicates the need to activate and actively pursue the desired
reflective development through using the work based environment in terms of problem
solving, development or a change situation to facilitate the learning development.
Statement 5 indicates a need for critical awareness of why the individual has not kept to
the deadlines agreed for the learning path. Statement 6 suggests a need for a critical
review of the learning path as the reflective learning is primarily aimed at using this
learning to overcome problems, which occur within the work-based learning approach.

3.6.1.3 The Learning Set and Working Styles Tool

This tool examines how types of working style could affect the team coherency in terms
of learning development. A coherent team where individual members have implicit trust
in each other and the organisation is an essential basis for successful professional
development. Each member who joins the set will have their own style of working
which will have a key effect on how the Learning Set functions. The aim of this tool is
to facilitate trust among the team members by understanding the different working
styles within the team, thus minimising conflict and barriers to effective professional
development.

This tool is designed to:

- Establish for each individual an awareness of their own style of working
  and that of the others in the learning set.
- Establish for the set where potential problems could arise from style
difference and how it could affect the work based learning development.
- Facilitate the set members in to taking up a role within the set, which
devlops their strengths and those of the group as a whole.

3.6.1.4 Barriers to Learning Development Tool

As the Work Based Learning CPD develops within the organisation, both the learning
set as a team and individual members will come against what are perceived to be
barriers to the overall learning development. The tool is designed to help differentiate
between real barriers and false barriers that can be removed and thus take forward the
learning development project. The tool is designed to help identify all the potential
barriers to taking the learning development project forward. It is essential to identify which potential barriers are actually real and which ones are in the mind. The reflective pathway tool can be used to analyse and work through the potential barriers identified. Imaginary barriers can be eliminated but real barriers need to be considered using an in depth reflective approach with a view to finding a way forward.

3.6.1.5 Tacit Knowledge Tool

The development and understanding of the value of tacit knowledge is essential to all individuals, who are involved in driving development, change or problem solving within the workplace. The tool will enable members of the learning set to understand the value of tacit knowledge and the value of bringing together tacit knowledge with explicit knowledge. The basis of the tool is to identify tacit knowledge within a learning set relevant to a chosen project, extracting the tacit knowledge and recording it as explicit. This is achieved through learning dialogs to identify possible tacit knowledge, an evaluation of current information and understanding of the subject matter and a reflective approach to the integration and recording of the information.

3.6.1.6 Action Development Tool

In order to facilitate the interrelationships between tacit knowledge and explicit knowledge, the learning programme needs a very clear and well thought out plan of activities. The action development tool is designed to develop a clear activity plan for
the learning set and for each individual member of that set. This tool underpins the setting-up of effective learning agreements. The first stage that needs to be considered, relates to defining and setting of goals for the agreement. The goals should be:

- Highly specific, avoiding any temptation to be vague.
- Precise definition of goals to be outlined.
- Time limits need to be set for all activities.
- All goals need to be achievable and challenging.

While the goals set should be challenging, a careful balance must be maintained so that the goals are achievable. If goals are set which are unattainable then motivation will drop rapidly and little or no learning development will take place. The negotiation of goals needs to be based on a partnership discussion with management to ensure buy in by all parties.

### 3.6.1.7 Learning Development Agreement Tool

This tool provides a set of specified agreements which can be used by individuals to achieve professional development in areas that they are shown to be weak in. While the professional development goal is specified in each case, it is for the individual and management to decide how the outcomes can be best achieved in the work based environment. The agreements can be used either with or without formal assessment and this decision should be made by management and the staff undergoing the professional development. The Learning Development Agreement should be set up as a formal
written agreement between the individual employee involved in the CPD, the company management team and the University. By taking the development forward in this manner it becomes a partnership between the parties involved. The aims of achieving CPD through the Learning Agreements Tool, is based on the following:

- The individual will be directly involved in the planning and development of the learning development activities and as such will feel that they are taking direct responsibility for their own learning.
- This means the CPD experience should be more meaningful, relevant and of direct interest to them for career planning.
- The individual will bring all their experience, including mistakes, into operation as an essential component of the basis for the activities.
- The individual will be achieving learning which will have immediate relevance to their job and this should act as a high motivation to deliver.
- The emphasis on learning is problem based rather than discipline oriented.

3.7 The Development of a Model to Investigate Tacit to Explicit Knowledge Transfer

When evaluating the toolkit developed by Chisholm et al (2006), it can be seen that the toolkit is complex and covers a range of activities. When the initial trials for the toolkit were carried out the emphasis of the case studies was to investigate CPD for individuals
using work based learning techniques within the workplace. The main findings of the case studies were that using work based learning for CPD within the workplace was an effective method of knowledge transfer. It was also acknowledged that tacit to explicit knowledge transfer had taken place and that CPD and work based learning were a methodology for supporting this type of knowledge transfer, but little analysis or emphasis was placed on the efficiency or implication of this knowledge transfer.

When investigating methodologies for evaluating tacit to explicit knowledge transfer, the toolkit of Chisholm et al (2006) forwarded the opportunity to focus in on the transfer of tacit knowledge within the workplace through the use of work based learning techniques, development of the workforce through CPD in the workplace, targeted to the individuals needs and to monitor tacit to explicit knowledge transfer. When investigating tacit to explicit knowledge transfer, the range of activities of the toolkit surpass the requirements needed for the cases studies. The following tools within the toolkit were identified to build a model to investigate tacit to explicit knowledge transfer. On developing the model for the case studies, a number of tools from the Chisholm et al (2006) toolkit were selected as a building block (appendix 1.), for the carrying out of industry based case studies.

- Learning Need Analysis Tool
- Development of Reflective Practice Tool
- Tacit Knowledge Tool
- Learning Development Agreement Tool
3.7.1 Learning Needs Analysis Tool

The learning needs analysis tool, gives an overview of the organisation and how it performs as a learning organisation. It also reflects the individuals understanding of tacit knowledge, the value of CPD/ WBL and their understanding of a learning organisation. The information gathered from the questionnaire, although over and above the requirements for the case studies will help build a detailed understanding of how the organisation is structured and operated. The relevant information to the chosen tools can be analysed in detail and applied. Evaluation of the questionnaire with industry partners resulted in the re-wording of some of the questions to simplify the language as it was felt by the industrial partners that the academic level of the questions had been set to high for some of the workforce. The questions were rewritten, maintaining the integrity of the question. It was also decided, after discussing the questionnaire with the industrial partners that a list of the keywords and their definition be added to the questionnaire to aid clarification.

3.7.2 Development of Reflective Practice

The reflective practice tool is aimed at developing individuals understanding of the reflective cycle and how reflection can contribute to effective problem solving and tacit to explicit knowledge transfer. The reflective practice process aids the individual in identifying tacit knowledge associated within a working practice or application and brings it forward to the learning set to be integrated into the current explicit knowledge
In order to assess whether tacit to explicit knowledge transfer has taken place, reflective practice of the process will have to be carried out by the individuals involved. Also reflective practise is an important element of the WBL process.

3.7.3 Tacit Knowledge Tool

In order for tacit to explicit knowledge transfer to take place, it is essential for individuals to understand the value of tacit knowledge. The tacit knowledge tool helps individuals understand the value of tacit knowledge for a given work based project and the value of tacit knowledge to the organisation. Individuals will learn through learning dialogs to recognise tacit knowledge for a given application and the advantages of integrating tacit knowledge into explicit knowledge through a reflective approach of identifying, integrating and recording data. The information gathered from this process will confirm if tacit to explicit knowledge transfer has taken place.

3.7.4 Learning Development Agreement Tool

In order to create the right environment for the case studies, learning agreements are seen as the way to create a partnership between the management and the individuals taking part in the project. Learning development agreements can be used to identify CPD requirements for the individual, required outputs for the company and a structure to best achieve the outcomes of the project. The learning agreements are to be set up as
a formal written agreement between the individuals, the organisation and the university research team. Formal assessment by the university will not take place, but the individuals will be given a certificate of achievement and recognition of CPD by the organisations involved.

3.8 Summary

The UK Government commissioned the Leitch report on Skills, in December 2006 to consider what the UK’s long term ambition should be for developing skills to combat the growing threat of the emerging economies of the world:

*In the 19th Century, the UK had the natural resources, the labour force and the inspiration to lead the world into the Industrial Revolution.... In the 21st century, our natural resource is our people – and the potential is both untapped and vast. Skills will unlock that potential... Becoming a world leader in skills will enable the UK to compete with the best in the world.*

(Leitch 2006, p.1)

The Fundamental findings of the Leitch report point to a direct correlation between skills, productivity and employment. In order for the UK to compete on the international stage Leitch talks about having 40% of the adult workforce qualified to L4 and above. Universities will not have the capacity to absorb this sort of expansion; therefore the education sector will have to expand into the workplace, and the workplace will become an extension of the HE environment. New partnerships and training models will need to be developed to deal with this paradigm shift of bringing organisations into the academic fold to accommodate the expansion in the HE sector.
In order for academic institutions to stand a chance of reaching the Government targets set out in the Leitch Report, there needs to be a substantial shift from the traditional academic methods (Mode 1) of knowledge production into using the workplace (Mode 2) as an extension of the academic environment. Work based learning is a recognised and a tested method of off campus learning:

_Work based learning is the term being used to describe a class of university programs that bring together universities and work organisations to create new learning opportunities in workplaces. Such programs meet the needs of learners, contribute to the longer-term development of the organisations and are formally accredited as university courses._

(Boud, Solomon, & Symes 2001, p.4)

Tacit knowledge alongside explicit knowledge plays a key role in an organisation’s skills capital. When you start to investigate the tacit knowledge transfer models of Nonaka & Takeuchi (1995), or Saint-Onge & Wallace (2003) with work based learning methodologies such as those of Boud, Solomon, & Symes (2001), or Brodie & Irving (2005) it becomes apparent that there is a crossover in their methodologies. This interaction can be seen closer in the works of Raelin (1997) and Chisholm et al (2006). By integrating tacit knowledge theory into work based learning theory, there is the opportunity, to further understand the knowledge creation process within a Mode 2 environment and enhance the learning process for the Learner, Organisation and Academic Partner.

The toolkit developed by Chisholm et al (2006) has been selected as a methodology to investigate tacit to explicit knowledge transfer. By selecting appropriate tools from the toolkit, a series of interventions have been identified that can be used in case studies to
investigate the extent to which tacit knowledge can be transferred into explicit knowledge and to evaluate the effectiveness of the process. By using work based learning techniques coupled with CPD methodology, tacit knowledge can be identified and the effectiveness of its transfer closely monitored.
CHAPTER FOUR:

INVESTIGATING TACIT TO EXPLICIT KNOWLEDGE TRANSFER
4.0 Introduction

The aim of this chapter is to test a series of interventions designed to promote understanding of knowledge management and the conversion of tacit knowledge into explicit knowledge and to investigate the extent to which tacit knowledge can be transferred into explicit knowledge.

The interventions developed from the Chisholm et-al (2006) toolkit in chapter 3, are used in case studies carried out within two Small to Medium Enterprises (SME’s) located along the South Wales M4 corridor in the UK. The case studies are designed to concentrate on the strengths and weakness of transferring tacit knowledge into explicit knowledge and the implications of this knowledge transfer for the individuals and organisations involved and to investigate the extent to which tacit knowledge can be converted into explicit knowledge.

The two company’s taking part in the case studies, wished to remain anonymous throughout the process, and will be referred to as Company A and Company B within the case studies to maintain their privacy.

4.1 Methodology

The case studies were set up with two SME’s within the South Wales region. Both companies were established manufacturing units and the case studies involved
Chapter 4: Investigating Tacit to Explicit Knowledge Transfer

engineering personnel and engineering applications. The two companies that were chosen to carry out the case studies were selected on the basis that they were both manufacturing facilities of similar size (SME’s) and the cases studies were to be carried out in the Production and Maintenance Departments. Both companies had senior managers who had completed Engineering Degree’s within UWIC and would be running the project internally. The methodology for carrying out the case studies could therefore be the same for both case studies, supporting the accuracy of the results.

The aims of the case studies are to investigate the strengths and weaknesses of transferring tacit knowledge into explicit knowledge, and to investigate the extent to which tacit knowledge can be converted into explicit knowledge. The objectives are to use WBL and CPD techniques in the management of knowledge capital for an organisation and to investigate the extent that tacit knowledge can be converted into explicit knowledge.

Qualitative techniques will be use to monitor and assess the effectiveness of tacit to explicit knowledge transfer, of the case studies, through in depth interviews, observation studies of the learning sets and the use of focus groups. The criteria of the case studies, involves the setting up of learning sets. It is the intention to use the learning sets as focus groups and also in an observational context. The management running the cases studies will be used for in depth interviews and will monitor the effectiveness of the cases studies through observation of change in working practices. Individuals within the learning sets will be interviewed for feedback and to develop an understanding of the effectiveness of the case studies.
4.1.1 Ethical Considerations of the Cases Studies

The research within this thesis is carried out within the UWIC Ethics Framework (2009)

*This framework articulates the general principles that will guide Staff, Students and Governors in their day-to-day activities in upholding UWIC’s Values. The principles are developed from UWIC’s values into more specific practices relevant to particular areas of activity (e.g. research and enterprise).*

UWIC (2009)

In order to comply with the ethics framework, an application was made to the UWIC Research Ethics Committee (UREC) and approval obtained to carry out the research.

Initial consultations with the companies were carried out and the ethical framework established. Company B had concerns about competitors acquiring information with regard to the production procedures and protocols and loss of intellectual property. From the onset of the research, it was decided that both companies would remain anonymous in the publication and dissemination of the results of the research. In order to achieve this, the two companies would be referred to as Company A and Company B within the research. All data collected was to be collected blind as in no company headed paper was to be used for feedback or reports, the same generic questionnaires were to be used for both companies, labelled company A and company B and no personal data was to be collected (such as names, titles etc) that could possible be traced back to the companies.
4.1.2 Definition of the Project Framework

Initial consultations were carried out with the companies outlining the research and the objectives that need to be meet by the research and the expected outcomes and benefits to the company. Meetings were held with Senior Managers of the company and the research team (T. Clarke author and D.M Holifield supervisor). Presentations were given to senior managers outlining the research proposal, indicating expected commitment from the company, the time frame of the project and dissemination of the results. Once agreements had been reached with senior managers, a second set of presentations were carried out to the engineers and technicians who were going to be involved in the project. These presentations included:

- The research and its aims and objectives.
- How the research was to be carried out.
- An understanding of tacit and explicit knowledge.
- The implications of tacit to explicit knowledge transfer.
- Their role in the research.
- The timeframe of the project.
- Establishment of ethics frame work.

The focus of the meetings was to encourage the engineers and technicians to buy into the project and outline the benefits to both the individuals and the organisation.
4.1.3 Learning Needs Analysis

A learning needs analysis was carried out for the organisation. A questionnaire was circulated within the company primarily aimed at the departments involved with the research, but also to a cross section of the company to establish an overview of the company’s position as a learning organisation and its understanding of tacit and explicit knowledge.

From the evaluation of the results of the learning needs analysis, outlined later in this chapter, an assessment of the company could be made and recommendations of how to move the company forward as a learning organisation formulated.

4.1.4 The Setting up of the Research Programme

Meetings were held with the relevant personnel within the companies, to outline the research proposal specific to their department. During these meetings, the objectives of the research were outlined, the perceived gains to be made for the individuals and their CPD profiles and the perceived gains to the company through the management of knowledge capital.

4.1.5 Running and Monitoring of the Project

In order to ensure that all individuals and groups worked towards delivering the outcomes of the research programme, the researcher team, monitored the running of the
project in conjunction with the company. Weekly meeting were held by the company and feedback was re-laid to the researcher. Regular meetings were also attended by the research team to monitor and ensure that procedures were carried out within the research plan.

4.1.6 The Debrief of the Project

Qualitative data was collected through out the case studies, to establish the effectiveness of tacit to explicit knowledge transfer. Interviews were carried out with the personnel involved in the case studies to gain an understanding of how the research has impacted on there working practices and personal development of their skills base. Observations were taken and feedback received from the working sets. The working sets were used as focus groups to establish effectiveness of the research to knowledge transfer and changes in working practices. Interviews were carried out with the managers running the project with in the companies, throughout the research to gain feedback on the effectiveness of the research and to ensure parity for both case studies.

Throughout the cases studies and after the case studies had been completed, focus group meetings were held at the company, with management and the personnel involved with the research, to establish the effectiveness of the research and to reflect and identify the benefits gained by the company and the individuals. The final analysis of the project determined the contribution to the project of tacit to explicit knowledge transfer, the effectiveness and usability of the research and the progressing of the company in terms of knowledge management.
4.2 Company A

Company A is a SME, based in the South Wales region, the main focus of the company is the manufacture of food products. The role of the engineering department is to support the manufacturing process, through maintaining production equipment, developing new production methods and designing and upgrading the manufacturing process.

What are the company problems? The engineering department is divided across the manufacturing facility. Each department is responsible for a dedicated area of the manufacturing process. Each of the departments has developed their own set of working procedures and protocols in the pursuit of maintaining production. Very few of the procedures are held in an explicit form and are not standardised across the departments.

The objective of the project for the company, is to, identify the procedures and protocols which are in a tacit form (personal to individuals) and convert them in to explicit knowledge to help standardise working practices across the company. As part of the research, the company would like to identify the CPD requirements of the engineers and technicians, for the up-skilling of the workforce, as the technology advances made within the manufacturing processes have taken a major step forwards and there is a knowledge gap widening among the engineers and technicians. From the primary discussions with the company, it was decided that the case study would be implemented in a number of stages:
• Presentation of the research project and its aim and objectives to senior managers.

• Initial feedback from senior managers.

• Presentation of the project and the case study to engineers and technicians.

• Completion of Learning Needs Analysis.

• Setting up of learning sets.

• Monitoring and running of the programme.

• Assessment of deliverable outcomes.

4.2.1 Presentations to Chief Executive and Senior Managers

A presentation was made to the Senior Managers of the company. The presentation was broken down into two parts:

• Overview of the research project - The general overview of the research project was given, the aims and objectives of the research and ideas behind the carrying out of the research.

• Specific tasks of case studies - The second part to the presentation involved the detailed explanation of the case studies and the expected benefits to the company which are:

  a. Standardisation of working practices held in an explicit form.

  b. Up-skilling of the workforce through CPD.
Also the characteristics of the new methodology and the implications of tacit to explicit knowledge transfer were explained. A frame work for the case studies was discussed, including:

- Expected commitments from the company.
- Number of personnel included.
- Processes for the company that needed reviewing or improving.
- Time frames for the project.
- Expected outcomes for the company.
- Expected outcomes of the research.

4.2.2 Feedback from the Senior Managers

The following feedback was received from the meeting with the Senior Managers:

- Company A would be happy to participate in the project, providing that the company remains anonymous when disseminating the findings of the research.
- Staff members would be accredited by the company for their CPD learning.
- Further detailed discussions would be needed with the engineering manager of the company before the project commences.
4.2.3 Implementation of the Project.

A further series of meetings was undertaken with engineering manager on how the project was to be run and the implementation of the project. During these meetings a project framework was developed as follows:

- Presentation of the research project and the case study to engineers and technicians involved in the project.
- Completion of learning needs analysis questionnaire.
- Setting up of learning sets.
- Monitoring of the work programme.
- Assessment of deliverable outcomes

A presentation similar to the presentation given to the senior managers was organised and given to the engineers and technicians.

4.2.4 Learning Needs Analysis

A Learning Needs Analysis was carried out within the company, through the use of a questionnaire. The questionnaire was completed by relevant engineers, technicians and craftsmen. Further questionnaires were distributed throughout the company to get an overview of the company as a whole. The brief outcome from the analysis was that
Company A had a limited understanding of tacit and explicit knowledge and there is certainly room for improvement in their position as a learning company.

### 4.2.5 Setting up of Learning Sets

It was agreed that the engineering manager would establish the learning sets. The role of the learning set is to investigate areas where explicit knowledge is not available for a process or procedure and identify the tacit knowledge that needs to be turned into explicit knowledge. Prior to the establishment of the learning sets, an analysis of skills requirements was carried out and protocols that could be standardised across the plant identified. This helped categorise the areas of knowledge required and the skills base of the engineers and technicians working with in each department.

Learning contracts were written for each individual taking part in the case study, as the company wanted to accredit the employee’s for the CPD learning. The following reflective practice process was setup as a framework for the learning set:

- Select various work related topic areas for each members of the team
- Each member will keep a reflective journal on the work related areas
- Critically reflect, in the learning set, each of the learning journals.
- Make recommendations for change, if appropriate, from the reflection of the learning journals.
The reflective process will be used to help identify the skills and knowledge gaps of the company and the future CPD requirements of the employees.

4.2.6 Assessment of Deliverable Outcomes

The assessment of deliverable outcomes was carried out using qualitative techniques through in depth interviews, observations and focus groups. Meetings were held with the engineering manager and the personnel involved with the project, group meetings were observed and individuals assessed to establish the effectiveness of the research and the benefits gained by the individuals and the company. An analysis was made of the results and feedback was received on the effectiveness of the project for both the company and the individuals that took part.

4.3 Case Study Results for Company A

A learning needs analysis was carried out for the company to establish an overall understanding of the company as a learning organisation and its understanding of tacit and explicit knowledge. A copy of the questionnaire can be seen in appendix 2. In order to comply with ethical considerations, no names were put on the questionnaires. The questionnaire consists of 88 statements which are divided into 8 specific areas. Each statement is rated from 1 to 5, 1 indicates that you absolutely agree with the statement, to a score of 5 which indicates that you totally disagree with the statement. The
individual responses were added together to give an overview of the company as a whole. As part of the evaluation of the questionnaire the score rating was changed from 1-10 to 1-5 as it was felt by the company that it simplified the process. The results of the question have to be doubled for final analysis to account for this change. The results for the learning needs analysis are as follows.

4.3.1 Learning Needs Analysis Results for Company A

Table 3: Staff profile

<table>
<thead>
<tr>
<th>Position</th>
<th>Manager</th>
<th>Engineer</th>
<th>Technician</th>
<th>Admin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td>under 20</td>
<td>2</td>
<td>5</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>20 - 30</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>30 - 40</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>40 - 50</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>50 - 60</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>60+</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sex</td>
<td>Male</td>
<td>17</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Female</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Questionnaires Completed</td>
<td>Total</td>
<td>18</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4: Team Skills and Team Working in a Learning Set

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>23</td>
<td>41</td>
</tr>
<tr>
<td>24</td>
<td>60</td>
</tr>
<tr>
<td>27</td>
<td>72</td>
</tr>
<tr>
<td>29</td>
<td>42</td>
</tr>
<tr>
<td>30</td>
<td>30</td>
</tr>
<tr>
<td>32</td>
<td>30</td>
</tr>
<tr>
<td>61</td>
<td>59</td>
</tr>
<tr>
<td>64</td>
<td>34</td>
</tr>
<tr>
<td>72</td>
<td>38</td>
</tr>
<tr>
<td>73</td>
<td>37</td>
</tr>
<tr>
<td>76</td>
<td>69</td>
</tr>
<tr>
<td>78</td>
<td>58</td>
</tr>
<tr>
<td>81</td>
<td>40</td>
</tr>
<tr>
<td>86</td>
<td>54</td>
</tr>
<tr>
<td>87</td>
<td>70</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>770</strong></td>
</tr>
</tbody>
</table>

Divide by 18

No. of returns

Multiply by 2

For scoring **86**

The Team Skills and Team Working in a Learning Set scored 86/160. This score is in the medium range and indicates a degree of uncertainty of team skills and the advantages of what the team working environment can offer.
Table 5: Reflective Practice Attributes

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>59</td>
</tr>
<tr>
<td>8</td>
<td>57</td>
</tr>
<tr>
<td>22</td>
<td>63</td>
</tr>
<tr>
<td>23</td>
<td>41</td>
</tr>
<tr>
<td>24</td>
<td>60</td>
</tr>
<tr>
<td>44</td>
<td>54</td>
</tr>
<tr>
<td>45</td>
<td>63</td>
</tr>
<tr>
<td>46</td>
<td>39</td>
</tr>
<tr>
<td>47</td>
<td>65</td>
</tr>
<tr>
<td>48</td>
<td>34</td>
</tr>
<tr>
<td>55</td>
<td>65</td>
</tr>
<tr>
<td>59</td>
<td>60</td>
</tr>
<tr>
<td>70</td>
<td>49</td>
</tr>
<tr>
<td>72</td>
<td>38</td>
</tr>
<tr>
<td>73</td>
<td>37</td>
</tr>
<tr>
<td>78</td>
<td>58</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>842</strong></td>
</tr>
<tr>
<td>Divide by 18</td>
<td>47</td>
</tr>
<tr>
<td>Multi by 2</td>
<td>94</td>
</tr>
</tbody>
</table>

A score of 94/160 is a medium score and indicates a position where reflective practice has been encountered but not fully understood. The organisation would benefit from developing reflective practice techniques on a professional and personal level.
Chapter 4: Investigating Tacit to Explicit Knowledge Transfer

Table 6: Understanding and Developing of Tacit Knowledge

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>59</td>
</tr>
<tr>
<td>10</td>
<td>45</td>
</tr>
<tr>
<td>11</td>
<td>61</td>
</tr>
<tr>
<td>14</td>
<td>47</td>
</tr>
<tr>
<td>16</td>
<td>43</td>
</tr>
<tr>
<td>17</td>
<td>69</td>
</tr>
<tr>
<td>19</td>
<td>54</td>
</tr>
<tr>
<td>37</td>
<td>36</td>
</tr>
<tr>
<td>40</td>
<td>32</td>
</tr>
<tr>
<td>41</td>
<td>64</td>
</tr>
<tr>
<td>52</td>
<td>49</td>
</tr>
<tr>
<td>54</td>
<td>61</td>
</tr>
<tr>
<td>55</td>
<td>65</td>
</tr>
<tr>
<td>57</td>
<td>51</td>
</tr>
<tr>
<td>63</td>
<td>69</td>
</tr>
<tr>
<td>65</td>
<td>68</td>
</tr>
<tr>
<td>Total</td>
<td>873</td>
</tr>
</tbody>
</table>

Divide by 18 49
Multi by 2 97

The Understanding and Developing of tacit knowledge scored 97/160. This score intimates that you have heard of tacit knowledge but are unsure of the value to the company and yourself. The organisation will certainly benefit from developing an understanding of tacit knowledge and its potential to create competitive advantage.
A score of 95/240 is in the low region, which indicates that the company has a learning atmosphere and supports CPD. Developing in a learning organisation is easier than in one were learning is seen as a separate exercise to work.
A score of 77/160 is in the medium range and suggests a confused understanding of what can be achieved through work based learning. Some of the organisations personnel may have heard of work based learning but have no experience of it, while others may have completed some form of work place skills development.
Table 9: Understanding the Value of CPD

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>6</td>
<td>28</td>
</tr>
<tr>
<td>18</td>
<td>36</td>
</tr>
<tr>
<td>36</td>
<td>30</td>
</tr>
<tr>
<td>42</td>
<td>56</td>
</tr>
<tr>
<td>43</td>
<td>39</td>
</tr>
<tr>
<td>50</td>
<td>33</td>
</tr>
<tr>
<td>51</td>
<td>33</td>
</tr>
<tr>
<td>58</td>
<td>29</td>
</tr>
<tr>
<td>59</td>
<td>60</td>
</tr>
<tr>
<td>60</td>
<td>36</td>
</tr>
<tr>
<td>67</td>
<td>56</td>
</tr>
<tr>
<td>75</td>
<td>45</td>
</tr>
<tr>
<td>79</td>
<td>60</td>
</tr>
<tr>
<td>81</td>
<td>36</td>
</tr>
<tr>
<td>Total</td>
<td>655</td>
</tr>
</tbody>
</table>

Divide by 18 36
Multi by 2 73

A score of 73/160 indicates that CPD is known to the personnel and is being undertaken. It suggests that staff go on courses, but are failing to correlate what is being taught to what they are doing in their job. Or perhaps the CPD that they have completed has little relevance to their job role.
Table 10: Action Development Planning

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>30</td>
</tr>
<tr>
<td>21</td>
<td>32</td>
</tr>
<tr>
<td>25</td>
<td>38</td>
</tr>
<tr>
<td>28</td>
<td>39</td>
</tr>
<tr>
<td>47</td>
<td>60</td>
</tr>
<tr>
<td>61</td>
<td>65</td>
</tr>
<tr>
<td>70</td>
<td>49</td>
</tr>
<tr>
<td>74</td>
<td>63</td>
</tr>
<tr>
<td>82</td>
<td>26</td>
</tr>
<tr>
<td>85</td>
<td>33</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>435</strong></td>
</tr>
</tbody>
</table>

Divide by 18  
Multi by 2  

A score of 48/100 is in the medium range and suggests that you are unsure about the rationale of action development planning in the role of CPD. The company will benefit from being able to plan the development of CPD to achieve realistic target outcomes from work based projects.
Table 11: Developing Knowledge Based Skills

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>48</td>
</tr>
<tr>
<td>12</td>
<td>57</td>
</tr>
<tr>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>26</td>
<td>46</td>
</tr>
<tr>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>39</td>
<td>47</td>
</tr>
<tr>
<td>43</td>
<td>39</td>
</tr>
<tr>
<td>51</td>
<td>33</td>
</tr>
<tr>
<td>61</td>
<td>59</td>
</tr>
<tr>
<td>64</td>
<td>34</td>
</tr>
<tr>
<td>Total</td>
<td>427</td>
</tr>
<tr>
<td>Divide by 18</td>
<td>24</td>
</tr>
<tr>
<td>Multi by 2</td>
<td><strong>47</strong></td>
</tr>
</tbody>
</table>

A score of 47/100 indicates that some skills based training is taking place, but you are not fully clear on what skills have been developed and what others need to be developed. Knowledge based skills are being developed, but there is room for further targeted development.

The overall score for the learning needs analysis is 617 this is at the mid point in the medium range. A medium score indicates a confused environment where some development is taking place and some of the terms are recognised by individuals. The professional development needs to be more targeted to the current needs of the individual. More recognition needs to be made of the value of work based CPD or CPD in general. The organisation needs to develop to make a further move towards being a 'learning organisation'. Key aspects to good practice are not recognised such as
developing staff to become more in depth reflective practitioners. The organisation is one where tacit knowledge has not been fully recognised either for its own value or its integrative value with explicit knowledge. Overall the organisation has yet to take advantage of the potential and value which work based learning can bring to both the staff and the organisation. The using of groups or teams, to drive change and problem solving needs to be developed in the organisation. The company has yet to fully recognise the value of available intellectual capital and the possible competitive advantage.

4.3.2 Developing Working Codes and Practices

The main focus of company A is the manufacture of food products. Technology advances made within the manufacturing processes have taken a major step forwards over the last few years with big investments to enhance the production facilities. A knowledge gap has widened among the engineers and technicians with regards to the new technologies that have been installed on site. Some engineers are knowledgeable with regards to the new equipment, but a knowledge gap has certainly been created across the engineers and technicians as a whole.

The engineering department is divided across the manufacturing facility. Each department is responsible for a dedicated area of the manufacturing process. The departments have developed their own set of working practices and protocols for carrying out the same procedures. In many cases these procedures are different from
department to department. Most of these procedures have been developed by the
engineer and technicians responsible for that department and are in a tacit form. The
objective of the project for the company, is to, identify the procedures and protocols
which are in a tacit form and convert them to explicit knowledge to help standardise
working practices across the company. This issue is really prevalent with regards to the
handling and application of glue, classed as a hazardous material and certainly a
contaminate not wanted in the food process. In order to monitor and comply with the
latest legislation, standardisation of glue handling and the gluing process is paramount.

The early meetings that took place predominantly involved the engineer in charge of the
project and the research team. The aims of the early meetings, was to establish a
research protocol to include:

- Time frame of the research.
- Identifying knowledge to be transferred.
- Number of personal included.
- How the research was to be implemented.
- Expected outcomes.
- Setting up of learning sets.
- Monitoring progress.

Key personnel for the project were identified by the Engineering Manager. These
people were bought together to form the learning set. Engineers and technicians from
different departments across the company were identified through a skills audit and
bought together into learning sets. The intention was to use the learning set as a focus
group to assess the effectiveness of the research. Regular meetings for the group were arranged and the aims of the group clarified.

The first meeting of the group was used to explain the research proposal and introduce their involvement to the project. Early feedback from the senior engineer running the project was that, “my initial thoughts are that the beginning of the research will be dedicated to the unwillingness of the chosen team to participate”. It was decided for this reason that the first tasks for the group were to select a problem area and keep a journal to critically reflect their understanding and knowledge base. This gave them the opportunity to get accustomed to the reflective process before moving forwards with the main tasks.

The initial reaction to the reflective process was negative “waste of time”, “what do we need to do that for”, but as the group meet more often this negativity subsided. The subsequent task of the group was to investigate and identify the CPD requirements of the team. This involved the individuals reflecting on their experiences and identifying gaps in their knowledge base. Again this was problematic in the initial stages, as there was an unwillingness to admit to short falls in the skills base of some of the participants. The company decided to recognise the CPD potential of the project to the individual and the company, through the company appraisal scheme, which is directly linked to pay and bonuses. Once this had been established, the team members became enthusiastic towards the project and started to contribute more fully.
Special consideration was made towards the new technologies that had recently been incorporated into the production processes. Any training that was identified for the individuals was written into the learning contract and a plan formulated as to how the training would take place, through a mentoring scheme, or an outside learning provider. The engineers responsible for the new equipment reflected on their experiential learning and tacit knowledge of the new equipment and developed it into explicit knowledge in the form of written process and protocol. As this process started to unfold it became apparent that all the knowledge of a process could not be recalled instantly, “as they started to write up and discuss their findings, this triggered a further recall of information”. Also it became apparent that some processes were easier to demonstrate than to write down.

The final task set for the learning set was to standardise the handling and application of glue. The learning set looked at the current explicit material available within the workplace on glue handling and its application and investigated the experiences of the technicians in dealing with glue problems. Through the reflective process and analysis of the data that had been gathered, a process for dealing with the glue was formulated and documented as a set of working practices. These working practices were rolled out to all departments and are now used as a benchmark throughout the company for all gluing applications.
4.3.3 Barriers to Learning

The main topic of discussion in the early meetings was the understanding of tacit knowledge and how it could be used by the individual and the company. Once a full understanding of the objectives was achieved the group started to progress in its tasks. It was observed that the group generally had problems with understanding the reflective practice process and the need to write journals. This became easier with practice and they were encouraged to keep a journal as the CPD achieved through taking part in the case study was formally being recognised by the company as part of the appraisal process which reflected on pay settlement.

The group members were active in pursuing training courses before the case study, so they did not have problems with identifying training needs within the group, as it was not seen as a negative short fall but a positive progression and was relevant for the company appraisal process. This allowed the group to establish the needs of the individual and map them to the needs of the engineering department and future developments. A big problem to the group was trying to identify the tacit knowledge that was held by individuals.

On reflection, some information came forth quite easily and was turned into explicit knowledge or through experiential learning into tacit knowledge by other group members, but other tacit knowledge was difficult to identify and needed some sort of trigger for recall, such as discussing the information within a group environment, a breakdown in production or a problem occurring. When observing the learning sets
discussing a set of information, it could be easily seen that as the information was discussed, this triggered a reflective cycle which bought out a further layer of information. As this information was processed and reflected on, a further triggered response was observed, unlocking a further layer of knowledge. The layer of knowledge that was triggered was not necessarily able to be made explicit but needed to be made tacit through experiential learning.

The knowledge that was identified that needed to be transferred tacitly was problematic, in that the recipients of the knowledge needed to have a prior understanding of processes or procedures to a certain level to be able to process and understand the information being passed on to them. In certain cases this required off site training to get persons up to speed.

As the new working practices and protocols began to be implemented, it could be observed that further questions were raised as situations arose that were not accounted for, such as breakdowns in production. These situations resulted in a triggered response and a further layer of information being recalled that could not previously be identified. Again this could be in a form that could be processed either explicitly or tacitly. From the final briefing of the project, it was commented that “information was still being triggered as new situations arise that had not been taken into account”. It was suggested that this process would continue for some time to come.

It was decided by the company that the explicit knowledge created in the form of documented working practices is to be reviewed regularly and update as new tacit
knowledge and information comes to light. It is envisaged that the actual level of tacit knowledge that has been turned into explicit knowledge is relatively low and this process needs to be on going and the data updated at regular intervals. It is expected that further training will be needed to be identified to accommodate knowledge that is triggered in a form that needs to be transferred tacitly, within the workforce.

The final feedback from the company and the personnel who took part in the project was positive; the company has formulated a set of safe working practices when dealing with the application of glue. These working practices and protocols are now being used as a bench mark throughout the company and further projects are being identified to repeat the process of tacit knowledge transfer.

The general skills levels of the workforce have been increased, especially with regards to the modern technology and machinery that has been installed. New procedures and protocols have been produced and tacit knowledge has been shared. New working practices have been developed for glue handling and application to comply with latest legislation and have been rolled out across the company.

4.4 Company B

Company B is a SME, based in the South Wales region, the company moved to a purpose-built manufacturing facility in South Wales, in the mid 1980s, supplying the rapidly expanding automotive sector. It is a member of an International group and
supplies OEM products exclusively to the automotive industry. The site in South Wales is an integral part of the global operations of the whole group, which comprises five further main sites in Europe, six in the USA, and two in developing markets, plus numerous sales offices in Europe, USA, and Asia. At present the company employs approximately 500 people in South Wales.

What are the company problems? A very experienced engineer is close to retirement age, his experience and knowledge of the three production lines is second to none. He attends a high percentage of breakdowns in the production area and is the backbone of all programme modifications on the three production lines. Much of his knowledge of the systems and production lines is not captured in any way and is personal to the engineer (tacit). He is highly respected within the company and does engage in trying to inform/teach the engineers and technicians who work along side him his knowledge and skills. This process is informal and usually takes place over a cup of tea. Also when a training opportunity arises such as when a fault occurs, the time constraints and cost of loss of production and the pressure of getting production back on line, are not compatible with a training environment. The results are such that effective knowledge transfer is not taking place and the company is fast approaching the scenario of years of experience being lost with the retirement of key personal. “Organisations can not afford to let their wealth of knowledge walk out of the front gate with ex-employees or the old timer has he walks happily into retirement” (Clarke, Holifield, & Chisholm 2004, p.386).
The objectives of the project for the company, is to capture the engineers knowledge, which is currently in a tacit form and convert it into explicit knowledge before he retires. Also, to identify the CPD requirements of the engineers and technicians, to help fill the knowledge gap, which will be created through his loss?

From the primary discussions with the company, it was decided that the case study would be implemented in a number of stages:

- Presentation of the research project and its aim and objectives to the Chief Executive and Senior Managers.
- Initial feedback from Chief Executive and Senior Managers.
- Presentation of the project and the case study to Engineers and Technicians.
- Completion of Learning Needs Analysis.
- Setting up of learning sets.
- Monitoring and running of the programme.
- Assessment of deliverable outcomes.

### 4.4.1 Presentations to Chief Executive and Senior Managers

A presentation was made to the Chief Executive and the Senior Managers of the company. The presentation was broken down into two parts:
1. Overview of the research project - the general overview of the research project was given, the aims and objectives of the research and ideas behind the carrying out of the research.

2. The specific tasks of the case studies - the second part to the presentation involved the detailed explanation of the case studies and the expected benefits to the company, the characteristics of the new methodology and the implications of tacit to explicit knowledge transfer.

A framework for the case studies was discussed, including:

- Expected commitments from the company.
- Number of personnel included.
- Processes for the company that needed reviewing or improving.
- Time frames for the project.
- Expected outcomes for the company.
- Expected outcomes of the research.
- Ethical considerations.

### 4.4.2 Feedback from Chief Executive and Senior Managers

The following feedback was received from the meeting with the Chief Executive and the Senior Managers:
• Company B would be happy to participate in the project, providing that the company remains anonymous when disseminating the findings of the research.

• Further detailed discussions would be needed with the lead person of the project within the company before the project commences.

• The Learning Needs Analysis Tool was reviewed and suggestions were made to simplify the scoring system, to alleviate confusion to the persons filling in the questionnaire.

• It was also pointed out that some of the questions within the questionnaire were worded at an academic level unsuitable for the general workforce and that a number of questions in the learning needs analysis need to be reworded for clarity and understanding.

After the feedback was received, a complete evaluation was taken of the learning needs analysis questionnaire, the scoring system was review and simplified and a number of questions were reworded or rephrased in a simpler form. A definition of terms and expressions was also added to the questionnaire to help clarify any misunderstandings in the language and terms used.
4.4.3 Implementation of the Project.

A further series of meetings was undertaken with the appointed lead person from the company on how the project was to be run and the implementation of the project. During these meetings a project framework was developed as follows:

- Presentation of the research project and the case study to engineers and technicians involved in the project.
- Completion of learning needs analysis questionnaire.
- Setting up of learning sets.
- Monitoring of the work programme.
- Assessment of deliverable outcomes
- Ethical considerations.

4.4.4 Learning Needs Analysis

A learning needs analysis was carried out within the company, through the use of a questionnaire. The questionnaire was completed by relevant engineers, technicians and craftsmen. Also the questionnaire was distributed to individuals throughout the company to get an overview of the company as a whole. The primary outcomes from the analysis, was that Company B had no major issues as a learning organisation, but there is certainly room for improvement in their position as a learning company.
4.4.5 Setting up of Learning Sets

It was agreed that the lead person from Company B will establish the learning sets. The learning sets again being used as focus groups for feedback. Prior to the establishment of the learning sets, an analysis of the required skills needed for the maintaining and running of the individual production lines was carried out. This helped categorise the areas of knowledge required and the skills base of the engineers, technicians and craftsmen working on each line. The following reflective practice process was setup:

- Select various work related topic areas for each members of the team
- Each member will keep a reflective journal on the work related areas
- Critical reflection, in the learning set, of each learning journal
- Make recommendations for change, if appropriate, from the reflection of the learning journal

The reflective process will be used to help identify the skills and knowledge gaps of the company and the CPD requirements of the employees. The role of the learning set is to establish areas where explicit knowledge is not available and if possible identify the tacit knowledge that needs to be turned into explicit knowledge. The priority for the employee who is due for retirement is firstly to explore and reflect on his experiential knowledge of the plant and identify his tacit knowledge. The learning set will be facilitated by an employee of Company B and the author.
4.4.6 Assessment of Deliverable Outcomes

Interviews were held with the research team, the management of the company and the personnel involved with the project in order to get feedback, observations were made of the workforce and their level of up skilling and the learning sets were used as focus groups to establish the effectiveness of the research methodology and evaluate the benefits gained by the individuals and the company.

4.5 Case Study Results for Company B

A learning needs analysis was carried out for the company to establish an overall understanding of the company as a learning organisation and its understanding of tacit and explicit knowledge. The results for the learning needs analysis are as follows.
### 4.5.1 Learning Needs Analysis Results Company B

**Table 12: Staff profile**

<table>
<thead>
<tr>
<th>Position</th>
<th>Manager</th>
<th>Engineer</th>
<th>Technician</th>
<th>Admin</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4</td>
<td>10</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Age</th>
<th>under 20</th>
<th>20 - 30</th>
<th>30 - 40</th>
<th>40 -50</th>
<th>50 - 60</th>
<th>60+</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
<td>5</td>
<td>9</td>
<td>5</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Sex</th>
<th>Male</th>
<th>Female</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>17</td>
<td>4</td>
</tr>
</tbody>
</table>

| Total No of Questionnaires | 18 |
Table 13: Team Skills and Team Working in a Learning Set

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>18</td>
<td>40</td>
</tr>
<tr>
<td>23</td>
<td>45</td>
</tr>
<tr>
<td>24</td>
<td>64</td>
</tr>
<tr>
<td>27</td>
<td>78</td>
</tr>
<tr>
<td>29</td>
<td>92</td>
</tr>
<tr>
<td>30</td>
<td>40</td>
</tr>
<tr>
<td>32</td>
<td>59</td>
</tr>
<tr>
<td>61</td>
<td>80</td>
</tr>
<tr>
<td>64</td>
<td>41</td>
</tr>
<tr>
<td>72</td>
<td>47</td>
</tr>
<tr>
<td>73</td>
<td>40</td>
</tr>
<tr>
<td>76</td>
<td>74</td>
</tr>
<tr>
<td>78</td>
<td>77</td>
</tr>
<tr>
<td>81</td>
<td>45</td>
</tr>
<tr>
<td>86</td>
<td>61</td>
</tr>
<tr>
<td>87</td>
<td>85</td>
</tr>
<tr>
<td>Total</td>
<td>968</td>
</tr>
</tbody>
</table>

Divide by 21 46
Multiply by 2 92

The Team Skills and Team Working in a Learning Set scored 90/160, which indicates a degree of uncertainty and understanding of team skills and the advantages of what the team working environment can offer.
Table 14: Reflective Practice Attributes

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>4</td>
<td>64</td>
</tr>
<tr>
<td>8</td>
<td>63</td>
</tr>
<tr>
<td>22</td>
<td>76</td>
</tr>
<tr>
<td>23</td>
<td>45</td>
</tr>
<tr>
<td>24</td>
<td>64</td>
</tr>
<tr>
<td>44</td>
<td>63</td>
</tr>
<tr>
<td>45</td>
<td>70</td>
</tr>
<tr>
<td>46</td>
<td>44</td>
</tr>
<tr>
<td>47</td>
<td>80</td>
</tr>
<tr>
<td>48</td>
<td>69</td>
</tr>
<tr>
<td>55</td>
<td>78</td>
</tr>
<tr>
<td>59</td>
<td>77</td>
</tr>
<tr>
<td>70</td>
<td>57</td>
</tr>
<tr>
<td>72</td>
<td>47</td>
</tr>
<tr>
<td>73</td>
<td>40</td>
</tr>
<tr>
<td>78</td>
<td>77</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>1014</td>
</tr>
<tr>
<td>Divide by 21</td>
<td>48</td>
</tr>
<tr>
<td>Multi by 2</td>
<td>97</td>
</tr>
</tbody>
</table>

A score of 97/160, is drifting towards a high score, and indicates a position where you think that you know what reflective practice is about but are unsure. It would be of benefit to develop reflective practice on a professional and personal level.
Table 15: Understanding and Developing of Tacit Knowledge

<table>
<thead>
<tr>
<th>Question No</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>9</td>
<td>64</td>
</tr>
<tr>
<td>10</td>
<td>52</td>
</tr>
<tr>
<td>11</td>
<td>68</td>
</tr>
<tr>
<td>14</td>
<td>59</td>
</tr>
<tr>
<td>16</td>
<td>52</td>
</tr>
<tr>
<td>17</td>
<td>80</td>
</tr>
<tr>
<td>19</td>
<td>61</td>
</tr>
<tr>
<td>37</td>
<td>43</td>
</tr>
<tr>
<td>40</td>
<td>40</td>
</tr>
<tr>
<td>41</td>
<td>73</td>
</tr>
<tr>
<td>52</td>
<td>60</td>
</tr>
<tr>
<td>54</td>
<td>74</td>
</tr>
<tr>
<td>55</td>
<td>78</td>
</tr>
<tr>
<td>57</td>
<td>50</td>
</tr>
<tr>
<td>63</td>
<td>81</td>
</tr>
<tr>
<td>65</td>
<td>78</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1013</strong></td>
</tr>
</tbody>
</table>

Divide by 21 48  
Multi by 2 96

Again the understanding and development of tacit knowledge score of 96/160, is drifting towards the high region. A medium score of 80 indicates that you have heard of tacit knowledge and its value but you are unsure of the real value to yourself or the organisation. The organisation would certainly benefit by developing an understanding of tacit knowledge.
Table 16: Operating as a Learning Organisation

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>68</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>5</td>
<td>71</td>
</tr>
<tr>
<td>6</td>
<td>65</td>
</tr>
<tr>
<td>15</td>
<td>74</td>
</tr>
<tr>
<td>21</td>
<td>58</td>
</tr>
<tr>
<td>26</td>
<td>87</td>
</tr>
<tr>
<td>28</td>
<td>81</td>
</tr>
<tr>
<td>29</td>
<td>92</td>
</tr>
<tr>
<td>31</td>
<td>48</td>
</tr>
<tr>
<td>32</td>
<td>59</td>
</tr>
<tr>
<td>33</td>
<td>71</td>
</tr>
<tr>
<td>38</td>
<td>60</td>
</tr>
<tr>
<td>48</td>
<td>69</td>
</tr>
<tr>
<td>51</td>
<td>66</td>
</tr>
<tr>
<td>53</td>
<td>80</td>
</tr>
<tr>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>68</td>
<td>70</td>
</tr>
<tr>
<td>75</td>
<td>81</td>
</tr>
<tr>
<td>77</td>
<td>35</td>
</tr>
<tr>
<td>80</td>
<td>71</td>
</tr>
<tr>
<td>82</td>
<td>64</td>
</tr>
<tr>
<td>84</td>
<td>78</td>
</tr>
<tr>
<td>88</td>
<td>86</td>
</tr>
<tr>
<td>Total</td>
<td>1664</td>
</tr>
</tbody>
</table>

Divide by 21
Multi by 2

A score of 158/240 is on the edge of a high score, this indicates that there is little evidence of integral learning within the company, to drive towards a learning organisation. The organisation will benefit from working towards a position where a common view is held with regards to the company being a learning organisation.
Table 17: Understanding the value of Work Based Learning

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>68</td>
</tr>
<tr>
<td>7</td>
<td>64</td>
</tr>
<tr>
<td>12</td>
<td>70</td>
</tr>
<tr>
<td>13</td>
<td>75</td>
</tr>
<tr>
<td>20</td>
<td>47</td>
</tr>
<tr>
<td>23</td>
<td>45</td>
</tr>
<tr>
<td>31</td>
<td>48</td>
</tr>
<tr>
<td>34</td>
<td>37</td>
</tr>
<tr>
<td>35</td>
<td>65</td>
</tr>
<tr>
<td>49</td>
<td>54</td>
</tr>
<tr>
<td>50</td>
<td>49</td>
</tr>
<tr>
<td>55</td>
<td>78</td>
</tr>
<tr>
<td>62</td>
<td>59</td>
</tr>
<tr>
<td>69</td>
<td>72</td>
</tr>
<tr>
<td>71</td>
<td>40</td>
</tr>
<tr>
<td>83</td>
<td>71</td>
</tr>
<tr>
<td>Total</td>
<td>942</td>
</tr>
<tr>
<td>Divide by 21</td>
<td>45</td>
</tr>
<tr>
<td>Multi by 2</td>
<td>90</td>
</tr>
</tbody>
</table>

A score of 90/160 is once again in the medium range and suggest a confused understanding of the value of Work Based Learning. Some of the companies personnel may have heard of work based learning but have no experience of it, while others may have completed some form of work place skills development.
Table 18: Understanding the value of CPD

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>60</td>
</tr>
<tr>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>6</td>
<td>65</td>
</tr>
<tr>
<td>18</td>
<td>40</td>
</tr>
<tr>
<td>36</td>
<td>38</td>
</tr>
<tr>
<td>42</td>
<td>69</td>
</tr>
<tr>
<td>43</td>
<td>48</td>
</tr>
<tr>
<td>50</td>
<td>49</td>
</tr>
<tr>
<td>51</td>
<td>66</td>
</tr>
<tr>
<td>58</td>
<td>36</td>
</tr>
<tr>
<td>59</td>
<td>77</td>
</tr>
<tr>
<td>60</td>
<td>80</td>
</tr>
<tr>
<td>67</td>
<td>69</td>
</tr>
<tr>
<td>75</td>
<td>81</td>
</tr>
<tr>
<td>79</td>
<td>77</td>
</tr>
<tr>
<td>81</td>
<td>45</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>950</strong></td>
</tr>
<tr>
<td>Divide by 21</td>
<td>45</td>
</tr>
<tr>
<td>Multi by 2</td>
<td><strong>90</strong></td>
</tr>
</tbody>
</table>

A score of 90/160 is a medium score and indicates that confusion exists as to the value of CPD and as to what CPD policy exists within the organisation. Staff, go on courses but may have failed to correlate what is being taught and what they are doing in their job. The CPD which they have completed may have had no relevance to their job.


Table 19: Action Development Planning

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>50</td>
</tr>
<tr>
<td>21</td>
<td>58</td>
</tr>
<tr>
<td>25</td>
<td>44</td>
</tr>
<tr>
<td>28</td>
<td>81</td>
</tr>
<tr>
<td>47</td>
<td>80</td>
</tr>
<tr>
<td>61</td>
<td>80</td>
</tr>
<tr>
<td>70</td>
<td>57</td>
</tr>
<tr>
<td>74</td>
<td>71</td>
</tr>
<tr>
<td>82</td>
<td>64</td>
</tr>
<tr>
<td>85</td>
<td>37</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>622</td>
</tr>
<tr>
<td>Divide by 21</td>
<td></td>
</tr>
<tr>
<td>Multi by 2</td>
<td>59</td>
</tr>
</tbody>
</table>

A score of 59/100 is again in the medium range and indicates that you are unsure about the rationale of action development planning in the role of CPD. The organisation would benefit from being able to plan the development of CPD to achieve realistic target outcomes from work based CPD projects.
Table 20: Developing Knowledge Based Skills

<table>
<thead>
<tr>
<th>Question No.</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>60</td>
</tr>
<tr>
<td>12</td>
<td>70</td>
</tr>
<tr>
<td>15</td>
<td>74</td>
</tr>
<tr>
<td>26</td>
<td>87</td>
</tr>
<tr>
<td>33</td>
<td>71</td>
</tr>
<tr>
<td>39</td>
<td>47</td>
</tr>
<tr>
<td>43</td>
<td>48</td>
</tr>
<tr>
<td>51</td>
<td>66</td>
</tr>
<tr>
<td>61</td>
<td>80</td>
</tr>
<tr>
<td>64</td>
<td>41</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>644</strong></td>
</tr>
<tr>
<td><strong>Divide by 21</strong></td>
<td><strong>31</strong></td>
</tr>
<tr>
<td><strong>Multi by 2</strong></td>
<td><strong>61</strong></td>
</tr>
</tbody>
</table>

A score of 61/100 indicates confusion about what skills have been developed and what others may need developing. Also there is probable confusion as to how much support is forthcoming in the organisation. The work place seems to be a place were creativity and innovation is not being recognised to the full, and the organisation will benefit from developing these skills.

The overall score for the learning needs analysis is 744 this is just above the mid point in the medium range. A medium score indicates a confused environment where some development is taking place and some of the terms are recognised but individuals are not really sure what professional development is really taking place. More recognition needs to be made of the value of work based CPD or CPD in general. The organisation needs to development and invest to make a move towards being a 'learning
organisation'. Key aspects to good practice are not recognised such as developing staff to become more in depth reflective practitioners or developing knowledge based skills. The organisation is one where tacit knowledge has not been fully recognised either for its own value or its integrative value with explicit knowledge. Overall the organisation has yet to take advantage of the potential and value which work based learning can bring to both the staff and the organisation. The using of groups or teams, to drive change and problem solving needs to be developed in the organisation. The company has yet to fully recognise the value of intellectual capital and competitive advantage. This means the organisation through management needs to give serious attention to creating an environment where CPD can be achieved in the workplace.

4.5.2 Tacit Knowledge and the Retiring Employee

As the Senior Engineer (K) is coming up for retirement, the objectives of the project for the company, is to capture the engineers knowledge, which is currently in a tacit form and convert it into explicit knowledge before he retires. Also, to identify the CPD requirements of the engineers and technicians, to help fill the knowledge gap, which will be created through his loss? K has a vast amount of knowledge and experience which covers the whole plant. Due to the complexities and size of the plant, it was decided to be specific in targeting the RFID Tag Reading System as it is one of the most technical challenging processes and a critical process within the manufacturing of all products.
Preparation for initial meetings involved identifying the knowledge requirements for the line processes, prior to the first meeting. This helped categorise the areas of knowledge that were needed to keep production running.

**Line 1**
- Small amount of Omron PLC programming
- Good fault finding skills and analysis work.
- Basic tooling design knowledge.
- Electrically / mechanically biased does not matter.

**Line 2**
- Opto 22 programming and offset adjustment knowledge
- Good fault finding skills and analysis work.
- Basic tooling design knowledge.
- Electrically / mechanically biased does not matter.

**Line 3**
- Opto 22 programming and offset adjustment knowledge
- Good fault finding skills and analysis work.
- Basic tooling design knowledge.
- Electrically / mechanically biased does not matter.
- Epson Robot programming

**Line 4**
- Basic tooling design knowledge.
Good fault finding skills and analysis work.

- Epson Robot programming
- Good organisation skills
- Servo programming
- Omron PLC

Test

- Insight Vision software
- Knowledge of listen sound check systems
- Individual speaker requirements

The first few meetings, were centred on the engineers being honest about their current knowledge level and recording this information in a written form so that it could be studied and training short falls identified. What was observed was some quite heated dialogue at times where engineers became defensive about the information they were giving as to the level of knowledge that they had in certain areas. They did not want to appear to be weak in any subject area. It took some time before the team became at ease with the objectives of the meeting and information started to flow. From the initial meetings and reflective practice, the training needs and CPD requirements of the team members were identified.

It was identified, that some of the knowledge gap could only be bridged by employing external training resource. To give an example, two of the engineers were identified as requiring training in Omron PLC programming and Vision System Programming. This
training was identified and written into the learning contracts and later provided on site through an external training provider. The training was tailored to the company’s specific needs, and all course criteria were documented (explicit) for future reference.

All the engineers actively engaged in CPD. The engineers researched how they could improve their current knowledge base and qualifications through external learning providers. This resulted in the engineers being actively enrolled and partaking in B.Eng (Hons) Degree’s, HND’s and NVQ’s level 3.

“K has been the engineer who has reflected the most. He realised that the methodology he was adopting to transfer his knowledge was not working”. Due to the constraints on his time and his role of being a trouble shooter for the whole of the plant, he was not documenting how breakdowns and problems were being solved. K developed a set of documentation detailing schematics, operation detail and basic fault finding guides for the areas where the other engineers had identified a knowledge gap, predominantly within the RFID Tag reading System.

Instead of providing instruction during the breakdown phase which inevitable became a pressure situation because of lack of production, K has given briefings and gone through his documentation with the engineers at more suitable times. This documentation is now available to all engineers and is regularly reviewed and added to. This proved to be more rewarding to K and more beneficial to the engineers, resulting in more tacit knowledge being transfer into explicit knowledge and tacit knowledge transferred to tacit knowledge through experiential learning.
It was noted by K that as he reflected on the documentation he was producing, this triggered a response of more information that he had not recalled earlier. This trigger response also occurred, when he was explaining the information or discussing it with other engineers. K also noted that some information could not be written down but needed to be taught experientially to the other team members.

### 4.5.3 Barriers to Learning

The initial meetings worked well, once the engineers had gotten over the initial barriers of identifying their shortfalls in knowledge and the knowledge gaps currently within the department. Initially, some engineers did not understand the concept of tacit knowledge and its role in the organisation, although this became less evident throughout the next few months. Engineers identified their strengths, weaknesses and knowledge gaps, but this was not without issue. Engineers were reluctant to admit shortcomings in their knowledge base. Multi-discipline Line teams had been recently setup across the plant, with the aim of providing complete support to the lines. The teams contain representatives from the Quality Department, Process Engineering, Maintenance, Production Management and Production Team Leaders. The team’s objectives are to drive scrap down, efficiency up, changeover time down, breakdown time down, all within set budget levels.

The teams meet once per week to discuss performance against the Key Performance Indicators (KPI’s). All members of the teams performance is measured against the KPI’s. In earlier evaluations, some lines performed better than others, for one line,
performance declined and for another line, performance stayed the same. The two areas
that did not improve, all members of the team did not receive annual pay increases.
Members of the project team involved in the line teams were very reluctant to engage in
any activity other than activity that influences line performance.

As the meetings progressed with time, meeting attendance was poor and individual
moral was low. It became increasingly difficult to explain to the team the benefits of
what was trying to be achieve and keep them motivated. In order to combat this
situation, the line performance indicators were changed to encourage attending meetings
and contributing to the project. With reluctance the employee’s had to buy in to the
process and soon it could be observed that they recognised the benefits to line
performance which in turn generated further enthusiasm to the process.

The other problem that became apparent early on was that the team had difficulty
identifying what tacit knowledge needed to be captured. It was found that a trigger was
needed to identify short comings in the knowledge base. For example, K had produced
his documentation which was being used as a guide, but it was only when a breakdown
occurred that was not documented, did the team and K realise that K’s knowledge of
that scenario had not been fully captured. K found it difficult to recall his tacit
knowledge until faced with a problem which triggered recall. For this reason, it became
apparent from interviewing K that the amount of tacit knowledge held by K and
 transferred would be relatively low in the short term.
The writing of the reflective practice journals also became problematic, the engineers were happy enough to carry out reflective practice during meeting but it was difficult to get them to write a diary and this fell by the way side. A further issue arose, in that when K identified tacit knowledge, the engineers did not have the background knowledge to process it or to use it. CPD for the individuals had to be identified and completed before K’s tacit knowledge became explicit in a form that could be used. An element of tacit knowledge was identified that could not be made explicit in a form that could be processed into explicit knowledge due to its complexity. It was found that this element of tacit knowledge could be transferred directly to tacit knowledge through an experiential learning process, from employee A, teaching employee B.

After the case study finished, the company developed a Knowledge Repository on line, accessible by all engineers to review, log and up date data on process and production procedures, which is working very successfully. Also the KPI’s for all engineers have been changed to include an element of production output. This has resulted in all engineers contributing to the knowledge repository, as their appraisal and pay increase is linked to production instead of just their immediate department performance.

Follow up interviews were carried out with the engineer who ran the project, 1 year after the case studies were completed. The company was still using the knowledge repository and focusing on tacit to explicit knowledge transfer. The programme was working well and the knowledge base of the company was growing. The main comment from the engineer is that “tacit to explicit knowledge transfer will not take
place unless the recipient of the information has prior learning to be able to learn and process the knowledge and secondly they are willing to learn”.

4.6 Conclusions

The aim of the case studies was to investigate the transferring of tacit knowledge into explicit knowledge, using work based learning and CPD techniques. It can be seen through the results of the two case studies that a knowledge transfer process has taken place. This transfer of knowledge has been tacit to explicit, but also an element of tacit to tacit knowledge was identified. It was found that certain tacit knowledge was easier to transfer through experiential learning straight to the recipient and into their tacit knowledge base. The fundamental issue with this process is that the recipient in certain cases needs to have a knowledge grounding in the subject matter to be able to process the new learning and turn it into tacit knowledge. It was identified in both case studies that training had to take place for the individuals to be able to process the knowledge transfer.

The other issue that came to light is that it is difficult to identify the tacit knowledge that needs to be transferred. It was observed that a certain amount of tacit knowledge that has easy recall and can be process into either tacit or explicit knowledge relatively easily through the reflective practice process, but there is certainly an element of tacit knowledge that only comes to light and needs a trigger in order for the individual to access that knowledge.
The time frame for this process is difficult to establish, taking month’s possible years to complete the process. Further research is needed to understand the time implications of this process and the percentage of the tacit element that can be transferred. A follow up interview with the engineer who ran the case studies in company B indicated that the trigger process is still happening, the frequency has dropped significantly, but as difficult situations occur a knowledge response is triggered.

In the case of Company A, new protocols and procedures for dealing with glue handling and application have been created and held in an explicit form and now are being used as benchmarks across the whole company. Work based learning and CPD techniques have helped in the up skilling of the group and recognition of skill shortages across the departments. The company has moved forwards as a learning organisation and recognised the value of tacit knowledge to both the individual and the company. The company were looking at further areas for knowledge transfer after the completion of the case studies. The engineer running the project left the company shortly after the case studies and no further work was carried out in this area.

In the case of company B, the tacit knowledge gained by K, through experiential learning over years of dealing with the production process, has started to be broken down and turned into an explicit form. As in the case of Company A, certain elements of K’s knowledge were easier to pass on through experiential learning and transferred tacit knowledge straight to tacit knowledge. The recall issue was also prevalent in both case studies; certain knowledge only came to the forefront when a trigger came into
play. The individuals could not identify elements of tacit knowledge until a situation or scenario triggered the tacit recall.

The company certainly move forwards as a learning organisation, and have now set up a knowledge repository to review, log and update data on process and production procedures, which is working well in managing the tacit knowledge available to the company. It must be noted that “the process of capturing the tacit knowledge is slow, due to the fact it is difficult to identify”. Once the initial recall process has taken place, a trigger is needed for the individual to recall further tacit knowledge. The trigger process is a continuous process, so further research is needed to establish the percentage of tacit knowledge that falls into this recall category. It was felt by the employee’s, the management and the author that this process will take time to draw out the tacit knowledge of an individual and may take months if not years to fully complete. In the case of company B, it was observed that 1 year after completion that this trigger response is still occurring.

The fundamental findings of these case studies are that tacit knowledge can be transferred, and WBL and CPD can be an aid to this process. What has to be recognised is that tacit knowledge is not a single entity; it has to be broken down into elements. There is an element of tacit knowledge that can be easily recalled through reflective practice and turned into explicit. An element of tacit knowledge that can be recalled but needs to be transfer straight to tacit knowledge through experiential learning, and an element of tacit knowledge that needs a trigger for recall.
Tacit knowledge can also be seen as having layers, the top ones can be peeled back relatively easily, but as you go deeper into the layers, the harder it is to retrieve the information and the effort and time required is greater. It can also be seen that a trigger response is needed to open up the layers, which in turn induces a reflective cycle again triggering a deeper layer of knowledge.

From the results of these case studies, it can be seen that tacit knowledge is not a single entity but is made up of different element of tacit knowledge. Four such elements have been identified through the case studies:

- A tacit to explicit element
- A tacit to tacit element
- A triggered element
- Unknown tacit element.

Through further research and investigation, it is felt by the author that other elements of tacit knowledge will come to light and be identified. Tacit knowledge can no longer be viewed as a single entity for knowledge transfer, but needs to be viewed as a ‘Tacit Knowledge Spectrum’, made up of layers and elements that need to be unpealed the results of which are a knowledge transfer either tacit to explicit or tacit to tacit.
CHAPTER FIVE:

THE TACIT KNOWLEDGE SPECTRUM
5.0 Introduction

The aim of this chapter is to develop a model to represent a Tacit Knowledge Spectrum. From the findings of the case studies in chapter 4, it became apparent that tacit knowledge transfer had taken place but it was by no means a smooth transition. Recalling of tacit knowledge was problematic in that the individual did not recognise the depth of knowledge that they possesses until it was triggered by an external factor, such as dialogs with colleagues or break down scenarios. Secondly, not all of the knowledge that was identified could easily be turned into explicit knowledge. Due to the complexity of the knowledge, it was deemed to be easier to transfer direct to tacit knowledge through experiential teaching.

From the analysis of the results obtained in the case studies, it was identified that tacit knowledge is made up of a number of components that could be divided into a minimum of four different elements and was not a single entity as previously expected. The four elements of tacit knowledge identified in the case studies are as follows:

1. Tacit knowledge that could easily be recalled and turned into explicit knowledge.
2. Tacit knowledge that can be transferred into tacit knowledge.
3. Tacit knowledge that needs a trigger for recall.
4. Tacit knowledge that is hidden to the individual.
It can be seen from the outcomes of the case studies, that tacit knowledge needs to be recognised as being made up of a number of elements. The development of a Tacit Knowledge Spectrum Model will look at conceptualising the elements of tacit knowledge into an easily recognisable format. The case studies demonstrate that there is a need to develop a model that represents the Tacit Knowledge Spectrum, which identifies the elements of tacit knowledge that can be readably transferred either explicitly or tacitly. Consideration needs to be given to tacit knowledge that can be triggered by external factors and knowledge that is deep rooted that may never be bought to the surface. The development of a tacit knowledge spectrum model will give organisations the opportunity to manage tacit knowledge transfer by targeting specific elements of tacit knowledge with appropriate time and resources.

5.1 The Elements of Tacit Knowledge

An analysis of the study data demonstrated that the actual amount of tacit knowledge transferred from an individual was actually relatively low. Although the company made significant gains in increasing the knowledge capital in an explicit form, the total tacit knowledge capital available to the company was far greater than that actually transferred. This research has demonstrated that the release of tacit knowledge was not in a single form, it was broken down into different elements. Three elements of tacit knowledge were subsequently identified, plus a body of tacit knowledge that was available to the individual but very difficult to identify (fig14).
The identified elements of tacit knowledge have been labelled as:

- The Tacit to Explicit Element
- The Tacit to Tacit Element
- The triggered Response Element
- Unknown Tacit Element

**Figure 14: Elements of Tacit Knowledge**

The four elements of tacit knowledge identified by this research are by no means the end to the argument; the Unknown element of tacit knowledge implies that it can be broken down into further elements, this being an area for future research. In order to develop the model, the unknown tacit knowledge will be dealt with as a single entity, with an implied need for further research.
5.1.1 The Tacit to Explicit Element

The findings of the case studies indicate that an element of an individual’s tacit knowledge on a defined subject can be turned into explicit knowledge; this element is referred to as the Tacit to Explicit Element (fig. 15).

Figure 15: The Tacit to Explicit Knowledge Element

When adopting the reflective practice approach either as an individual or in a group environment, the individual is able to recall information such as a process or working practice about a defined subject. In the case of the retiring engineer, working manuals and protocols were produced in an explicit form. Also safe working practices and protocols for handling glues were identified and produced in an explicit form.
The recalled knowledge is able to be written down or recorded as explicit knowledge in a format that can be used by individuals and added to the company’s knowledge capital. There is an element of tacit knowledge that can be identified at this point as being suitable for transfer straight to tacit knowledge through experiential teaching; this will be discussed later in this chapter.

In the case of company B this element of tacit knowledge has been illustrated by the retiring employee who developed a set of documentation detailing schematics, operational details and basic fault finding guides. Where this information had been held previously in a tacit form, it was transferred into explicit material and made available to other individuals throughout the organisation. In the case of company A, a similar trend can be seen in the setting up of protocols across the company for glue handling and application. By extracting the tacit knowledge of individuals across the plant and combining it into an explicit form new working practices have been established and standardised in an explicit form which were previously tacit to the individuals.

5.1.2 The Tacit to Tacit Element

Through the reflective process, tacit knowledge was identified, that was not suitable to be transferred directly into explicit knowledge due to its complexity; the individual could not process the knowledge into a form that could be used explicitly. This knowledge needed to be transferred straight in to tacit knowledge, a Tacit to Tacit Element (fig. 16).
Figure 16: The Tacit to Tacit Knowledge Element

One of the reasons for the need of this type of knowledge conversion was the complexity of the knowledge recalled and the individual’s ability to process it into a form that could be used by individuals in an explicit format. It became apparent when analysing the outcomes of the case studies that this information needed to be taught by one individual to another experientially. The transferring of this type of knowledge was problematic in that the individual being taught needed an understanding or grounding in the subject matter to be able to process the knowledge. In certain circumstances, training courses were provided to individuals to give them a grounding and understanding of the knowledge base, before the tacit knowledge could be transferred. The process of knowledge transfer for this element of tacit knowledge, needed to be completed through demonstration and experiential learning, providing the knowledge base was sufficient to process the information.
One of the situations identified for this type of knowledge transfer, was the computer programming of production machines in the company B case study. The complexity of the programming in relationship to the machine process, did not allow the information to be captured in a form that was readily usable by other individuals. The complexity of the recalled knowledge could not be process into an explicit form by the individual but could be demonstrated to colleagues. One to one training was given to individuals by the retiring employee to transfer the knowledge base.

In some cases, it was found that the individual’s knowledge base was not sufficient to take on this knowledge and external training courses were attended so the individual’s knowledge base could be increased to allow the information to be processed straight into tacit knowledge. Individuals learning through this process were by no means attaining the level of expertise of the retiring individual, they were given a fundamental grounding in the subject matter, but it was going to take time and experience to develop their own expertise.

5.1.3 The Triggered Response Element

As the case studies progressed, analysis demonstrated that there was an element of tacit knowledge that could only be recalled by the individual through a triggered response, The Triggered Response Element (fig.17). In order for the individual to recall the trigger response element of tacit knowledge, a trigger was needed for the individual to identify the information to be made available. The trigger response could take many forms and could easily be observed in group discussions, as a subject matter was
discussed and reflected upon with colleagues, further knowledge of a subject came to the surface.

In certain circumstances, as this new level of knowledge was discussed and reflected upon, the process was repeated in that another layer of knowledge was revealed. The triggered response could also be seen when a breakdown occurred, on seeing a situation arise, the engineer could recall similar situations and how to deal with the problem but he had been unable to recall the information previously through a reflective process. This element of tacit knowledge could then be processed, either into explicit knowledge or straight to tacit knowledge, depending on the complexity of the subject matter. Within the case studies, there were numerous situations where a trigger response was needed for recall; the most obvious case was when dealing with a breakdown scenario. There were many cases of information coming to light that were not recorded or identified until needed by the engineer or technician in a breakdown or pressure situation.

**Figure 17:** The Triggered Response Element
The trigger response seemed to be non exhaustive in the short term, which implied that more tacit knowledge was held by the individual that could not be recognised than that could be recognised and easily processed. Further research is needed to establish the time frame for transferring this element of tacit knowledge and the percentage of knowledge that can be triggered and transferred. In follow up interviews with company B, the triggered responses were still happening after a 12 month period, the frequency had slowed down significantly but occasional situations arose were a response was triggered.

5.1.4 The Unknown Tacit Element

The fourth tacit element is all the remaining tacit knowledge, that can not be readily identified the Unknown Tacit Element (fig.18). It was acknowledged throughout the focus groups and interviews carried out in the cases studies that all the tacit knowledge of an individual had not been identified. In all cases it was accepted that an individuals tacit knowledge could not all be transferred as it is extremely difficult to identify an individuals knowledge base. The top layers could be recalled relatively easily through reflective practice but as you progress down the layers an external factor such as a trigger is needed for recall.
There is a very strong argument to suggest that tacit knowledge can be broken down into components that:

- Can be recognised by the individual.
- Not recognised by the individual.
- Not wanted to be shared by the individual.
- Communicated by the individual to peers.
- Understood and practiced by peers.

There are more components that can be added to this list...

(Clarke et al. 2007.p.147)

The unknown tacit element is being represented as a set of ever decreasing rings, the smaller the ring the more difficult to recognise and extract the knowledge. It can be suggested that the inner rings are so personal to the individual that they may never be recognised or shared.
The case studies demonstrate that over time, the outer rings can be recalled and transferred, but as the rings get smaller the time frame for recall extends, such that the unraveling of knowledge takes place over a period of months if not years. Also an external factor is needed to trigger a knowledge response.

When investigating the elements of tacit knowledge, it is difficult to come up with defined boundaries. There is a crossover between all the elements, and this has to be accounted for in the model. When considering the tacit to explicit element and the tacit to tacit element, this knowledge and how it is processed is dependent on the individual and their ability to communicate this information. In certain situations, it was found that the recalled knowledge could be made explicit, but was taught experientially (tacit to tacit) to reinforce learning. When evaluating the trigger response element of tacit knowledge, it was identified as having a tacit to tacit and a tacit to explicit element. There was no control over the recalled information and the form it was recalled in.

As knowledge was being identified and reflected upon, further layers of knowledge were identified and through further reflection the process was repeated and more tacit knowledge brought to the forefront. This process could also be observed with a triggered response, as a layer of knowledge was triggered and reflected upon, a further layer could be identified, which in turn could unlock the next layer through reflective process. In certain circumstances this could be repeated three or four times and in others it could be a one-off process.
In developing the tacit knowledge spectrum model, the elements of tacit knowledge need be clearly displayed and the associated implication of tacit knowledge transfer identified. Transferring tacit knowledge into explicit knowledge is not a straight forwards process and being able to target and implement appropriated methodology to deal with specific elements of tacit knowledge will facilitate the knowledge transfer process.

5.2 The Tacit Knowledge Spectrum

In order to start constructing a tacit knowledge spectrum we have to go back to the early writings of Polanyi and his book *The Tacit Dimension* (1966). Here Polanyi outlined the concept of tacit and explicit knowledge in that “we can know more than we can tell”. Polanyi’s concept of knowledge was that tacit and explicit knowledge were not separate categories of knowledge, rather they are an integral part of all knowing.

Nonaka and Takeuchi (1995) in their book *The Knowledge Creating Company* take forwards the work of Polanyi and separate out tacit and explicit knowledge. This can be seen in table 1 (Two Types of Knowledge, p.27). Nonaka and Takeuchi through the assumption that knowledge is created through the interaction of tacit and explicit knowledge, postulate four different modes of knowledge conversion which can be seen in figure 2. (The Seci Model, p.32). Nonaka and Takeuchi propose a cyclic approach in which tacit knowledge is shared throughout the organisation as it moves through the four modes of knowledge conversion, becoming explicit and evolving
into knowledge capital which becomes part of the company culture embedded into the workforce and working practices, again becoming tacit.

McAdam et al (2007), identifies that “a key dichotomy in the tacit literature exists. Are tacit and explicit knowledge two separate types of knowledge as suggested by Nonaka and Takeuchi (1995) or as Polanyi (1966) argues two dimensions of one?”

In order to start building a model of the tacit knowledge spectrum, this is the first fundamental question that needs to be addressed.

From the analysis of the case studies, it can be seen that a component of tacit knowledge can be identified and isolated. If you apply the theory of Nonaka and Takeuchi you can successfully argue that tacit knowledge can be turned into explicit knowledge which with time evolves into knowledge capital and again becomes tacit.

The fundamental problem with Nonaka and Takeuchi theory is the identification of tacit knowledge. Throughout the cases studies, it could be observed that the identification of tacit knowledge by an individual is problematic, the first layers of tacit knowledge come away relatively easily through reflective practice, but then a trigger is required such as group discussions or a pressure situation before the tacit knowledge is identified. For this reason Nonaka and Takeuchi’s theory is too simplistic, tacit knowledge can not be treated as a single entity which can be transferred in its entirety into explicit knowledge, the components that make up tacit knowledge are far more complex and need to be treated accordingly.

Leonard & Sensiper (1998, p.113), talk about knowledge existing on a spectrum:

Knowledge exists on a spectrum. At one extreme it is almost completely tacit, that is, semiconscious and unconscious knowledge held in
people’s heads and bodies. At the other end of the spectrum, knowledge is almost completely explicit, or codified, structured and accessible to people other than the individuals originating it.

Figure 19: Explicit and Tacit Knowledge as Two Dimensions of Knowledge

McAdam et al (2007, p.48)

The works of Leonard & Sensiper and Mc Adam et al can be further defined, with explicit knowledge on one end of the spectrum and tacit knowledge at the other, with a far narrower crossover (fig. 20). This then lends its self for tacit knowledge to be further broken down to represent a tacit knowledge spectrum.

Figure 20: A Knowledge Spectrum
McAdam et al (2007), *Exploring the dichotomies within the tacit knowledge literature*, acknowledge different epitomes of tacit knowledge, which reinforces the concept that elements of tacit knowledge can be isolated. The most frequently used epitomes of tacit knowledge were identified as follows (figure 21):

- **Intuition** – intuition is expressed as directly knowing or learning without conscious reasoning or making choices without formal analysis (Brockmann and Anthony, 1998).
- **Skills** – skills can include negotiation, physical, coordination or cognitive skills. This is perhaps the epitome that is most used without any form of definition.
- **Insight** – insight is used as an understanding, often in a sudden form but also as “glimpses” into knowledge (one’s own or others).
- **Know-how** – know-how is often expressed as the ability to put know-what into work which is to great extent the product of experience (Brown and Duguid, 1998).
- **Beliefs** – beliefs used as a set of understandings that reflect our perspective of the world.
- **Mental Models** – mental models are cognitive structures formed by the abstractions of experience. They reflect our perspectives of the world around us (Giunipero et al, 1999).
- **Practical intelligence** is expressed as “a persons ability to apply components of intelligence to everyday life” (Somech and Bogler, 1999)
McAdam et al, (2007, p. 43)

McAdam et al (2007) go on to say that “although tacit knowing is perceived as highly individual and personal, many of the epitomes refer to more collective forms of tacit knowing”. They also note that several of the concepts can be considered abstract in the sense that they can not be conveyed to others, such as intuition and gut feelings.

From the findings of McAdam et al, it can be seen that the epitomes of tacit knowledge lend themselves to the concept of a tacit knowledge spectrum, at one end of the spectrum we will have epitomes that can not be conveyed to others and on the opposite end of the spectrum will be epitomes which refer to more collective forms of tacit knowing.
5.2.1 The Transferring of Tacit Knowledge

From the carrying out of the case studies, it could be observed that when asked to reflect on as process or procedure, a reflective cycle was carried out as suggested by Kolb, (1984). As the individual started to process their tacit knowledge, the reflective cycle came into play and further layers of knowledge rose to the surface. This process is represented in a feedback loop in figure 22 and represents the Unknown Tacit Element.

Figure 22: The Reflective Process

Through further investigation and observations, it became apparent that a triggered response reflective cycle was also contributing to the recall of tacit knowledge. As the individual discussed the recalled tacit knowledge in a group or one to one environment, or in a pressure situation such as a breakdown in production, this triggered a further recall of tacit knowledge. This again on reflection could expose further layers of knowledge. This triggered response is represented as a second feedback loop, fig 23 and represents the Triggered Response Element.
Through out the case studies, recalled tacit knowledge could be identified as two different elements, a tacit element that could be transfer directly to tacit knowledge through experiential learning due to its complexity and an explicit element that could be turned into explicit knowledge, this can be seen in figure 24, the Tacit Knowledge Transfer Model. As these two elements of tacit knowledge, the tacit element and the explicit element are integrated into existing knowledge, a third reflective cycle is carried out. As each reflective cycle is carried out, a deeper layer of tacit knowledge is revealed.
5.3 The Tacit Knowledge Spectrum Model

The four elements of tacit knowledge identified throughout the case studies are represented within the tacit knowledge spectrum model fig 25. The model outlines the complexities involved with tacit knowledge transfer and the reflective processes that need to be carried out. The unknown tacit element is represented by layers of tacit knowledge with reference to the epitomes such as intuition, skills, insights etc. The trigger response element is represented through group discussions, breakdowns and associated problems, but this list is only an example of situations that induce a trigger response. Further investigation is needed to identify the range of triggers and their effectiveness.
The tacit element is represented by recalled tacit knowledge transferred experientially along with the explicit element, represented by recalled tacit knowledge transferred explicitly. The final knowledge output represents the transfer of tacit knowledge which can be through tacit to tacit transfer or explicit to explicit knowledge transfer.

Throughout the tacit knowledge literature, the likes of Nonaka (1995), Baumard (1999), McAdam (1199), Stewart (1977), make references to three forms of tacit knowledge:

- Individual Tacit Knowledge
Chapter 5: The Tacit Knowledge Spectrum

- Group Tacit Knowledge
- Organisational Tacit knowledge

When carrying out the case studies, tacit knowledge was transferred at all three levels, individual tacit knowledge through the retiring engineer, group tacit knowledge through the development of new working practices on the production lines and organisational tacit knowledge in bringing together working practices and protocols for glue handling. The same experiences and reflective cycles were observed and reported at all three levels. The above model can be used to facilitate tacit knowledge transfer across the tacit knowledge spectrum.

5.4 Summary

With the near collapse of the apprenticeship system (a well tried and tested method of tacit knowledge transfer) and an ageing skilled work force especially within the engineering sector; the need for organisations to investigate tacit knowledge release is of high importance. The results of the case studies, point to tacit knowledge transfer taking place, but by no means was all the tacit knowledge available to the organisation transferred. This point was readably agreed upon by the academics, the organisation and the employees involved in the case studies.

The current literature on tacit knowledge and its transfer, treat tacit knowledge as a single entity in terms of knowledge transfer. From analysis of the case studies, it was found that tacit knowledge can be recalled in different forms, tacit knowledge that
could easily be turned into explicit knowledge, tacit knowledge that was easier
transferred through experiential learning straight into tacit knowledge and tacit
knowledge that only came to the for-front through the aid of a trigger and tacit
knowledge that was personal to the individual but not identifiable.

The development of the Tacit Knowledge Spectrum Model represents the elements of
tacit knowledge identified within the case studies and there inter-relationships. The
complexities of tacit knowledge are represented in a graphical format. The aim of the
model is also to show that there are different levels of tacit knowledge, levels that can
easily be recalled and transferred, through to levels that an individual can not identify
and may take years to unravel and transfer. The model is not complete, as it is
anticipated that through further research and cases studies, more elements of tacit
knowledge will be identified that can be added to the model and the model expanded.
By fully understanding the complexities of tacit knowledge and the inter-relationship
of the elements of tacit knowledge, knowledge transfer and the management of tacit
knowledge should become a more successful and a useful resource to organisations.
CHAPTER SIX:

CONCLUSIONS & FURTHER AREAS OF RESEARCH
6.0 Introduction

As the world economy shrinks and the UK enters recession, Knowledge Capital Management within the workplace is of vital importance. As companies down size and lose employees, large amounts of the company’s knowledge capital in the form of tacit knowledge will walk out of the door and be lost for ever. Companies that can adopt methodologies and procedures to capture this knowledge before it is lost will be better placed to survive the recession and prosper with the up turn in their market place.

The UK Government has recognised the importance of up-skilling the workforce and the impact that it will have to the economy through the publication of the Leitch Report on Skills (2006). Leitch talked about the need to have more than 40% of the adult workforce educated to L4 Qualification by 2020. Traditional higher education modes of training will not be able to support such an influx, so new methodologies need to be developed for up-skilling in the workplace.

The aim of this chapter is to conclude the findings of the research into tacit knowledge and the development of The Tacit Knowledge Spectrum. As this research has progressed, further areas of research have been identified; this chapter suggests future areas of research and development which will enhance the understanding of the management of tacit knowledge and expand on theory of the tacit knowledge spectrum.
6.1 Review of Objectives

The aims of this research was to develop a taxonomy of approaches to Knowledge Management in a number of organisational contexts and to explore the effectiveness of various interventions designed to promote the conversion of Tacit Knowledge into Explicit Knowledge within organisations, through CPD and WBL techniques.

Objective 1

To undertake a critical review of relevant literature, to develop an understanding of tacit knowledge and explicit knowledge and ways in which tacit knowledge can be converted into explicit knowledge.

A critical review was carried out of current literature to develop an understanding of tacit knowledge and its relationship to explicit knowledge, and ways in which tacit knowledge can be managed and converted into explicit knowledge. Through this review, it became apparent that there were two main arguments with regard to tacit knowledge transfer:

1. All tacit knowledge could be transferred into explicit knowledge,

2. Tacit knowledge was personal to the individual and could not be transferred.
On further investigation, a small number of publications were found that suggested that may be there was a more complex argument as to how much tacit knowledge, held by an individual could actually be transferred into explicit knowledge.

The current methodologies available on tacit knowledge transfer treat tacit knowledge as a single entity that can be turned straight into explicit knowledge, which with time become embedded into working practices of the individuals exposed to the information and becomes tacit again.

No reference could be found to the argument that tacit knowledge comprises of different elements that need to be recognised and managed appropriately to facilitate knowledge conversion. Secondly, there were no references to the concept of a tacit knowledge spectrum that was made up of different elements of tacit knowledge.

The results of the case studies confirm that tacit knowledge can be transferred into explicit knowledge, but the process is far more complex that a straight conversion to explicit knowledge as suggested in previous publications. Serious considerations have to be made on the best way to manage the tacit knowledge that is being extracted i.e. is it recorded as explicit knowledge or transferred through an experiential teaching and learning process straight to tacit knowledge of the taught individual.

Objective 2

To investigate organisational approaches to knowledge management and the management of the relationship between tacit and explicit knowledge.
The second objective of this research looked at reviewing knowledge management techniques currently being used within organisations and their relationships with tacit knowledge management. The initial findings indicate that tacit knowledge transfer is taking place, but that it is usually included in a more complex model and is a by product of the process and could not readily be identified. The knowledge management models in some cases are aware of tacit knowledge, but they do not target it directly and only recognise it as a single entity to be transferred directly into explicit knowledge.

Through further investigation, Work Based Learning and Continuous Professional Development techniques were identified as being appropriate methods of targeting tacit knowledge within an organisation and facilitating its management and its transfer.

Objective 3

To test a series of interventions designed to promote understanding of knowledge management and the conversion of tacit knowledge into explicit knowledge and to investigate the extent to which tacit knowledge can be transferred into explicit knowledge.

The third objective was to develop a model to assess the relevant aspects of an organisation’s approach to knowledge management and its understanding of the relationship between tacit and explicit knowledge. A series of interventions designed to promote understanding of knowledge management and the conversion of tacit knowledge into explicit knowledge were developed, based on the model of Chisholm et al (2006), in the publication, Continuous Professional Development (CPD) By Work
Based Learning (WBL) Toolkit. Sections of the toolkit identified the importance of tacit knowledge and developed methodology to aid its transfer. The toolkit in its entirety was deemed to be too complex for the needs of the research, so sections of the toolkit were reviewed and developed to focus in on the management of tacit knowledge.

The interventions developed through this research were trialled in two case studies, in conjunction with two SME’s in the South Wales region. The case studies investigated the strengths and weaknesses of transferring tacit knowledge into explicit knowledge and the implications to the individual and the organisation. The analysis of the results of the cases studies indicated that tacit knowledge transfer had taken place, but it was not a simple transfer of tacit to explicit knowledge.

It was established in the case studies that tacit knowledge could not be treated as a single entity but was made up of different components. Four elements were readily identifiable, but through further research, it is expected for this number to increase. In order for tacit knowledge transfer to be effective, it was identified that each individual element of tacit knowledge needs to be considered and an appropriate methodology adopted for the transfer of that element.

Analysis of the case study results identified that the recalled knowledge was not necessarily in a suitable form to be turned straight into explicit knowledge. A component of tacit knowledge was identified that was easier to transfer through an experiential learning process from one individual to another. The complexity of the knowledge and the ability of the individual to express the said knowledge in an explicit
form were not compatible. The individual could demonstrate or explain but could not record the knowledge in an explicit form that could be useful for colleagues.

It was acknowledged by the organisation, the individuals and the author that by no means all of the tacit knowledge held by the individual was transferred. As a component of tacit knowledge was identified that needed a trigger response for recall, time plays an important role in tacit knowledge transfer. Tacit knowledge management needs to become part of company culture to be truly effective, as recall of certain knowledge may take months or even years to be identified by the individual when presented with the appropriate trigger.

Objective 4

To develop a model to represent The Tacit Knowledge Spectrum.

The fourth objective was to develop a model to represent The Tacit Knowledge Spectrum. From analysing the results of the case studies, tacit knowledge was identified as being able to be broken down into different elements. The four elements identified were:

1. A tacit to explicit element, that could be easily recalled and that could be recorded in an explicit form.

2. A tacit to tacit element that was required to be transferred through experiential learning and transferred straight to tacit knowledge.
3. A triggered response element that could only be recalled when prompted by a trigger. Once recalled, this knowledge could be in either of the previous two elements form.

4. An element of tacit knowledge that was not easily identifiable, but was made up of numerous layers and levels of tacit knowledge, that needed to be identified through further research.

The elements identified within this research are by no means all of the elements that make up the Tacit Spectrum, further extensive research and case studies will be needed to unravel the layers and understand the inter relationships between the elements.

The final section of this research developed a model to represent The Tacit Knowledge Spectrum (fig.24). It can be seen from the findings of the knowledge review in chapter 2 that in current academic publications tacit knowledge is treated as a single entity that is transferred directly to explicit knowledge. This research argues that this view is far too simplistic and that tacit knowledge is made up of a number of elements of which four are readily identifiable.

The elements of tacit knowledge and their interrelationship have been analysed and represented in the form of the tacit knowledge spectrum. The graphical representation of the tacit knowledge spectrum gives an instant visual view of the interrelationship of the tacit elements and the complexity of trying to retrieve the tacit knowledge by the individual.
Figure 25:  The Tacit Knowledge Spectrum

6.2  The Contribution of the Thesis

The literature review in chapter 2 was carried out to establish current academic standing with regards to tacit and explicit knowledge and the transfer of tacit knowledge into explicit knowledge. From this literature review, it was established that tacit knowledge
is viewed as a single entity when dealing with knowledge transfer. Furthermore, in order to transfer tacit knowledge it has to be converted into explicit knowledge.

Through the writing of this thesis and the carrying out of the research, it can be seen that this is simply not the case. Through the carrying out of the case studies, it was identified that tacit knowledge is not a single entity and that it can be broken down into elements that need to be considered individually in order for tacit knowledge to be transferred successfully. One of the main fundamental problems when dealing with tacit knowledge is that the persons recalling the knowledge may not be able to express themselves in an eligible form that can be recorded explicitly and understood. Tacit knowledge was identified by individuals that could only be articulated through person to person teaching, due to its complexity and relevance to a situation i.e. a computer programming operation, a tacit straight to tacit exchange of knowledge.

A further element of tacit knowledge was identified, that could not readily be identified by individuals, but could be recalled when triggered through a situation such as a production breakdown or request for certain information. This triggered tacit knowledge could be recalled as a tacit to explicit element or a tacit to tacit element. This triggered response is an ongoing process, with the potential to role out over months if not years. The recalling of tacit knowledge is a cyclic approach, as one layer of knowledge is identified or triggered; further layers are opened up on reflection of this information, again triggering the unlocking of deeper layers.
Through further investigation, a fourth element of tacit knowledge was identified. This element has been represented in the tacit knowledge spectrum as a layer of ever decreasing rings. The ever decreasing rings represent the increased complexity of trying to transfer this knowledge. It is believed by the author, that through further research that this element of tacit knowledge could be divided further and the spectrum model expanded.

No publications could be found that make reference to the concept of a tacit knowledge spectrum or the modelling of such a spectrum, the closes reference is Leonard & Sensiper (1998) who talk about a knowledge existing on a spectrum. Saint- Onge & Wallace (2003) and Chisholm et al (2006) concede to there being a more complex argument to tacit knowledge transfer. Through the development of the tacit knowledge spectrum (fig. 24) the identified elements of tacit knowledge have been conceptualised into an easily-recognisable format. The model gives a clear view of the complexity of tacit knowledge and the inter-relationships of the elements. From first observations, it can be seen that tacit knowledge cannot be treated as a single entity and consideration has to be given to the individual elements to enhance efficient tacit knowledge transfer.

When evaluating current knowledge management techniques, tacit knowledge is not specifically targeted, but is usually a by product of the process. It can be seen from this research, that tacit knowledge transfer can be achieved using CPD and WBL techniques. From this thesis, the elements of tacit knowledge have been identified, and the implications of managing their transfer. Buy adopting these findings into existing methodologies of knowledge transfer and targeting tacit knowledge, greater gains can
be made it the up-skilling of the workforce and the facilitation of knowledge capital for organisations.

Tacit knowledge and its potential value to organisations can not be ignored any longer. The contribution of this research and thesis is to identify the elements of tacit knowledge and the development of a model to represent the tacit knowledge spectrum, to enable the development of new methodologies for effective tacit knowledge transfer and the efficient management of organisational knowledge capital.

6.3 Limitations of the Research

The research carried out generated more questions than those that were answered. In the case of the element of hidden tacit knowledge identified, it can be seen that this element is made up of many different components that are not readily identifiable. The complexity and inter-relationships of these components is high. Further targeted research is needed to identify theses components and their inter-relationships. Once these components have been identified, further work will be needed to evaluate whether these components can be treated as an element of tacit knowledge and be incorporated into the tacit knowledge spectrum model. Until this research is carried out, a full understanding of tacit knowledge and its transfer will not be known.

Secondly, further research needs to be carried out on the type of trigger that can cause a recall in tacit knowledge. It could be seen in the evaluation of the cases studies that a
number of different triggers were able to cause a tacit recall. If certain types of trigger can be established and their effectiveness evaluated, a better understanding of tacit knowledge transfer will be established.

Thirdly, research is needed to establish the amount of tacit knowledge that has been transferred from an individual on a said subject. It is extremely difficult at this point to estimate the percentage of tacit knowledge on a subject that has actually been transferred. From the case studies and interviewing personnel who took part in the studies, it can be suggested that as low as 10% of actual tacit knowledge had been transferred.

Finally research needs to be targeted to the effects of emotional intelligence. When the case studies first started, employees were reluctant to exchange knowledge as they were concerned about the motives of the company and university in carrying out the research. The flow of information was slow. As the employees became more comfortable with the process and they could see the advantages first hand the flow of knowledge increased. To what extent information was withheld are unknown and the reasoning behind withholding the said information. In order to manage tacit knowledge transfer effectively, reasons for withholding information need to be established and methods for retrieval established.
6.4 Further Areas of Research

As this thesis has developed, a number of observations have come to light which can be identified as further areas to research. Through the close collaboration with industry, in carrying out the case studies, the true complexity of tacit knowledge transfer has been identified.

6.4.1 The Unknown Tacit Element

When evaluating the results of the case studies, a body of tacit knowledge was identified and labelled as The Unknown Tacit Element. This body of tacit knowledge was not a single entity but made up of different components of tacit knowledge. The case studies indicated that this element was made up of layers, which over time slowly unpick and are made available to the individual. These layers are represented on the Tacit Knowledge Spectrum Model as a set of ever decreasing rings, the inference being that the smaller the ring the more difficult to recognise and extract that knowledge.

From the case studies and further work that has been continued by company B independently, it was found that these layers could take months if not years to unwrap and it was felt that it could be a continuous process that may never be fully completed. In order to fully understand tacit knowledge transfer an understanding of the inter-relationship between these rings need to be established. Carrying out of this research
will be complex; requiring case studies with industrial partners, carried out over an extended period time.

### 6.4.2 Investigate the Cost to Return Ratio for Tacit Knowledge Transfer

From the results of the case studies, it can be seen that a small percentage of tacit knowledge can be identified and transferred relatively easily. The cost to return ratio of transferring this knowledge is low. It can be seen from the feedback received in the case studies that there are other components of tacit knowledge that are difficult to identify and only become apparent over an extended period of time. The cost of transfer of this knowledge to return ration is high.

In order for companies to buy in to the concept of tacit knowledge management and justify the changes and expenses needed for tacit knowledge management to become part of the organisation culture, an understanding of the cost in terms of resources, personal and company commitment needs to be clarified. Research is needed to establish the cost to return ratio for organisations and the realistic levels of tacit knowledge that can be transferred before it ceases to be cost effective in terms of money and knowledge transfer. Understanding the costs associated with tacit knowledge transfer, will help to identify the outstanding elements of tacit knowledge and further enhance the Tacit Knowledge Spectrum Model.
6.4.3 The Knowledge Repository

On completion of the case studies, Company B continued in the pursuit of tacit knowledge management. The advantages of tacit knowledge management were recognised by the senior managers who took part in the case studies and a decision was taken to role out programme across the company. From the experiences gained through the cases studies, a programme of action was taken up including setting up a Knowledge Repository.

The company set up a working group of senior engineers who meet at frequent intervals to reflect upon the problems that occur in the manufacturing process. A full cross discipline evaluation of the problem is carried out, and the findings are recorded on an online knowledge repository assessable by all personnel across the company both at home and internationally. The web based data base has been designed with standardised forms that relate to the operational processes and a history of problems and outcomes is readily available (tacit to explicit knowledge transfer), and is constantly evolving. The feedback from the company indicates that up to 30% efficiency gains have been made across some processes and that the knowledge base is constantly evolving and growing.

A research opportunity exists for academic scrutiny of the efficiency and value of tacit to explicit knowledge transfer through the setting up a knowledge repository. Company B is using the Knowledge Repository to very good effect and has every intention in continuing with the process and rolling it out across its European subsidiaries.
6.5 Personal Reflections

The transfer of knowledge has always been in the forefront of my working experience, from starting work at sixteen as an apprentice, managing training profiles of employees as the General Manager of an engineering company, through to my current post as a Senior Lecturer in the engineering department at the University of Wales, Institute, Cardiff. The experiences gained over a 30 year period have given me a good insight into the knowledge transfer process. The carrying out of this research and the writing of this thesis have given me the opportunity to reflect on my own experiences of learning in a tacit to tacit knowledge transfer environment and lecturing in an explicit knowledge dominated environment. It has given me the opportunity to combine these experiences in a research environment and identify that tacit knowledge is made up of different elements that can be combined to develop the tacit knowledge spectrum model.

The problems associated within organisations in managing their knowledge capital are not easily solved. The writing of this thesis has looked at identifying some of these problems and developed a model to help organisations conceptualise and target the specific tacit knowledge that they wish to transfer and in what form this needs to be managed. By further understanding tacit knowledge and its elements, organisations will be able to improve their efficiency and understanding in the managing of tacit knowledge capital. Tacit knowledge is an important resource that organisations need to recognise and manage, especially in these times of recession and major job losses. Organisations can not afford to lose their knowledge capital along with their employees.
The writing of this thesis has been a humbling experience, my personal understanding of knowledge management and its transfer has grown tremendously and I will continue to research within the knowledge management field. The writing of this thesis for me personally has developed many more questions than I have answered and in order for knowledge management to take place smoothly and efficiently within organisations, some of these question will need to be addressed.


Foster, E. J. & Saunders, S., 1996, "Comparable but Different: Cultural Differences in Work-Based Learning", in ECER.

Fowler, H. N. 1953, Plato, Phaedo, 65e, in Plato I Harvard University Press.


Haldane, E. S. & Ross, G. R. T. 1911, René Descartes, Discourses on the Methods Cambridge University Press.


McAdam, R. Mason, B. & McCrory, J. 2007, Exploring the dichotomies within the tacit knowledge literature: towards a process of tacit knowing in organizations, Journal of Knowledge Management, Vol.11, No. 2


Rammell, B. 2006, *Minister for Lifelong Learning and Higher Education*, DfEE.


APPENDICES - 1
Extracts From Meetings and Feedback

Background Information

************* is a very experienced engineer who is close to retirement age. The current situation is that much of his knowledge of the systems currently employed in ************* is not captured in any way. He attends a high percentage of breakdowns in the production area and is the backbone of all program modifications on Lines 1, 2, and 3. He is highly respected and does his best to inform / teach the engineers and technicians who work along side him his knowledge and skills. This knowledge transfer usually takes place in the form of a conversation over a cup of tea for example.

The objective of the project is to capture ************* knowledge which is currently in the Tacit form and convert it to Explicit knowledge before he retires.

Also, throughout the project, identify the importance of CPD in the workplace and how it can help engineers and the organisation at all levels.

Meetings

Preparation for initial meeting

Knowledge requirements for all Lines were identified prior to the first meeting. This helped categorise the areas of knowledge required.

Line 1

☐ Small amount of Omron PLC programming

☐ Good fault finding skills and analysis work.

☐ Basic tooling design knowledge.

☐ Electrically / mechanically biased does not matter.
Opto 22 programming and offset adjustment knowledge
Good fault finding skills and analysis work.
Basic tooling design knowledge.
Electrically / mechanically biased does not matter.

Epson Robot programming

Basic tooling design knowledge.
Good fault finding skills and analysis work.
Epson Robot programming
Good organisation skills
Servo programming
Omron PLC

Insight Vision software
Knowledge of listen sound check systems
Individual speaker requirements
Team Members:

The first few meetings were centred on the Engineers’ being honest about their current knowledge level and then getting this information in written form so that it could be studied and talked about.

What developed was some quite heated dialogue at times where Engineers became defensive about the information they were giving as to the level of knowledge they had. It took some time before the Team became at ease with the objective of the meeting.

Areas of Knowledge Identified and Individual analysis

**********: Senior Engineer within the organisation. Has a vast amount of knowledge and experience. Generally respected by other engineers, although sometimes frowned upon as he records very little of what he does daily and ‘gets by’ completely on Tacit – Local knowledge.

Current attributes:

- Complete plant breakdown coverage
- Opto 22 expertise
- Omron programming expertise
- Small projects
- Limited speaker knowledge
- Excellent fault finding skills
- Excellent vision system understanding
- Is not scrap and efficiency driven.
Good Epson robot programming

*********: Good process engineer but requires motivating and continual prompting to achieve his goals. Generally accepts CPD as being valuable to aid his progression, but has little motivation to engage it.

Current attributes:

☐ Epson Robot knowledge
☐ Process knowledge line 2, 3
☐ Opto 22 for New Projects
☐ Limited project management
☐ No design experience
☐ Average fault finding skills
☐ Scrap and efficiency driven
☐ Average Epson robot programming

**********: New to the organisation. Very experienced with Test equipment and processes generally. Is eager to progress CPD.

☐ Limited process knowledge
☐ Good speaker knowledge
☐ Excellent test system knowledge
☐ Average fault finding skills
☐ Limited vision system understanding
☐ No Epson robot programming
**********: Very experienced with over 15 years with then company, confident on most equipment to a level he is comfortable with, currently does not see the value of CPD as he is happy with current situation.

Current attributes:

- Average fault finding skills
- Average Omron programming skills
- Good speaker knowledge
- Average fault finding skills
- Limited Opto 22 programming
- Limited Epson robot programming

**********: Recently promoted, Lacks confidence when working on equipment, good team player, a follower rather than a leader.

Current attributes:

- Average fault finding skills
- No Omron programming
- Average speaker knowledge
- Below average fault finding skills (new to position)
- No Opto 22 programming
- No Epson Robot programming

Barriers to learning and Progression

It became apparent very early in the project that reflection and commitment to the project would be very difficult to sustain. This was for a number of reasons.
Currently within the Organisation, Multi-discipline Line teams have been established for all areas with the goal of providing complete support to the lines. The teams contain representatives from Quality department, Process Engineering, Maintenance, Production Management and Production team leaders. The team’s objectives are to drive Scrap down, Efficiency up Changeover time down, Breakdown time down, all to budget levels. The teams meet once per week to discuss performance against the Key Performance Indicators. All members of the team are measured on the above KPI’s. This is where the problem lies.

Earlier in the year, some lines performed better than others, for one line, performance declined and for another line, performance stayed the same. The 2 areas that did not improve, all members of the team did not receive annual pay increases.

The situation today is that members of the project team involved in the line teams are very reluctant to engage in any activity other than activity that influences line performance. Because of this, meeting attendance was poor and individual moral was low. It became increasingly difficult to explain to the team the benefits of what we were trying to achieve.

Another reason was ******** lack of enthusiasm to transferring his knowledge. This was not because he did not want others to know what he knew, rather, the amount of people he had previously trained in various areas of technology, had subsequently left the organisation. This was very frustrating to him.

Time is another factor. Sometimes the best time to learn is when the fault is present during production – i.e during the breakdown scenario. It didn’t take long before the breakdown
situation became a pressurised situation when K********was sharing with Engineers the methodologies he was using to identify the fault at hand.

Individual confidence and agreement of the objectives was another barrier.

**Continuous Professional Development**

Not all aspects of the project were difficult to employ.

The engineers actively engaged some areas of CPD. ************** all engaged in researching how they could improve their current knowledge base and qualifications via external learning providers having identified areas where they were lacking early on in the project. All subsequently identified what was best for their current level of development and are now actively enrolled and partaking BEng hons degree, HND, NVQ level 3 respectively.

Out of the initial meetings, we were able to identify the training needs of the team members, so that some of the knowledge gap may be bridged by employing external training resource. This has proved effective for ***** and ***** who now have increased knowledge in Omron PLC programming and Vision System Programming respectively. The training has been provided on site and tailored to our needs, with all course criteria documented.

************ has been the engineer who has reflected the most. He realised that the methodology he was adopting to transfer his knowledge was not working. What he has done is develop a set of documentation detailing schematics, operation detail and basic fault finding guides to some of the areas where other engineers had been lacking. Instead of providing instruction during the breakdown phase, he now has given briefings and gone through his documentation with the engineers at more suitable times. This has proven to be more rewarding.
Conclusion

The initial meetings were beneficial as they identified the knowledge gaps currently within the department. Initially, some Engineers did not understand the concept of Tacit knowledge and it’s role in the progression of CPD, although this became less evident throughout the next few months where Engineers identified their strengths, weaknesses / knowledge gaps and pursued education and training programs to satisfy their needs.

The learning sets were difficult to deploy basically due to the change in climate regarding appraisal methods within the organisation.

In my view, CPD is crucial for the development of all Engineers and a limited amount of hours per year should be dedicated to their progression. This is beneficial to both Engineer and Organisation. Until this is fully understood by the Organisation, Engineers will continue to pursue qualification based CPD with the aim of progressing their careers outside the Organisation. Tacit knowledge will remain un-captured and Current Engineering staff will progress blindly in the pursuit of the knowledge required to perform at the highest level.
Learning Needs Analysis

Please complete the following Information & questionnaire.

Department:

Position:

Shift:

Sex:

Age: under 20  20-30  30-40  40-50  50-60  60+

Length of Service:
<table>
<thead>
<tr>
<th>No</th>
<th>Statement</th>
<th>Absolutely Agree</th>
<th>Partially Agree</th>
<th>Note Sure</th>
<th>Partially Disagree</th>
<th>Totally Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>The organisation uses mentors/facilitators within the organisation to develop other individuals in the organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>Staff are actively encouraged to drive their own personal development via the workplace.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>3</td>
<td>You are aware that through effective Continuous Professional Development you can contribute to organisational change to drive growth and efficiency in the organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>4</td>
<td>The organisation is one which places emphasis on the development of the ability to deliver through reflective practice.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>5</td>
<td>The organisation regards the individual as having a key role in the developing of the organisation as a learning organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td>The organisation makes it clear that Continuous Professional Development learning is a partnership where both organisation and employee mutually benefit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>7</td>
<td>I feel confident that the organisation would recognise experience based learning in the workplace as a means of achieving Continuous Professional Development.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>8</td>
<td>The organisation is one which encourages active reflection in relation to all aspects of job delivery and targets achievement.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Statement</td>
<td>Rating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------</td>
<td>--------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>I have heard tacit knowledge being discussed in the organisation as important to the future of the organisation.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>I am confident that I can differentiate between tacit and explicit knowledge in the organisation.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>11</td>
<td>This organisation has made staff aware that tacit knowledge plays a key role in the way they deliver both as an individual and in collaboration with others.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>I have been made aware of the range of knowledge based skills which could be developed through experiential learning in the workplace.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>The organisation has made employees aware that work based learning offers structures which can be accessed at any stage of an individual's career in the organisation.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>Staff in the organisation are aware that tacit knowledge is difficult to capture in the organisation.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>In the organisation it is acceptable to admit to a lack of needed knowledge and skills and expect development advice.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>I am aware that tacit knowledge is made up of the collective attitudes of employees in the organisation.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>17</td>
<td>The organisation has made staff aware that knowledge transfer is the vehicle to encourage renewal of tacit knowledge.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>I understand the value of group working in relation to in Continuous Professional Development the workplace.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>19</td>
<td>The organisation is aware of the need to share forms of tacit knowledge of the organisation with the customer base.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>20</td>
<td>I consider that innovation in the organisation is best sustained by continuing experimental learning of employees.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>21</td>
<td>After implementation of experiential work based Continuous Professional Development, the organisation would evaluate feedback on effective changes in the organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>22</td>
<td>As a learning organisation, staff understand that there is open discussion of what has been learned from mistakes.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>23</td>
<td>I believe the development of the organisation as a community of practice would encourage better working based Continuous Professional Development practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>24</td>
<td>I would feel comfortable to put trust in my colleagues and publicly reflect on personal development issues.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>25</td>
<td>I believe that I could contribute to learning by questioning the working practices of the organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>26</td>
<td>This organisation operates as an extended family where it is accepted that the individual has needs, feelings, prejudices, skills and limitations that need to be addressed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>27</td>
<td>The culture of the organisation is that of being supportive and concerned for our colleagues.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>28</td>
<td>My organisation is one where I would feel comfortable to question underlying assumptions relating to the practices of the organisation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>29</td>
<td>The organisation is one where an atmosphere of trust has been established by effective communication.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>30</td>
<td>I am friendly, outgoing and social with my work colleagues in the organisation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>31</td>
<td>Business/Technological growth is achieved through specific projects and learning paths to support delivery.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>32</td>
<td>Staff are expected to communicate and work with each other, to assist the’ learning of others in the organisation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>33</td>
<td>Staff are developed in the workplace in relation to people interaction and problem solving skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>34</td>
<td>I feel that I can give the commitment, natural self motivation and time to achieve professional development through work based learning in the workplace.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35</td>
<td>Staff have continuous learning and development in the organisation through the mechanism of experiential problem oriented work based learning.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Statement</td>
<td>Rating</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------</td>
<td>--------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>36</td>
<td>I would be pleased if the organisation introduced a regular learning</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>review to facilitate and support relevant Continuous Professional Development.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>37</td>
<td>I am aware that tacit knowledge is fundamental to my continuing</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>professional development.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>38</td>
<td>This organisation is a primary factor in developing of competitive</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>advantage..</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>39</td>
<td>I am confident that I know the knowledge based advanced skills which I</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>need to achieve further personal growth.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>40</td>
<td>I am aware that it is important to identify tacit knowledge and convert</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>it to explicit knowledge to sustain the knowledge capital of the</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>organisation.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>41</td>
<td>Staff are aware of how to and the need for tacit knowledge in the</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>organisation to be integrated with explicit knowledge.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>42</td>
<td>The organisation is aware that Continuous Professional Development needs</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>to be used with all levels of the organisation to achieve a paper balance</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>of team build up and mind culture change.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>43</td>
<td>I feel that to get more involved in innovation with in the organisation</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>that I need further Continuous Professional Development in relation to</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>knowledge and skills.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44</td>
<td>The organisation encourages staff to reflect and evaluate using the</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>experiences of the workplace.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>I see reflection mainly as a practice for the individual and private to the individual.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>46</td>
<td>I believe that reflection would help me to achieve growth in professional learning.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>47</td>
<td>This is an organisation where people reflect upon and alter were appropriate working behaviour.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>48</td>
<td>The staff of the organisation, have been made aware that knowledge creation and transfer is seen as a collective activity where learning is part of each individual's job.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>49</td>
<td>The learning in the organisation is stimulated and supported by experimental 'hands on' action based learning.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>50</td>
<td>I feel that I have the abilities to benefit from work based Continuous Professional Development and that this will enhance my performance.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>51</td>
<td>Knowledge based skills development is actively pursued as a policy by the organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>52</td>
<td>I am aware that tacit knowledge can best be developed by experiential work based methodologies.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>53</td>
<td>The organisation has made employees aware of the value of the organisation's knowledge capital and the contribution that is made by tacit knowledge.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>54</td>
<td>In the organisation it is clearly understood that the updating of tacit knowledge is important to the sustainability of the organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>55</td>
<td>The organisation encourages progressive discussion with staff as to what they have learned from the delivery of projects / products / services in the workplace.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>56</td>
<td>The organisation supports an environment where creativity and innovation are welcomed.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>57</td>
<td>I am aware that I have been learning through my work activities and that much of this was tacit.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>58</td>
<td>I would be committed to achieving CPD targets agreed between management and myself.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>59</td>
<td>Thinking constantly about my problem solving processes is not something which comes easily.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>60</td>
<td>The organisation promotes the importance of Continuous Professional Development as a means of developing as a learning organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>61</td>
<td>Staff are encouraged to develop communication techniques into Their working practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td>62</td>
<td>Staff are developed by attending short courses either internally or externally.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>Statement</td>
<td>Rating</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>--------------------------------------------------------------------------</td>
<td>--------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>63</td>
<td>Staff in the organisation have been made aware that tacit knowledge is important for the continuing growth of the organisation.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>64</td>
<td>I know that I could develop new advanced skills through an established community of practice in the organisation.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>65</td>
<td>The organisation has established ways to convert tacit knowledge to explicit knowledge for Continuous Professional Development.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>66</td>
<td>Usually, requests to have Continuous Professional Development which I want, is highly supported.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>67</td>
<td>I feel that I can contribute to the development of the organisation without the need for further Continuous Professional Development.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>68</td>
<td>After implementation of experiential work based Continuous Professional Development, the organisation would effectively evaluate the outcomes in relation to organisation improvement.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>69</td>
<td>The organisation will facilitate and make time for work based learning to underpin the delivery of new ideas.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>70</td>
<td>It is clear that the organisation is based on action; not reflection.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>71</td>
<td>I believe that I have sufficient insight regards my strengths and weaknesses to identify where workplace learning can help.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>-----------------------------------------------------------------</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td></td>
</tr>
<tr>
<td>72</td>
<td>I have participated in learning discussions with colleagues I feel that I can trust.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>73</td>
<td>I believe that critical reflection on the organisation's practices is best achieved through team working.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>74</td>
<td>I feel the organisation is one which sets goals and targets as fair and reasonable.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>75</td>
<td>The organisation is driven by providing learning opportunities for the individual in the organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>76</td>
<td>Staff are actively encouraged to deliver through teamwork and net working.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>77</td>
<td>Learning within the organisation must be designed to benefit both the organisation and the individuals participating.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>78</td>
<td>I have taken part within the organisation in team meetings involving reflection and discussions on working practices.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>79</td>
<td>I see my organisation as one which invests in Continuous Professional Development of its employees.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td>80</td>
<td>I have benefited from the support of a senior manager acting as a mentor regards my learning development in the organisation.</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Statement</td>
<td>Score</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---------------------------------------------------------------------------</td>
<td>-------</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>81</td>
<td>I am aware that for effective Continuous Professional Development in the workplace that account has to be taken of the individual and collective attitudes of employees and customers.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>82</td>
<td>The organisation is committed to delivery of products and services through developing as a learning organisation.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>83</td>
<td>The organisation would provide the resources and time needed to develop experiential work based learning.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>84</td>
<td>The basis of operation in the organisation is that of employees and staff becoming more and more open and honest with each other.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>85</td>
<td>I believe that I have the capacity to initiate new ideas in relation to products/developments/services.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>86</td>
<td>The organisation is set up such that ideas and problems can be shared with colleagues.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>87</td>
<td>People in the organisation operate on the basis of sharing information and 'know how' freely.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>88</td>
<td>I feel that management positively accepts feedback about the structure and nature of learning needs in the workplace.</td>
<td>1 2 3 4 5</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Any comments.
Learning Needs Analysis

Explanation of terms

Mentors/facilitators – Adviser or councillor

CPD – Continuous Professional Development

Reflective Practice - to review ones actions

Tacit Knowledge - Knowledge that is instinctual “knowing how”

Explicit Knowledge – Knowledge that is easily recognisable such as books “knowing That”

Knowledge Transfer – Transferring knowledge from one point to another

Facilitate – smooth the path

Community of practice – Standard practices across the company

Fundamental assumptions – initial ideas

Learning paths – Different routes to achieve training objectives.

Experiential – learning through experience

Knowledge capital – total knowledge within the company

Methodologies – methods of practice

Innovation – developing new ideas
TOOLS FOR DEVELOPING REFLECTIVE PRACTICE

This learning path tool deals with change in the workplace and is particularly suited to individuals involved in driving change or involved in changes to the workplace. It is aimed at helping individuals develop their continuous learning process as part of their own development and as a contribution to change in the organisation through learning processes which are primarily problem oriented and work based and which bring together tacit knowledge in the company with explicit knowledge.

This path is focused on taking the individual forward through reflective practices to emphasize and develop the individual's motivation and understanding of how the reflection cycle can contribute to effective problem solving in work based situations while at the same time achieving learning growth for the individual.

This pathway will support the individual in achieving change and living through change in the organisation.

It aims to help those who feel unsure about CPD and what the organisation is trying to achieve through extending its development as a learning organisation committed to 'organisational learning'.

This tool pathway is designed to support individuals who are unable to see the value of reflective learning and how it can make the individual more effective in contributing to driving change within the organisation.

The Reflective Learning Cycle

You need to ask yourself a set of questions which aims to help you understand your own perspective of the value of reflective learning to drive problem solving and change situations in your organisation.

Steps in the Learning Path

1. Do you agree with or understand the need for reflective practice to underpin problem solving, development and change in your organisation?

2. Have you or are you considering how using reflective practices will affect your learning development?

3. Are you trying to define a clear learning path using reflection to help you deal with problem solving, development and/or change?

4. Are you actively taking forward your learning-path to deal with your CPD through the work based problem solving, development and change situations in the organisation?

5. Are you able to deliver your learning path according to the target dates agreed as part of it?
In keeping your learning path to target have you actively set out to overcome any barriers to progress in the workplace environment?

To move forward with your Work Based CPD you need to examine the stages related to achieving CPD through the reflective-learning path.

You should consider each statement carefully and if the answer is yes, then move to the next statement. If the answer is no this is the stage at which you should begin your active learning path process.

An answer of no to statement 1 indicates a significant lack of awareness of the reflective cycle and its value in driving learning. This indicates the need to start with an understanding of the process of reflective learning, before moving further along the learning path. A yes answer facilitates consideration of statement 2.

An answer of no to the statement 2 indicates the need to consider how reflective practice can contribute to more effective work based CPD. This process needs to be taken forward and the individual needs to be clear on how reflection is to be used in their learning development prior to moving further along the learning path. A yes answer facilitates consideration of statement 3.

An answer no to statement 3 indicates the need for decisions on the use of reflection to support CPD through problem solving, development and change in the workplace. The individual needs to activate a reflective learning plan before moving on. A yes answer facilitates consideration of statement 4.

An answer of no to statement 4 indicates the need to activate and actively pursue the desired reflective development through using the work based environment in terms of problem solving, development or a change situation to facilitate the learning development.

A yes answer indicates successful establishment of a learning plan using the reflective cycle as a basis for learning through a work based situation in the organisation. The individual can now consider statement 5.

An answer of no indicates a need for critical awareness of why the individual has not kept to the deadlines agreed for the learning path. This means giving consideration to all the factors which have contributed to the target dates not being realised. A yes answer indicates the learning path is going to plan and the individual can give consideration to statement 6.

An answer of no suggests a need for a critical review of the learning path as the reflective learning is primarily aimed at using this learning to overcome problems, barriers and obstacles which occur within the work based learning approach when tackling some problem, development or change situation. A no answer at this point in the learning path is indicative of the learning path being in danger of being abandoned. A yes answer indicates that a healthy learning path has been established to achieve reflective learning through work based learning.
CPD Development Dialogue

The aim of this dialogue is to show the individuals that the more they comprehend the reflective cycle and its value in addressing problem solving, development projects and change, the more likely that the individuals will sustain the CPD development of reflection as a component tool to achieve greater efficiency and positive results in the workplace.

The Learning Set working on the CPD should operate in working pairs as follows:

One individual (1) of the pair will consider a problem to be solved, a development project or a change to be taken forward giving a brief summary of the situation to be addressed.

The other individual (2) of the working pair will then ask a set of key questions to help stimulate the reflective cycle and facilitate the individual (1) then completing a reflective learning log recording the results of the reflective process.

The questions need to be focused with relation to a development project, problem situation or change situation being considered and the key activators to stimulate the reflection process are as follows:

- How do you think you can initiate the action on the development project / problem situation / change situation?
- What should then follow next?
- Given you had to choose one key aspect to move you toward a solution to the situation, what would it be?
- What do you see as the positive aspects of the development project / problem situation / change situation?
- Alternatively, what do you see as the more difficult aspects of the development project / problem situation / change situation?
- Can you describe what support you believe you need to achieve the solution to the development project / problem situation / change situation.

The person answering in each case needs to give as genuine an answer as possible for the dialogue to work.

Now the person should answer the following:

- decide on a scale 1-10 how you feel the reflective approach is supporting your approach to the development / problem / change situation and hence your CPD learning process?

  Scale: 10 = Maximum Benefit of reflective process supporting the process to 1=minimum benefit derived from the reflective approach.

What do you think needs to happen to facilitate you getting more benefit from the reflective approach.
The Learning Dialogue is designed to facilitate the team of individuals comprising the Learning Set through working in pairs to facilitate the learning development of each person in the Set.

The Learning set now need to consider at the end of the process the following points using a scale 1-10 where each member should indicate on a scale 1-10 how successful the dialogue tool was with 1 being minimum benefit and 10 being maximum benefit;

<table>
<thead>
<tr>
<th>Category</th>
<th>Statement to be considered</th>
<th>Minimum Benefit</th>
<th>Maximum Benefit</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>The action based dialogue was to facilitate the opening up of a discussion about the development / problem / change situation</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>B</td>
<td>The dialogue was designed to facilitate exploration of the positive and more difficult aspects of the development / problem / change situation</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>The speaker in each case should have found that the dialogue facilitated them in developing distinct ways forward to solutions for the development / problem / change situation</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>The dialogue should have facilitated the reflective process through the actions discussed</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
<tr>
<td>E</td>
<td>The dialogue is designed to facilitate the speaker identify where learning development is needed to support moving to a solution for the development / problem / change situation</td>
<td>0 1 2 3 4 5 6 7 8 9 10</td>
<td></td>
</tr>
</tbody>
</table>
If the scores for an individual are towards the minimum benefit end then the cycle should be repeated using another situation which should facilitate development of the reflective approach.

Now the Learning Set should decide on the basis of this exercise the following aspects again using a scale 1-10 where 1 indicates minimum benefit and 10 indicates maximum benefit.

- the Learning Dialogue should have overall generated an understanding of different approaches which could be taken on the development / problem / change situation, hence providing a significant learning development for the members of the Set.
- the Learning Set should be able see the variation of reflective process development shown by the team and where they are on the learning path and hence the need to bring all members to the same stage before moving on in the learning development process.
- the Dialogue should facilitate the team taking action to resolve problems which team members have identified.

The Learning Set should work together to assure that finally all team members feel they have understood and can use the reflective process.
TOOL - TACIT KNOWLEDGE

The development and understanding of the value of tacit knowledge is essential to all individuals who are involved in driving development, change or problem solving within the workplace. The tool will enable members of the Learning Set to learn through working on a chosen work based project the value of the tacit knowledge within the organisation, the value of bringing together tacit knowledge with available explicit knowledge and the value of recording tacit knowledge, thus converting it to available explicit knowledge. This will involve the use of a tool described as an Employee Development Agreement and each member of the Learning Set will require to agree to such a contract as part of the organisational learning development.

The basis of this tool is to identify tacit knowledge relevant to a chosen project(s) within the organisation where the individual employees will achieve professional development through learning development derived from delivery of a work based project. The outcome of the learning achieved will be an understanding of the value of identifying and using tacit knowledge to facilitate organisational solutions. This provides for a partnership within the organisation where solutions to projects are provided within a framework where professional development and learning are achieved by the individual. This learning will facilitate the release of tacit knowledge which is held in the mind and in 'know how' and which is implicit within actions and experience of each employee. The organisation will thus have employees with a learning development which enables them to make explicit the tacit knowledge embedded within the organisational systems of the company.

To address the understanding of tacit knowledge and its development, all members of the Learning Set will require to have successfully completed the Reflective Learning Path Tool.

Using the Tool

Once a CPD study area related to a work based project, problem or change situation has been agreed with the management as the basis for the CPD study, you will then be faced with considering how tacit knowledge will affect the progression of the work-based study and the role it will play in achieving the outcomes.

This tool is at the core of developing in each member of the Learning Set an understanding of the vital role that tacit knowledge can play in moving forward an organisation. The use of the tool relating to barriers/inhibitions should place the Learning Set in a strong position to review the importance of tacit knowledge in achieving the defined outcome of the work based project. This tool can be used either as a team exercise or by individuals in the Set and again the best way forward will be to try the different options using learning dialogues and learning logs to detail the results.

You should begin examining all aspects of the study project which has been agreed and as a Learning Set exercise identify all persons who have an input to the project area being studied. Once the Set have identified all the persons who interact with the project area this should be carefully recorded in the form of a grid with a brief statement of the remit which each person has in the area under study. Remember much of the tacit knowledge will be held in the minds of the individual persons identified in the grid.
At this stage, the Learning Set will need to share the task of a face to face learning dialogue with each person named in the grid. The objective of the dialogue is to identify inputs to the functioning of the area being studied which are not written in the form of an instruction of some type within the organisation.

The Learning Set will need to have prepared themselves to have in depth understanding of the area being studied so that they are in a position to consider each unwritten input which is identified in the face to face learning dialogues.

Alongside the Learning Set should as a team identify the explicit knowledge available relating to the area being studied. This will take the form of written material which exists in the organisation ad related directly to the area being studied.

Having identified all the written knowledge within the organisation the Learning Set will then need to use the reflective tool to consider what written knowledge external to the organisation may be required to facilitate achieving the objectives and the specified outcomes for the project.

Here is an example:

- The area being studied is a process for the heat treatment of steel with a view to significant efficiency improvements.
- Written knowledge is available on the concepts of the process and the procedures laid down in the organisation.
- On reflection the Set may decide that recent written information on improved treatments should be sought external to the organisation through a range of sources which would give codified written knowledge. A typical source would be an internet search or a library search.

At this point the Learning Set now need to consider the range of unwritten 'know how' actions which have been recorded on the grid and consider each in respect of what it contributes to achieving the desired outcomes.

Now continuing with the same example:

- The Set consider a step used in the process where a person indicates that certain procedures do not need to be used if a changed time is used for the second phase of the heat treatment.
- Consideration of this information related to recently obtained external knowledge confirms that the tacit knowledge is most probably correct.
- The implication for the area being studied is a significant efficiency gain as contribution to the project outcomes.
- The person who supplied this piece of tacit knowledge knows it works as he had found it worked in practice. He remembered that the supervisor who had retired three years previously had passed it to him verbally.

This simple example illustrates how an unwritten procedure existed as hidden knowledge which was not being used to advantage in the organisation and how integration with current
explicit knowledge let to verification that the procedure made sense technically. The result was an efficiency gain relating to that process in the organisation.

The Learning Set now need to consider the following:

- Consider for each input of 'know how' whether it can be codified as logical explicit knowledge.
- If not, give consideration as to why the input cannot be codified. What are the barriers.
- Consider how an input was nucleated and was able to grow in the organisation.

To do this the Set will need to hold further Learning Dialogues with the persons who supplied the tacit inputs. This is best done as a face to face meeting. In conducting the dialogue the Set member must be prepared to keep an accurate learning log to preserve the knowledge gained.

Consideration should also be given as to what rate controlling factors could affect these Learning Dialogues. Persons involved in the fact to face discussions may have a range of reasons for not wishing the tacit knowledge to be codified and for not wishing to comment on how the knowledge had nucleated and grown in the organisation.

Once the list of tacit knowledge inputs have been identified as capable of being codified, the inputs should then be evaluated for the specific impact or contribution it is liable to have in achieving the target outcomes. This should include consideration of the business impact, the financial impact and finally the value of the learning achieved. You should use a Tacit Inputs Grid as follows to detail the analysis of the tacit knowledge.

<table>
<thead>
<tr>
<th>Impact of the Input</th>
<th>Relationship to Outcomes of Study</th>
<th>Evaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Specific impact on the CPD project</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Business impact on the organisation</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financial impact on the CPD project</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Value of the Learning Achieved</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The completion may be best achieved as a Learning Set exercise as follows. A group learning dialogue should take place considering each tacit input in turn.
Key points to consider are:

Specific Impact: You need to consider exactly what the value of the input is and in particular show that it contributes positively to some form of improvement which is being sought as part of the overall outcomes. The main debate should be an accurate evaluation of the input.

Business Impact: You need to consider if that tacit input is capable of tacit knowledge transfer to other aspects within the organisation. In particular consider the consequences for other routines, systems and processes in the organisation to stimulate growth of the 'learning organisation'.

Financial impact: In most work based projects/problem solving/change situations the bottom line is often whether solutions are cost effective or generate cost savings or quantifiable efficiency gains. As the CPD studies are based on delivery in a real working environment the financial impact will thus be a prime factor to consider. You must consider whether the tacit input provides or contributes directly or indirectly to financial benefit.

The next stage needed is to extend consideration of the tacit inputs by considering whether there could be any improvements derived from the interrelationships between tacit knowledge, the explicit knowledge identified in the CPD study and the knowledge skills deriving from emotional intelligence. This is important as the evaluation of a tacit input may be improved in combination with relevant aspects of the explicit knowledge and the interpretation may also be modified by consideration of the type of knowledge skills needed to achieve the target outcomes.

Interrelationship of Tacit Knowledge, Explicit Knowledge and Knowledge Skills Grid

<table>
<thead>
<tr>
<th>Tacit Knowledge Input</th>
<th>Evaluation Related to Explicit Knowledge</th>
<th>Evaluation Related to Knowledge Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

22
This is the final step possible with the tool and the tacit inputs capable of being made explicit should be written up in a detailed learning log which combines all the analysis completed via the grids with a final grid which shows the total evaluation of each tacit knowledge input. It is essential that the evaluation and the tacit input is carefully written to be a contribution to the overall explicit knowledge available in the organisation.

The results from using this tool are at the core to the CPD in the workplace and should be used as major inputs to the Learning Agreement tool which is the tool which facilitates the layout of the complete CPD process in the workplace.

The Learning Set should now complete the following using the Reflective Pathway Tool:

- Consider how the tacit inputs have modified the approach to the overall project activities.
- In the light of the tacit inputs reflect on how the action plan within the project can be modified and improved.
- Allow each Set member to challenge the Set with regard to conclusions being made on the basis of the Tacit Knowledge Tool.
- Consider whether a further search is needed for relevant explicit knowledge to support arrival at the target outcome.
- Where knowledge skills have been identified as needing development to realise the outcomes consider using the Knowledge Skills component which in turn can be developed using the Learning Agreement Tool.

Finally, you will remember that the tacit inputs considered to be difficult to convert to explicit (written down) knowledge were rejected and not included in the exercises of looking at the tacit inputs. The final exercise for the Set should be to produce a grid which describes the tacit aspects still to be made explicit and for each indicate reasons why it cannot be written.

<table>
<thead>
<tr>
<th>Tacit Knowledge Input not made Explicit</th>
<th>Reasons for Inability to Transfer to Written Form</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>
It may be helpful to consider the following example which is well detailed in the literature:
**TOOL - LEARNING DEVELOPMENT AGREEMENT**

When developing and implementing the learning development using a work based transdisciplinary environment it is important to focus the demands which this approach may place on those involved in developing new knowledge and skills focussed around tacit knowledge and its transfer and integration with explicit knowledge as knowledge skills. The whole basis of this professional development approach is to achieve the employee development alongside delivery of work outcomes related to an agreed project, problem solving or change situation. Thus the value of this tool in the toolkit is that it is designed to integrate the employee development of knowledge and learning with the delivery of agreed work targets and outcomes.

**Development the Agreement**

A Learning Development Agreement should be set up as a formal written agreement between the individual employee involved in the CPD and management. By taking the development forward in this manner it becomes a partnership between the management and each individual taking part in the CPD exercise.

Where the CPD involves a Learning Set then each individual may take forward a partial Learning Agreement to deliver a specific goal with the partial Learning Agreements coming together as an overall Learning Agreement relating to the project, problem solving or change situation. The Learning Agreement should be established through mutual negotiation.

The aims of achieving your CPD through the Learning Agreements Tool is based on the following:

- You will be directly involved in the planning and development of the learning development activities and as such will feel you are taking direct responsibility for your own learning. This means the CPD experience should be more meaningful, relevant and of direct interest to you for career planning.

- You will bring all your experience, including mistakes, into operation as an essential component of the basis for the activities.

- You will be achieving your learning which has immediate relevance to your job and this should give you a high motivation to deliver.

- The emphasis on learning is problem based rather than content oriented.

- While you will take forward your partial Learning Agreement you will also be operating as part of a Learning Set and as such the Set will support and mentor you as a member.

Thus to start the CPD, the Learning Set need to agree with management on the area to be investigated and then develop a set of goals which form the basis of the overall agreement.

Thereafter, the partial Learning Agreements are put in place with each partial Agreement representing a specific goal to be delivered.
Each partial Agreement should contain the following sections:

- The goal to be achieved.
- Learning Development objective(s).
- The resources needed.
- The activities to be undertaken.
- Assessment / Assessment Criteria.
- Target delivery dates.

The Agreements can be used either as simply a means of having a formal written way forward with agreed delivery / target dates or they can contain assessment / assessment criteria. You need to decide at the outset of the CPD whether formal assessment is to be built into the Agreements or whether simply delivery of the goal is sufficient.

The Agreements are designed to suit the needs of the individual and you need some record at the end of a specific activity to reveal the gains in knowledge and skills achieved.

Within an overall CPD development in the organisation the aim should be to develop gradually and this means that you should expect to complete several Agreements where the Tacit / Explicit knowledge and knowledge skills are built up in stages. Thus goal based partial Agreements should be designed to give eight to twelve week time spans.

You should remember to use the other tools in the toolkit as appropriate. For example you may need to use the Reflective Practice Pathway Tool to consider how your learning development is progressing during delivery of the goal. You may also find that your reflective process is also helped by having public reflective sessions in the Set.

Choosing the Goal(s)

Management and the members of the Learning Set need to negotiate and agree on projects/problem solving/change situations which have strategic value to the organisation. Areas chosen should already be ongoing in the workplace or planned. The following should be considered with respect to areas investigated:

- Should involve doing something that does not appear to have been done before.
- There is no obvious solution to the situation.
- There are many different views on how the problem could be solved.
- Will involve and depend upon a number of unpredictable conditions and situations which will require examination.

By choosing areas which involves these aspects this will assure that the CPD involves, tacit knowledge, explicit knowledge, knowledge skills and their interrelationships and hence learning through practical application.
The choice of project area must be negotiated such that the members of the Learning Set know that their actions have the potential to have an impact on the organisation, otherwise serious self and public reflection will not happen and the learning experience will be sub-standard.

The choice should be made where both management and the Set members mutually agree on the project area to be studied.

Once the choice of area of investigation has been made and goals decided, the Learning Set should then work as a team to provide support in the development of the partial Learning Agreement. The Learning Set should also have the support of a facilitator such that the set can present to management an agreed way forward through the partial Learning Agreements matched to individual members.

Agreements can be detailed as follows:

<table>
<thead>
<tr>
<th>Learning Goal:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Objectives:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Resources Needed:</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td><strong>Plan of Activities:</strong></td>
</tr>
<tr>
<td>------------------------</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Assessment Criteria:</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Assessment Methods:</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>NAME:</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Signature:</strong></th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th><strong>Dates Agreed:</strong></th>
</tr>
</thead>
</table>