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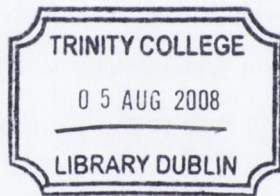
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Adaptable Design for Talk-Based Mental Health Interventions

A thesis submitted to the
University of Dublin, Trinity College
for the degree of
Doctor of Philosophy

David Coyle

June, 2008

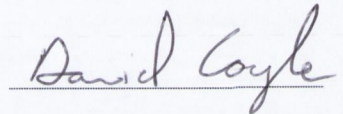


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David Coyle

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David Coyle,

University of Dublin, Trinity College

June 2008.

Related Publications

Peer Reviewed Journals

Coyle, D., Doherty, G., Sharry, J., & Matthews, M. (2007). Computers in Talk-Based Mental Health Care. *Interacting with Computers*, 19(4), 429-586. <http://dx.doi.org/410.1016/j.intcom.2007.1002.1001>.

Coyle, D., Matthews, M., Sharry, J., Nisbet, A., & Doherty, G. (2005). Personal Investigator: A Therapeutic 3D Game for Adolescent Psychotherapy. *International Journal of Interactive Technology and Smart Education*, 2, 73-88.

Book Chapters

Matthews, M., Doherty, G., Coyle, D., & Sharry, J. (2007). Designing mobile applications to support mental health interventions. In J. Lumsden (Ed.), *Handbook of Research on User Interface Design and Evaluation for Mobile Technology*.

Practitioners Journals

Matthews, M., Coyle, D., & Anthony, K. (2006). Personal Investigator. *Therapy Today: The Magazine for Counselling and Psychotherapy Professionals*, 17(7), 30-33.

Coyle, D., Sharry, J., Nisbet, A., & Matthews, M. (2003). Virtual Perspectives: Developing a Therapeutic 3D Virtual Environment for Adolescents. Invited Publication in *Eisteach: A Quarterly Journal of Counselling and Psychotherapy*, 2(25), 27-31.

Peer Reviewed Conference Papers

Coyle, D., Doherty, G., & Sharry, J. (2005). Adaptable Computer Gaming for Adolescent Psychotherapy - Extended Abstract. *CyberPsychology and Behavior*, 8(4), pp.311-312.

Matthews, M., Coyle, D., Sharry, J., Nisbet, A., & Doherty, G. (2004). Personal Investigator: Computer Mediated Adolescent Psychotherapy using an Interactive 3D Game. *Proceedings of NILE2004 Narrative and Interactive Learning Environments*, pp.75-81, 10-13 August 2004, Edinburgh, Scotland.

Conference and Workshop Presentations

Coyle, D., Sharry, J., & Doherty, G. (2007). PlayWrite - Publishing and playing 3D computer games in adolescent mental health interventions. Presented at the XXIV World Congress - International Association for Suicide Prevention, 28 August - 1 September 2007, Killarney, Ireland.

Coyle, D., & Matthews, M. (2004). Personal Investigator: A Game Tool for Psychological Interaction. Presented at the Games for Health Conference, Sept 17 2004, Madison, WI, US.

Coyle, D., & Matthews, M. (2004b). Personal Investigator: a Therapeutic 3D Game for Teenagers. Presented at the 'Social Learning Through Gaming' Workshop CHI2004 Conference on Human Factors in Computing Systems, 26 April 2004, Vienna, Austria.

Technical Reports

Coyle, D., Doherty, G., & Sharry, J. (2005). The Design of Computer Systems for Talk-Based Mental Health Care Interventions, (Technical Report No. TCD-CS-2005-50), Dublin, Ireland: Trinity College Ireland, Retrieved, from <https://www.cs.tcd.ie/publications/tech-reports/reports.05/TCD-CS-2005-50.pdf>.

Abstract

The cost to society of mental illness is substantial. This thesis proposes and provides practical illustration of an adaptable approach to the design of technology for talk-based mental health interventions. The approach has been developed in response to identified challenges of designing in the mental health care (MHC) domain. The primary aims of the adaptable approach are twofold. Firstly it aims to support effective collaboration between human computer interaction (HCI) and MHC professionals, and secondly it aims to provide a sustainable approach to the development of user-centred technologies, which can be adapted to meet the needs of a broad variety of both therapists and clients. An overall two stage approach is described. Stage one focuses on design and development. Rather than developing fixed solutions, it is proposed that flexible systems are developed. Further to this it is proposed that the ability to make adaptations to systems be placed in the hands of MHC professionals. Stage two focuses on clinical evaluations. MHC professionals have the opportunity to adapt and then evaluate systems which suit their own needs and those of their clients. Effective communication channels between stages one and two are an essential element of the approach. It is envisioned that stages one and two will overlap and complement one another, with stage one being lead by HCI researchers and stage two by MHC professionals.

The PlayWrite system is an implementation of the adaptable design approach. PlayWrite enables MHC professionals to create and adapt therapeutic 3D computer games, which can then be used in adolescent interventions. In total 55 MHC professionals from 18 different services throughout Ireland and the UK have participated in the evaluation of PlayWrite. The results of this study indicate that the adaptable approach can support effective collaboration, and provides a sustainable approach to the development of technologies which can be adapted to meet the needs of a broad range of end users. In all 10 new games have been created using PlayWrite. These games implement a wide range of theoretical approaches to talk-based MHC and address a broad variety of specific disorders. Several games are also targeted at specific social groups. Personal Investigator, the first game created with PlayWrite, has undergone a multi-site clinical evaluation. The results of this study indicate that games created with PlayWrite can have a positive impact on adolescent interventions. Several further evaluations of PlayWrite have now been initiated by independent mental health research centres.

Based on the lessons learned in evaluating the adaptable design approach, this thesis also provides a complementary set of guidelines for the design of technology in talk-based interventions. The final contribution of the thesis is to suggest future research directions and identify ways in which HCI researchers can contribute to this work.

Index

1	INTRODUCTION	1
1.1	Mental Health and Mental Illness	2
1.2	The Challenge Facing Mental Health Care Services	3
1.3	Adolescent Mental Health Care Services	4
1.4	The Challenges of Designing in the Mental Health Care Domain	4
1.5	Adaptable Design for Talk-Based Mental Health Care	5
1.6	PlayWrite	6
1.7	Contributions	6
1.8	The Structure of this Thesis	7
2	TECHNOLOGY IN TALK-BASED MENTAL HEALTH CARE	9
2.1	Talk-based Mental Health Care	9
2.2	Theoretical Approaches to Mental Health Care	9
2.2.1	Psychodynamic approaches	10
2.2.2	Cognitive and Behavioural approaches	10
2.2.3	Humanistic-existential approaches	11
2.2.4	Eclectic-integrative approaches	12
2.3	Previous Uses of Technology	14
2.3.1	Electronic contact and online information sources	14
2.3.2	Computerised questionnaires for assessment, diagnosis and outcome monitoring	15
2.3.3	Computerised treatment programs for Cognitive Behavioural Therapy	16
2.3.4	Virtual Reality treatments	18
2.3.5	Biofeedback	19
2.3.6	Therapeutic computer games	20
2.3.7	Collaborative multimedia storytelling	21
2.4	Conclusions	22
3	DESIGNING FOR TALK-BASED MENTAL HEALTH INTERVENTIONS	23
3.1	Tasks	23
3.1.1	Critical factors in mental health interventions	23
3.2	Users	24
3.2.1	Mental health care professionals	24
3.2.2	Clients	26
3.3	Users' Environment	27

3.3.1	Ethical constraints	27
3.3.2	Access constraints	28
3.3.3	Evaluation constraints	29
3.3.4	Adaptability and the importance of socio-cultural issues	29
3.4	Design Approaches and their Suitability to the Mental Health Care Domain	30
3.4.1	Designing for engagement	31
3.4.2	Designing in collaboration with mental health care professionals	31
3.5	Conclusions	33
4	<u>AN ANALYSIS OF PERSONAL INVESTIGATOR: A PROOF OF CONCEPT</u>	35
4.1	Iterative Design in Collaboration with a Mental Health Care Professional	35
4.1.1	Identifying the end users, the tasks and the environment	37
4.1.2	Choosing a technology to use	38
4.1.3	Choosing a game type	39
4.1.4	Choosing an intervention model	40
4.1.5	How to integrate therapeutic content	41
4.1.6	Developing a first prototype	42
4.1.7	Incorporating a game notebook	42
4.1.8	Incorporating video-based peer stories	43
4.1.9	Finalising the game	43
4.2	Personal Investigator	44
4.2.1	Technical details	44
4.2.2	Using Personal Investigator in clinical sessions	44
4.3	Evaluating Personal Investigator	45
4.3.1	Expert review	45
4.3.2	Pilot clinical evaluation	46
4.4	Analysis – Lessons Learned about Design	50
4.4.1	Collaborative design	50
4.4.2	Ethical requirements and access constraints	51
4.4.3	Different types of evaluation	51
4.4.4	Separating content development from systems development	53
4.4.5	Slow clinical evaluation cycles	53
4.4.6	Suitability to a broad range of clients and therapists	54
4.5	Conclusions	55
5	<u>ADAPTABLE DESIGN FOR TALK-BASED MENTAL HEALTH CARE</u>	57
5.1	The Importance of Adaptability in Mental Health Care Settings	58
5.2	An Adaptable Design Approach	58

5.2.1	Forms of adaptation	59
5.2.2	The structure of an adaptable system	62
5.2.3	A model of use for developed systems	63
5.2.4	Communication channels – handover and feedback	63
5.3	Anticipated Benefits of the Proposed Approach	64
6	<u>THE DEVELOPMENT AND FORMATIVE EVALUATIONS OF PLAYWRITE</u>	67
6.1	Overview – The Structure of the Play Write System	67
6.1.1	Why the two content creation applications were kept separate	68
6.1.2	Technical details	69
6.2	Design Methodology - The Cognitive Dimensions	69
6.3	Identifying Appropriate Forms of Adaptation	70
6.4	A Note on the Design of Spoken Language Dialogue Systems	72
6.5	The PlayWrite Game Template	73
6.6	The PlayWrite Dialogue Builder	74
6.6.1	PlayWrite dialogues	75
6.6.2	Building and editing dialogues	75
6.6.3	The voiceover and standalone player screens	77
6.7	The PlayWrite Game Builder	78
6.7.1	Creating a playable game	79
6.7.2	Importing and packaging games	80
6.8	The PlayWrite Game Admin Tool	80
6.9	PlayWrite Games	81
6.9.1	Re-implementing Personal Investigator	81
6.10	Formative Evaluations of PlayWrite	82
6.10.1	The Initial Usability Trials	82
6.10.2	The Group Study	86
6.10.3	Experimental Observations and System modifications	91
6.10.4	Further Usability Scores	92
6.11	Discussion and Initial Conclusions on the PlayWrite System	92
7	<u>USING PLAYWRITE TO CREATE NEW GAMES</u>	95
7.1	Making PlayWrite Available to Mental Health Care Professionals	95
7.2	The Handover Process	97
7.2.1	PlayWrite workshops	97
7.2.2	Meetings with individual therapists and teams	102
7.2.3	Clarifying the aims of the evaluation process	103
7.3	The Game Building Process	103

7.3.1	Therapists working independently	104
7.3.2	Therapists who requested support	104
7.4	Games and Content Created by Mental Health Care Professionals	106
7.4.1	Adaptation categories	107
7.4.2	Game characters and overall game metaphors	111
7.4.3	Games based on existing materials	112
7.4.4	Long and short dialogues	113
7.4.5	Other similarities and differences	114
7.5	Discussion	115
8	<u>AN ANALYSIS OF FEEDBACK & EMERGENT IDEAS</u>	117
8.1	Feedback from Mental Health Care Professionals	117
8.1.1	Workshop feedback	118
8.1.2	Group discussions	123
8.2	Researchers Observations	127
8.2.1	Formative evaluations	127
8.2.2	The evolution of workshop content	127
8.2.3	Working with word processors	127
8.2.4	Secondary annotation	128
8.3	Emergent Ideas	129
8.3.1	Games as a context for other therapeutic activities	129
8.4	Discussion	132
9	<u>CLINICAL EVALUATIONS OF PLAYWRITE GAMES</u>	135
9.1	The Multi-Site Evaluation of Personal Investigator	135
9.1.1	The scope and limitations of this evaluation	136
9.1.2	Individual client details and results	138
9.1.3	Feedback from therapists	139
9.1.4	Client feedback	144
9.1.5	Case studies	145
9.1.6	Conclusions on the therapeutic potential of Personal Investigator	147
9.2	Evaluations of new games	148
9.2.1	Temper Quest	148
9.2.2	Queens University Belfast study	148
9.2.3	University College Dublin studies	149
9.3	Discussion	150

10	DISCUSSION, CONCLUSIONS AND FUTURE WORK	151
10.1	Validation of the Adaptable Design Approach	152
10.1.1	Suitability to a broad variety of therapists and clients	152
10.1.2	Supporting effective collaboration	153
10.2	Lessons Learned	156
10.2.1	The handover process	157
10.2.2	The importance of protocols	157
10.2.3	The Cognitive Dimensions	157
10.2.4	Design guidelines	158
10.3	Limitations and Future Work	160
10.4	Conclusions	162
	BIBLIOGRAPHY	163

List of Figures

Figure 1.1 - A computer mediated model of a mental health intervention.....	1
Figure 1.2 - Adaptable design for technology in talk-based mental health care.	6
Figure 2.1 - The Skilled-Helper Model. Copyright © Egan 2002.....	13
Figure 4.1 - The decision making criteria established for the design of Personal Investigator.....	36
Figure 4.2 - Paper based sketches were used to layout and prototype the game world.	42
Figure 4.3 - Screenshots from the original prototype of Personal Investigator.....	44
Figure 5.1 - A two stage adaptable design approach for technologies in the mental health care domain.	59
Figure 5.2 - Forms of adaptation – functional & content.....	60
Figure 5.3 - Increasing levels of functional change in a system.	61
Figure 5.4 - The structure of an adaptable system.	62
Figure 6.1 - An overview of the PlayWrite system.....	68
Figure 6.2 - (a) the state machine representation of a dialogue used in SUEDE, and the tree-based hierarchies used in a Windows file explorer (b) and an email application (c).	73
Figure 6.3 - A map of the PlayWrite game world.....	74
Figure 6.4 - The three main screens of the PlayWrite Dialogue Builder.	75
Figure 6.5 - The Dialogue Building screen.....	76
Figure 6.6 - New elements are added using the buttons in the Dialogue Elements Panel.....	76
Figure 6.7 - The audio recording panel (a), and the video configuration panel (b).	77
Figure 6.8 - The Voiceover Recording screen.	78
Figure 6.9 - The three main screens of the PlayWrite Game Builder.	78
Figure 6.10 - The character configuration panel (a), and the door configuration panel (b).	79
Figure 6.11 - The welcome screens from two PlayWrite games.....	79
Figure 6.12 - The PlayWrite Game Builder toolbar.....	80
Figure 6.13 - Screenshots from a PlayWrite game.	81
Figure 6.14 - The PlayWrite start game screen sequence.	81
Figure 7.1 - The mental health care service which participated in the evaluation of PlayWrite.....	96

Figure 7.2 - The forms of adaptations in games created using Play Write.....	107
Figure 7.3 - A paper diagram of The Islands Game.....	113
Figure 8.1 - A blank gNAT trap and a completed trap. Copyright © Dr Gary O'Reilly.....	131
Figure 9.1 – Helpfulness ratings for Personal Investigator on a client by client basis.....	138
Figure 10.1 - Adaptable design with multiple clinical partners.	153
Figure 10.2 - Sources of feedback.....	155
Figure 10.3 - The potential span of technology based support.....	158

List of Tables

Table 4.1 - A summary of the dialogues and characters used in Personal Investigator.	41
Table 5.1 - Key considerations for design approaches in the mental health care domain.....	57
Table 6.1 - Applying relevant aspects of the Cognitive Dimensions.....	70
Table 6.2 - Three possible approaches to creating a computer game.....	71
Table 6.3 - The dialogue elements used in the PlayWrite Dialogue Builder.....	75
Table 6.4 - Brief details of the participants of the initial usability trial.....	83
Table 6.5 - Scores from the initial usability tests of the PlayWrite Dialogue Builder.....	84
Table 6.6 – Participants’ responses to statements on the usefulness of PlayWrite in usability trials.....	85
Table 6.7 - Brief details of the participants of the group study.....	86
Table 6.8 - Usability scores from the group study, based on the adapted SUS questionnaire.....	89
Table 6.9 – Participants’ responses to statements on the usefulness of PlayWrite.....	90
Table 7.1 - Brief details of each PlayWrite workshop.....	97
Table 7.2 - The three stage design cycle to which mental health care professionals were introduced.....	101
Table 7.3 - A summary of the games created using PlayWrite.....	106
Table 7.4 - The characters created for Trail Blazers.....	111
Table 8.1 - Workshop participants list of the most positive aspects of PlayWrite.....	119
Table 8.2 - Workshop participants list of the most negative aspects of PlayWrite.....	120
Table 8.3 - Workshop participants list of ways in which PlayWrite could be improved or extended.....	121
Table 8.4 - Improvements suggested in the group meeting.....	122
Table 9.1 - Details of the mental health care professionals who used Personal Investigator.....	136
Table 9.2 - Detail of the clients with whom Personal Investigator was used in the multisite evaluation.....	137
Table 9.3 - Mental health care professionals’ overall impression ratings for Personal Investigator.....	140
Table 9.4 - Mental health care professionals’ design feature ratings for Personal Investigator.....	141
Table 9.5 - The results of the specific issues section of the Personal Investigator questionnaire.....	142
Table 10.1 - Guidelines for the design of technology in talk-based mental health interventions.....	159

Chapter 1: Introduction to the Study of the History of the United States

Chapter 2: The American Revolution and the Founding of the Nation

Chapter 3: The Early Republic and the Expansion of the United States

Chapter 4: The Civil War and the Reconstruction Era

Chapter 5: The Gilded Age and the Progressive Era

Chapter 6: World War I and the Roaring Twenties

Chapter 7: The Great Depression and World War II

Chapter 8: The Cold War and the Civil Rights Movement

Chapter 9: The Vietnam War and the 1960s

Chapter 10: The 1970s and the 1980s

Chapter 11: The 1990s and the 2000s

Chapter 12: The 2010s and the Present

1 Introduction

The primary aim of the research presented in this thesis has been to develop a design approach which supports the effective development of technology for talk-based mental health interventions (MHIs). Computer technologies offer the potential to fundamentally change the process of talk-based mental health care (MHC). Traditional interventions focus on face-to-face dialogues between therapists and their clients¹. Computers offer the potential to reshape this interaction, by becoming a third party in the therapeutic dialogue and increasing the scope of the therapeutic interaction, Fig.1.1.

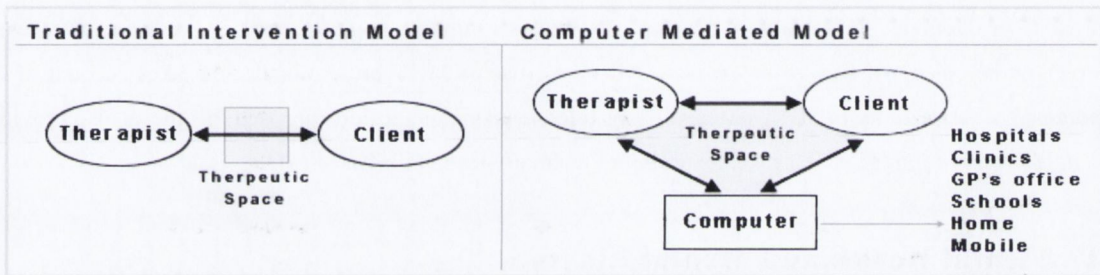


Figure 1.1 - A computer mediated model of a mental health intervention.

To date the use of technology in talk-based MHC has been limited. Many MHC researchers and practitioners are sceptical of the benefits of technology, citing fears such as damage to the client-therapist relationship, ethical and security issues, and worries that the current skills of therapists may become obsolete. Others fear that technology in and of itself has a damaging impact on the mental health of society. Suggested negative effects include increased isolation due to excessive time spent online or the influence on young people of violent video games (Caspar, 2004; Gentile & Walsh, 2002). However given the serious global significance of mental health disorders, it is incumbent on MHC services to find new ways of addressing society's growing need for effective treatment. A review of initial research indicates that computer assisted interventions have a significant potential to help in addressing this need. Even small changes in the effectiveness MHC services could significantly impact the general health of populations and greatly reduce the costs to society of mental illness.

This thesis identifies two key aims for technologies designed for talk-based MHC: *access* and *engagement* – that is, how can technology increase access to MHC services and how can it then help clients to engage more successfully with treatment once they have access to it? To date the use of technology has generally been justified on the basis of increased access, rather than on increased engagement and actual improvements in the

¹ In MHC settings the word client, rather than patient, is generally used to describe a person experiencing difficulties with mental health.

effectiveness of treatment (Caspar, 2004). In the main technology has been used to replicate traditional therapeutic strategies e.g. electronic contact as a natural extension of face-to-face dialogue and the computerisation of self-help materials. One of the primary reasons for this is that few researchers from a Human Computer Interaction (HCI) background have engaged in this area. Future research will benefit from the collaboration of HCI and MHC professionals. Such collaboration offers the potential to help in moving research to a new level, in which more specialist systems offer therapists new possibilities for working with clients. If such research is successful, more integrated use of technology may, at some point in the future, begin to have a feedback effect on theoretical models of MHC.

Previous research, while limited, has provided initial indications of the potential of technology. The key challenge now facing HCI researchers is to develop approaches and provide guidelines which maximise this potential. In this thesis significant factors which affect the design and evaluation of new technologies are identified, and based on these factors an adaptable approach to the design of new technologies is proposed. The overall aims of the approach are twofold. Firstly, it aims to support effective collaboration between HCI and MHC professionals. Secondly, it aims to provide a sustainable approach to the development of user-centred technologies, which takes advantage of the expertise of MHC professionals and takes account of the importance of adaptability in MHC settings. Alongside the adaptable design approach this thesis also provides a complementary set of guidelines for the design of technologies in talk-based MHIs.

1.1 Mental Health and Mental Illness

Mental health and mental illness can be thought of as points on a continuum. The World Federation for Mental Health states: *“Mental health should not be seen as the absence of illness, but more to do with a form of subjective well being, when individuals feel that they are coping, fairly in control of their lives, able to face challenges, and take on responsibility. Mental health is a state of successful performance of mental function, resulting in productive activities, fulfilling relationships with other people, and the ability to adapt to change and to cope with adversity specific to the individual's culture”*².

Mental illness refers collectively to all diagnosable mental disorders. Mental disorders are health conditions defined by the experiencing of severe and distressing psychological symptoms, to the extent that normal functioning is seriously impaired, and some form of help is usually needed for recovery. Symptoms may include anxiety, depressed mood, elation, hallucinations, delusions, obsessional thinking or compulsions. Mental illness can affect an individual's thought process, perception of reality, emotions and judgment and can result in low self-esteem, poor concentration, poor organisation skills and an inability to complete projects and make decisions. Individuals may also have difficulty in establishing support systems and may sometimes display inappropriate behaviour. Common mental health disorders include: depression, anxiety and panic, bipolar disorder, behavioural disorders, obsessive-compulsive disorders, phobias, psychosomatic problems, schizophrenia and eating disorders.

² www.wfmh.org

It is generally agreed that there are several principal contributory factors in the development of mental health disorders: genetic disposition, past life experiences (particularly early life), current life events, physical illness and socio-cultural and economic factors. The social norms of any society have a large influence on what it means to be mentally healthy. Some of the specific socio-cultural issues which affect MHC include: gender, age, social class, disability, race, culture and ethnicity, sexual orientation and religious or secular assumptions. The social norms of any society will influence the approaches used in the treatment of mental health issues and also the language used to refer to issues in this domain.

1.2 The Challenge Facing Mental Health Care Services

The past fifty years have witnessed major advances in the treatment of mental illnesses. In 1999 the US Surgeon General's office published its first ever report on mental health. The report concluded that (1) the efficacy of mental health treatments is well documented and (2) a range of effective treatments exist for most mental disorders (Surgeon General, 1999). However despite this progress challenges still remain.

In 1996 Harvard University in cooperation with the World Health Organisation and the World Bank published the results of a large international study entitled 'The Global Burden of Disease' (C. L. Murray & Lopez, 1996). The study revealed that mental illnesses, including suicide, are the second leading cause of disability and premature mortality in developed countries. Cardiovascular conditions come first and all malignant diseases, including cancer, come third. Combined mental illnesses account for over 15% of the total burden of disease in established market economies, such as Europe and the US, and major depression is the single leading cause of disability worldwide among persons over the age of five.

Unfortunately several large scale international studies also conclude that the majority of people suffering mental health disorders do not receive the required treatment (Surgeon General, 1999; WHO World Mental Health Survey Consortium, 2004). The primary causes of failure to receive treatment are lack of access to appropriate specialist services and social stigmas associated with mental health disorders. Studies suggest that while people suffering from severe psychotic problems do receive the required treatments, others suffering from more common, yet still disabling, disorders such as depression and anxiety do not. Figures show that among Britons with depression only half receive any help at all, while only 8% have seen a psychiatrist and only 3% have seen a psychologist. A similar picture has emerged in many other developed countries (Layard, 2004). This lack of access to specialist treatment is at odds with clinical guidelines, which recommend that people suffering mental disorders have access to specialist services and the possibility to choose between biomedical and talk-based treatments (National Institute for Clinical Excellence, 2004 - 2005). A similar lack of access to specialist treatment for people suffering from debilitating physical illness is unlikely to be deemed acceptable.

Along with the issue of access outlined above, a second critical challenge facing MHC services is that of client engagement. The importance of client engagement spans all theoretical models of MHIs (Assay & Lambert, 1999). The level to which clients engage both with their therapist and their treatment, and draw on

their own personal resources is a major factor in the success of interventions. Unfortunately research suggests that, due largely to the severe stigma often associated with mental illness, many clients find it difficult to successfully engage with treatment. This problem is particularly severe amongst some of the most vulnerable social groups, including adolescents, young men and the socially disadvantaged.

1.3 Adolescent Mental Health Care Services

The research presented in this thesis has been conducted in collaboration with the Department of Child and Family Psychiatry of a large Irish hospital and on a practical level has focused on developing systems which can support therapists working with adolescent clients. The focus has also been placed on developing systems suitable for use in public MHC services.

The challenges and difficulties outlined above have been recognised as particularly severe amongst adolescent groups and MHC professionals face particular difficulties in dealing with adolescents (BMA, 2006). Kraus (1980) defines adolescence as “the no-man’s land” between childhood and adulthood. During adolescence people experience a growing independence from former authority figures, combined with a heightened social awareness and dependence on peer groups. Adolescents are generally more private and self-conscious and also more confrontational than either younger children or adults. Therapeutic models that exist for children and adults are not always successful in adolescent interventions (Sharry, 2004). Disturbed adolescents are more likely to seek help from informal sources such as friends. However, while such informal help may be beneficial, it is often insufficient to enable adolescents to overcome more serious difficulties. It has been found that successful intervention during adolescence can prevent the onset of more severe problems in later life and greatly increase the quality of life of affected individuals (BMA, 2006).

1.4 The Challenges of Designing in the Mental Health Care Domain

There are several challenges of designing in the MHC domain which create difficulties in the direct application of traditional HCI approaches, such as user-centred, participatory and iterative design. Of the issues identified in this thesis, ethical requirements along with the sensitivity and stigma associated with mental illness pose particular challenges for design and evaluation. These factors place severe limitations on access to MHC settings by non-MHC professionals. This difficulty is further exacerbated by the durations typically required to conduct evaluations in clinical settings. Overcoming these difficulties requires the collaboration of HCI and MHC professionals. New methods are required which support effective collaboration and which take account of the inherent challenges of designing in the MHC domain.

Chapter 4 of this thesis provides an analysis of an initial project in which two HCI researchers, including the author, and one MHC professional worked together to create a therapeutic 3D computer game called Personal Investigator (PI). PI incorporates a goal-oriented, strengths based intervention model called Solution Focused Therapy. Worldwide, PI was the first 3D game to implement such a therapeutic approach. A pilot study of PI was conducted in the Department of Child and Family Psychiatry of a major hospital. Whilst initial results

indicated that playing PI in sessions can be helpful, the evaluation also highlighted several limitations of the design approach applied in the development of PI and of any fixed system in MHC settings. The evaluation demonstrated that small details in the design of the game had significant implications for its usefulness. While the game proved successful when used with appropriate clients, MHC professionals felt that details, such as the appearance of characters and the accent and language used in the voiceovers for game characters, could alienate and make the game unusable with many adolescent clients. Given the importance of engagement in MHIs, the impact of design factors which cause alienation for clients are likely to be severe. However a balance must be struck here. There is little point in producing bland systems, which while not likely to cause alienation, are equally unlikely to enhance engagement. A better approach is to produce flexible systems which can be adapted to suit the needs of various client groups.

Alongside client oriented adaptation, further forms of adaptation have also been identified as desirable. For example, teams of therapists working in public health care services often have different theoretical backgrounds, and many adopt a variety of eclectic approaches to working with clients. For technologies to be of practical use in a broad range of MHC interventions, they should ideally be adaptable to (1) a broad range of theoretical models, (2) a broad range of mental health disorders, (3) the differing needs of various demographic groups, and (4) the specific needs of individual clients. The potential benefits of such adaptability, together with the ethical and access constraints identified above, led to the development of the adaptable approach proposed in this thesis.

1.5 Adaptable Design for Talk-Based Mental Health Care

This thesis proposes and provides an evaluation of an adaptable approach to the design of technology for talk-based MHIs, Fig.1.2. The approach describes an overall two stage process which aims to support effective collaboration and provide a sustainable, user centred approach to the design of new technologies. Stage one of this approach focuses on the design and development. The aim at stage one is to develop and evaluate systems to the point where they are shown to be usable by the target end users, are agreed to have clinical validity and are predicted to have therapeutic benefits. Rather than developing fixed solutions, it is proposed that flexible systems are developed. Further to this it is proposed that the ability to make adaptations to systems be placed in the hands of MHC professionals. Stage two focuses on clinical evaluations. MHC professionals have the opportunity to adapt and then evaluate systems which suit their own needs and those of their clients. Whilst HCI researchers focus on designing systems which target broad therapeutic objectives (e.g. establishing a client-therapist relationship, improving client engagement), MHC professionals can adapt these systems to implement specific theoretical approaches, to target specific disorders and to meet the needs of different socio-cultural groups or individual clients. It is envisioned that stages one and two will overlap and complement one another, with stage one being lead by HCI researchers and stage two by MHC researchers. As systems are developed at stage one they can be taken to stage two for clinical evaluation. The results of this evaluation will feed back into further design and development at stage one, which in turn provides further

possibilities for clinical evaluations at stage two. In this way a parallel process for collaborative design and evaluation can evolve.

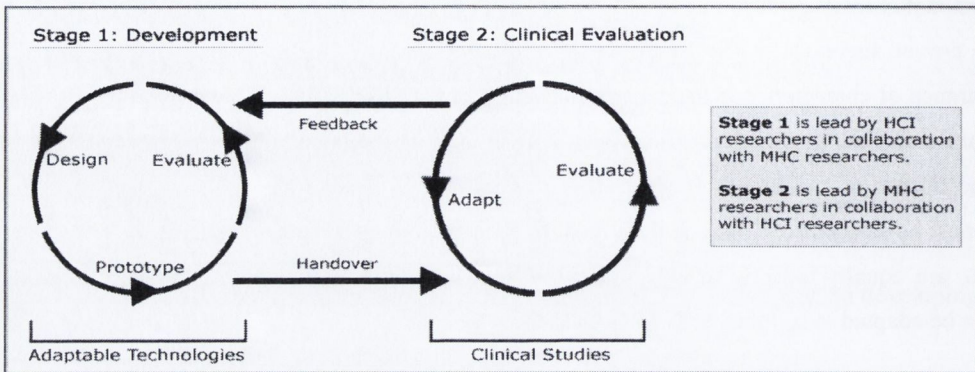


Figure 1.2 - Adaptable design for technology in talk-based mental health care.

1.6 PlayWrite

The PlayWrite system is an implementation of the adaptable design approach proposed in this thesis. PlayWrite is designed to allow MHC professionals to create and adapt therapeutic 3D computer games, which can then be used in adolescent MHIs. The aims in developing PlayWrite were twofold. Firstly, it provided a means through which to evaluate, and attempt to provide a validation of, the adaptable approach. Secondly, it provided the means through which to explore the approach in greater detail, and gain an understanding of the methods required to successfully implement the approach in MHC settings. This thesis presents the results of a detailed evaluation of the PlayWrite system.

1.7 Contributions

The work presented in this thesis is amongst the first research worldwide to explore the potential of applying HCI techniques in the design of technology for talk-based MHIs. The primary contribution of the research is to propose and provide an evaluation of an adaptable approach to the design of technology for MHC settings. The results presented in this thesis indicate that the approach can support effective collaboration between HCI and MHC professionals and can provide a sustainable approach to the development of effective user-centred technologies. Based on the lessons learned in evaluating this approach, a broad set of guidelines for the design of technologies in talk-based MHIs is also provided. These guidelines are an extension of those recently published in (Coyle, Doherty, Sharry, & Matthews, 2007). They are amongst the first such guidelines to be published in the HCI domain.

Alongside this theoretical contribution, the application of the research presented in this thesis led first to the creation of PI and then to the development of PlayWrite. Worldwide, PI was the first game of its type specifically designed for adolescent MHIs. This thesis presents the results of a multi-site evaluation of PI. This evaluation indicates that PI can have a positive impact on adolescent MHIs. Benefits include increased

client engagement and improvements in client-therapist relationships. Using PlayWrite MHC professionals have now developed nine further games. These games implement a wide range of theoretical approaches and address a broad variety of specific disorders. Several games targeting specific social groups have also been created. The game creation process has provided a large amount of feedback which can be acted upon in future iterations of PlayWrite. Alongside direct feedback from MHC professionals, new possibilities not envisioned by the designers of PlayWrite have emerged through MHC professionals use of the system. The PlayWrite system has now reached a point at which clinical evaluations and systems development can proceed in parallel and complement one another.

The success of the PlayWrite system – and of the approach used in its development – is reflected in the interest the system has generated within the MHC community. A total of 55 MHC professionals from 18 MHC services throughout Ireland and the UK have participated in the evaluation of PlayWrite. The results of this evaluation are presented. Several proposals have now been submitted by academic institutions interested in further exploring the potential of the system. For example, clinical psychology researchers in Queens University Belfast recently submitted and received funding for a three year clinical study, which will evaluate games created with PlayWrite. Researchers with the Department of Clinical Psychology in University College Dublin have made a call for expressions of interest from PhD students for a further three year study.

1.8 The Structure of this Thesis

The remainder of this thesis is divided into 9 chapters.

Chapter 2 provides a review of theoretical approaches to talk-based MHC and also reviews the current state of the art in technology in talk-based interventions.

Chapter 3 looks at significant factors which impact design in this domain and discusses the importance of collaboration between HCI and MHC researchers.

Chapter 4 provides an analysis of an initial proof of concept project in which two HCI researchers and a MHC professional collaborated to create PI, a therapeutic 3D computer game. The design and development process applied in the development of PI is described. The chapter also describes the initial evaluations of PI and provides an analysis of the lessons learned. The most important issue to emerge from this evaluation is the importance of adaptability in new technologies.

Chapter 5 provides a detailed description of the adaptable design approach proposed in this thesis. It discusses issues including the forms of adaptation being proposed, the structure of an adaptable system, a model of use for developed systems, and the importance of communications channels between HCI and MHC professionals.

Chapter 6 describes the development and initial evaluations of the PlayWrite system. PlayWrite is an implementation of the adaptable design approach. It enables MHC professionals to create and adapt therapeutic 3D computer games, which can then be used in adolescent MHIs. This chapter describes

PlayWrite and the formative evaluations, conducted to ensure that the system is sufficiently usable by the target end users.

Chapters 7 to 9 describe significant stages in the evaluation of PlayWrite. **Chapter 7** describes the stage in which PlayWrite was made more generally available to MHC professionals, who had the opportunity of using it to create new games. The handover process and game building process are described, and new games created by MHC professionals are discussed. **Chapter 8** analyses different types of feedback from the game building process, and looks at new ideas which have emerged through MHC professionals' use of the system. Finally **Chapter 9** describes clinical evaluations of games created with PlayWrite. In the main this chapter focuses on the multi-site evaluation of PI, the first game created using PlayWrite. However it also describes initial evaluations of new games and MHC professionals' plans for further formal and informal evaluations.

Chapter 10 discusses the lessons learned in developing and evaluating PlayWrite. Much of this final chapter is dedicated to addressing the question of whether or not the research presented in this thesis validates the adaptable design approach. Based on the lessons learned in evaluating this approach a broad set of guidelines for the development of technology in talk-based MHC are also put forward. Finally this chapter discusses future work and identifies ways in which HCI researchers can contribute to this work.

2 Technology in Talk-Based Mental Health Care

This chapter is divided into two broad sections. The first section examines theoretical approaches to talk-based MHC. The second section reviews previous uses of technology in this domain.

2.1 Talk-based Mental Health Care

As stated in the introduction chapter, a recent report by the US Surgeon General's office concluded that (1) the efficacy of mental health treatments is well documented and (2) a range of effective treatments exist for most mental disorders (Surgeon General, 1999). Treatment generally takes the form of talking, listening and learning, physical treatment (drugs, ECT, biomedical) and/or social interventions. This thesis focuses on listening-and-talking based intervention methods. Many studies, included the report of the Surgeon General, have concluded that talk-based methods are equally as effective as drug based interventions in the treatment for many disorders. Studies show greater acceptance of talk-based methods amongst people suffering mental health disorders and suggest benefits of talk-based interventions which extend beyond the end of the treatment. The benefits of drug based treatments generally stop with the cessation of medication and although the risks of side effects have been reduced, concerns still remain (Surgeon General, 1999). Talk-based methods include psychotherapy, clinical and counselling psychology, psychiatry, counselling, and mental health social work. Interventions generally aim to be both remedial and preventative. They aim to both reduce a client's current symptoms and suffering and also improve the client's ability to manage and overcome future difficulties. Specific theoretical approaches to achieving these aims are reviewed in the next section.

2.2 Theoretical Approaches to Mental Health Care

To begin working in the mental health area it is important that HCI researchers and practitioners have a grounding in the major theoretical approaches to talk-based MHC. Karasu (1986) estimated that there are between 250 and 400 different approaches to talk-based MHIs. There are however a handful of 'major schools' and in practice most professionals, even those declaring allegiance to a particular theoretical school, often borrow and mix methods and techniques from various approaches. This borrowing and stitching is called eclecticism. What follows are brief descriptions of the most prominent 'schools' of treatment – Psychodynamic, Humanist-Existential, Cognitive-Behavioural, and Eclectic-Integrative. Within each school

particularly influential approaches are highlighted. It is important to note that there is no universally agreed way of classifying approaches to talk-based MHC and that approaches differ from culture to culture and country to country. The classification presented in this thesis is adopted from (Feltham & Horton, 2000). The approaches outlined below have their theoretical origins in the US and Europe and reflect the most prominent approaches used by public health care services in these countries. For further details see (Capuzzi & Gross, 2003; Feltham et al., 2000; Payne, 1997).

2.2.1 Psychodynamic approaches

Psychodynamic approaches include Psychoanalytic Therapy (Freudian), Adlerian Therapy, Analytical Psychology (Jungian) and Psychodynamic Therapy (Kleinian). Psychodynamic theories assume that behaviour comes from movements and interactions in peoples' minds. They emphasise how the mind stimulates behaviour and also how a person's social environment both influences and is influenced by the mind and behaviour. Great emphasis is placed on early life experiences and parental and sibling relationships. This approach developed from the early discoveries and theories of Freud, who found that by helping patients recall and talk about painful childhood experiences, he could relieve them of debilitating hysterical symptoms.

Psychoanalytic theory proposes that beneficial change can occur by increasing an individual's self-knowledge and bringing the unconscious into consciousness. In this way past trauma may be re-experienced in the present, revealing hidden feelings and liberating creative potential for new resolutions and the prospect of taking greater responsibility for actions. Free association is one of the primary strategies. The client is encouraged to say whatever comes to mind and dreams may be explored. The therapist maintains a state of reverie, making links between associations and waiting for signs of repression, shown through hesitations or resistance to ideas, or slips of the tongue.

Psychodynamic interventions are often very time intensive, sometimes based on years of work and encouraging an open ended exploration of clients' lives, with the aim of gaining ever deeper insight and understanding. While such approaches remain popular in private practice, they are usually impractical for publicly funded or emergency interventions. Public systems are more likely to adopt more structured, goal oriented approaches, placing greater emphasis on achieving specific targets and relieving specific problems faced by the client in the shorter term. For similar reasons broad psychodynamic strategies have received little specific attention by researchers investigating computer assisted interventions. However the influence of psychodynamic theories on subsequent theories, including those discussed below, is significant.

2.2.2 Cognitive and Behavioural approaches

Behavioural therapy developed from early work in learning theory. Whereas psychodynamic theory states that behaviour comes from processes in the mind, learning theory argues that we cannot know what is happening in someone else's mind. We can only study and influence the behaviour which emerges. Aside from inborn reflexes, all behaviours are learnt through contact with the world (conditioning). It is therefore possible to

learn new behaviours to replace those which cause problems (counter-conditioning). Treatments focus on doing things which lead to consistent changes in behaviour.

Cognitive therapies developed in part from behaviour theory and also incorporate lessons from social learning theory. Beck's Cognitive Therapy is the most evidence-based, influential and widely used cognitive approach (Feltham et al., 2000). Beck hypothesised that mental health disorders such as depression are 'thinking disorders'. His cognitive model relates thoughts to emotion and behaviour and proposes that it is not just people's situations and experiences which make them depressed or anxious, but rather their own internal schemata and how they process experience. A schema is a hypothetical cognitive structure which acts as a filter on incoming information. People can have adaptive and healthy schemata or maladaptive and unhealthy schemata, which tend to be negative, rigid and inflexible. Long lasting change comes from modifying a person's dysfunctional schemata and beliefs (cognitive restructuring). Some of the specific strategies used to bring about cognitive restructuring include Socratic questioning, considering alternative perspectives, completing automatic thought forms, reality testing and cognitive rehearsal.

Today few therapists use exclusively behavioural or cognitive approaches. Cognitive-Behavioural Therapy (CBT) has developed to include successful aspects of both approaches, with therapists focusing on changing thoughts and feelings alongside behaviours. CBT is more highly structured than many other therapeutic methods. Interventions generally follow a specific formulation of assessment, goal setting, attempting specific strategies and then measuring success based on valid and reliable clinical measures (e.g. the Beck Depression Inventory). Some of the most commonly used treatments include: exposure therapy, systematic desensitisation, relaxation training, response prevention, coping tactics, cognitive restructuring, self-monitoring and self regulation, covert sensitisation, psychoeducation, role rehearsal and social skills training. Client self-efficacy is one of the most important aims of treatments. Self help exercises and therapeutic homework are commonly used and there is an emphasis on psycho-education.

CBT is one of the best researched treatments. Empirical validation is emphasised. A number of studies have shown that CBT methods are superior to drug based interventions and other therapies for a wide range of problems, including anxiety disorders, mild to moderate depression, phobias (including social phobia), post-traumatic stress disorders, obsessive-compulsive disorders, chronic fatigue syndrome and psychosis (Feltham et al., 2000, p. 320). CBT is also widely used in public health services. Some of the key reasons for this are that it is widely applicable, highly structured, goal-oriented, problem solving, easily learned and less time intensive than more free form methods. For these reasons, CBT has also received more attention in terms of computerisation than other approaches reviewed in this thesis. The results of this research are reviewed in Section 2.3.3.

2.2.3 Humanistic-existential approaches

Humanist and Existential approaches to talk-based treatment emphasise the ability of human beings to reason, make choices and act freely. They focus on the capacity of people to gain the personal power to control their lives and change ideas governing how they live. Personal empowerment is one of the primary aims.

Psychodynamic and cognitive behavioural theories emphasise how the past has an important influence on the present. Humanist and Existential approaches emphasise how it is our interpretation of the past which is important. Consequently, through their personal freedom, people are able to create or define themselves and reinterpret their past in an empowering manner, which frees them to act towards a more fulfilling future.

Person-centred or Rogerian therapy, first developed by Carl Rogers in the 1940s, is one of the most influential humanistic approaches. Rogers identified an empowering client-therapist relationship as the essence of a therapeutic process and proposed that a quality therapeutic relationship could, in and of itself, provide the *'necessary and sufficient conditions for therapeutic personality change'* (Payne, 1997). The healing effects of treatment are predicted to occur through the client experiencing an emphatic, non-judgemental, positive and accepting relationship that frees them to achieve greater self acceptance. Although modern research suggests that an empowering relationship is not in and of itself sufficient, the importance of a client-therapist relationship is the most influential contribution of person-centred therapy to modern MHC. Chapter 3 of this thesis suggests that targeting issues such as improvements in the client-therapist relationship should be one of the key objectives of new technologies for MHIs.

Narrative Psychotherapy is a more recently developed humanistic approach. The core text in its development is *'Narrative Means to Therapeutic Ends'* (White & Epston, 1990). It developed out of movements in psychology by theorists such as Bruner who argued that storytelling represents a fundamental human means of communication and personal understanding. Personal narratives are central to a person's sense of self; through narrative thinking a person forms a sense of self, a sense of the world around them and of their place in that world (Bruner, 1986). Mental health problems can arise when a person tells overly negative stories or becomes blocked from telling their story, for many reasons including social isolation, overly critical environments, purposeful oppression, or because a person feels their story does not fit with accepted or perceived social norms. Narrative psychotherapy can be seen as the process of inviting clients to tell and re-tell their life story from a variety of perspectives with the aim of generating alternative stories and reaching a coherent and meaningful narrative at the end. Many narrative interventions will seek to create a record of the client's story. This record can act as a tool for reflection. Traditionally this record is usually written, however multimedia systems now offer greater scope for media rich records and also greater possibilities for sharing and co-constructing therapeutic stories. Aside from specifically narrative approaches the importance of personal stories is pervasive in MHIs.

2.2.4 Eclectic-integrative approaches

Recent trends suggest that eclectic approaches to client treatment work best. Effective eclecticism however requires some integrating framework to give coherence to the entire process. Examples of eclectic and integrative approaches include: Cognitive Analytic Therapy, Multimodal Therapy, The Skilled Helper Model and the Trans-theoretical Approach. In this thesis the Skilled Helper Model is highlighted (Egan, 2002).

The Skilled Helper Model is a high level overview of the structure of a helping intervention. Orlinsky and Howard (1987) say that it is a generic model of helping and Egan (2002) states that it is the most widely used

structural overview of counselling and psychotherapy in the world. Although the main thrust of the model is cognitive-behavioural it also incorporates client-centred and humanistic theories.

The model is separated into three stages plus an overall actions line (Fig.2.1). Each stage centres on a series of sub-categories that help clients move forward in managing problems and developing opportunities. The theme of stage one is problem/opportunity clarification and ownership. Stage two is about goal setting and commitment to goals. The therapist helps the client to envisage possibilities for a better future and then they work together to choose realistic and challenging goals for achieving solutions to key problems and unexplored possibilities. Stage three is about strategies for accomplishing goals. The client and therapist choose the actions which are most likely to succeed based on an examination of the client's resources, talents, temperament and lifestyle. The Action arrow spans the three stages, indicating that right from the beginning of the process the client needs to act on their own behalf. Without goal-accomplishing actions, the process of discussing problems and opportunities and developing goals is a hollow one. Throughout the helping process the therapist reviews the client's progress and actions and helps adapt the action strategies accordingly.

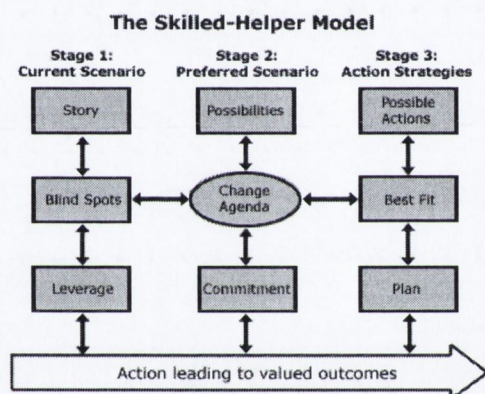


Figure 2.1 - The Skilled-Helper Model. Copyright © Egan 2002.

The stages of the Skilled Helper Model are not rigidly designed and in reality they often overlap and interact. The model is designed as a flexible overview, to guide helping interventions. It acts as a map for therapists, helping them identify *'where they are'* with a client and what kinds of interventions would be most useful. Egan refers to the model as a *'browser, for mining, organising and evaluating concepts and techniques that work for clients, no matter what their origin'*.

Within the context of technology for MHIs, models such as the Skilled Helper Model offer the potential to act as guiding frameworks, helping to identify the potential of different technologies and applications to be applied to different stages of helping interventions. Eclectic models along with a review of the 'major schools' can also help in identifying broad factors in successful interventions. These factors include: client empowerment, engagement and actions, a quality client-therapist relationship, personal storytelling, psychoeducation, identifying and correcting internal thought processes, and problem solving and management skills. The adaptable design approach proposed in this thesis advocates an approach whereby HCI professionals develop flexible systems which target broad therapeutic factors. MHC professionals can then

use these systems in eclectic ways or tailor and adapt them to target specific theoretical approaches and disorders.

2.3 Previous Uses of Technology

This section provides a review of previous research on technology in talk-based MHIs. Of the areas outlined below most attention to date has focused on electronic contact and online information sources, and electronic questionnaires for assessment, diagnosis and outcome monitoring. Computerised implementations of cognitive behavioural therapies and virtual reality based exposure therapies have also received attention, while computer gaming and multimedia storytelling have emerged more recently, suggesting particular potential in the area of adolescent interventions. In general research in each of these areas is still in its early stages and only a very limited number of systems have begun to achieve widespread use in public health care systems.

2.3.1 Electronic contact and online information sources

Much of the literature on the use of technology in MHC focuses on various forms of electronic contact, which offer a natural extension of traditional face-to-face therapy. There is documented evidence of the use of email (Rochlen, Zack, & Speyer, 2004), Internet relay chat (Chechele & Stoffle, 2003), video conferencing (Simpson, 2003), shared hypermedia (Castelnuovo, Gaggioli, Mantovani, & Riva, 2003) and text messaging (Bauer, Percevic, Okon, Meermann, & Kordy, 2003). The past decade has also witnessed the proliferation of websites providing psycho-educational information, although the standard varies widely and ensuring people access information from trusted sources (e.g. MHC organisations) is one of the key concerns for MHC professionals working in this area. Online discussion groups, forums, e-health groups and mailing lists have also been used to facilitate online group therapies and provide peer support and psycho-educational information (Houston, Cooper, & Ford, 2002; Page, Delmonico, Walsh, L'Amoreaux, Nanninhirsh, Thompson et al., 2000). Collectively these forms of online communication have become known as Internet Therapy. The Islands System project is currently attempting to combine various forms of Internet Therapy to provide MHC services to isolated European island communities (Angelos, Lentziou, Bekiaris, Fernanda, & Bullinger, 2005). To date the most common form of Internet therapy has been email (Rochlen et al., 2004). For further details of each form of Internet therapy see (Goss & Anthony, 2003).

Much of the research in this area has focused on developing models of practice for therapists working online (Maheu, 2003; Suler, 1999). Other researchers have focused on identifying the similarities and differences between online and face-to-face contact and on the benefits and challenges posed to therapists operating purely online. For example Rochlen et al (2004) suggest the benefits include convenience and increased access, disinhibition and internalisation, increased time for reflection and the therapeutic benefits of writing emails. Possible challenges suggested including missing non-verbal cues, misreading, time delays, technical difficulties for clients, issues of crisis intervention and issues of mistaken identity and security. Another difficulty identified by many MHC researchers working in this area has been the general need, to date, to use

off the shelf systems not specifically designed for MHIs. The Internet Therapy area has developed to the stage where ethical guidelines for the practicing of online counselling have been published by organisations including the American Counseling Association, the British Association of Counselling and Psychotherapy, and the International Society for Mental Health Online. Developing specialised systems which incorporate and take account of such guidelines is a worthwhile aim for future research.

2.3.2 Computerised questionnaires for assessment, diagnosis and outcome monitoring

Computerised versions of standard psychological questionnaires, for assessment, diagnosis and rating procedures, have been validated against therapist administered paper versions for conditions including phobias, depression and anxiety, obsessive compulsive disorder and alcohol and substance abuse problems (Butcher, 2004; Marks, 1999; Parkin, 2000). A meta-analysis study revealed that for statistically based assessments, computerised tests offer a 10% accuracy advantage over clinician administered paper tests (Butcher, 2004). Studies show that clients often find it easier to disclose sensitive information to a computer. Clients report feeling less embarrassed and more in control with a computer than with a clinician, but evidence suggests they can describe their feelings better to a human. Computers also offer advantages in terms of time savings, repeatability and eliminating many of the interpersonal variables of face-to-face written assessments, including variations in administration from clinician to clinician. Many computerised assessment procedures produce written reports, summarising the information entered by the client and making recommendations, which clinicians can use to help them make treatment decisions.

More limited recent research has focused on the benefits of more intensive and adaptive testing made possible by computers. Various adaptive versions of the time intensive Minnesota Multidimensional Personality Questionnaire have been validated against conventional versions in terms of scale validity and classification accuracy, but gave substantial item and time savings (Butcher, 2004; Butcher, Keller, & Bacon, 1985; Handel, Ben-Porath, & Watt, 1999). Percevic et al (2004) describe the AKQUASI program, which uses regular computerised questionnaires to implement models for continuous monitoring and feedback. AKQUASI can be used from any Internet enabled device (PC's, laptops, PDA's, mobile phone) and allows clinicians to tailor questionnaires, schedule plans and scoring/evaluation algorithms, based on a palette of predefined functions, input elements and psychometric instruments. The program provides written and graphical feedback of scaled scores, evaluations of these scores and changes over time in relation to the concepts of 'clinically significant change' and expected treatment response. It also provides integrative evaluations of treatment status or progress and aggregation over patients. AKQUASI aims to enable adaptive allocation strategies, whereby clients who need additional treatment will get it and clients who are no longer suffering can terminate treatment or move to less intensive therapies. Limited trials have demonstrated several benefits including: a reduction in the duration of treatments, reduced failure rates for at risk patients, greater success rates of clinically significant improvement and reduced operating costs.

The success of computerised questionnaires shows that working with computers is acceptable to many clinicians and people suffering mental health disorders. The potential of computers to reduce client discomfort in disclosing sensitive information is significant, as stigma has been identified as a key issue which must be overcome to improve MHC services. Systems such as AKQUASI can potentially improve the success rates and consistency of talk-based interventions, by providing more intensive feedback and assisting clinicians to monitor clinical outcomes and success factors. A particularly interesting aspect of the AKQUASI study was the facility offered to clinicians to choose and tailor psychometric instruments, schedule plans etc. The issue of adaptation is one of the primary focuses of the research presented in this thesis. Whilst in a limited way, AKQUASI is one of the first systems to offer such possibilities.

While initial benefits have been demonstrated, the MHC sector is lagging behind other health care sectors in taking advantage of medical informatics. Percevic et al (2004) identify that methodological advances in psychometric assessment such as adaptive assessment and complex measures (e.g. response time, physiological measures, speech and video analysis), although used in related areas for many years, have not yet made a breakthrough into psychotherapeutic research and practice. Further work is required to better understand the presentation of feedback data, to evaluate what contributes to its effectiveness and to access what forms of feedback are appropriate and most valuable.

2.3.3 Computerised treatment programs for Cognitive Behavioural Therapy

Recent attempts to design computerised treatment programs have, in the main, focused on cognitive and behavioural treatments. Earlier attempts to replicate psychodynamic and humanist approaches encountered difficulties; with natural language processing and the intangibilities of replicating a human relationship and client-therapist dialogue (Cavanagh, Zack, Shapiro, & Wright, 2003). As illustrated in Section 2.2.2 cognitive and behavioural programs have the advantage of being more structured, systematic and goal based and of involving more psycho-educational elements and having measurable outcomes. This review highlights several recent, more widely tested implementations of cognitive behavioural strategies. For a review of older systems, see (Cavanagh et al., 2003; Marks, 1999; Newman, Erickson, Przeworski, & Dzus, 2003). Systems are divided into two categories: (1) treatments in which the computer is used as an adjunct to traditional face-to-face therapy, and (2) standalone systems in which the computer delivers almost the entire psychotherapeutic treatment.

2.3.3.1 Computer supported treatment

'Good Days Ahead: A Multimedia Program for Cognitive Therapy' is a DVD based learning program for the treatment of anxiety and depression, covering the core self help elements of CBT (Wright, Wright, Salmon, Beck, Kuyendall, Goldsmith et al., 2002). Psycho-educational material is complemented throughout by the use of videos, showing characters overcoming depression and anxiety using the methods of CBT. There are also graphics, multiple choice questions, checklists, mood ratings and interactive self help exercises and homework to encourage users to apply the lessons learned in real life situations. In a controlled study, clients experiencing major depression received nine 25 minute sessions with a therapist along with nine 25 minute

sessions with the program. Results were compared with clients receiving nine full 50 minute sessions with a therapist. Response rates for computer assisted treatment were identical to standard therapy, but with considerable savings in direct face-to-face contact time (Wright et al., 2002).

Several recent studies have explored the potential of Personal Digital Assistants (PDA's) in computer assisted therapy. For example, Przeworski and Newman (2004) describe the use of PDAs in group treatment of social phobia. The program included a diary function for ongoing self monitoring of anxiety, as well as guidance on relaxation, cognitive restructuring, self-control desensitisation and homework exercises. Clients received 6 computer assisted sessions instead of a standard 14 sessions. The system demonstrated major savings versus standard treatment and proved equally effective. Clients expressed enthusiasm for using the PDA, and reported that they found it very helpful. There was also a higher than normal rate of compliance with homework exercises.

2.3.3.2 Standalone treatment

There have been several studies on the use of standalone computerised treatment programs. These systems do not aim to fully remove the possibility of human intervention, rather they aim to minimise the required contact time in treatments and make it easier for treatments to be delivered in primary health care settings (e.g. GP's office), or in the clients own home.

Beating the Blues is a standalone PC based CBT program for anxiety and depression which has had extensive clinical trials (Proudfoot, Goldberg, Mann, Everitt, Marks, & Gray, 2003; Proudfoot, Swain, Widmer, Watkins, Goldberg, Marks et al., 2003). Like Good Days Ahead, Beating the Blues is an interactive multimedia program, incorporating questionnaires and self rating scales, animations, voiceovers and video-based storytelling featuring people learning to overcome anxiety and depression. Results showed that standalone treatment with Beating the Blues is equally effective as standard therapy for treating mild to medium anxiety and depression, and achieves equal client completion rates. Clients reported significantly higher treatment satisfaction than for standard human treatment.

Gega et al (2004) report on a trial at a London clinic to test the integrated use of four previously validated standalone treatment programs. Fearfighter was used for the treatment of panic/phobias, Balance for generalised anxiety and mild depression, COPE for non-suicidal depression and BTSTEPS for obsessive compulsive disorder. Fearfighter and Balance are PC based applications that can be used either in a clinic or from home via the Internet. BTSTEPS and COPE use phone based Interactive Voice Response (IVR), where clients with a touch tone phone can access self help materials and guided self help exercises. The use of these systems by clients, complemented by brief contact with real therapists, enabled therapists to treat significantly more clients per hour than would have been otherwise possible, without appearing to sacrifice on the effectiveness of treatment. Because the systems were available from home many clients received treatment where it would not have normally been possible and patients had 24 hour access to help. The clinic gave a rough estimate of potential cost savings of between 15% and 41% per annum compared with a standard clinic.

The studies highlighted above demonstrate the potential of computerised cognitive behavioural programs to greatly reduce the costs of MHIs and greatly increase the number of patients a single therapist can treat. They can also increase access and make treatment more convenient for clients. Initial research has also demonstrated increased compliance with homework and self help tasks. This is significant, as such activities increase client self efficacy which significantly influences clinical outcomes. Fearfighter is amongst the first computer based treatment programs to achieve widespread use in public health care services, through clinics associated with the National Health Service (NHS) in the United Kingdom (UK). However the full scope of such systems has yet to be fully discovered. For example, in a physical health care context Dishman (2004) has envisaged a fully integrated system of '*wellness in place*', to enable many health care treatments and after care services to be delivered in the home by informal care givers e.g. family and friends. The potential of modern mobile phones is also largely unexplored. Mobile phones can offer many of the combined benefits of IRV and PDA based systems i.e. an existing, extensive and cost effective hardware platform, combined with mobile content delivery and support.

To date computer assisted cognitive behavioural programs, such as Good Days Ahead and Beating the Blues, are largely computerised multimedia versions of standard self-help and psychoeducation material. Within an educational context such systems would be classified as instructional approaches to learning. An alternative approach to learning with technology, likely to prove particularly beneficial in MHC settings, is the constructionist approach (Jonassen, 1998; Papert, 1980). Jonassen (1991) suggests that whereas the strength of instructional approaches lies in their ability to teach basic concepts and well structured knowledge, constructionist approaches can enhance engagement and are most appropriate for advanced knowledge acquisition and ill-structured knowledge domains. Constructionist approaches offer the learner/client the opportunity to experiment and construct new understanding by building personally meaningful artefacts, rather than simply by absorbing knowledge. They offer the potential to improve and personalise learning outcomes by increasing engagement, increasing collaborative learning, and increasing experimentation. The application of ideas from constructionist learning offers strong possibilities for future MHC exploration.

2.3.4 Virtual Reality treatments

Exposure therapy incorporating systematic desensitisation is one of the most commonly used counter-conditioning techniques in behavioural therapy. Clients are first taught relaxation techniques. They are then gradually exposed to an anxiety provoking stimulus and learn to use relaxation techniques to fight their anxiety. There is a large body of research into the use of virtual reality exposure treatments for many anxiety and panic disorders. Virtual environments allow clients with specific phobias to be placed in safe, yet realistic environments, where they experience the various stimuli associated with their phobia. Virtual reality exposure is often used in combination with CBT training and physiological monitoring/feedback and has demonstrated improvements over traditional exposure methods. A detailed review of this work is beyond the scope of this thesis, but recent reviews of the state of the art in this area can be found in (Glanz, Rizzo, & Graap, 2003; Riva, 2005; Wiederhold & Wiederhold, 2004). Research is focused in several main areas, including:

- Efficacy studies of existing VR based treatments.
- The extension of existing treatment methods to a greater range of disorders.
- Issues related to presence in virtual environments.
- Ongoing improvements to virtual reality hardware and software technologies. Of interest here is any research into visual or intelligence aspects of virtual environments (e.g. life like virtual character, intelligent characters, visual fidelity etc.).
- Alcañiz et al (2007) and Botella et al (2006) describe initial research on the development of VR environments that can be adapted in real time to attempt to illicit specific emotional reactions or induce specific emotional states in a user.

One major disadvantage of virtual reality treatments is the need for expensive specialist equipment, which makes it prohibitive for widespread use in public health care systems. Research is ongoing into whether cheaper non-head mounted and desktop gaming technologies can deliver the same benefits. Riva and Gaggioli (2008) also described initial research on the development of the NeuroVR toolkit which aims to reduce the development time involved in creating the VR environments required for exposure treatments.

2.3.5 Biofeedback

The use of biofeedback in MHC is based on evidence of the important relationship between cognition-behaviour-emotion and physiological change. Direct observation of physiological change can potentially enable self-awareness and psycho-physiological monitoring. The therapist and client can gain an insight into the clients' physical and emotional state and the client can learn techniques, such as relaxation exercises, for controlling their physiological state. To date research has generally focused on the use of biofeedback in the treatment of anxiety disorders, attention deficit disorders and impulse control problems. Biofeedback treatments have proven particularly effective for engaging children and adolescents (Culbert, Kajander, & Reaney, 1996). The core reference book for biofeedback practitioners is (Schwartz & Andrasik, 2003). In MHC settings research is concentrated on several areas including:

Biomedical engineering: ongoing research to develop the tools with which to measure and classify physiological signals. Work is currently ongoing on the issues involved in classifying specific emotions, however this work is still at an early stage (Picard & Klein, 2002).

Representation: once the relevant signals have been measured and classified, what are the most effective ways of representing these measurements? In the past measurements were generally displayed as graphical trends. More interactive forms of representation are currently being explored e.g. through music, animation and using computer games. For example Pope and Passion (2001) have developed methods for using off the shelf Nintendo and Playstation games in combination with electroencephalogram biofeedback, in relaxation exercises for children with attention deficit and hyperactivity disorders. Results concluded that the inclusion of games in normal biofeedback treatments increased the therapeutic effects. Both children and their parents rated as significantly higher their enjoyment of coming to video game based sessions. Children found the sessions more inherently motivating and remained more focused on therapeutic tasks.

Clinical verification: research is conducted to determine the actual effectiveness of biofeedback in the treatment of specific disorders, e.g. relaxation training for anxiety disorders (Gould, Otto, Pollack, & Yap, 1997; Rice, Blanchard, & Purcell, 1993), and treatments for attention disorders (Fox, Tharp, & L.C., 2005; Monastra, Monastra, & George, 2002).

For a more detailed review of recent research and evaluations of specific biofeedback supported interventions in MHC settings please see (Yucha & Gilbert, 2004).

2.3.6 Therapeutic computer games

Interest in the potential uses of computer games in MHC settings has its theoretical foundations in previous research on the therapeutic use of non-computer based games and play, most often in child and adolescent interventions (Gallo-Lopez & Schaefer, 2005; Schaefer & Reid, 2004; Sharry, 2004). However actual research on computer games on MHC settings has been limited. Whilst some MHC researchers have begun to show an interest in the potential of suitably designed games (M. D. Griffiths, 2004; Parkin, 2000), much literature in recent years has focused on the negative effects of computer games. Risks such as addiction and increased aggressiveness and violence have been suggested (Gentile, Lynch, Linder, & Walsh, 2004). During the 1980's and early 1990's several evaluations of actual games were undertaken. Some researchers from a psychology/psychotherapy background developed their own games (Allen, 1984; Clark & Schoech, 1984; M. Griffiths, 1997; Oakley, 1994; Resnick & Sherer, 1994), while others have examined the potential of off-the-shelf commercial games (Allen, 1984; Gardner, 1991). Suggested benefits included:

- Games can successfully engage clients previously difficult to engage by other means. Clients were more cooperative with their therapists, with whom they developed effective therapeutic relationships. Session attendance rates greatly improved and the stigma felt in attending therapy was reduced (Allen, 1984; Clark et al., 1984).
- Games can help adolescents develop “more self-confidence, a sense of mastery, more willingness to accept responsibility” (Allen, 1984).
- Games can help children displace their aggression, develop problem solving skills and deal with negative and positive outcomes in the game (Gardner, 1991).

These findings must be viewed with a large degree of caution. This early research was largely uncoordinated, and the difficulties surrounding clinical evaluations meant that trials typically had limited user numbers.

As noted above research on the use of biofeedback-based games for the treatment of anxiety disorders and attention problems has received more recent attention and has again suggested increased levels of client engagement (Pope et al., 2001). Research is also ongoing to evaluate the effectiveness of a game called Virtual Iraq, which is translation of the graphic assets from the Xbox game Full Spectrum Warrior, into a VR-based exposure therapy application for combat-related PTSD with Iraq War veterans (Rizzo, Graap, Pair, G., Treskunov, & Parsons, 2006; Rizzo, Pair, Graap, Manson, McNerney, Wiederhold et al., 2006). Researchers at McGill University in Montreal have also developed a set of Flash based online games aimed at helping

individuals with low self-esteem. Research has shown that people with low self-esteem exhibit a perverse vigilance in discerning signs and expressions of rejection in others. In one game you must identify a smiling face from a 3x3 grid of otherwise frowning faces. Initial evaluations suggested that the game can help individuals learn skills to deal with negative social information (Dandeneau & Baldwin, 2004). More recently an Australian not-for-profit organization the Inspire Foundation, which runs the online mental health portal ReachOut.org, launched an online game called Reach Out Central, which aims to deliver relevant psychoeducational information to adolescents. At the point of writing results of initial evaluations of this game had not been published.

Substantially more research on computer games has been conducted in educational and other health care areas. Suggested benefits of computer games in these areas include increased motivation, increased self-esteem, increased health care knowledge and self efficacy, behaviour changes, improved problem solving and discussion skills and improved storytelling skills (Bers, 2001; Fogg, 2003; HopeLab, 2006; Marsella, Johnson, & LaBore, 2003; Robertson & Oberlander, 2002; Squire, 2003). It is an open question as to whether these benefits are transferable to MHC settings.

2.3.7 Collaborative multimedia storytelling

As highlighted in Section 2.2.3, telling and reflecting on personal stories is a fundamental element of most, if not all, MHIs. While computerised implementations of cognitive and behavioural therapies have shown benefits of incorporating video-based peer stories, other researchers have undertaken more intensive research on the uses of multimedia storytelling. Sharry et al (2004) describe a more focused exploration of the potential of collaborative multimedia storytelling to engage clients (particularly children and adolescents) in narrative treatments. The Working Things Out (WTO) project, has developed an interactive DVD/CDROM containing the stories of eleven adolescents who have successfully overcome problems including depression, bullying, eating problems and self-harm. WTO distinguishes itself from previous resources in that the eleven adolescents undergoing treatment played an active part in the creation of the multimedia stories and this creation process facilitated an empowering therapeutic intervention. WTO is now being investigated as a therapeutic resource with young people experiencing similar mental health problems. It is also being investigated as a preventative resource, for use in schools, by raising awareness of mental health issues. Brosnan et al (2006) describes ongoing work to develop a 12 week intervention program for adolescents incorporating use of WTO with a new multimedia storytelling toolkit which aims to streamline the animation process, making it accessible to a wider range of MHC professionals and their clients.

A far greater body of research has been conducted in educational settings on the potential of digital storytelling. There is much documented evidence of use of video-based, multimedia scenarios to engage adolescents in social learning. For further details see (Goldsworthy, 2002). Lessons from constructionist educational research may also be adapted to enhance self expression and storytelling in therapeutic settings. For example Marina Umaschi Bers has coined the term *Identity Construction Environments* to describe the computer tools she has developed for exploring personal identity within community environments (Bers,

2001). Her work pays particular attention to the relationship between personal and moral values and personal identity. A substantial body of work has also investigated the use of peer storytelling and story listening systems, e.g. see (Ananny & Cassell, 2001; Cassell, 2004; Druin, Stewart, Profit, Bederson, & Hollan, 1997; Ryokai & Cassell, 1999). The possibilities of using the audio, photographic and video capabilities of mobile phones, to allow clients document, explore and reflect on their own life between therapeutic sessions has also not yet been explored. Nor has the potential of multimedia weblogging or ideas of '*citizen journalism*' (Ananny & Strohecker, 2002).

2.4 Conclusions

Alongside reviewing theoretical approaches to talk-based MHIs, this chapter has identified several areas in which initial benefits of technology have been demonstrated. However, whilst initial benefits have been demonstrated, research to date has focused largely on computerised approaches which complement or copy existing face-to-face methods. Several ways in which research in each area may be taken forward have also been discussed. Such research will benefit from the involvement of both HCI and MHC professionals. This involvement can help to move research to a new level, in which more specialist systems offer therapists new possibilities for working with clients.

Electronic contact and computerised implementations of cognitive behavioural therapies have provided initial indications that technology can increase access to MHC services. Studies of computerised questionnaires have shown the potential of computers to assist in reducing client discomfort with disclosing sensitive information. However technologies for reducing stigma and increasing engagement have, in general, received less attention and our understanding of how to design such technologies is currently poor. Virtual reality and biofeedback systems have demonstrated initial potential in this area, however both rely on equipment not generally available in public services and also require specialist training for MHC professionals. Both approaches also focus on the treatment of specific issues, e.g. anxiety and attention disorders. There is a need to develop inexpensive systems which can improve engagement and target a broader variety of mental health disorders.

The exploration of design approaches which support the development of systems that help to increase client engagement is one of the key aims of the research presented in this thesis. Therapeutic computer gaming is an example which has demonstrated potential in this area, however exploiting this potential further will require the collaboration of HCI and MHC researchers. As highlighted in Section 2.3.6, early research by MHC professionals stalled, in part due to MHC professionals' inability to meet the increasing technical challenges of developing modern computer games. The practical application of the design approach proposed in this thesis has led first to the creation of a 3D computer game called Personal Investigator, and subsequently to the development of the PlayWrite system. PlayWrite has been used by MHC professionals to create 10 further computer games. Details of this work are presented in chapters 4 onwards. Before this however, Chapter 3 discusses the challenges of designing effectively in MHC settings.

3 Designing for Talk-Based Mental Health Interventions

In discussing both the generic and specific nature of design in a particular domain (Moran & Carroll, 1996, p. 7) state: *“a lot of domain specific knowledge is needed, and the practices of design are different in different domains. ... Useful design tools need to be domain-specific, but many of the principles behind the tools are generic.”* Designing technologies for MHIs is a relatively new area of HCI research. As such, whilst successful design will benefit from the application of established HCI techniques, it also requires the identification of the challenges and design requirements specific to the MHC domain.

Traditional HCI approaches have identified three significant elements of requirement and task analysis. For example Redish and Wixon (2003) highlight the triangulation of information about tasks, users, and the users’ environment. For the purposes of structuring a discussion the following sections highlight key aspects of designing for talk-based MHIs in each of these three areas. The focus is placed on identifying the unique requirements and challenges of designing in the MHC domain.

3.1 Tasks

As discussed in Chapter 2 there are many different theoretical approaches to the treatment of mental health disorders. Palmer (1996) and Jinks (2000) provide extensive lists of specific tasks and related strategies. One of the greatest challenges for HCI researchers working in this domain is the sheer variety of these tasks and the fact that many are very loosely defined, relative to the tasks studied in other HCI domains. It is therefore helpful to identify critical factors that can be targeted to improve the effectiveness of a broad range of interventions. Targeting such factors is one of the key aims of the adaptable design approach proposed in this thesis.

3.1.1 Critical factors in mental health interventions

The past two decades have seen an increase in the number of studies which attempt to identify specific factors which influence successful or failed interventions. This research area has been broadly termed Patient-Focused or Outcome-Focused research. See the Journal of Consulting and Clinical Psychology 69(2) for further details. Assay et al (1999) conclude that, across all intervention models, four main factors are responsible for achieving positive change. They have also estimated the relative contribution of each factor:

- 40% Client Factors - Client and environment strengths and resources.
- 30% Quality of Therapeutic Alliance or Relationship.
- 15% Therapeutic Model and Technique.
- 15% Expectance, Hope and Placebo factors.

These results demonstrate the central importance of client factors to effective interventions and also the importance of building a strong therapeutic relationship between the therapist and client. Therapeutic interventions are most likely to be successful if the therapist engages with the client in a client-centred way. Alongside this, the overall success of a MHI is strongly influenced by the degree to which the client engages both with the therapist and most importantly with their own treatment. A quality client-centred approach will aim to actively engage the client's participation, by involving their interests, strengths and ideas. Engaging interactive applications may offer the potential to assist in achieving this aim.

Whilst it may appear to be stating the obvious it is also important to remember that all talk-based techniques are, at their root, talk-based, and rely on dialogue between the therapist and client to achieve positive therapeutic outcomes.

3.2 Users

Whilst systems designed for MHC settings must take account of the overall structure of MHC services, systems designed specifically for use in interventions must consider two key sets of end users: therapist and the clients with whom they work.

3.2.1 Mental health care professionals

Many MHC researchers and practitioners are sceptical of the benefits of technology. This section notes some of the specific issues identified by MHC professionals and discusses how a consideration of these factors will be critical to MHC professionals' acceptance and use of any new technology:

The role of technology in society: Caspar (2004) notes that, alongside the more specific issues discussed below, some MHC professionals have expressed concerns that technology in and of itself can have a damaging impact on the mental health of society. Suggested negative effects include increased isolation due to excessive time spent online or the influence on young people of violent video games (Gentile et al., 2002). Both the design and use of technologies in MHC settings must be sensitive to such concerns. For example, if a person is experiencing mental health difficulties, partial as a result of excessive use of a particular technology, is it appropriate that therapists use technology supported approaches with this person? Decisions on such issues are best made by appropriate MHC professionals. Ensuring that technologies and the evaluations thereof meet the ethical requirements of the domain (Section 3.3.1) will also assist in easing therapists' general concerns about technology.

The client-therapist relationship: Potential damage to the client-therapist relationship is one of the key concerns cited by MHC professionals with regard to the introduction of technology in MHIs (Caspar, 2004). As noted above establishing effective client-therapist relationships is a critical factor in the success of interventions. Some MHC professionals have expressed fears that the use of technology may act as a barrier to the establishment of effective relationships. It is important that technologies are designed in such a way as to minimise the risk of such negative impacts and if possible act to enhance client-therapist relationships.

Time Constraints: Therapists working in public health care settings generally face high time pressures. It is important that technologies do not add to this pressure by placing extra demands on therapists' already limited time. Design approaches must also take account of this constraint. Busy MHC professionals are unlikely to become actively involved in design activities unless they can see the direct benefits of such activities in their day-to-day work.

Training: An informal survey, conducted during the initial stages of the research presented in this thesis, revealed that while many therapists are familiar with Microsoft Office, email and Internet software, few are currently likely to have had specific training or experience in the use of technology in client contact situations. Further to this Berger (2004) reports that although computer based training has many documented benefits and has become increasingly popular in other health science and educational programs, it is still largely unused in MHC training. These factors have a knock on effect on the use of computers in clinical practice. Caspar (2004) notes that, when questioned about increased use of technology, many therapists express concerns over the need for additional training and fear that existing skills may become obsolete. At this early stage in the development of technology for MHIs it is desirable that systems should be designed to take advantage of the existing skills of therapists and integrate with current working methods. As the use of technology becomes more common place, the issues surrounding the training of therapists will become increasingly important.

Security: Many MHC practitioners cite fears over the security of sensitive information as one their primary reasons for scepticism of the benefits of technology (Caspar, 2004). While many methods have evolved for ensuring the actual security of electronic data, perhaps more significant in MHC settings is the perceived security of this information by both therapists and their clients. In peer support and collaborative group systems it is also essential that the accuracy of information and the integrity of individuals be maintained and represented. HCI researchers exploring aspects of trust in computer systems can contribute to maximising this sense of security and trust in technologies.

Responsibility: Another concern for therapists is the new level of responsibility that may be placed upon them by systems enabling clients to continually record personal data between therapeutic sessions, e.g. mood or anxiety levels. Questions arise, such as, should therapists have access to this data and if they do what responsibility does this place on them to monitor the data and to act on changes in the client's condition? Added responsibility in this area could considerably increase the demands on a therapist's time. However

access to such data could prove crucial in some circumstances; e.g. when a client is exhibiting suicidal tendencies.

3.2.2 Clients

As highlighted in Section 3.1.1 client factors are of critical importance to the success of MHIs. An analysis of the needs of the target client group is an essential element of design. The following section identifies some broad client related factors. The focus is placed on discussing adolescent clients.

Client Groups: In general therapists work with three broad client groups: children, adolescents and adults. Within these groups there are many sub-groupings. For example amongst the adult group, young males aged 18-25 have been identified as being particularly vulnerable (BMA, 2006). Adolescents have also been identified as particularly in need of attention. Difficulties of access and engagement, while important amongst all client groups, are particularly severe with adolescent populations. For adolescents therapy is typically something imposed upon them by authority figures and because of this they are often unwilling to accept it. Young people have also been found to have more discriminatory attitudes to mental health problems than adults. There is a strong sense of stigma surrounding mental illness and research has identified this as a major concern of adolescents attending therapy (Office of the Deputy Prime Minister, 2004).

The British Medical Association has provided more detailed information on adolescents requiring MHC in the UK (BMA, 2006). This report is an excellent starting point for requirements gathering within this domain. The study highlights that adolescents need to feel respected, listened to and not judged by health professionals. They strongly value confidentiality and consistency of care is important.

Direct and Indirect Communication: Whereas many adults are comfortable with direct face-to-face dialogue, this is often not the case with children, adolescents or clients experiencing problems with engagement. Many children struggle to express themselves with words alone and much research has been conducted into ways of engaging children using indirect channels and play. Some examples of tools used are storybooks, construction materials, artwork, puppets and board games (Sharry, 2004). These materials provide a means of engaging children in indirect communication. Adolescents can be resistant to these methods; they like to be treated as adults and will not engage if they perceive they are being treated as children. Equally, many teenagers are private and self-conscious and often react confrontationally or not at all to direct dialogue with a therapist. Given the general enthusiasm of many adolescents for modern technology, technology has a particular potential to help in adolescent interventions, replacing storybooks, board games etc, acting as a third part in the therapeutic interaction and providing a channel for indirect communication.

Client-Centred Technologies: As stated above therapeutic interventions are most likely to be successful if the therapist engages with the client in a client-centred way. Similarly, technologies are most likely to prove effective if they are designed to be client-centred. On this basis, a key factor in this design process is choosing the appropriate technology to use with a given client group. For example research described in Chapter 2 has

provided initial evidence that the use of computer games in adolescent interventions can improve client engagement and help in building a quality client-therapist relationship.

Above and beyond choosing client-centred technologies, it is essential that any system is designed to meet the needs of given client groups. The significance of this issue is discussed in greater detail in Section 3.3.4 below.

3.3 Users' Environment

MHC takes place in many settings and in many forms. Individual therapy, focusing on face-to-face dialogue between a therapist and client, is by far the most common form of treatment. It offers clients optimal confidentiality, privacy, attention, intimacy, and safety. Group therapy is also common. It offers clients the opportunity to learn that others experience similar problems to themselves, to be accepted by a group, to give as well as receive help and insights and to learn to draw on the experiences and perceptions of others. Specialist forms of treatment have also evolved for the treatment of children and adolescents and for family groups. As previously stated the research presented in this thesis has primarily focused on the application of technology in public health care systems. Public systems generally consist of multi-disciplinary teams, often incorporating, amongst others, psychotherapists, clinical and counselling psychologists, psychiatrists, counsellors, speech and language therapists and mental health social workers. The overall structure of MHC services is likely to vary from country to country and possibly also from service to service. Appendix A contains a broad overview of the structure of MHC services in Ireland.

The following sections discuss some of the key factors, relating to the users' environment, which effect design in this domain.

3.3.1 Ethical constraints

As well as meeting the ethical requirements of the HCI domain, e.g. see (Friedman & Kahn, 2002; Molich, Laurel, Snyder, Quesenbery, & Wilson, 2001), research into the use of technology in MHC settings must adhere to the strict ethical requirements of the MHC domain. These ethical requirements have significant implications for the design and evaluation of new technologies. All health care professionals, including MHC professionals, are required to obey the basic Hippocratic Oath, often stated as 'first do no harm', which means that above all else interventions must not have harmful effects on the client. The Declaration of Geneva of the World Medical Association (WMA) binds professionals with the words: "The health of my patient will be my first consideration" (World Medical Association, 1949-2006). The WMA Declaration of Helsinki provides ethical guidelines for researchers. It binds all researchers to the agreement that "in medical research on human subjects, considerations to the well-being of the human subject should take precedence over the interests of science and society" (World Medical Association, 1964-2004).

Roberts and Dyer (2004) have produced a concise guide to MHC ethics and suggest solutions to specific ethical dilemmas. As cultural and societal differences have been shown to be one of the key factors in the

treatment of mental health difficulties, researchers and practitioners also need to be familiar with the specific requirements of their own culture or country. The Declaration of Helsinki states that “research investigators should be aware of the ethical, legal and regulatory requirements for research on human subjects in their own countries as well as applicable international requirements”. Mental health associations worldwide have produced detailed ethical guidelines for both research and practice. Some of the commonly espoused general principles include: welfare and nonmaleficence, confidentiality, respect for client’s rights and dignity, integrity and competence.

To help in meeting the ethical requirements of the MHC domain this thesis suggests that new technologies are

1. Based on accepted theoretical models of MHC.
2. Designed in full collaboration with MHC professionals.
3. Designed to integrate with existing working methods.
4. Used by clients under the guidance of a professional therapist.

Prior to being used in clinical settings it is essential that:

1. The reliability and usability of any technology is thoroughly verified.
2. The therapeutic validity of technologies is evaluated by MHC professionals.
3. Ethical clearance must be agreed for all proposed studies.

In relation to ethical clearance, the Declaration of Helsinki states that proposed studies “should be submitted for consideration, comment, guidance, and where appropriate, approval to a specially appointed ethical review committee, which must be independent of the investigator, the sponsor or any other kind of undue influence”. Ethical review committees are designed to insure that guidelines, such as those given in (Roberts et al., 2004), are respected and that the well-being of clients is protected. This process of validating systems and gaining ethical clearance is a time consuming process which must be completed prior to each stage of the clinical evaluation of a technology.

3.3.2 Access constraints

The ethical requirements and stigma associated with mental illness place strict and severe limitations on access to MHC settings for non-MHC professionals. Matthews et al (2007) describe MHC settings as ‘sensitive situations’ in which “poor quality solutions may have a highly negative impact and where the introduction of not just the technology but also the designer could be detrimental to the environment which is the target of the technological intervention”. Very few HCI practitioners are likely to have the required qualifications, which would allow them direct access to sensitive MHC settings, or allow for direct contact with people suffering mental health disorders. This constraint affects each stage of the design, development and evaluation cycle of a system. Approaches to the design and evaluation must take consideration of this access constraint.

For example, participatory design would require direct collaboration with both therapists and clients suffering mental illnesses. Similarly the use of ethnographic methods would ideally require a HCI professional to be present in the MHC setting with a therapist and their client. While such approaches might be possible with less sensitive MHC disorders with adult clients, it is unlikely to prove ethically acceptable for more sensitive situations or in situations involving children or adolescents. It may be argued that observation using video recordings or two way mirrors could be used as an alternative to direct contact. However, given the ethical constraints and privacy demanded of MHC settings, even limited second hand observations are likely to prove ethically sensitive, time consuming to organise and prohibitive to regular use. Even in the training of MHC professionals there is a reliance on role-play rather than direct contact. While video records of real sessions and occasionally two-way mirrors are used, this is controlled by strict ethical guidelines (e.g. it must be done with the full agreement of clients), is only conducted on a limited basis, and is only deemed acceptable given the need to train future MHC professionals.

3.3.3 Evaluation constraints

As well as the access constraint identified above, there are several other evaluation constraints worth noting. In MHC settings evaluation is typically a slow process. Full scale clinical trials can require time periods extending from several months to several years. Ethical consent is required for all proposed studies. Such consent is time consuming to organise and will only succeed if the safety of the proposed study has been thoroughly demonstrated, and an independent panel of MHC professionals is confident that the study is likely to have a positive impact. In relation to computer based interventions, if any substantial changes are made to a system, then the ethics review procedure must be performed again. One important implication of this constraint is that repeated evaluation is generally not possible. Furthermore, systems can only be submitted for evaluation once they are completed. Intermediary or incomplete systems cannot be evaluated in clinical settings. Finally, design approaches must take consideration of the fact that clinical evaluations will be conducted by MHC professionals, rather than by HCI professionals.

3.3.4 Adaptability and the importance of socio-cultural issues

Socio-cultural issues are one of the major factors in the development of mental health disorders and are a key factor which must be considered in treatment. Some of the specific socio-cultural issues which affect mental health include: gender, age, social class, sexual orientation, religious or secular assumptions and race, culture and ethnicity. Professionals working in public health care systems are faced with the need to work with a broad range of clients, from a broad range of socio-cultural backgrounds and experiencing a broad range of disorders. For example the British Medical Association (BMA) state that adolescents attending therapy are a heterogeneous group and have varying backgrounds, motivations, abilities and interests (BMA, 2006). Given the importance of cultural and social issues in the treatment of mental disorders, the exaggerated nature of such issues in adolescent groups introduces increased difficulties for adolescent MHC services. For example there can be substantial differences between a 13 and 15 year old girl, and even more so compared with

similarly aged boys. Working with such diverse client groups requires that therapists be able to adapt their approaches to suit the needs of given clients.

As will be seen in Chapter 4, the evaluation of PI has demonstrated the importance of adaptability in the design of technologies for talk-based MHIs. It has been found that adaptability not just to the needs of clients, but also to the differing approaches favoured by MHC professionals, is critical to the effectiveness of new technologies.

3.4 Design Approaches and their Suitability to the Mental Health Care Domain

To successfully develop technology for the MHC domain it is necessary to develop approaches to design and evaluation that take consideration of the ethical requirements and access and evaluation constraints inherent to this domain. As stated above, these constraints have many implications for the direct application of established HCI methods such as user-centred, participatory and iterative design. For example, in the paper entitled “Key principles for user-centred system design” Gulliksen et al (2003) identify 12 key principles for the development of user centred systems. Even by considering the first two principles listed by Gulliksen et al, it is possible to see that, whilst some aspects of traditional user-centred design can be directly applied in the MHC domain, this is not always the case. The first two principles are:

User focus – the goals of the activity, the work domain or context of use, the users’ goals, tasks and needs should guide the development.

Active user involvement – representative users should actively participate, early and continuously throughout the entire development process and throughout the system lifecycle.

The first principle advocates a general user centric approach or ethos, which encourages the design team to focus on the needs and goals of the end user. Whilst principles such as this are directly applicable in the MHC domain, it is less easy to directly apply the second principle. Active involvement of clients experiencing mental health disorders at an early, continuous and regular basis is not possible in the MHC domain. Similar difficulties arise with other key principles. Whilst principles such as holistic design, ensuring a professional attitude, and developing a user centred attitude - which support a general user-centred ethos - are applicable, other principles requiring regular access to end users or regular evaluations in context of use are less easy to apply directly. These constraints will affect all stages in the lifecycle of a systems development (e.g. requirements gathering, design, prototyping, evaluation) and will also affect the specific techniques applied at each stage (e.g. context studies, interviews, focus groups, paper prototyping, card sorting, usability testing etc).

It must be noted at this point that while access to clients may be limited, the same restraints do not apply to contact with MHC professionals. It is therefore beneficial if design in this domain is conducted by multi-disciplinary teams involving both HCI and MHC professionals. Such teams can apply both the design

principles identified by Gulliksen et al (e.g. evolutionary systems development and explicit and conscious design activities) and many specific HCI techniques (e.g. scenario development, prototyping, expert evaluations etc). The ability to support effective collaboration between multidisciplinary teams should be a key element of any approach to the design of new technologies in the MHC domain. Collaborative design is discussed further in Section 3.4.2 below.

3.4.1 Designing for engagement

Whilst previous sections have highlighted the difficulties in directly applying many HCI techniques in the MHC domain, it is also important to highlight the potential benefits of applying HCI techniques. In recent years designing for engagement and "funology" have emerged as significant areas for HCI research. This is a good example of a HCI research area which has many potential applications in the MHC domain. Engagement is critical to building client-therapist relationships and improving client self-efficacy. Research on designing for engagement has the potential to be applied in reducing stigma and helping clients to engage more easily in MHIs. Words such as fun, play, excitement, pride and engagement are used frequently in the literature, e.g. (Interactions 11(5), 2004). But the literature stresses that these features are designed to address utilitarian goals. Monk et al (2002) state: *"People are neither interested in a dull but useful tool, nor in a fancy but utterly useless toy. The challenge for HCI research is to systematically address hedonic (non-utilitarian) requirements and combine them with goal orientated requirements."* Within a MHC context engaging technologies are a non-utilitarian means of achieving the utilitarian benefits (engagement, client self-efficacy), which increase the potential for positive therapeutic change. It is also important to stress that designing for engagement in the MHC domain must place the emphasis on engagement with the treatment, rather than on engagement with the technology. There is little point in developing a system which, while deeply engaging for the user, does little to assist in achieving the overall therapeutic objectives e.g. engagement with the therapist and with the therapeutic process. Successful technologies will achieve a balance, whereby an appropriate level of engagement with the technology enhances engagement with the overall therapeutic process.

3.4.2 Designing in collaboration with mental health care professionals

As outlined above, the ethical constraints and stigma associated with MHIs mean that it is generally not possible for HCI researchers or practitioners to have direct contact with people undergoing clinical treatment. Difficulties caused by lack of access are further exacerbated by the fact that few MHC professionals currently have the experience required to design or develop new technologies or to rigorously evaluate them to the standards required for successful introduction to clinical settings. Overcoming these difficulties requires the collaboration of HCI and MHC professionals. The benefit of involving domain experts and end users in the design process is well documented in HCI literature and has also been demonstrated in many related health care areas (Boyd-Graber, Nikolova, Moffatt, Kin, Lee, Mackey et al., 2006; Johnson, Johnson, & Zhang, 2005; Newell & Gregor, 2000; Sainfort, Jacko, & Booske, 2003). For example Newell et al (2000) have developed an approach called User Sensitive Inclusive Design to support the development of technological

systems which cater to the needs of people with physical disabilities. Boyd-Graber et al (2006) have demonstrated the ability of medical professionals to act as proxies for end users in the design of a hybrid desktop-handheld system to support individuals with aphasia. In this case, as in MHC settings, involving patients/end user in the design process is difficult.

However, as well as establishing the benefits of collaborative design, the research highlighted above has also identified several issues of which designers in health care areas should be aware. For example it has been noted that health care professionals are often not very good at explicitly stating what they need of a technology which does not already exist. Also, as clinicians' experience of technology may be limited, they may have difficulties in envisioning the potential of technologies with which they are not familiar. Boyd-Graber et al (2006) highlight the difficulties health care professionals sometimes have with early prototyping techniques. For example they state: *"they (the speech-language pathologists) were relatively poor at evaluating paper prototypes because they could not envision the problems users would have with the detailed interaction with the systems"*. Boyd-Graber et al (2006) also highlight difficulties in accessing tacit knowledge. They state: *"although the speech and language pathologists had a wealth of information that was useful to our designs, much of it was tacit - that is, they did not think of it as being important or useful."*

Newell et al (2000) highlight other communication difficulties often experienced by multi-disciplinary teams, stating: *"communication between clinicians and engineers can be fraught with difficulties as they come from different backgrounds and have different jargon. A fully co-operative team of clinicians and engineers is a world beating combination, but it needs to be developed and fostered"*. Newell et al suggest that to achieve this aim it is important that the nature of the design process is clearly stated. Is it for example long term research or shorter term product development? In the first case, as well as consulting with practice orientated clinicians, it is beneficial to have research oriented clinicians involved in the design team. (Newell et al., 2000) state that this helps to *"ensure that the ethos of the whole team is a research ethos, which is vital for long term research"*. In either case it is important to ensure *"that the clinicians are fully aware of the motivations and methodologies of the design process, which is very different from a normal clinical situation."* Finally Newell et al (2000) note that while users/clinicians should be involved in the design process, they should not be allowed to take a dominant role. It is important to allowed balanced input from all the relevant actors and to allow designers to apply their design expertise.

As can be seen in this discussion previous research has highlighted the importance of establishing an overall ethos within a design team. It has also highlighted the difficulties health care professionals sometimes experience in working with initial prototyping techniques and in envisioning the potential of systems which do not yet exist. In such situations the role of the HCI researcher is important. Whilst input from health care professionals is beneficial it must not come at the expense of input from HCI researchers. Whilst health care professionals have the necessary domain expertise, HCI researchers have the knowledge and experience of approaches such as designing for engagement and user-centred design, which health care professionals are unlikely to possess. HCI professionals are also likely to have a broader knowledge of the uses and potential

uses of different technologies. Allowing for a balanced input from each member of a design team is therefore an essential element of a successful collaborative design process.

3.5 Conclusions

As stated in the introduction of this chapter '*useful design tools need to be domain-specific, but many of the principles behind the tools are generic.*' Whilst there are strong initial indications that the appropriate use of technology can assist in increasing access, reducing stigma and increasing engagement with MHC services, this chapter has identified several challenges which must be overcome in order to design effectively in the MHC domain. Research must be conducted within the strict ethical requirements and access constraints inherent in this domain. These constraints necessitate the close collaboration of HCI and MHC professionals. The key challenge now facing HCI researchers is to develop approaches and provide guidelines, which support this collaborative approach and which maximise the potential of new technologies in the MHC domain. The next chapter describes an initial project in which two HCI researchers and an experienced MHC professional worked together to develop a therapeutic 3D computer game called Personal Investigator.

4 An Analysis of Personal Investigator: a proof of concept

As highlighted in Chapter 2, prior to the commencement of the work presented in this thesis only a very limited amount of research had been conducted on the design of technology for talk-based MHIs. Even less was known about designing specifically for adolescent interventions. Chapter 3 identified some of the challenges of designing in this domain and discussed the importance of collaboration between HCI and MHC professionals. During the early stages of the research presented in this thesis two HCI researchers (including the author) and one experienced MHC professional undertook an initial proof of concept project. The overall aim of the project was to develop an application which could support therapists working with adolescents in the Department of Child and Family Psychiatry of a large Irish hospital. The project led to the development of a therapeutic 3D computer game called Personal Investigator (PI). Worldwide PI was the first computer game of its type specifically designed for adolescent MHIs. The first prototype for PI was designed and evaluated during the initial stages of the research presented in this thesis.

The development of PI provided an opportunity to gain practical experience of designing in the MHC domain and of working collaboratively with a MHC professional. There were also further benefits. As highlighted in Chapter 3 many MHC professionals are suspicious of the benefits of technology. Very few have experience of using computers in clinical interventions and many have difficulties in envisioning the potential of applications which don't yet exist. This project provided the opportunity to develop a concrete artefact, with which the potential of technology could be demonstrated. A further important outcome was that the project assisted in developing relationships with and gaining the trust of MHC professionals in the hospital.

Finally, whilst the evaluation of PI did provide initial evidence of the potential of collaborative design, it also highlighted previously unconsidered challenges. This chapter briefly describes the design and evaluation of PI and shows how an analysis of the lessons learned contributed to the development of the adaptable design approach proposed in this thesis.

4.1 Iterative Design in Collaboration with a Mental Health Care Professional

An iterative design process was applied in the development of PI, in which prototypes were developed and then reviewed and evaluated by the design and development team. The team consisted of two HCI researchers

working in collaboration with an experienced MHC professional. At various stages in the project the team also received input from further MHC professionals in the collaborating hospital. HCI researchers did not have access to situations involving adolescents at any stage during the design and evaluation process. The emphasis in this chapter is placed on showing how input from both HCI and MHC professionals contributed to important decisions made during the design process.

Chapter 3 highlighted some of the documented difficulties of collaborative, multi-disciplinary design in other health care domains. One of the main challenges is to ensure that, when key decisions are made, there is an appropriate level of input from each member of the design team. Whilst the decision making criteria identified in Fig.4.1 were not explicitly defined prior to the development of PI, they are representative of the input applied to key decisions during this process. In future projects it is likely that establishing such decision making criteria early in the design process will be a beneficial design activity. The criteria set out in Fig.4.1 do not rely on the point of view of any single discipline, rather they aim to allow for balanced input from both the HCI and MHC domains. Depending on the nature of the decision to be made (e.g. is it primarily a HCI or therapeutic decision), differing criteria can be called on and considered.

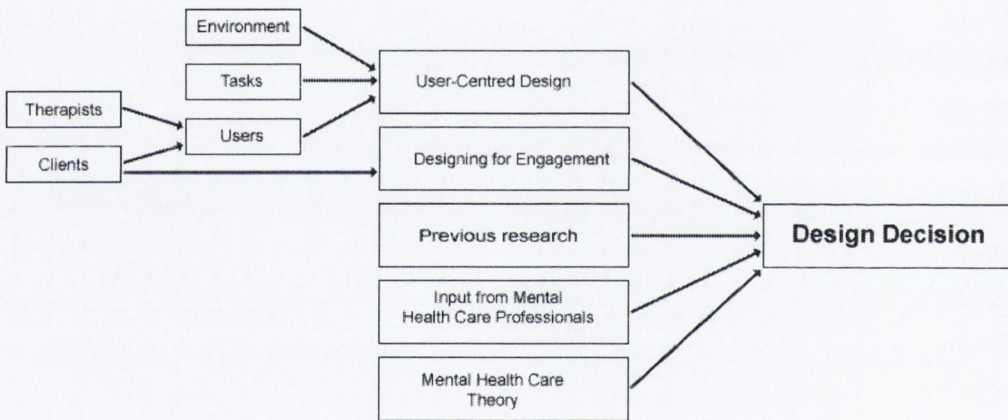


Figure 4.1 - The decision making criteria established for the design of Personal Investigator.

It is important to briefly note the distinction between the broad group of therapists who are the target end-users of a system, and the MHC professionals who are part of the design team and who have direct input into decisions made during the design process. This distinction is visible in Fig.4.1.

The following sections show how the decision making criteria outlined in Fig.4.1 assisted in the design of PI. The criteria were initially applied to broad high level decisions (e.g. what type of technology to use). As the design progressed, they were used as a basis for increasingly focused decisions (e.g. what type of game to build and how to integrate therapeutic content into a 3D game). It must be noted that ensuring a balanced input is applied to design decisions is not a trivial task. For example, at several stages in the design of PI there were differences in opinion between HCI and MHC professionals on the appropriate balance between developing an application which would be engaging to adolescents, and concerns that the application could distract from the therapeutic aims of an intervention.

4.1.1 Identifying the end users, the tasks and the environment

As stated above the overall aim of the project was to develop an application which could support therapists working with adolescents in the Department of Child and Family Psychiatry of a large hospital. During the initial stages of the design process, informal interviews were conducted with several therapists in this department. These interviews allowed the design team to gather information and gain experience of the working environment, aims and approaches of the MHC professionals. They also served a second important function in helping to develop a working relationship and sense of trust between the HCI researchers and the MHC professionals who would be using the finished application.

One of the key issues which therapists stressed during the interviews was the difficulties often experienced in engaging adolescents in direct face-to-face conversation. One therapist described how she would sometimes turn away and look out of a window when talking to adolescents. Another described a time when going for walk with a client helped them to begin talking. He compared it to a situation in which fathers and their teenage sons, who sometimes find it difficult to communicate, may find it easier to talk when they are driving together in a car. In this case rather than facing each other they are both looking out at the road. While HCI researchers were aware of the difficulties in engaging with adolescents, these examples helped to reinforce the significance of this issue and the potential benefits of indirect communication in adolescent MHIs.

The interviews also confirmed that the majority of interventions in this hospital involved individual work between therapists and adolescents, generally spread over several one hour sessions, which are typically one to two weeks apart. The therapists are required to work with a broad range of adolescents, experiencing a broad variety disorders, of varying severity. The therapists interviewed, while comfortable using applications such as email and Microsoft Office, had limited or no experience of using computers in client contact situations. Based on these factors, and a consideration of the issues discussed in Chapter 3, the following initial requirements were identified:

- The application must work on computers generally available in public MHC services, and must not require additional expensive hardware or software not generally available.
- The application must complement traditional intervention approaches and therapists must not require significant training before being able to use the application.
- The application should use a technology which appeals to the interests of adolescents.

The following decisions were also made:

- The application should support individual face-to-face work during clinical sessions. This ensured the application would only be used under the supervision of a MHC professional, and helped in meeting the ethical requirements of the domain. Developing an application for use in face-to-face sessions also helped to alleviate the concerns of therapists about the implications of using computers therapeutically.
- The application should support a broad range of issues rather than targeting a specific disorder.

- The application should assist the therapist in achieving broad therapeutic aims, including: achieving and maintaining client engagement, relationship building and engaging clients in constructive therapeutic conversations.

4.1.2 Choosing a technology to use

The first critical decision facing the design team was the choice of what technology to use. Chapter 2 has described previous use of technology in this domain. Of the approaches identified only multimedia storytelling and computer games (including biofeedback games) have used technology which specifically targets the interests of adolescents. Other technologies popular with adolescents, e.g. mobile phones and media-rich social networking websites, have not yet been investigated or have received very limited attention.

Mobile technologies, multimedia storytelling and media-rich websites were considered at the outset of the project. Mobile technologies and media-rich websites were not chosen as the decision had already been taken to develop an application for use in sessions, rather than between sessions. The final decision was to develop a computer game that adolescents and therapists could play together in sessions. The factors which led to the decision to develop a game are described below.

4.1.2.1 Adolescent Centred and Engagement Issues

A recent UK survey reported that 53% of eleven to fourteen year olds play games four times a week or more, and that 44% play for more than one hour at a time (McFarlane, Sparrowhawk, & Heald, 2002). A 2005 survey commissioned by the BBC in the UK indicated that under-16's rank computer gaming as their number one entertainment form (Pratchett, 2005). The average American child aged 2–17 years plays video games for seven hours a week (Gentile et al., 2002). Computer games currently constitute a client-centred approach to adolescent MHIs.

4.1.2.2 MHC Theory

Much research has been conducted into ways of engaging younger children in therapeutic processes using play (Schaefer & Reid, 2001). Some examples of tools used include storybooks, construction materials, art work, puppets and board games. Play and games provide a metaphorical structure and language that can act as a safety net and shield clients from both the trauma of their problems and the trauma of therapy. Adolescents can be resistant to traditional approaches to play therapy. They like to be treated as adults and will not engage if they feel they are being treated as children (Sharry, 2004). We hypothesised that computer games offered the potential to help in overcoming this difficulty.

4.1.2.3 Previous Research

Chapter 2 has reviewed previous research on computer games in MHC settings. As described, recent research on computer games has been limited. Substantially more work has been conducted in educational and other health care areas. Suggested benefits include increased motivation, increased self-esteem, increased health care knowledge and self efficacy, improved problem solving and discussion skills and improved storytelling

skills (Kato, 2006; Kirriemuir & McFarlane, 2004). Much literature in recent years has focused on the potentially negative effects of computer games, e.g. addiction and increased aggressiveness and violence have been suggested (Gentile et al., 2004). The MHC professional on the design team also expressed initial concerns about the use of games. For example, it was also suggested that adolescents could become too engrossed in games and on achieving game goals, and that this could distract from the therapeutic process. These risks must be considered in designing games for MHIs and games must be designed in such a way as to minimise any negative potential.

4.1.3 Choosing a game type

As described above, the MHC professional expressed concerns that excessive gameplay would distract from the therapeutic process. The HCI researchers felt that challenging gameplay could assist in achieving the objective of engaging adolescents. Deciding on a style of game was an important step in addressing these concerns. Again several of the criteria outlined in Fig.4.1 were applied in making this decision.

4.1.3.1 Previous Research and input from MHC professionals

Lindley (2002) speaks about this issue in terms of gameplay gestalts, and describes how different game types engage players in terms of the perceptual, cognitive and motor requirements necessary to achieve gameplay tasks. Many of the most popular commercial games (e.g. FPS and racing games) focus on motor skill gameplay (fighting, shooting, racing, running). These games engage the player through fast paced action, requiring fast perceptual and motor coordination skills, rather than focusing on problem solving, character development and storytelling. Role Play Games (RPG's) offer an alternative to this type of gameplay. Here the emphasis is on strategies, character interaction, relationships and emergent stories.

During the early stages of the project, the design team took some time to play several computer games together. This was important as the MHC professional had very little experience of computer games. Various types of games were played, including FPS games, simulations, and an RPG. The MHC professional reaffirmed concerns about the nature of gameplay in FPS games and confirmed the suitability of the dialogue based interactions in the RPG. It was decided that dialogue-based RPG's offer a good match between engaging gameplay and existing intervention methods, i.e. direct dialogue between the therapist and client.

Based on the concerns of MHC professionals, it was also decided that the amount of non-dialogue based gameplay would be limited and that game interactions and tasks would focus on dialogues between the player and game characters. As the game was to be used in clinical sessions, it was envisaged that in-game dialogues could provide a context for more detailed conversations between the player/client and therapist. Game dialogues could also be used to organise and structure the delivery of therapeutic content.

4.1.3.2 Engagement

The question of how the game would be presented was also raised. Options such as 2D, 3D and isometric were considered. Research has demonstrated that for educational games to be successful they must strive for high quality, otherwise their effects will be lost (Elliott, Adams, & Bruckman, 2002). Adolescents have much experience of playing high quality commercial games and have high expectations of what constitutes a good computer game. On this basis the decision was made to develop a 3D game.

The issue of camera views was also discussed e.g. first person, third person or top down views. HCI and MHC researchers both identified the importance of the player identifying strongly with their character in the game, however we also identified the importance of allowing the player to choose a character and play a role. This distance can allow clients to discuss and raise difficult issues without directly associated the issues with themselves, until they are comfortable doing so. HCI researchers suggested that a third person view could offer a suitable balance of role-play and identification with the player character, however this decision was not finalised until the later stages of game development.

4.1.4 Choosing an intervention model

To design a successful therapeutic computer game for adolescent MHIs it was necessary to choose an appropriate intervention model to implement.

4.1.4.1 Previous research and MHC theory

Previous research on computer aided intervention programs suggests that structured approaches, such as CBT, are more easily implemented than more freeform therapeutic approaches, e.g. psychoanalytical and humanistic. The MHC professional on the design team also highlighted the potential of Solution Focused Therapy (SFT). Like CBT, SFT is a highly structured therapy. SFT is an established and effective strengths-based, goal-focused approach to counselling and psychotherapy. It is more personalised than CBT, focusing on recognising the client's own strengths, achievements and goals. SFT helps clients construct solutions rather than focus on problems, concentrating on the future and not on the past (De Shazer, 1988; Sharry, 2001).

HCI researchers noted that SFT uses a goal-oriented approach, which could complement the development of a therapeutic computer game. Both games and SFT actively use goals as a form of motivation. The first step in SFT is for the therapist and client to set an overall goal they want to achieve (e.g. overcome depression). This overall goal is achieved by completing smaller therapeutic tasks e.g. identifying personal resources. Computer games operate in a similar way. To achieve the major goals (e.g. finish the game), players must achieve minor goals (e.g. fight an enemy). A traditional computer game will reward its players for reaching a goal in different ways, e.g. receiving a special new tool, reaching the next level. In a therapeutic game the goals defined for the game are therapeutic goals, which will benefit the client in their day-to-day life.

Table 4.1 - A summary of the dialogues and characters used in Personal Investigator.

STF strategy	Brief description	Game character
Setting Goals	This is the first character the players meet. The character helps clients to identify a problem in their lives and then convert that problem into a goal they want to achieve. Achieving this goal becomes the objective of the game.	The Goal Setter, based on Professor Charles Xavier from the X-Men movies.
Recognising Exceptions	Exceptions are times when the client's problem is not present or is less acute. SFT helps clients recognise and explore these times with a view to repeating them more often.	Damini the forensic scientist, who specialises in spotting hidden evidence.
Coping:	SFT helps clients to recognise ways they currently have of dealing with their problem, suggests positive alternatives and explores how they have successfully overcome past problems.	Inspector Cluso, a younger version of Inspector Columbo from the US TV series.
Identifying resources:	SFT helps clients identify resources, in particular support from family and friends, which they can draw upon. Resources refer also to the client's own strengths i.e. things they are good at.	Detective Spade, a New York policeman who likes to watch old detective programs on television.
The Miracle Question:	"Imagine you woke up tomorrow and the problem was solved, how would your life be different?" By imagining a future without their problems, clients are motivated to seek a solution.	Siobhán, an artist, who helps people visualise their life without their current problems.
Wrap-up Dialogue	Having met all the other characters, the player meets the Goal Setter again. This character congratulates the player and shows them how to print their game notebook.	The Goal Setter.

4.1.5 How to integrate therapeutic content

Having chosen an intervention model the work the issue of how this model would be integrated into a game then arose. As stated in Section 4.1.3 the decision had been made to develop an RPG style game, with the emphasis on dialogues between the player character and game characters. Working together the design team now began to sketch out the game world, characters and in-game conversations. Having considered several possibilities the MHC researcher identified five key conversation strategies in SFT (Table 4.1) and the team began developing dialogue ideas around these strategies. At this stage the choice of an overall game metaphor (game world and game story) became an important design decision.

4.1.5.1 Previous Research and input from MHC professionals

In traditional Play Therapy, games help to provide a metaphorical structure and language, through which therapists and clients can talk more easily about mental health problems. The choice of an overall game metaphor determines the language used while playing the game. Many RPGs are set in fantastical worlds and feature characters including elves, goblins etc. The design team decided that a more contemporary game metaphor and characters were likely to prove more beneficial. The MHC professional felt that while the game

should allow the adolescent to play a role, the game should be grounded in everyday reality. This is a matter of opinion and requires investigation. The MHC professional also highlighted a book called “Becoming a Solution Detective” in which a detective metaphor is used to teach the basic principles of SFT. The designers decided to adapt the metaphors used in this book. The detective metaphor provided an established vocabulary for the game to use. It was at this stage that the name Personal Investigator emerged for the game. In PI, instead of playing a *private investigator* hired to solve a case, the adolescent plays a *personal investigator* whose mission is to resolve a personal problem.

Having chosen the detective metaphor, the team now began to develop the game dialogues and also created personas for the game characters. Table 4.1 summarises the dialogues, the characters and how each dialogue corresponds to a key conversation strategy in SFT.

4.1.6 Developing a first prototype

At this stage development work began on the first prototype of the 3D computer game. Paper-based sketches were first used to layout possible game worlds, Fig.4.2. These paper-based sketches were important, as they allow the MHC professional to visualise more clearly the 3D worlds being proposed by the HCI researchers. A 3D prototype of the game was then developed. From this point onwards PI went through several iterations prior to the completion of the finished game. During this process several significant issues arose. Again both HCI and MHC input were applied to address these issues.

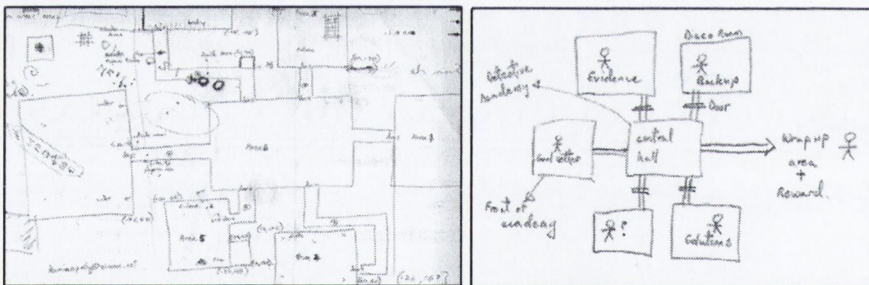


Figure 4.2 - Paper based sketches were used to layout and prototype the game world.

4.1.7 Incorporating a game notebook

In the initial prototype of PI, game characters asked the player questions in a spoken form and players typed in their answers. This was quickly identified as unsuitable. In PI open questions rather than multiple choice or scaled questions are used. The aim of such questions is to allow the player to give free form answers, which both the therapist and adolescent could learn from and potentially discuss further. When characters asked open questions in a spoken form, there was a natural expectation that the character would then respond appropriately to the player’s freeform answer. Given the limitations of available natural language processing techniques this was not possible.

4.1.7.1 Previous research and MHC theory

Therapeutic writing and diary keeping are regularly used in MHIs (Jinks, 2000). The idea of an in-game detective notebook was suggested for PI. Players are given this notebook at the start of the game and are encouraged to create a written record of their in-game experiences. When characters speak to the player they introduce ideas and then refer the player to their notebook where they answer written questions. Further details of the issues addressed by the characters can also be added to the notebook. The notebook serves as the player's own personal space in the game. There is no expectation that the characters will interpret the player's answers. Also, Clark et al (1984) reported benefits of having a tangible output from a game. Upon completing the game this written artefact can be printed and serves several purposes. It is: (1) a tangible reward for completing the game, (2) a record of the therapeutic information contained in the game, and (3) a useful tool for further reflection between therapists and clients.

4.1.8 Incorporating video-based peer stories

As PI neared completion HCI researchers became concerned that the in-game conversations were lacking in engagement and too information heavy. There were difficulties in striking a balance between imparting sufficient information and not having overly long conversations with which adolescents could quickly become bored. The MHC professional was also concerned that the dialogues would lack a real world context and sense of relevance to adolescents.

4.1.8.1 Previous research, MHC theory and engagement

The decision was made to incorporate video-based peer storytelling into PI. Rather than game characters describing issues, difficult situations and potential solutions, several videos were recorded in which adolescents tell their own stories. Although actors are used, the videos are based on real case studies. The adolescents first describe their own situation and then describe the techniques that helped them overcome their difficulties. The videos appear within the 3D world and are incorporated into character dialogues. The characters introduce them, use them as conversation pieces and then as the basis for question and answer sessions in the player's notebook.

MHC professionals are familiar with the use of video-based storytelling. As described in Chapter 2 recent years have seen increasing use of video-based multimedia stories in interventions. Shared stories allow clients to see that they are not alone in experiencing problems. Watching video-taped segments of clinical sessions is also one of the key methods in the training of most professionals (Beutler & Harwood, 2004).

4.1.9 Finalising the game

Having incorporated the video-based stories, the dialogues in the game went through several further edits. Several changes were also made to the game world, including adding sound effects (e.g. the player character shouts 'yippee' when they receive a key), improving the graphical quality of the world (e.g. adding pictures of past pupils to the walls), and increasing the amount of camera movements in the games (e.g. the camera pan at the start of the game). Whilst not therapeutically significant, these features are important to the level of

engagement players experience while playing the game. The decision to use a third person camera position was also finalised. However, when the player begins talking to a game character the camera switches to a first person view.

4.2 Personal Investigator

Fig.4.3 shows several screenshots of the completed game. To briefly summarise, PI is a 3D computer game which incorporates a goal-oriented strengths based intervention model called Solution Focused Therapy (SFT). PI represents the first time this established intervention approach has been integrated into a 3D game. The game employs a detective metaphor. Adolescents visit the Detective Academy and play the role of a *'personal investigator'* hunting for the clues that will help them solve a personal problem. Players are given a detective notebook, where they are asked to record their thoughts and ideas. Five solution focused conversational strategies are mapped into five distinct game areas. In each area the player meets a master detective who talks with the player in an informal way and asks the player to answer questions in their notebook. Three of the dialogues incorporate videos of adolescents describing how they overcame personal problems using the strategies described. To complete the game and graduate the academy players must complete the tasks set by each master detective. Upon completing the game, they receive a printout of their notebook.



Figure 4.3 - Screenshots from the original prototype of Personal Investigator.

4.2.1 Technical details

The first prototype of PI was developed using a beta version of Adobe Atmosphere, in combination with Macromedia Flash. Adobe developed Atmosphere as a tool for quickly developing 3D worlds. The game was programmed using the Atmosphere JavaScript API. Due to difficulties with stability and the obsolescence of the Atmosphere platform, PI was subsequently re-implemented using the PlayWrite system, the 3D elements of which use the Torque games engine (Chapter 6).

4.2.2 Using Personal Investigator in clinical sessions

In clinical sessions the therapist and adolescent sit together at a computer, but the adolescent has full control of the keyboard and mouse. The adolescent chooses a username and logs into the game. The game creates an individual account for each adolescent, automatically saving their progress and allowing them to return to saved games at a later date. The adolescent has full control over the game; they play at their own pace and choose their own path through the world. Throughout the game the therapist is a partner in the exploration of

the game world and is no longer an interlocutor. If the adolescent asks for help, the therapist can elaborate on the subjects brought up by the game or answer more specific questions from the adolescent in relation to their situation.

4.3 Evaluating Personal Investigator

There were two distinct stages in the initial evaluation of PI. First the game was independently reviewed by experienced MHC professionals. A pilot clinical study was then conducted in the Department of Child and Family Psychiatry of the collaborating hospital. As described in Chapter 9, a larger scale clinical evaluation was conducted at a later stage, in which 9 MHC professionals used the game with 22 adolescent clients. The pilot study not only provided the initial evidence necessary to justify a larger scale study, it also provided evidence of interaction issues which should be addressed, and assisted in identifying design challenges not previously considered. Many of the findings of this small scale study were later verified by the larger study.

4.3.1 Expert review

Before PI was used with adolescents it was reviewed and approved for clinical use by several independent MHC professionals. Unexpectedly, as well providing ethical approval for the clinical use of PI, this process also provided feedback on issues which have a broader relevance for design in this area. Subsequent to these initial reviews, further reviews were also conducted in which experienced MHC professionals viewed PI and gave their opinions of the game. Much of the feedback from both sets of reviews focused on the suitability of PI for a broad range of both clients and therapists.

4.3.1.1 Suitability of PI for a broad range of therapists

While PI implements SFT in an open manner not aimed at specific disorders, therapists suggested that the use of SFT could, in and of itself, create difficulties for therapists not trained in this approach. As highlighted in Chapter 2 therapists have training in a broad variety of theoretical approaches. SFT is a highly structured and goal orientated approach to treatment. Other therapeutic approaches (e.g. Narrative Therapy or Person Centred Therapy) are more freeform and do not focus on achieving specific goals. Whilst not precluding the game from use, the choice of a specific therapeutic approach has the potential to limit the suitability of the game (or any other system) to a broad range of MHC professionals.

4.3.1.2 Suitability of PI for a broad variety of adolescents

Several therapists expressed reservations about the age range of clients for whom PI might be suitable. However the therapist did not agree on the age range for which the game is most suitable. One therapist, who provides counselling support to several girls schools, also expressed an opinion that the game is very male orientated. For example the principal of the detective academy is a man and three of the five characters are men. Later, this therapist used to PlayWrite system to create a game which uses only female characters.

Another significant issue also emerged. PI uses written text in the detective notebook to provide psychoeducational information and reinforce characters spoken statements. Players are also required to type

answers to the questions posed in their notebook. Several therapists felt this could prove problematic for some adolescents, as they stated that it is not uncommon for clients to have literacy difficulties. The validity of this concern was borne out by clinical evaluations.

4.3.1.3 Small Issues Can Make Games Unusable

The expert evaluation of PI revealed that small design features, which may seem insignificant, can actually severely limit the effectiveness of PI or even make it unusable in many circumstances. Three examples identified by therapist are outlined below.

“It’s set in a school” – Several therapist felt that setting the game in a school, the Detective Academy, would make the game unsuitable for many clients. Adolescents experiencing disorders including depression, anxiety and social phobia often have difficulties with formal school systems.

“One of the characters is a policeman” – Many adolescents referred to MHC services will have had difficult experiences with legal systems (e.g. social services or the police). These are often the clients whom therapists find most difficult to engage. Having a policeman character was identified as a potential problem with such adolescents.

“Splendid” – The first character players meet speaks with a formal English accent and uses words such as ‘splendid’ and ‘excellent’. Therapists felt this communication style had the potential to alienate many adolescents from disadvantaged urban backgrounds.

The fact that these simple game design features have the potential to make the game less effective, or even unusable, has significant implications for design in this domain. Other issues which arose in the evaluation of PI (e.g. the reliance on keyboard skills) can be addressed using standard approaches to usability improvement. This is not the case with the type of small design features identified above. These issues will only emerge, and be relevant, based on the therapists and clients with whom a game is used. With different therapists, working with different clients, these issues may not have emerged. Indeed it is likely that different design issues may have emerged. The fact that the choice of a specific therapeutic approach can limit the suitability of the game to a broad range of therapists is also significant. These issues are discussed further in Section 4.4.6 below.

4.3.2 Pilot clinical evaluation

A pilot clinical evaluation of PI was conducted in the Department of Child and Family Psychiatry of the collaborating hospital. Three therapists used the game with four adolescents experiencing difficulties including anxiety and behaviour problems, attempted suicide, and social skills difficulties. Therapists selected adolescents for whom they felt the game was suitable. The adolescents ranged in age from 13 to 16 (two boys and two girls). Both the adolescents involved and their parents gave written consent to use the game.

In a one-hour session PI was typically be used for thirty to forty minutes. Initial expectations were that the game would take one session to complete. However, due largely to the amount of discussion the game

produced between therapists and adolescents, the game took an average of three sessions, spread over three weeks, to complete.

During the evaluations HCI researchers were not allowed direct access to therapeutic sessions or adolescent clients. A request to make video or audio recording of sessions was also deemed inappropriate. Access to anonymous copies of adolescents' in-game notebooks was also denied. It was agreed that feedback would be collected through post-trial questionnaires and discussions with therapists. Therapists also agreed that, provided they deemed it appropriate on a client by client basis, they would also ask adolescents to complete a post trial questionnaire. Each questionnaire consisted of a combination of multiple-choice and open questions. The questionnaires and consent form used in the pilot evaluation are included in Appendix B.

Prior to the evaluations the therapists involved were given an introduction to the game. While each of the therapists had been interviewed during the initial stages of the PI project, none had directly contributed to the design and development of PI. They were first shown how to start the game and then played it themselves. They were also shown how to print players' game notebooks. One issue did emerge during this introduction process. While the clinics involved did have PCs capable of running the game, these PCs were not in the rooms used by therapists when working with adolescent clients. As a result the clinics were lent a laptop computer for the duration of the study.

4.3.2.1 Therapist feedback

All three therapists who used the game with clients agreed that it was 'very easy' to integrate into their therapeutic work. Two therapists rated the game as 'very helpful' and one as 'helpful' in engaging adolescents and in helping them to talk about their personal issues. All therapists thought the game was particularly helpful in keeping clients focused on a therapeutic task for an extended period of time, while keeping the process enjoyable and fun. One therapist stated that the game was *'very helpful in encouraging clients to think more widely around problems, to examine resources in solving problems and to reinforce coping skills'*.

The therapists believed the use of a 3D environment was 'very helpful' in engaging adolescents. For example one therapist stated that it made the game *'interesting and appealing to the young person'* and that it was *'very realistic'*. Initially, it functioned as a factor to help engage adolescent clients. Further to this therapists felt the 3D aspect and navigation gave clients a sense of control and empowerment and allowed them to pace their journey. One therapist said the 3D gave clients a sense of control and mastery in therapy. Another therapist felt that the 3D environment provided *'a safe place to go'* for clients. It provided an environment where they could escape the difficulties of their day-to-day lives and focus more easily on solving their personal problems.

Writing in the detective notebook was described as 'very helpful' by one therapist, who said it was empowering for her client to be able to type her answers and that it was good for recording ideas which her client could then look back on and also to serve as a therapeutic record. It was rated 'helpful' by the other

therapists, but they had reservations over the reliance upon literacy skills, which some of their clients had not mastered.

Watching the video stories of other adolescents was described as 'very helpful' by two therapists and 'helpful' by one. All three therapists remarked on how interested their clients were in these stories. All therapists described client's interaction and dialogue with the computer characters in the game as 'very helpful'. In general, there was unanimous agreement that the use of PI helped to increase adolescents' engagement in therapy and helped therapists develop therapeutic relationships with their clients. Therapists also agreed that PI successfully implemented a model of SFT.

Critical feedback from the therapists centred on several design issues. Requests were made for bigger fonts, pause, forward and rewind options for the dialogues³, interim printouts of the detective notebook (rather than just at the end) and a more elaborate graduation ceremony to reward participants on completion. These interaction issues are discussed in greater detail in Section 4.3.2.4.

4.3.2.2 Adolescents' feedback

All four adolescents rated PI as 'very easy' to use. They also unanimously rated the game as 'very helpful' in assisting them to think about and solve a personal problem. When asked to name what they thought was helpful, they named 'collecting the keys', 'answering the questions', 'hearing from other people' and 'listening to the videos'. Listening to the videos of other young people's experience was rated as particularly valuable and rated by three adolescents as the most memorable aspect of the game. One adolescent stated that it was '*good to hear from other people*'. Three adolescents said the use of 3D was 'very helpful'; the other one was 'not sure'.

Three adolescents described the detective notebook as 'very helpful'. However one adolescent thought it was 'unhelpful', because of difficulties typing answers into the book and reading text from it. Listening to the computer characters and answering their questions was described as 'very helpful' by two adolescents, and 'helpful' and 'alright' by the other two. One adolescent gave suggestions for improving the game. He felt that the game was too short and would have liked the opportunity to answer more questions and gain more keys. He also suggested the possibility of adding an 'extra level' in the game for more experienced or older players.

In general, all four adolescents found that the game helped them with their problem and found it fun. They all believed that other adolescents would find PI engaging and fun to use.

4.3.2.3 Case study

In order to give a more detailed account of one adolescent's use of the game, a brief case study is presented. This case study is based on one therapist's opinions of their experience of using PI with a young person. Sue (not real name) was 13 years old when she was referred to an adolescent mental health service because she was anxious about attending school, being in public places and having to talk to other people. She also had

³ The current version of PI includes a 'Next' button which the player presses to move the dialogues forward. The original implementation of PI did not include this button and the game moved forward automatically.

low self-esteem and a mild learning disability. Prior to the introduction of PI, the therapist had already seen Sue for seven sessions over several months. Although there had been some progress, Sue was uncommunicative, would often forget her goals and not carry out plans between sessions.

After the game was introduced, there was noticeably more discussion between the therapist and Sue. She completed the game over four sessions and the therapist felt Sue found it very engaging. Playing, navigating around the game environment and typing her answers in the game (writing was difficult for her in school) all helped boost her self-esteem. Before answering questions in the game, Sue often engaged in an extended dialogue about the subject with the therapist. The therapists felt the final answers written in the notebook were often very meaningful to her and gave her confidence as she had ownership over them. One of her difficulties was feeling anxious when out shopping, when she would be very self-conscious of other peoples' reactions. When asked in the game how she could cope with this anxiety, she typed (after discussion with her therapist) *'think that people are minding their own business'*. The therapist felt that this meant that Sue had realized that it was better to shift her thoughts from believing that people were focused on her (thus making her anxious and self-conscious) to an opposite belief, which would help her be calmer and more collected. This represented an important cognitive strategy that she built upon and remembered in subsequent situations. The use of PI facilitated this discussion and in this respect helped the therapeutic process.

4.3.2.4 Interaction issues

Although PI was used with only four adolescents several reoccurring interaction issues did emerge and there was a high level of consensus between the therapists who used the game.

Over-reliance on keyboard and literacy skills: As stated above, expert reviews identified the potential of PI's reliance on keyboard and literacy skills to cause difficulties for some adolescents. Two of the therapists who used PI independently confirmed the validity of this concern and said clients had experienced difficulties reading the notebook and using the keyboard. Interestingly the third therapist described writing in the detective notebook as 'very helpful', and said it was empowering for the client to type her answers and demonstrate her keyboard proficiency. Despite their concerns over the required literacy skills, both therapists with reservations about the use of the notebook concluded that, overall, writing in the notebook was helpful. All therapists confirmed that it was beneficial to create a therapeutic record which clients could then look back on and use as a tool for reflection.

Importance of quality voiceovers: Therapists felt that the quality of the voice acting in dialogues was critical to engaging adolescents. Standard talk-based interventions place a great deal of emphasis on therapists' non-verbal and verbal communication style, including tone and speed of voice (Egan, 2002). It appears that this carries over to the game domain.

Fine control of playback is required: Each of the therapists who used PI felt there was a need for greater control over playing, pausing, rewinding, forwarding and replaying parts of the game. For example they felt it should be possible to pause and rewind dialogues with game characters and replay finished dialogues. Events

in the game often triggered in-depth conversations between therapists and adolescents and it is important that games can be easily paused or rewound at any point to facilitate these conversations. Therapists also requested the option to print the in-game notebook at any time during the game, rather than just at the end of the game.

4.4 Analysis – Lessons Learned about Design

The pilot evaluation of PI provided initial evidence that 3D computer games have the potential to assist therapists working with adolescent clients. The evaluation suggested that playing PI can help to engage and motivate clients, increase the amount of dialogue between therapists and adolescents and help in developing a therapeutic relationship. Both therapists and adolescents found the game very easy to use and therapists felt it integrated well with traditional approaches. It is important to emphasise here that PI (or any game used in therapy) should not be viewed as a panacea, but as a tool that helps a client engage in a meaningful way in therapy. In this case PI helped to create sufficient conditions from which effective therapeutic work could proceed. Further details of the initial pilot study of PI have been published in (Coyle, Matthews, Sharry, Nisbet, & Doherty, 2005).

The project was also beneficial in other practical ways. As hoped for, the project did enable HCI researchers to develop relationships with MHC professionals in the hospital and to gain a deeper insight into the needs of the domain. It also provided a concrete demonstration of the potential of technology in adolescent interventions and helped to allay therapists' fears over potential damage to the client therapist relationship. Therapists particularly valued the fact that PI was designed to complement traditional therapeutic approaches and clearly recognised the potential of PI to act as a third party in therapeutic interactions, taking the focus off direct face-to-face communication.

As well as providing initial evidence of the potential effectiveness of collaborative design in the MHC domain, the process of creating and evaluating PI highlighted several issues which have significant implications for design in this domain. These issues, discussed below, contributed to the development of the adaptable design approach proposed in the next chapter of this thesis.

4.4.1 Collaborative design

Whilst it is important to acknowledge that the pilot evaluation of PI was relatively small scale and has many limitations, the success of the study suggests that collaborative design involving HCI and MHC professionals is an effective approach, and offers the potential to move the use of technology in this domain to a level which could not be reached by either group working independently. Whilst there were significant oversights in the design process (e.g. the failure to identify the importance of literacy issues), the project resulted in the development of the first 3D computer game specifically designed for adolescent MHIs. Allowing for balanced input from both the MHC and HCI domains was a vital element of this development process. Decisions made during the collaborative design process, based on both HCI and MHC considerations, were validated in the

clinical evaluation. For example, overall it can be argued that PI's structured division of SFT – an established theoretical approach - within a computer game and the use of simple game goals and rewards, helped adolescents to engage more easily in a therapeutic process. In spite of the literacy concerns noted above, the use of the in-game detective notebook also proved effective. A critical feature of the game was the therapeutic conversation that questions in the notebook evoked between therapists and clients. Before and after answering the questions, the clients would discuss their answers with the therapist. These conversations could last up to ten minutes per question. Adolescents had less difficulty answering questions, because they were not posed directly by the therapist but by the computer. The game helped the therapists to become allies with the adolescents playing the game. The printout of the notebook served as a record of the therapeutic session, which clients and therapists could use in future sessions or which the client could take away as a reminder of what was discussed and agreed upon during the session. The use of video-based peer storytelling also proved effective and particularly popular with adolescents. Adolescents found it useful and encouraging to see stories of how other adolescents used the skills, taught in PI, to overcome a personal problem. The use of 3D was also identified as beneficial. Therapists felt it had an empowering effect, allowing the adolescent more control over the pacing and direction of the therapeutic process.

4.4.2 Ethical requirements and access constraints

The implications of the ethical requirements and access constraints of the MHC domain have been discussed in Chapter 3. Although HCI researchers were aware of these issues, the process of designing and developing PI served to further reinforce the severity and significance of access constraints in this domain. During the design and evaluation process HCI researchers were not permitted access to sensitive MHC settings, nor was it possible to view recorded footage of such settings. The only form of feedback from young people which HCI researchers could access was written questionnaires. This was complemented by questionnaires and post-trial interviews with therapists. As such it is important that HCI researchers work closely with therapists to identify design features which affect the usability and usefulness of the game (or any other system), as well as assessing its therapeutic effectiveness.

4.4.3 Different types of evaluation

During the iterative design and development of PI, regular evaluations were undertaken by the collaborative design team. As described in Section 4.1 these evaluations lead to the inclusion of features such as the in-game notebook and video-based peer stories. Two types of evaluation were also conducted during the evaluation phase of PI: expert reviews by independent MHC professionals and a pilot clinical evaluation. Three issues which emerged from these evaluations are worthy of further discussion. Firstly, some of the interaction difficulties identified during the clinical study were also identified during the expert reviews, independent of the need for clinical studies. Secondly, why were these issues not identified during the iterative design process? Thirdly, are there issues which can only be evaluated and which only emerged through clinical studies?

The first of these issues is addressed first. During expert reviews therapists successfully identified that an over reliance on keyboard and literacy skills could prove problematic for some adolescents. This observation was later confirmed in the clinical study. Given the difficulties and durations typically involved in clinical studies, the ability of MHC professionals to identify interaction difficulties is significant. Having developed prototypes, future design approaches in this domain should aim to maximise the use and effectiveness of non-clinical evaluations. As well as increasing therapists' ability to identify design issues, design approaches should also seek to make MHC professionals active partners in providing solutions to identified difficulties.

Although a collaborative process was applied in the design of PI, and initial interviews were conducted with a broad variety of MHC professionals, the significance of literacy issues did not emerge until the finished game was presented to independent MHC professionals. It is important to ask why this issue was not identified earlier in the design process and to ensure that future design approaches are more successful at identifying such issues. In this case there are several possible reasons, including:

- While MHC professionals were aware of these issues, they did not feel it worth mentioning or significant. As shown in Chapter 3, this difficulty has been documented by previous research in other health care domains. Boyd-Graber et al (2006) state that although clinicians *"had a wealth of information that was useful to our designs, much of it was tacit - that is, they did not think of it as being important or useful."*
- Previous research suggests that inexperienced computer users often have difficulties envisioning the use of technologies which does not yet exist. Traditional MHC interventions focus on face-to-face dialogue, where literacy skills are not relevant. Prior to testing the completed game therapists may not have considered the implications of introducing a new form of interaction requiring literacy skills.

Future projects may benefit from more rigorously applying traditional user-centred requirements gathering techniques. However, the problem of access to clients by HCI researchers still remains. Techniques are required which help HCI researchers to gain access to the tacit knowledge of MHC professionals. One approach suggested in other health care domains is to engage clinicians in scenario based storytelling. More intensive use of this technique may prove useful in MHC settings, and is worthy of further investigation. The use of proxies for clients experiencing mental health disorders may also prove useful. For example, as part of their training MHC professionals are regularly required to engage in role-play scenarios based on proposed clinical situations. Different therapists take turns of playing the therapist and the client. This technique was developed as trainee MHC professionals are only allowed very limited access to real client contact situations. Asking therapists to role-play situations involving new technologies may prove to be an effective approach to requirements gathering, and may also prove effective in evaluating early design proposals and prototypes. Matthews et al (2007) have also identified the potential benefits of a multi-stage prototyping technique, in which healthy peers of the relevant client group are used as proxies for clients experiencing mental health disorders. Whilst the further exploration of such techniques is not the focus of the research presented in this thesis, these areas of future research are worth noting.

Finally it is important to acknowledge that while many issues can be identified in non-clinical evaluations, clinical evaluation will remain the final arbiter of the clinical effectiveness and usability of any system. Clinical evaluations are necessary to assess the therapeutic impact of any system. Also several interaction issues only emerged during clinical evaluations. These issues included the importance of fine control over playback (e.g. rewinding and replaying dialogues) and the need to print out the game notebook at any point. The design team initially expected that PI would be played in a single one hour session. In hindsight this seems naive, but it was only when clinical studies were conducted that it became apparent that the game would be used over several sessions. This has implications for future iterations of the game. For example at the beginning of each new session it should be possible to review a record of game progress in previous sessions. Therapists also highlighted the need for interim printouts of the in-game notebook, which clients could take home at the end of each session. These features were not included in the original game, as they were not envisaged as being required. The final important requirement of clinical evaluations is to develop protocols for the use of any new technology. Protocols are required for issues including, but not limited to:

- The situations and clients for which a particular system is suitable.
- The situations or clients with whom a particular system should not be used.
- How and at what point should a particular system be introduced?
- Guidelines for using the system effectively, including guidelines to situations in which a therapist should stop using a particular system with a client.

If a system does prove effective in clinical trials and is considered worthy of more widespread distribution, it is important that detailed protocols of how to use the system are included in this distribution process. Developing and evaluating protocols for using a system should be a key aim of any clinical studies.

4.4.4 Separating content development from systems development

During the development of PI a great deal of time was spent developing the therapeutic content, e.g. the dialogues and overall game metaphor. The dialogues went through many iterations. Each time the dialogues changed, the MHC professional required the support of a HCI researcher to transfer this content into the game and evaluate it. In future iterations of PI, or any other similar system, a great deal of time could be saved if MHC professionals could independently develop and evaluate content without the need for continuous input from HCI researchers. This would free HCI researchers to spend more time developing the system and focusing on other interaction issues.

4.4.5 Slow clinical evaluation cycles

As stated in Chapter 3, evaluating new approaches in MHC settings is a very time consuming process. The evaluation of PI again reinforced this issue. From start to finish, including the initial design phase, the development of PI took six months. This included the time taken for HCI researchers to develop the skills required to use the technologies involved (e.g. becoming familiar with the Atmosphere scripting language, API and 3D modelling environment). Once the game was complete, it then took approximately two more

months to agree that the game was suitable for clinical evaluation. This approval could only be sought once the game was fully completed. Following this it took a further three months to conduct a small scale pilot study in which therapists used the game with four adolescents. Such durations are not atypical of evaluations in MHC settings. Larger scale trials, including randomised controlled trials, often take place over extended periods of between 12 to 36 months.

It is important that design approaches in the MHC domain take account of this issue. For example, it will be beneficial if clinical evaluations and the development of new technologies can proceed in parallel and complement one another. In this way, while MHC professionals evaluate a system, regular feedback from this process could be applied to improve future iterations of the system. Also, given the time taken to conduct evaluations, it is important that systems should aim to be useful to a broad range of therapists, in a broad range of settings and with a broad range of clients.

4.4.6 Suitability to a broad range of clients and therapists

Developing technologies which suit the needs of a broad range of clients and therapists is not a trivial undertaking. As seen in previous sections, while PI proved successful when used with appropriate clients, MHC professionals suggested that small details in the design of PI have the potential to limit the effectiveness or even make the game unusable with many clients. The significance of such issues was confirmed in the later larger scale evaluation. During one workshop two participants discussed different reactions to the policeman character. One therapist felt that this was the character which appealed most to clients. In the second case the therapist said a client had visibly retreated from the game when they meet the policemen – the therapist mimed the client withdrawing from the computer. In this case the client was a young girl who had been referred to the mental health service as a result of court order.

The fact that small design details, such as a policeman character or the language and accent of other characters, can impact the effectiveness of a game has significant implications for design in this domain. Given the importance of client engagement in MHIs, the impact of design factors which cause client alienation is likely to be severe. However a balance must be struck here. There is little point in producing bland systems, which while not likely to cause alienation, are equally unlikely to enhance engagement.

It is also important to note that the issues identified in PI are not critical to overall operation of the game. Nor are they critical to the new form of interaction which the game enables between therapists and clients. The strength of PI lay not in its use of specific characters or conversations. It lay in the games ability to create a context for more detailed therapeutic conversations between therapists and clients. For example the policeman character could be replaced by a footballer talking about the importance of back up from team mates. However this change could cause alienation for other clients, e.g. young girls or boys who don't like football. Rather than producing a fixed game, or indeed any other fixed system, a better approach would be to produce games or systems which can be adapted to suit the needs of various client groups. For example using PlayWrite therapists have now created games with characters including a crocodile wrestling Australian, a

philosopher of calm from northern India, a scientist based on the Peter Venkman character from the film *Ghostbusters*, and Jim Brass, the head of a criminal forensics team.

Alongside adaptation to suit the needs of clients, further forms of adaptation are also desirable. For example, MHC professionals felt that the use of SFT in PI had the potential to make the game unsuitable for therapists not trained in this approach. Later evaluations again confirmed the significance of this issue. When asked to identify the greatest weakness of PI, one therapist, who had used the game with several clients, stated that its greatest weakness was the use of SFT. She commented:

“One of my biggest difficulties is that PI does not fit with my way of working.”

She did not feel that SFT was an inherently poor approach to treatment, rather that, given her training as a narrative therapist, the goal orientated nature of SFT – and thereby PI – was inappropriate to her normal ways of working with clients. When asked to give her opinion on the statement “playing PI can help in structuring sessions with young people”, she chose ‘agree’, but added that structure is not necessarily a positive thing and that “structure is not the way of working for narrative therapists”. Asked to comment further she added:

“What excites me is working this way rather than the PI game. PI gave it a kick start. I would love to have a repertoire of games. And PI is probably one of the ones I’d use least”

She added that she would like to continue using PI and felt it could be very useful with adolescents from chaotic backgrounds, for whom structured approaches can be very helpful.

4.5 Conclusions

The design and evaluation of PI provided initial evidence of the benefits of collaborative design involving both HCI and MHC professionals. While HCI researchers have the skills required to envision and develop new technologies, MHC professionals have the necessary domain expertise and experience of working with clients. Allowing for balanced input from the HCI and MHC domain was a significant factor in the development of PI. Fig.4.1 highlights one possible set of decision making criteria for this area. The combination of a general user-centred design ethos with direct input from MHC professionals and a consideration of MHC theory can provide a strong basis for decisions made during the development of a system. The evaluation of PI also demonstrated the benefits of using client centred technologies in MHIs. Initial evidence suggests that playing PI can help in engaging adolescents in the therapeutic process and help in establishing a client therapist relationship. Given the importance of such factors in the outcomes of MHIs, these are potentially significant benefits.

The overall evaluation of PI also highlighted the potential benefits of non-clinical evaluations by independent MHC professionals. Investigating techniques which increase the effectiveness of non-clinical evaluations is a worthwhile research objective. For example heuristic evaluations have been shown to be effective in other HCI domains. Is there an appropriate and effective heuristic checklist for technologies in the MHC domain? It is important to note here that irrespective of the effectiveness of non-clinical evaluations, clinical evaluations

will remain the final arbiter of the effectiveness of any system in the MHC domain. Several further issues which need to be addressed by future research have also been identified. For example, one of the major weaknesses in the design of PI was the oversight of the importance of literacy difficulties for many adolescent clients attending MHC services. Investigating techniques which minimise such oversights, and which help HCI researchers to gain access to the tacit knowledge of MHC professionals, is a worthwhile aim for future research. However these issues are not the main focus of the research presented in the remainder of this thesis.

The evaluation of PI highlighted the limitations of fixed systems in the MHC domain. Given the durations required to conduct clinical evaluation it will be of significant benefit if systems can be developed which successfully meet the needs of a broad variety of clients and MHC professionals. One approach to addressing this challenge is to develop flexible systems, which can be adapted by MHC professionals to suit both their own needs and those of their clients. Based on the issues discussed in this, and previous chapters, the remaining chapters of this thesis propose and provide an evaluation of an adaptable approach to the design of technology for talk-based MHIs. The next chapter begins by provided a collated list of some of the key issues which must be considered by design approaches in the MHC domain.

5 Adaptable Design for Talk-Based Mental Health Care

Chapter 3 provided an initial review of some of the challenges of designing in the MHC domain and also discussed the difficulties these challenges create in the direct application of traditional HCI techniques. As well as confirming the significance of the issues described in Chapter 3, the development and evaluation of PI highlighted further challenges which must be considered. It is important that approaches to the design of technology for talk-based MHC take account of these issues. Table 5.1 summarises some of the main recommendations and issues identified in chapters 3 and 4.

Table 5.1 - Key considerations for design approaches in the mental health care domain.

Design approaches must take account of the ethical requirements and access constraints inherent to the MHC domain.

Systems designed for MHIs should take account of the needs of both MHC professionals and the clients with whom they work.

Design in the MHC domain benefits from collaboration between HCI and MHC professionals. Design approaches should seek to support and enhance this collaborative process and allow MHC professionals to become active partners in the overall development process.

In collaborative projects it is beneficial to establish a set of decision making criteria which allows for balanced input from all relevant domains.

Design approaches should take account of the time required to conduct clinical evaluations. Approaches must also take account of the fact that clinical evaluations will be conducted by MHC professionals. Developing protocols for using a system should be a key aim of clinical studies.

It is beneficial if clinical evaluations and system development can proceed in parallel and complement one another. In content rich systems it is also beneficial to separate the development of therapeutic content from the development of the overall system. Therapists should be enabled to independently develop and evaluate content.

Design approaches should take account of the importance of adaptability in MHC settings. Given the time required to develop and evaluate any new system, it is beneficial if systems can be adapted to meet the needs of a broad range of therapists, working with a broad range of clients.

5.1 The Importance of Adaptability in Mental Health Care Settings

Before introducing the design approach proposed in this thesis, it is important to stress the significance of adaptability in MHC settings. Socio-cultural issues are one of the major contributory factors in the development of mental health disorders and are a key factor which must be considered in treatment. The significance of such issues was confirmed in the evaluation of PI. Given the importance of engagement in MHIs, the impact of design factors which cause alienation for clients are likely to be severe. Some of the specific socio-cultural issues which affect mental health include: gender, age, social class, sexual orientation, religious or secular assumptions and race, culture and ethnicity. Therapists are also required to work with clients experiencing a broad range of disorders, of varying severity.

Many of the issues which arose in the evaluation of PI – e.g. the need for greater playback control and the over reliance on keyboard skills – can be addressed using standard approaches to usability improvement. This is not the case for problems caused by the use of a specific therapeutic approach or for the problems caused by small design details (e.g. the appearance or language used by a character). These issues are best addressed through a more flexible approach to design, which allows MHC professionals to adapt systems to suit both their own needs and those of their clients.

For technologies to be of practical use in a broad range of MHIs, they should ideally be adaptable to:

1. The broad range of theoretical approaches used by different MHC professionals
2. A broad range of mental health disorders
3. A broad range of socio-cultural groups
4. The specific needs of individual clients

5.2 An Adaptable Design Approach

Overcoming the challenges of designing in the MHC domain requires the collaboration of HCI and MHC professionals. While collaborative design, involving domain experts, is desirable in most design spaces it has a particular significance in the MHC domain. Fig.5.1 outlines a two stage approach to this collaborative process. The overall aims of this adaptable approach are twofold. Firstly, to support effective collaboration between HCI and MHC professionals and to allow MHC professionals to become more active partners in the overall development process. Secondly, to develop a sustainable approach to the development of user-centred technologies, that takes advantage of the expertise of MHC professionals, and takes account of the importance of adaptability in MHC settings.

Stage one of the adaptable design approach focuses on the design and development of technologies. The aim at stage one is to develop and evaluate systems to the point where they are shown to be usable by the target end users, are agreed to have clinical validity and are predicted to have therapeutic benefits. Approaches such as collaborative design can be applied at this stage. Rather than developing fixed solutions at the development

stage, it is proposed that flexible systems are developed. Further to this it is proposed that the ability to make adaptations to systems be placed in the hands of MHC professionals. Stage two focuses on clinical evaluations. MHC professionals have the opportunity to adapt systems to suit their own needs and those of their clients and to then evaluate systems in clinical settings. As well as evaluating specific therapeutic benefits, stage two should aim to develop protocols and guidelines for the clinical use of any system, e.g. when and with which clients is it appropriate to use a given system? It is envisioned that stages one and two will overlap and complement one another, with stage one being lead by HCI researchers and stage two by MHC researchers. As systems are developed at stage one they can be taken to stage two for clinical evaluation. The results of this evaluation will feed back into further design and development at stage one, which in turn provides further possibilities for clinical evaluation at stage two. In this way a parallel process for collaborative design and evaluation can evolve.

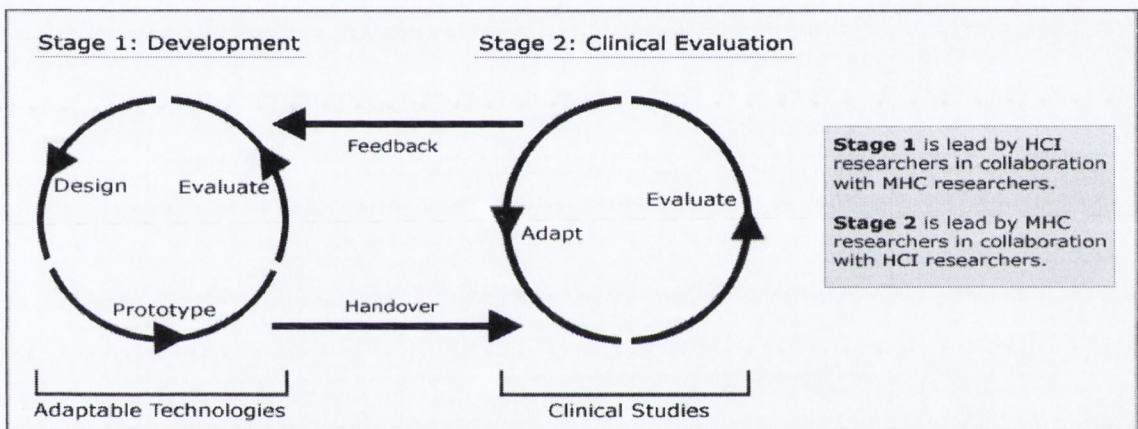


Figure 5.1 - A two stage adaptable design approach for technologies in the mental health care domain.

5.2.1 Forms of adaptation

A large body of research exists on the design of systems which intelligently adapt to the needs of users, e.g. (Brusilovsky, 2004; Maybury & Wahlster, 1998). Much of this research focuses on the development of user-models, based upon which adaptation decisions can be made. Research has focused on intelligently adapting both the content delivered by systems and also the ways in which this content is delivered, e.g. through the use of intelligent user interfaces and agent based adaptive interfaces (Paris & Sidner, 2006). Several frameworks have been proposed for the development of such systems, e.g. (De Bra, Brusilovsky, & Houben, 1999). It is important to clarify at this point that this thesis is not proposing to explore the development of intelligent adaptive systems. Whilst future work may explore the potential of such systems, the aim in this thesis is to develop an approach which allows MHC professionals to make decisions and adapt systems based on their own needs and those of their clients. In some respects such systems could be called end-user programming environments. Again a large body of research exists on different approaches to end user programming, e.g. visual programming, programming by demonstration (Burnett, 1999; Zhang, 2007). In many cases the complexity of end user modification offered by such systems is beyond that which could be

reasonably expected of MHC professionals. Much of this literature also focuses on the development of systems in areas not relevant to the MHC domain (e.g. the development of visual programming tools to support specific tasks in the engineering and scientific domains). However in related domains such as the educational domain several systems/approaches have been successfully developed which allow educators to make adaptations in the systems used by learners. For example, the WebQuest model provides educators with a structured approach to creating web-based educational activities for students (B. Dodge, 1998; B. Dodge, 2001). Further examples include in the educational domain include the REDEEM system (Ainsworth & Fleming, 2006) and AutoTutor (T. Murray, 2003). In the MHC domain the AKQUASI system, described in Chapter 2, has demonstrated initial benefits of allowing clinicians to tailor questionnaires, schedule plans and scoring/evaluation algorithms, based on a palette of predefined functions, input elements and psychometric instruments. Whilst no overarching design approaches have been proposed, several further papers also describe initial work on the development of adaptable systems for MHC settings (Alcañiz et al., 2007; Botella et al., 2006; Riva et al., 2008).

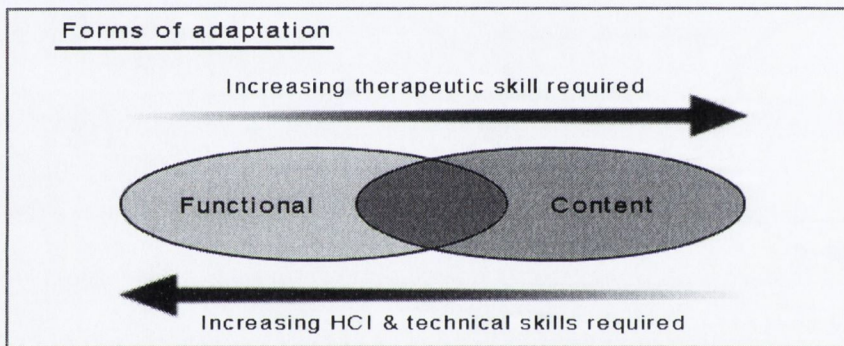


Figure 5.2 - Forms of adaptation – functional & content.

For the purpose of the discussion presented here, the forms of adaptation possible in any system are divided into two broad categories: functional and content, Fig 5.2. Content adaptations focus on what content is delivered by a system. Functional adaptations focus on how the content is delivered⁴. In designing PI, many functional decisions were made about how therapeutic content would be delivered, e.g. the decision to deliver the content in a 3D game. While these decisions were made in collaboration with a MHC professional, they were primarily interaction design decisions and the actual implementation work was done by HCI researchers. The main role of the MHC professional in implementing the game was to develop the therapeutic content. While the MHC professional received input from HCI researchers, the process of developing content was primarily a task for the MHC professional.

Functional adaptations to a system will generally require HCI and technical skills (e.g. knowledge of design methodologies or the ability to use a programming language). Content adaptations are more reliant on therapeutic skills relevant to the domain. Systems which offer increased access to functional adaptations will

⁴ In this thesis the term 'functional' is intended to describe a very broad set of decisions, including, decisions on what functions are delivered (e.g. functional requirements) and also more design oriented decisions (e.g. how are the required functions to be delivered).

be more flexible, however they are also likely to require increased technical skills and will require users to make more decisions about how content is delivered. Systems which focus on content adaptations - while less flexible - will also require fewer technical skills.

Again as highlighted in Fig.5.2, there will generally be a continuum and an overlap between functional and content oriented adaptation. For example, in PI content is delivered through dialogues, but content within dialogues can be delivered in three different ways: dialogue spoken by a character, written content in a notebook and video content. Finding the appropriate balance of these three content delivery methods was an important step in the development of PI. The overall layout of the game world also determined the order in which content was delivered. In PI players collect keys by talking to characters. These keys allow them to unlock doors and progress through the game world. By changing the order in which keys unlock doors, the overall order in which content is delivered could be changed.

Larger adaptations in how content is delivered will require greater functional changes. Fig.5.3 uses the example of PI to highlight varying degrees of functional change possible in a system. Making changes to functionality such as the technology used or the game type would require substantial implementation work and technical skills. Identifying the appropriate forms of adaptation to make available to MHC professionals is an important step in the development of any system.

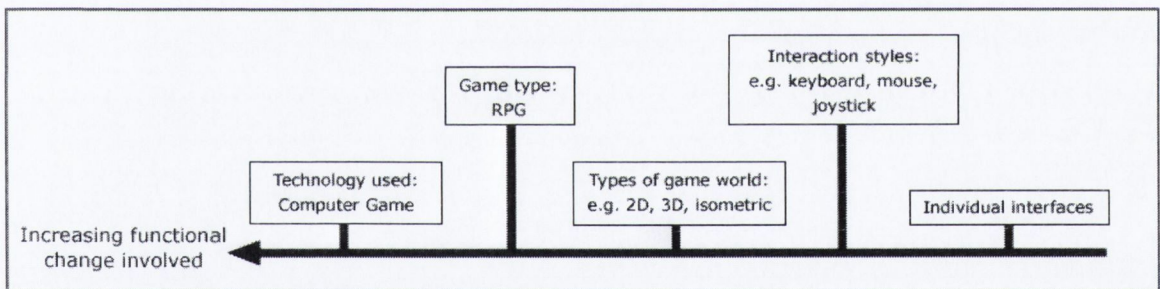


Figure 5.3 - Increasing levels of functional change in a system.

The research presented in this thesis focuses primarily on developing systems which allow MHC professionals to make content adaptations. As demonstrated by the evaluation of PI, the ability to make content changes could greatly increase the usefulness of any system. The strength of PI lay not in the delivery of specific content, rather in the new form of interaction which the game enabled between therapists and their clients. In future, while HCI researchers focus on designing, developing and improving frameworks for delivering therapeutic content, MHC researchers can adapt these systems for use in various interventions and evaluate their therapeutic benefits. This approach can allow HCI researchers to focus on designing systems which target broad therapeutic objectives (e.g. establishing a client-therapist relationship, improving client engagement). MHC professionals can then adapt these systems to implement specific theoretical approaches, to target specific disorders and to meet the needs of different socio-cultural groups or individual clients.

5.2.2 The structure of an adaptable system

Fig 5.4 shows an overview of the basic structure for the adaptable systems proposed in this thesis. Systems consist of two key components:

1. Applications which allows MHC professionals to create and adapt the content delivered by a system.
2. Applications which deliver this content in MHIs.

Content creation applications should be designed for use by MHC professionals. These applications should allow MHC professionals to independently create new therapeutic content and adapt existing content, and then publish this content for use in MHC settings. If the content creation application creates and stores content in an appropriate form, content can potentially be delivered in multiple forms. For example, aside from the time and technical expertise required, there is little to prevent the dialogues used in PI from being delivered in other forms. The content delivery applications should focus on the needs of clients, but must also be suitable for use by MHC professionals and must complement the aims of the MHIs (e.g. client engagement, relationship building etc).

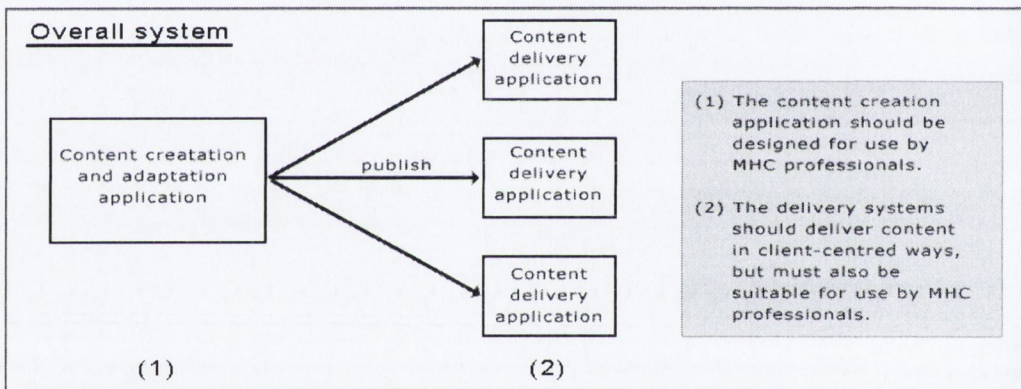


Figure 5.4 - The structure of an adaptable system.

5.2.2.1 Designing content creation and adaptation applications

As stated above, content creation and adaptation applications should be designed to meet the needs of MHC professionals, e.g. they should take advantage of their existing skills. One of the strengths of the proposed design approach is that many traditional approaches to user-centred design can be applied in the design and evaluation of these applications. Contact with MHC professionals is not encumbered by the access constraints which apply to contact with clients. For example, therapists can be interviewed as part of a requirements gathering phase, various prototyping techniques can be used, and as applications are developed traditional usability evaluations can be conducted.

5.2.2.2 Designing content delivery applications

Content delivery applications should focus on delivering content in client-centred ways and in ways which are appropriate to the aims of MHIs. For example, in PI the therapeutic content was delivered in a 3D game. Design approaches applied in the development of content delivery systems must take account of the access

restraints of the domain. Applications can be designed in collaboration with MHC professionals. The use of decision making criteria, such as those described in Chapter 4, is likely to prove beneficial. Expert reviews by MHC professionals and approaches such as the multi-stage prototyping technique proposed by (Matthews et al., 2007) can also help to improve the usability of applications prior to clinical evaluations and increase the probability that systems will achieve the desired therapeutic benefits.

Clinical studies will be the final arbiter of the therapeutic impact and effectiveness of any content delivery application. However an envisioned benefit of the proposed approach is that once the validity and therapeutic effectiveness of an application is demonstrated, the content delivered by the application can then be adapted to meet the needs of various clients, therapists and situations. It may also be possible to simultaneously evaluate multiple adaptations of an application, e.g. delivering content which implements different therapeutic approaches or targets different disorders. Such evaluations have the potential to provide independent validation of the effectiveness, or indeed the non-effectiveness, of the interaction approaches used in any system.

5.2.3 A model of use for developed systems

Whilst it is desirable that a large number of therapists are comfortable using any system, it is not necessary that all therapists be able to create new content or make large scale modifications in the use of the system. A possible model of use for a system is:

- Small groups of expert MHC researchers and practitioners develop and adapt content for use within their own areas of expertise e.g. targeting specific disorders and implementing specific intervention models.
- Larger groups of practitioners use these implementations with clients and have the option of making small scale adaptations to suit the needs of specific demographic groups or clients.

By enabling therapists to play an active role in building and tailoring the content delivered by computerised systems, it is hoped that adaptable technologies will provide a sustainable approach to the development of client and therapist centred technologies for MHIs.

5.2.4 Communication channels – handover and feedback

Establishing good communication channels between the development team (which should include MHC professionals) and the broader body of MHC professionals who use, adapt and evaluate systems in clinical settings is expected to be a critical factor in the success of the adaptable design approach. Two broad communication channels are highlighted by the approach shown in Fig.5.1: handover and feedback.

The handover process is expected to be essential to the success of any system. One of the priorities of the handover process is to introduce therapists to the system. They can be shown both how to create and adapt content and also introduced to the use of applications in clinical sessions with clients. Given therapists limited experience of using technology, it is important to help them overcome any anxiety they might have and build their confidence in their own ability to use the system. The handover process should also encourage MHC

professionals to become active participants in the overall design process. As they use a system they can be encouraged to actively review and evaluate it, focusing not just on therapeutic issues but also on usability issues and ideas for extending and improving the system.

The feedback channels should enable MHC professionals who use a system in clinical settings to make the development team aware of any issues they identify. Feedback can focus on issues including:

1. Evaluations of the therapeutic value of the system. This can include detailed descriptions of how systems are used in clinical sessions, what features are particularly effective and what features are less effective. MHC professionals can also collect feedback from clients with whom a system is used. These evaluations will focus on the use of the content delivery applications in clinical settings.
2. As well as providing feedback on the therapeutic value of a system, feedback can focus on issues which impact the usability of the system, e.g. therapists who used PI clinically identified the need for greater flexibility in playing and replaying parts of the game.
3. As well as providing feedback on the content delivery applications, therapist can also provide feedback on the content creation applications. Therapists can be asked to identify potential improvements and new types of functionality which could be incorporated into future iterations of a system. This can include improvements and new functionality for both the content creation and delivery applications.

The development team should aim to gather feedback from MHC professionals at regular intervals during the clinical evaluations stage. In this way, while clinical evaluations of a system are ongoing, feedback can be applied to improve and expand future iterations of a system.

5.3 Anticipated Benefits of the Proposed Approach

It is hoped that the adaptable design approach proposed in this chapter will offer several benefits for the design of technology for talk-based MHC. The anticipated benefits include:

1. By allowing MHC professionals to adapt systems to suit their own needs and those of their clients, systems will be more useful in a broader range of MHIs. Once the validity and therapeutic effectiveness of an application is demonstrated in a clinical evaluation, the application can then be adapted to meet the needs of various clients, therapists and situations. As previously stated, to achieve this aim systems should ideally be adaptable to:
 - A broad range of theoretical approaches
 - A broad range of mental health disorders
 - A broad range of socio-cultural groups
 - The specific needs of individual clients

2. It may also be possible to simultaneously evaluate multiple adaptations of an application, thereby providing independent validation of the effectiveness, or non-effectiveness, of the interactions approaches used in any application.
3. The approach aims to support effective collaboration between HCI and MHC professionals and allow MHC professionals to become more actively involved in the overall design and development process. It is hoped that by more actively involving therapists they will provide increased feedback not just on therapeutic issues, but also on usability issues and ideas for extending and improving systems.
4. By allowing MHC professionals more freedom to experiment and to independently develop and evaluate content, it is hoped MHC professionals will develop guidelines and protocols for the effective use of a system in clinical settings.
5. It is hoped that a process will evolve in which clinical evaluations and system development can proceed in parallel and complement one another. As systems are developed at stage one they can be taken to stage two for clinical evaluation. The results of this evaluation will feed back into further design and development at stage one, which in turn provides further possibilities for clinical evaluation at stage two.

The next chapter of this thesis describe the design and initial evaluations of the PlayWrite system. PlayWrite is an implementation of the design approach advocated in this chapter. PlayWrite aims to allow MHC professionals to create and adapt therapeutic 3D computer games for adolescent MHIs. The aims in developing PlayWrite were twofold. Firstly, to evaluate and attempt to provide a validation of the proposed design approach. For example, can PlayWrite deliver some or all of the benefits outlined above? Secondly, to explore the design approach in greater detail and provide a better understanding of the methods required to successfully implement this approach in MHC settings.

6 The Development and Formative Evaluations of PlayWrite

This chapter describes the development and formative evaluations of the PlayWrite system. PlayWrite is an implementation of the adaptable design approach proposed in Chapter 5 and was developed to provide a means through which to evaluate this approach in MHC settings. PlayWrite is designed to allow MHC professionals to both create and adapt therapeutic 3D computer games, which can then be used in adolescent MHIs. The initial sections of this chapter provide a description of PlayWrite and discuss key decisions made during its development – e.g. the choice of which forms of adaptation to make available to MHC professionals. At the outset the aim was to develop a game building tool, which would be sufficiently flexible and which would enable non-programming MHC professionals to create therapeutic games which:

1. Implement different theoretical approaches to talk-based MHC
2. Target a variety of mental health disorders
3. Target the needs of various socio-cultural groups
4. Target the needs of individual clients

No such tool existed prior to the development of PlayWrite. The latter sections of the chapter describe the formative evaluations of PlayWrite. Formative evaluations with MHC professionals are an important part of the development stage of the adaptable design approach. The aim in conducting these evaluations is to insure that a system is sufficiently usability by the target end users and also to gain initial evidence of the potential usefulness of the system.

Whilst this chapter addresses the development and evaluation of PlayWrite in separate sections, it is worth briefly noting that in practice these activities overlapped as part of an iterative design process.

6.1 Overview – The Structure of the PlayWrite System

Fig.6.1 shows an overview of the PlayWrite system. The system consists of four components:

1. **The PlayWrite Dialogue Builder:** This application allows users to create interactive dialogues with computer game characters. Dialogues created with this application provide the therapeutic content for games. This application can also be used to edit the dialogues used in existing games.

2. **The PlayWrite Games Builder:** This application allows users to create new games or edit the content of existing games. New games are created by attaching dialogues to characters in a 3D game template.
3. **PlayWrite Games:** An installation of PlayWrite can include many games. A link to start each game is stored in the PlayWrite 'My Games' folder.
4. **The PlayWrite Games Admin Tool:** This administration tool allows users to view information about their PlayWrite games.

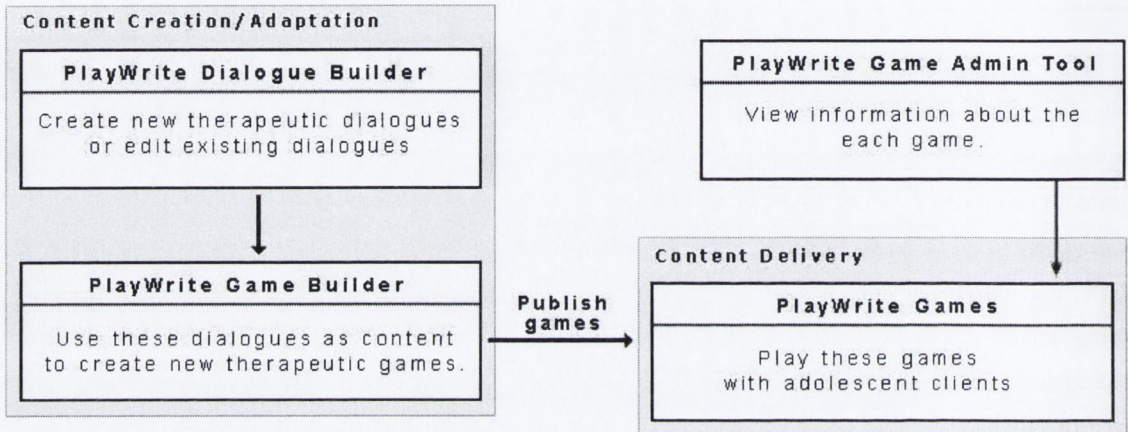


Figure 6.1 - An overview of the PlayWrite system.

Appendix E contains details of how to install and use PlayWrite. The PlayWrite installation includes a set of help files. Further details of each aspect of PlayWrite can be found in these help files. As can be seen in Fig.6.1 the PlayWrite system consists of two content creation applications and a content delivery application. The system also includes an administration tool. This tool allows MHC professionals to quickly access information about any games contained in their overall system (e.g. the theoretical approach applied or the usernames of players). PlayWrite builds on PI. As in PI the content is delivered in a 3D game. The pilot evaluation of PI provided initial evidence that appropriately designed 3D computer games have the potential to assist in adolescent MHIs. As the design and initial evaluations of PI have been described in Chapter 4, this chapter focuses largely on the development and initial evaluations of the content creation applications.

6.1.1 Why the two content creation applications were kept separate

The PlayWrite game building system consists of two separate content creation applications, the Dialogue Builder and the Game Builder. Future implementations of the system may benefit from integrating the functionality of these separate applications into one single application. The primary reason that this was not done in the current implementation, is that the Dialogue Builder is seen as an application for creating general therapeutic content in a dialogue based format. While this content is currently used in games, future versions of the system could allow this content to be used in multiple formats. For example, if appropriate delivery systems were implemented, dialogues could be delivered in websites using animated characters, or on mobile phones. All content created with the Dialogue Builder is saved in XML format, which could be read directly

by new delivery systems, easily converted to other XML mark-ups using XSLT, or translated into other appropriate formats. For example, the PlayWrite Game Builder converts XML dialogue files into TorqueScript files, for use in PlayWrite games. Using XML as an intermediary representation increases the potential usefulness of content created using the Dialogue Builder. Developing multiple content delivery applications was not a priority for the research presented in this thesis, but may be an area of future development.

6.1.2 Technical details

The PlayWrite game building system is implemented using the Java platform. The Java Media Framework (JMF) is used for functionality including video playback. The JMF must be installed separately on any computer, in addition to a Java runtime environment, in order to run PlayWrite. All content created using PlayWrite is saved in XML format, using a mark-up notation designed for the system. Initial usability evaluations with inexperienced computer users indicated that many have difficulties in managing files on a computer (e.g. saving, opening and finding files). For this reason all content created in PlayWrite is automatically saved in specific locations within the PlayWrite installation folder. While users do have the option of selecting their own save locations for files, this is not a requirement. Details of the file system used in PlayWrite are included in Appendix E.

PlayWrite games are rendered using the Torque Game Engine by Garage Games. An indie license for this engine was purchased for the project. This license grants permission to distribute any games created with PlayWrite. The Torque engine was chosen because an indie license is relatively affordable (compared to other commercially available games engines), access to source code is provided and there is a large user community, including extensive online discussion forums. The engine is also robust and has been proven in real world commercial environments. Whilst the Java components of PlayWrite will run on most computers, PlayWrite was designed for PC's and the Torque Game Engine will only run on Windows operating systems.

6.2 Design Methodology - The Cognitive Dimensions

The development of content creation applications is not encumbered by the access or experimental constraints which apply to the design and evaluation of content delivery applications. With content creation applications the focus is placed on developing applications which can be used effectively by MHC professionals. As there are no exceptional restraints on access to MHC professionals, a broad range of user-centred design techniques can be applied at various stages in the overall process.

An iterative design process was applied in the design and development of PlayWrite. The MHC professional who collaborated in the development of PI also collaborated on the design of PlayWrite, and was consulted at regular intervals during the development process. Two major evaluations of the system involving MHC professionals were conducted during the implementation phase. At other stages of the implementation process non-MHC professionals, with limited computer experience, were used as proxies for MHC professionals.

Whilst there are many sets of guidelines which can assist in the development of interactive computer systems, the Cognitive Dimensions Framework was applied in the development of PlayWrite. Green (1996) describes the Cognitive Dimensions Framework as a set of user-centred discussion tools for designing and evaluating information based artefacts and notations. A system which enables MHC professionals to adapt and create content for therapeutic computer games can be viewed as an end-user programming environment. Green and Petre (1996) describe how the Cognitive Dimensions can provide effective user-centred discussion tools, to aid the design and evaluation of end-user programming environments. There are two main reasons why the Cognitive Dimensions were chosen in the development of PlayWrite:

1. They are a broad brush approach that can be applied at any stage of the design and evaluation process.
2. It was important to choose a discussion tool accessible to both HCI and MHC professionals. The Cognitive Dimensions have been shown to be accessible to a wide range of people from both technical and non-technical backgrounds.

Table 6.1 shows how relevant Cognitive Dimensions were applied to establish reference points in the design of PlayWrite. They were found to be a useful mechanism for structuring discussions at the design stage, and in reviews of early prototypes of the system. They also proved useful in structuring discussions during formative evaluations with MHC professionals, Section 6.10.

Table 6.1 - Applying relevant aspects of the Cognitive Dimensions.

Cognitive Dimension	Application
Role Expressiveness	Ensure that graphical representations clearly express the purpose of content they represent.
Progressive Evaluation	Allow for easy testing of all changes and overall progress.
Visibility	Allow building/editing/testing options to be visible at the same time.
Closeness of Mapping	Wherever possible use representations and interaction styles familiar to MHC professionals. Take advantage of MHC professionals existing skills.
Consistency	Maintain the same interaction styles and visual representation throughout the application.
Error Proneness	Reduce the potential for errors by clearly identifying the options available at any time.

6.3 Identifying Appropriate Forms of Adaptation

As stated in Chapter 5 one of the key decisions in the development of an adaptable system is the choice of what forms of adaptation to make available to MHC professionals. To briefly recap, the aim of PlayWrite was to develop a system which enabled non-programming MHC professionals to create and adapt therapeutic 3D computer games. Prior to beginning the development of PlayWrite it was necessary to identify how this aim could best be achieved. As discussed in Chapter 3, the majority of MHC professionals have limited experience of using computers and many face severe time constraints. Further to this, the vast majority are

unlikely to have experience of designing therapeutic games. The following priorities were established for PlayWrite:

- The initial threshold to creating a new game or adapting an existing game must be low, both in terms of the time involved and the need to develop new skills.
- The game building process must take advantage of therapists' existing skills.
- Therapists must not be required to spend a lot of time creating media resources.
- Therapists must not be required to develop programming skills.
- The system must be capable of producing games which are suitable for use in adolescent MHIs.

There are many possible levels at which the design of 3D computer game can be considered, from the very technical, through to more content orientated approaches. Table 6.2 shows three possible levels at which the development of a 3D game can be considered.

Table 6.2 - Three possible approaches to creating a computer game.

	Examples of the tasks involved	
Example 1: Build a new game from scratch using a game engine	Choosing a game type. Designing the game. Choose an appropriate game engine to use. Create the media resources required for the game. Implementing the game, e.g. programming etc. Create the game content e.g. character dialogues.	Level of technical and game design skill required: High Development time: High Flexibility: High
Example 2: Build a game using a toolkit, which supports the creation of a specific type of game, e.g. an RPG	Design the game. Build the game world using the graphical components provided in the toolkit. Implement the game logic using a scripting language. Create the game content e.g. character dialogues.	Level of technical and game design skill required: Medium Development time: Medium Flexibility: Medium
Example 3: Modify the content delivered in an existing game template	Choose a game template to use. Choose the game characters to use. Choose what the characters will say. Choose the order in which players meet characters.	Level of technical and game design skill required: Lower Development time: Lower Flexibility: Lower

Example 1 is the approach normally taken by commercial game companies. This approach offers the greatest degree of flexibility, but is time consuming and requires high levels of technical and design expertise. There are however many game building toolkits which allow users to build games using the approach described in example 2. Examples of commercially available toolkits include 3D GameMaker, DarkBasic and 3D

GameStudio. Many modern computer games also include game building kits, which allow users to create new games similar to the original. For example, the Neverwinter Nights Toolset is included in recent Neverwinter Nights games. This toolkit allows users to build their own RPG's, using the characters and world building components in the original Neverwinter Nights game. Users also have the option of creating their own 3D and media resources which can be imported into the toolkit. The level of technical expertise and game design skills required to use such toolsets is lower than that required to develop new games from scratch, however it is still relatively high and for new users the learning curve is steep. The level of flexibility offered by toolkits generally correlates closely with the level of technical expertise required. To take advantage of advanced functionality and implement game logic, users typically need to learn a scripting language.

Developing games using the approaches identified in example 1 or 2 is beyond the ability of the vast majority of MHC professionals. For the few willing to develop the skills required, the time commitment would be substantial. Example 3 outlines an alternate approach to building a new game which, while less flexible, also requires a lower degree of technical and game design experience. This is the approach used in PlayWrite. The ability to engage clients in therapeutic dialogue is a fundamental skill required of all MHC professionals. PlayWrite takes advantage of this skill. As in PI, PlayWrite games use dialogues with game characters to deliver therapeutic content. PlayWrite provides therapists with a fixed game template and enables them to create or adapt dialogue based content, which can be inserted into the template to create new games. In-game dialogues with game characters provide a context for more detailed conversations between therapists and their clients. In PlayWrite therapists are not required to create any of the 3D or other media resources for a game.

The design approach described in Chapter 5 advocates this content oriented approach to adaptation. While HCI researchers focus on implementing and extending a systems functionality, MHC professionals are able to focus on creating or adapting therapeutic content. Depending on the success of the PlayWrite system, future versions could allow greater flexibility over functionality issues e.g. the ability to tailor the 3D game world.

6.4 A Note on the Design of Spoken Language Dialogue Systems

Before describing PlayWrite in greater detail it is worth briefly noting several issues related to the design and use of spoken-language dialogue systems (Bernsen & Dybkjaer, 1997; Dybkjaer & Bernsen, 2000; McTear, 2002). These issues were considered during the development of PlayWrite, but given the scope of the study undertaken were not significant focus points.

The PlayWrite Dialogue Builder allows MHC professionals to create interactive dialogues which are then delivered by computer game characters. In several respects the Dialogue Builder has similarities with systems which allow end-users to create and prototype speech user interfaces, e.g. SUEDE (Klemmer, Sinha, Chen, Landay, Aboobaker, & Wang, 2000) and the CSLU Toolkit (Sutton & Cole, 1997). In PlayWrite dialogues are represented by a tree based overview, Fig6.5. This representation is at odds with that favoured in other recent systems and literature. SUEDE and the CSLU toolkit both use visual, state machine representations of dialogues, Fig6.2(a).

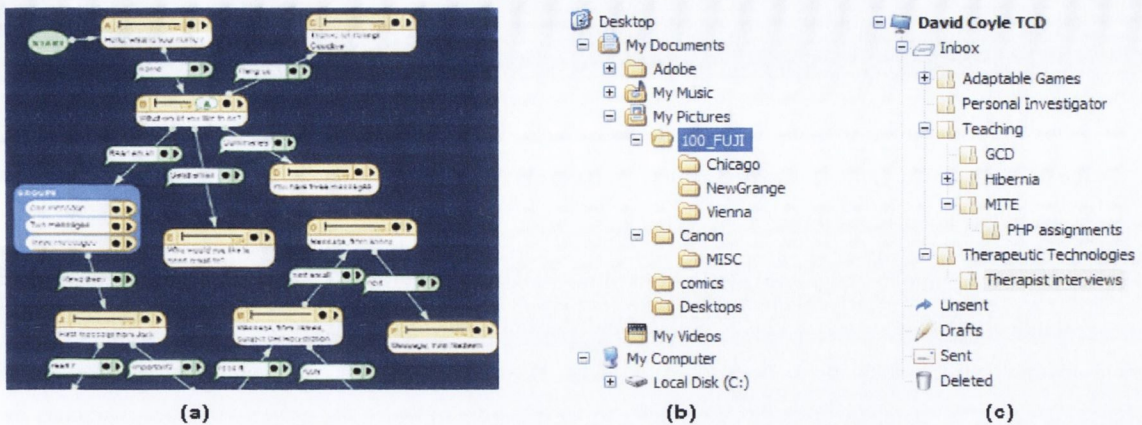


Figure 6.2 - (a) the state machine representation of a dialogue used in SUEDE, and the tree-based hierarchies used in a Windows file explorer (b) and an email application (c).

It is possible that the tree based representation of dialogues may be a source of user difficulty in the current iteration of PlayWrite. The main reason that this representation was chosen is that many MHC professionals are familiar with the tree based hierarchies used in several Windows applications, e.g. Windows file explorer and email applications, Fig6.2 (b) and (c). None of the MHC professionals interviewed during the initial stages of the PlayWrite study were familiar with representations such as that shown in Fig6.2(a). A more detailed investigation of the most effective means of representing dialogues with this user group was not undertaken, although it may be an aim of future work.

As discussed in Chapter 4, several of the young people who used the original version of PI experienced difficulties when required to read text on screen or record answers to questions using a keyboard. Whilst there are several potential ways of tackling this usability difficulty, e.g. the use of spoken-language input, addressing this issue was not a primary concern in the development of PlayWrite. On screen text and textual input via a keyboard are two of the primary input and output methods used in games created using the current iteration of PlayWrite. As will be seen in later chapters usability difficulties caused by the reliance of these input/output methods have been consistently identified as one of the key limitations in the current system. Addressing this limitation will likely be a focus for future work.

6.5 The PlayWrite Game Template

The PlayWrite system provides users with a single fixed 3D game template. Whilst future iterations could provide further templates this was not a priority for the current system. A re-implemented version of the 3D world used in PI is used as the game template in PlayWrite. Fig.6.3 shows a 2D map of this 3D game world.

As can be seen in Fig.6.3 the game world can contain up to 6 characters. Each of these characters can deliver one dialogue. There are three broad areas in game world:

1. A grassy area in front of a building. There is one character in this area (character 1). This is the first character players meet. This character generally introduces the overall theme of the game.

2. A building with an entrance and exit door. Inside the building there is a lobby area and four rooms. There is one character in each room (characters 2-5).
3. A grassy area behind the building, accessible through the exit door. There is one character in this area (character 6). This is the last character players meet. This character will generally wrap up the game and congratulate the player for their progress.

Players begin the game in the grassy area in front of the building. To complete the game they must make their way through the building to the grassy area behind the building. In order to make their way through the building they must unlock the doors of the building. Players unlock doors by talking to characters and collecting keys. The person who builds the game can set the order in which the player will meet characters by setting the keys required to unlock each door. In this way therapists can place an overall structure on the therapeutic content of the game. As in PI, players have an in-game notebook, which they can print at the end of the game. The game ends when the player talks to character 6.

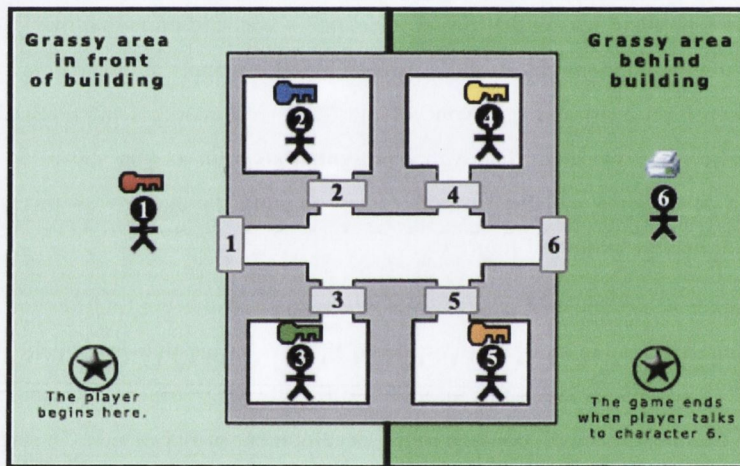


Figure 6.3 - A map of the PlayWrite game world.

There are two main stages in building a game using PlayWrite:

1. Create the dialogues for the game using the PlayWrite Dialogue Builder.
2. Add these dialogues to the game template and publish the game using the PlayWrite Game Builder.

6.6 The PlayWrite Dialogue Builder

The Dialogue Builder consists of three main screens: the Dialogue Building Screen, the Voiceover Recording Screen and the Standalone Player Screen, Fig.6.4. Each screen provides a specific functionality. The Dialogue Building screen is used to build, edit and test dialogues. The Voiceover Recording screen allows users to quickly record all the voiceovers required for a dialogue. The Standalone Player screen removes all other functionality and provides a view dedicated to playing back dialogues.

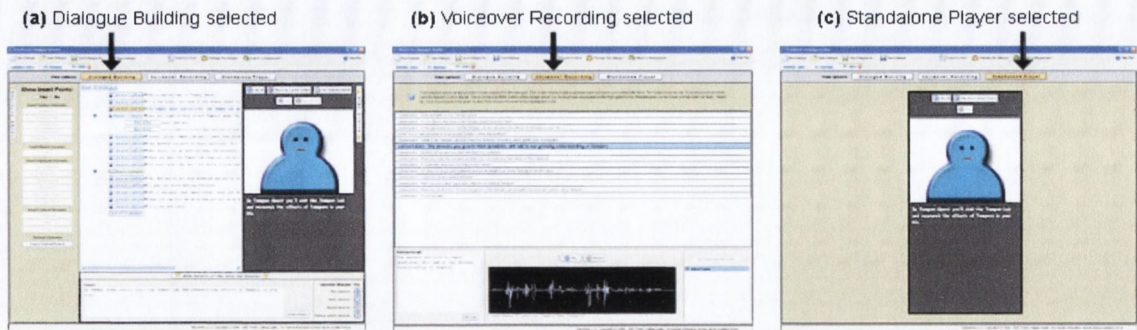


Figure 6.4 - The three main screens of the PlayWrite Dialogue Builder.

6.6.1 PlayWrite dialogues

PlayWrite Dialogues are similar to the dialogues used in PI. As in PI dialogues can consist of conversation spoken by a character and written content in the game notebook. Dialogues can also incorporate video-based content. However in PI only linear dialogues are used, all questions are presented in written form in the game notebook, and only general questions requiring descriptive answers are used. In PlayWrite several new types of questions are possible. Non-linear branching dialogues can also be created.

PlayWrite Dialogues are built using different types of *dialogue elements*. There are four distinct categories of dialogue elements: Spoken Elements, Media Elements, Notebook Elements and Control Elements. Within each category there are several distinct types of dialogue element (Table 6.3). Spoken, Notebook and Media elements allow the user to add content to a dialogue. Control elements serve a different purpose. They give the user additional control over the playback and organisation of a dialogue. Further details of the uses of each dialogue element are given in Appendix D.

Table 6.3 - The dialogue elements used in the PlayWrite Dialogue Builder.

Spoken Elements	Conversation, General Question, Scaled Question, Multiple Choice Question, Multiple Choice Answer
Notebook Elements	Open Notebook, Information, General Question, Scaled Question, Multiple Choice Question, Multiple Choice Answer
Media Elements	Video
Control Elements	Label, Go To Action, Group

6.6.2 Building and editing dialogues

Dialogues are created and edited using the Dialogue Building screen, Fig.6.5. As suggested by the Cognitive Dimensions, this screen has been designed such that all the dialogue building options can be made visible on a single screen. The screen is divided into four distinct areas: (1) the Dialogue Overview area, (2) the Dialogue Elements Panel, (3) the Editing Panel, (4) the Player Panel. Panels 2, 3, and 4 can be made visible or hidden at the user's discretion. This option allows the user to manage their screen space and create customised views.

- 1 : The Dialogue Overview area
- 2 - The Dialogue Elements Panel
- 3 - The Editing Panel
- 4 - The Player Panel

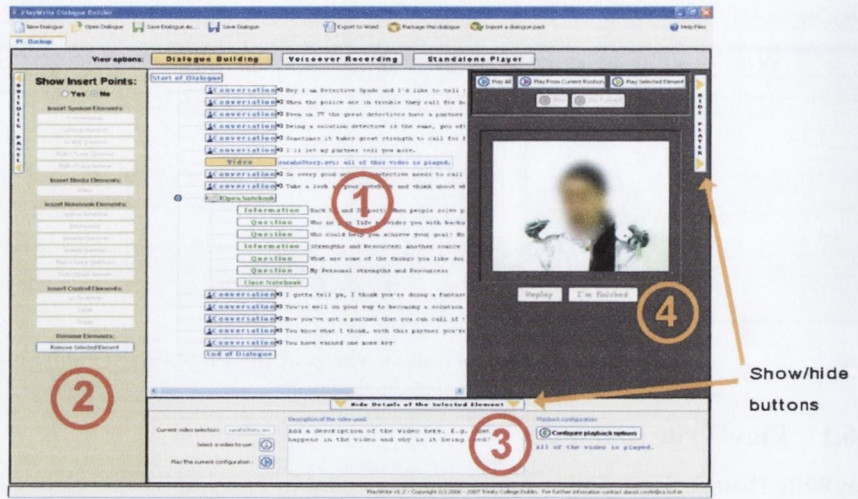


Figure 6.5 - The Dialogue Building screen.

The Dialogue Overview area provides a graphical representation of the overall structure of a dialogue. Each dialogue element listed in Table 6.3 is represented by a distinct symbol. Individual elements can be selected by clicking on them. The selected element is highlighted with an orange background. Several functions can be accessed by right clicking on any element, including cut, copy, paste and delete. Elements can also be moved about using 'drag and drop'. An 'ignore element' function is also available in the right click menu. Sometimes when building a dialogue it is useful to try different variations of the overall dialogue. The 'ignore element' function can be useful in situations like this. When the ignore option is selected the element is skipped during dialogue playback. This allows an element to be ignored without requiring it to be deleted. An element is reactivated by right clicking on it and selecting 'Reactivate this element'.

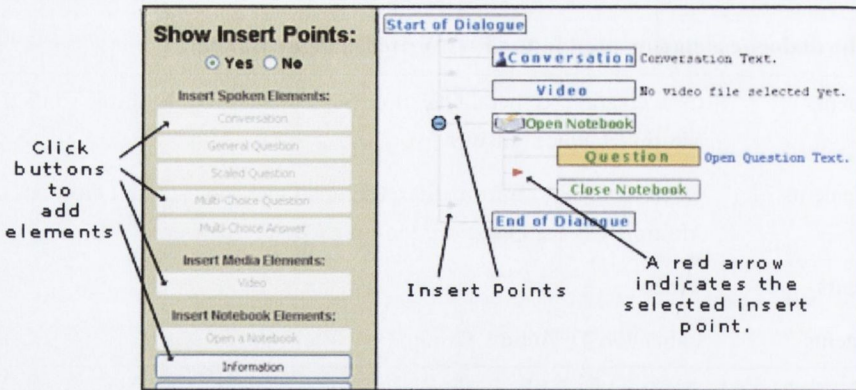


Figure 6.6 - New elements are added using the buttons in the Dialogue Elements Panel.

New elements are added using the buttons in the Dialogue Elements Panel (Fig.6.6). The buttons in this panel show the different types of elements that can be added to a dialogue. The grey arrows in the Dialogue Overview area are insert points; they clearly indicate all the points at which new elements can be added to a dialogue. Insert points are selected by clicking on the relevant grey arrow. A red arrow indicates the insert point currently selected. When an existing dialogue element is selected the application makes a 'best guess'

and automatically selects a new insert point. This is generally the insert point after the selected element. This feature was added during initial user testing. It is a time saving feature which allows the user to add a sequence of elements without having to repeatedly click new insert points.

When the user clicks on an element in the Dialogue Overview area, the Dialogue Editing Panel, at the bottom of the screen, displays the details of the selected element. This panel is used to configure/edit each element e.g. set the text for the element or attach a voiceover. The view varies depending on which type of element is selected. The Player Panel allows users to play the dialogue they are building. This panel provides a rough view of how the dialogue will appear to players in a game⁵. It facilitates testing and allows the user to get a feel for the dialogue they are creating. Dialogues can be played in their entirety or from a selected position. Individual dialogue elements can also be played. Finally specialised panels are also provided to record voiceovers and configure the playback of videos imported into the system, Fig.6.7 (a) and (b).

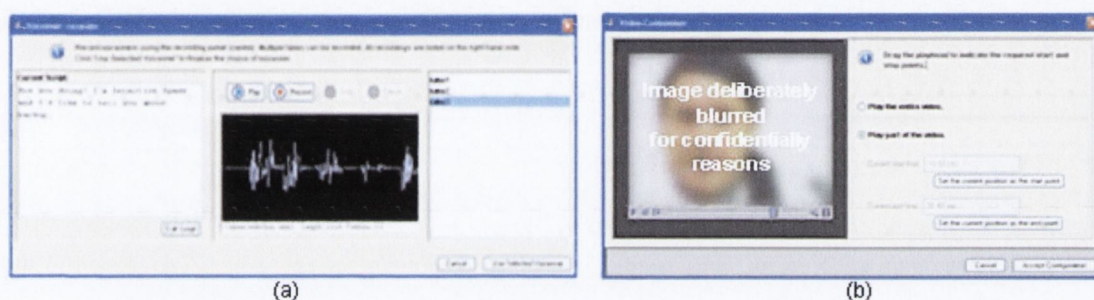


Figure 6.7 - The audio recording panel (a), and the video configuration panel (b).

6.6.3 The voiceover and standalone player screens

The first major iteration of the PlayWrite Dialogue Builder did not include the voiceover and standalone player screens. These screens were added as a result of the evaluations described in the latter sections of this chapter. To record a voiceover for a dialogue element in early iterations, users selected the relevant element in the dialogue overview area and then clicked the record button in the editing panel. One of the issues highlighted in initial usability tests was that therapists would often prefer to have a third party record the voiceovers for their dialogues. Fig 6.8 shows the Voiceover Recording Screen. This screen allows users to quickly record all the voiceovers required for a dialogue. When users open the Voiceover Recording Screen all the voiceovers required for a dialogue are listed. The user can click through each line in the list and record all the necessary voiceovers. As well as making the job of recording voiceovers more streamlined for therapists themselves, this screen can be used by a third party, without them having to click through a dialogue in the Dialogue Overview area and without the need to understand any further functionality of the Dialogue Builder.

⁵ Future versions of the PlayWrite system may benefit from using more realistic character graphics in this playback area. Due to time constraints, this was not a priority in the current implementation. During the evaluations of PlayWrite the character currently used became known as the Tellytubby. The basic appearance of the Tellytubby did not appear to hinder users' ability to create dialogues.

A list of all the voiceovers required in the dialogue.
Users click on each row to record the relevant voiceover.



Figure 6.8 - The Voiceover Recording screen.

Fig.6.4(c) shows the Standalone Player screen. This screen was also added as a result of initial trials with MHC professionals. On this screen all other functionality of the Dialogue Builder is removed, leaving just a dialogue playback view. This screen proved particularly useful during later workshops, when therapists used it to review each other’s work.

6.7 The PlayWrite Game Builder

Having created or adapted content using the Dialogue Builder, the PlayWrite Game Builder enables users to insert this content into a 3D game. The Game Builder has three main screens, which correspond to three stages in building a game, Fig.6.9.

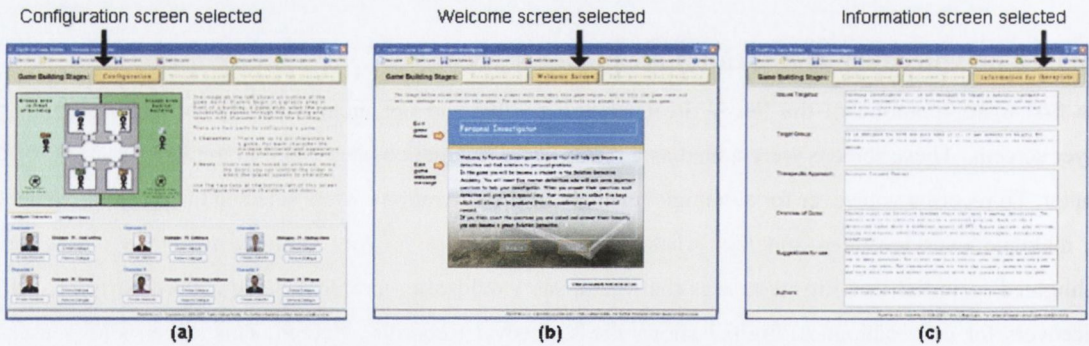


Figure 6.9 - The three main screens of the PlayWrite Game Builder.

The configuration screen, Fig.6.9(a), enables users to insert content into the PlayWrite game template. It shows a map of the game world with the game characters numbered on it. The user is able to choose what dialogue each character will deliver, choose each character’s appearance and set the order in which players will meet the characters. Character 1-6 are displayed in the characters tab at the bottom of the screen, Fig.6.10(a). In all there are ten 3D character models to choose from. Future iteration may have more options. Therapists have suggested that less formally dressed models and also younger models, the same age at the adolescents playing the game, would be particularly useful.

By clicking the ‘Configure Doors’ tab users can set the keys required to unlock each door in the game, Fig.6.10(b). Players collect specifically coloured keys by speaking with game characters. The doors in the

game world are numbered 1-6. By associating the appropriately coloured keys with the different doors the user can set the order in which players will meet game characters. As will be seen in Chapter 7, the new games created by therapists use a variety of key/door combinations to structure the ways in which content is delivered in games.

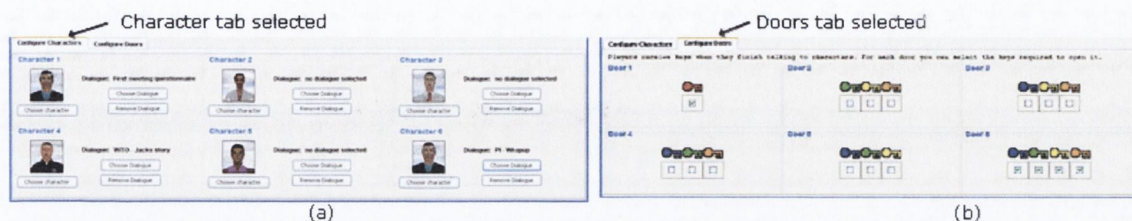


Figure 6.10 - The character configuration panel (a), and the door configuration panel (b).

The game welcome screen, Fig.6.9(b), allows users to tailor the screen players see when they start a game. There are two parts to setting up the game welcome screen: (1) choosing the game name and (2) creating a game welcome message. Fig.6.11 shows examples of welcome screens from two completed games.

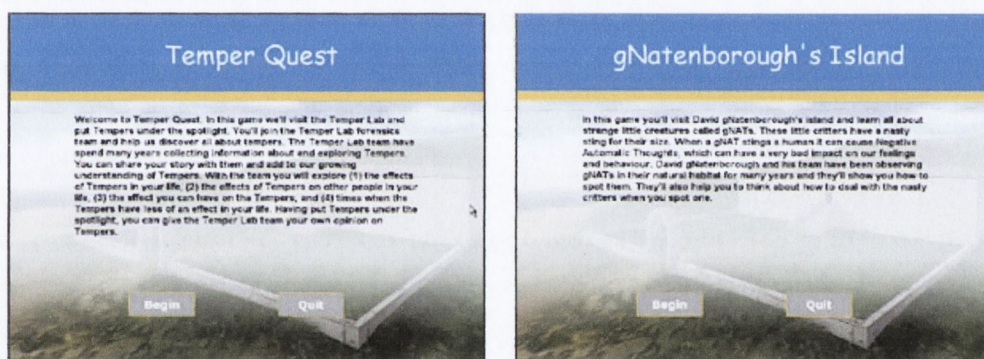


Figure 6.11 - The welcome screens from two PlayWrite games.

The Information for Therapists screen, Fig.6.9(c), allows a MHC professional building a new game to add information which they think could be useful for other therapists using their game. For example they can include information on the issues addressed by the game, the age range and client group for whom they think the game is suitable, and some ideas on how to use the game. This information is not seen by young people playing the game. When a game is published this information is exported to a separate file. Using the PlayWrite Game Admin Tool, Section 6.7 below, therapists can quickly browse through the information files of games and decide which game is appropriate to their needs.

6.7.1 Creating a playable game

Fig.6.12 shows the toolbar of the PlayWrite Game Builder. The 'Save' and 'Save As' buttons save a description of a game in XML format. Saving a game does not create a playable game. To create a playable game users press the 'Build this Game' button. When this button is pressed a message box appears, telling the user their game is being built. Depending on the content used in a game (e.g. are a lot of video and voiceover files are used), this process may take several minutes to complete. It takes all the resources used in the game

and converts them to the format readable in the PlayWrite game template. For example, XML dialogue files are converted into TorqueScript files and video files are converted into '.ogg' files, an open source video file format which can be rendered by the Torque engine. Once converted, the new files are transferred to the relevant folders within the PlayWrite installation. When the process is complete, a message box appears to inform the user that their game has been created. The user is informed that a link to start their new game has been created in the PlayWrite 'My Games' folder.

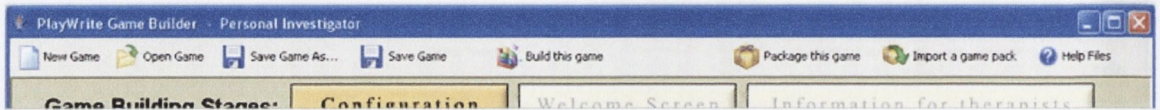


Figure 6.12 - The PlayWrite Game Builder toolbar.

6.7.2 Importing and packaging games

The final functionality of the Game Builder, worth noting here, are the game packaging and import functions. Many resources are used in a single PlayWrite game: e.g. the XML dialogue files and the associated voiceover and video files. Moving all of these resources between computers is awkward, if each file has to be transferred separately. When the package button is pressed, all the resources associated with a game are packaged into a single file with a '.gme' extension. This packaged file is then saved in the PlayWrite exports folder and can be more easily transferred from computer to computer. The import function allows users to import packaged game files into their PlayWrite system. Users select a '.gme' file to import and Game Builder unpacks all the files into the relevant PlayWrite folders. Users can then build and use this new game. The package and import functions are accessed using buttons in the Game Builder toolbar, Fig.6.12.

6.8 The PlayWrite Game Admin Tool

An installation of the PlayWrite system can contain many games. The PlayWrite Game Admin Tool allows users to quickly access information on the games in their PlayWrite installation. The tool has three main functions:

1. When therapists click on a game in the games list, any therapeutic information available about the game is displayed at the bottom of the screen. This could include information about the issues targeted, the appropriate age range and the therapeutic approach used in the game. This information is created by therapists when they build a game using the PlayWrite Game Builder.
2. When users click on a game in the games list, the usernames of players of that game are displayed in a players list. This allows therapists to retrieve forgotten usernames if clients are unable to remember them and want to continue a saved game.
3. Using the buttons below the games and players lists, therapists can delete individual players or entire games.

6.9 PlayWrite Games

When a therapist builds a game using the Game Builder, all the resources required to run the game are created and transferred to the relevant folders in the PlayWrite installation. As stated in Section 6.4 above, all games in the current iteration of PlayWrite use the same 3D game world. It is the therapeutic content of games which changes. A link to start each game is stored in the ‘My Games’ folder. Fig.6.13 shows several screenshots from a PlayWrite game.

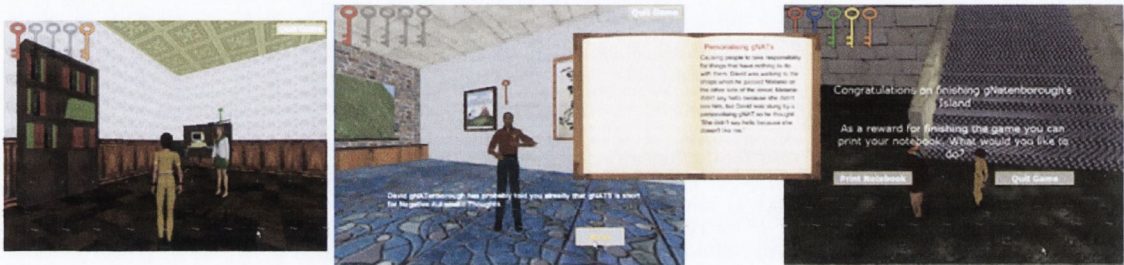


Figure 6.13 - Screenshots from a PlayWrite game.

When players start a game, they are taken through the sequence of screen shown in Fig 6.14. On these screens they view the game welcome message, pick a username, choose a game character and then start the game. Players can also log in to a saved game using the relevant username. Players’ games are saved automatically as they progress through the world. When players quit a game they are given a reminder of their username.

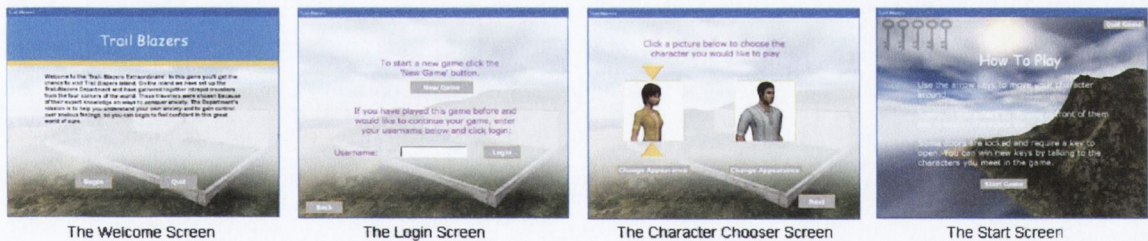


Figure 6.14 - The PlayWrite start game screen sequence.

6.9.1 Re-implementing Personal Investigator

One of the first aims for the PlayWrite system was to re-implement PI. This aim was achieved successfully. Each of the dialogues used in the original version of PI was re-created using the PlayWrite Dialogue Builder and added to the game template using the GameBuilder. A new version of PI was then built. The major difference between the new version of PI and the original implementation is that this version can be adapted using PlayWrite. As well as having a game which can be used with adolescents, therapists have access to the files used to create PI, i.e. the dialogue files and game description files. Using PlayWrite therapists have the option of modifying the content of the game to better suit their own needs and those of their clients.

6.10 Formative Evaluations of PlayWrite

Evaluations with MHC professionals are an important part of stage one - the iterative development stage - of the two stage approach proposed in this thesis. The aim of such evaluations is first to ensure that a system is sufficiently usable by the target end users and secondly to gather initial evidence of the potential usefulness of a system. The following sections describe the formative evaluations of PlayWrite. Again the emphasis is placed on evaluating the content creation applications. One major usability trial was conducted during the development of PlayWrite. At a later date a further trial was conducted, in which the usability and usefulness of the system were again major focuses.

6.10.1 The Initial Usability Trials

To evaluate the usability of the first major iteration of the Dialogue Builder, a trial was conducted in which ten MHC professionals were asked to complete a series of tasks. Table 6.4 provides brief details of the participants. Participants included psychotherapists, clinical psychologists and mental health social workers, and had positions ranging from trainee mental health social worker to Principal Clinical Psychologist of a major psychiatric department. Each participant was comfortable using Windows based PC's and typically spent 1-3 hours a day using word processing, email and Internet applications. Some described using computers in their leisure time, e.g. playing computer games. The majority also had previous experience of using computers in client contact situations. Each trial lasted two hours and was divided into three parts.

Part 1 – Introduction and Pre-Task Questionnaire: The purpose of the trial was explained to the participant and the re-implemented version of PI was demonstrated. The participant was told that they would be asked to implement a series of pre-scripted dialogues similar to the ones in PI. It was made clear that the aim of the trial was to investigate the usability of the system and whether it could be useful in adolescent MHIs. The participant was asked to complete a consent form and pre-trial questionnaire designed to record (1) a professional profile, (2) previous use of computers in a MHIs and (3) level of experience and confidence in using computers. The participant was then given a brief introduction to the PlayWrite Dialogue Builder.

Part 2 –Tasks: Each participant was asked to implement a series of pre-scripted dialogues using the Dialogue Builder. Task one asked the participant to implement a linear dialogue involving various types of spoken elements. The users were asked to record voiceovers for elements as required. Task two was divided into four parts, in which the complexity of the dialogue was gradually increased: e.g. several spoken elements, a video element and several notebook elements were used, branching dialogues were introduced, Labels and Go To Actions were used. The author was in attendance during the evaluations and participants were encouraged to talk out loud about their experience and ask any questions they might have about the system.

Part 3 – Post Task Questionnaire and Informal Interview: A post task questionnaire was designed to provide a rough measure of the usability and usefulness of the system. An adapted version of the System Usability Scale (SUS) was used to estimate usability (Brooke, 1996). SUS is described as a “reliable, low cost usability scale that can be used for global assessments of systems usability”. SUS yields a single number

score, between 0 and 100, representing a composite measure of the overall usability of a system. SUS was chosen because (1) it was appropriate for the time limitations of the trials, (2) it has been widely used in many application areas, (3) it is freely available in the public domain, and (4) it examines the global usability of an overall system. In addition to SUS, participants were asked to list the three most negative and positive aspects of the system. Finally they were asked five questions about the usefulness of the system. Having completed the questionnaire a brief informal interview took place.

The task sheets and questionnaires used in this trial are included in Appendix C. The results of the usability evaluations are divided into two sections: (1) usability, and (2) usefulness.

Table 6.4 - Brief details of the participants of the initial usability trial.

	Profession	Years*	Typical usage of computers	Previously used computers with clients?
T1	Clinical Researcher	13	Regularly uses word processing, email, Internet. Also regularly uses multimedia packages, e.g. Photoshop, Flash.	Regularly uses WTO** and other graphics and animation packages with adolescents.
T2	Clinical Psychologist	14	Regularly uses word processing, email, Internet. Some experience of photo editing packages.	Had previously used PI with one client. Sometimes uses WTO with clients.
T3	Psychotherapist	7	Regularly uses email, Internet. Has experience of uses multimedia packages, e.g. Photoshop, Dreamweaver.	Regularly provides email counselling to clients and supervises a MHC website.
T4	Medical Social Worker	9	Regularly uses Microsoft Office applications, email and Internet.	Sometimes uses Internet to show information to clients.
T5	Clinical Psychologist	5	Regularly uses Microsoft Office applications, email and Internet. Also plays computer games in spare time.	Participates in MHC discussion forums.
T6	Student – Masters in Social Work	1	Regularly uses word processing, email, Internet.	No previous experience
T7	Clinical Psychologist	8	Regularly uses word processing, email, Internet, SPSS. Some experience of audio and video editing software.	No previous experience
T8	Student - PhD Clinical Psychology	4	Regularly uses Microsoft Office applications, email, Internet, SPSS.	Used computer based cognitive assessments and psycho-educational PowerPoint presentations
T9	Cognitive Psychotherapist	3	Regularly uses SPSS, email, Microsoft Office.	No previous experience
T10	Psychologist, Childcare Leader	10	Regularly uses email, Microsoft Office. Plays computer games in spare time.	No previous experience

* Number of years working or training in mental health care area.
 ** Working Things Out (WTO) is an interactive psycho-education CDROM.

6.10.1.1 The usability of the PlayWrite Dialogue Builder

Each of the ten participants successfully completed each of the trial tasks. SUS usability scores for the system varied from 97.5 to 72.5, with a mean value of 85.0, Table 6.5. Whilst not carrying any specific meaning, these ratings do indicate that the system is usable by the target end users and that participants experienced a high degree of user satisfaction. Participants indicated that the system is easy to use and easy to learn. Participants were asked to list the three most positive aspects of the system. Ease of use emerged as the most positive factor, with eight of the ten participants identifying it as a positive aspect of the system. The clear layout and visibility of functions available within the system were found to be key factors in this ease of use. Participants felt that the system was easy to learn and appreciated the fact that no complicated instructions were required. Participants were comfortable with the graphical representation of dialogues and liked the fact that grey insert points visibly indicated all points at which new content could be added to dialogues. One participant did have some difficulty in clicking on insert points due to their small size. Future implementations could allow participants to scale up and down the size of insert points.

The ability to easily test dialogues was also highlighted as a positive factor. During trials participants regularly tested the effects of changes while building dialogues. Other positive factors, identified by participants, included the ease with which video-based storytelling could be integrated into dialogues and the ease with which voiceovers could be recorded. Finally, six of the participant listed the usefulness of the system as one of its most positive aspects.

Participants were also asked to list the three most negative aspects of the system. Word processing issues emerged as the most negative aspect of the system. All of the participants were regular users of word processing and email applications, and the lack of standard keyboard short cut functions frustrated several participants. Several participants also identified the lack of help files as a negative factor in the system and suggested that help files and context sensitive help, similar to that in Microsoft Word, be added to the system. Later iterations of the system include help files.

Table 6.5 - Scores from the initial usability tests of the PlayWrite Dialogue Builder.

	T1	T2	T3	T4	T5	T6	T7	T8	T9	T10	Mean Score
Score (0-100)	82.5	90.0	97.5	77.5	85.0	72.5	87.5	77.5	85.0	95.0	85.0

6.10.1.2 The usefulness of the system

The potential usefulness of the system emerged as one of its most positive features. Participants were asked a series of scaled questions about the potential usefulness of the system, Table 6.6. As can be seen in Table 6.6 participants expressed positive opinions about both the flexibility and potential usefulness of the system. Participants also agreed that the system takes advantage of their existing skills, e.g. their familiarity with

dialogue based intervention strategies. Several participants paused during tasks and discussed, at length, the potential for using dialogues created with the system in clinical interventions. Comments included:

“I can really see this being put to practical use.”

“The possibilities for use in therapy are very exciting.”

“I think that the concept is really ideal for using with teenagers that are difficult to engage.”

Participants indicated many specific ways in which they might use the system. These included implementations of (1) standard intervention models such as Cognitive Behavioural Therapy, (2) standardised questionnaires such as Beck’s Inventory and the Minnesota Multiphasic Personality Inventory and (3) dialogues and games around issues including depression, anxiety and obsessive compulsive disorders. Participants expressed an interest in both creating new game dialogues and also in creating generic dialogues around common themes that could be adapted to the needs of specific client groups. For example, one participant made the following suggestion:

“A bank of reusable questionnaires, maybe using the ‘Think Good, Feel Good: Cognitive Behavioural Workbook for Children and Young People’, would be great to use in the framework.”

This was an encouraging development as it indicated the MHC professionals could think of specific ways of using the system that take advantage of their existing experience. Participants also indicated an interest in making fine detail changes to generalised content to suit the needs of clients on a case by case basis. This was somewhat unexpected, as it could prove time consuming to make such small scale changes. The initial expectation was that, whilst MHC professionals might be interested in creating generalised content usable across a wider range of interventions, content adaptation on a client by client basis might be seen as too time consuming. The fact that therapists indicated an interest in small scale adaptation was encouraging. The experimenter pushed participants on this issue and several indicated that in the case of adolescents who are particularly difficult to engage, this time investment would be worthwhile.

Table 6.6 – Participants’ responses to statements on the usefulness of PlayWrite in usability trials.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The system takes advantage of existing, non-technical skills of mental health care professionals.	T2, T6, T10	T1, T3, T4, T5, T7, T8, T9,			
Dialogues built using this system could be useful in mental health interventions.	T2, T4, T5, T6, T9, T10	T1, T3, T7, T8,			
The combination of conversation, questions and video is useful.	T2, T3, T4, T5, T6, T8, T9, T10	T1, T7,			
The system is flexible enough to implement a wide range of therapeutic conversations and questionnaires.	T1, T2, T3, T4, T6, T7, T9, T10,	T5, T8,			

6.10.2 The Group Study

In the usability trials described above participants implemented pre-scripted dialogues using the PlayWrite Dialogue builder. Based on these trials several changes were made to the overall system. Following the completion of these changes a further study was conducted. On this occasion, instead of meeting separately with each therapist, a group study was conducted. The other major difference in this study was that, instead of providing participants with pre-scripted dialogues, each MHC professional was asked to create an original dialogue.

Six MHC professionals participated in the group study, Table 6.7. There was no overlap between participants of this study and those of the initial usability trials. Each participant had a least 5 years experience of working with adolescents. Several had significantly more. All were comfortable using Windows based PC's, typically for word processing, email and the Internet. Several had previously used computers with adolescent clients.

In general the participants of the group study had less experience, and also expressed less confidence in their own ability to use computers, than participants of the initial usability trial. In response to pre-trial questions regarding levels of experience and confidence the majority of participants rated their experience as 'adequate' and themselves as having 'some confidence'. The majority of participants in the earlier trial expressed higher levels confidence (either 'confident' or 'very confident') and also rated themselves as either 'experienced' or 'very experienced' computer users. Unlike the participants of the group study, many of the participants of the initial trials had experience of using computer graphics and multimedia packages and many described using computers in their leisure time.

Table 6.7 - Brief details of the participants of the group study.

	Profession	Years *	Typical usage of computers	Previously used computers with clients?
T1	Speech & Language Therapist	6	Approx 1 hour daily for word processing, email, Internet.	Has used specific speech & language programs to develop literacy and phonological awareness skills.
T2	Speech & Language Therapist	6	Approx 2 hours daily for word processing, email, Internet.	No previous experience
T3	Social Worker	11	Approx 1 hour daily. Mostly for email, Internet.	Previously used PI with 2 clients.
T4	Speech & Language Therapist	20	2-3 times a week for word processing, email, Internet.	No previous experience
T5	Child Psychiatrist	30	Approx 3 hours daily for word processing, email, Internet.	Regularly uses WTO with young people. Occasional email contact with clients' parents.
T6	Clinical Psychologist	18	1-2 hours daily for word processing, email, Internet.	Previously used PI with 1 client. Occasionally uses WTO with clients.

* Number of years working clinically with adolescents

The group study was two and a half hours in duration. As with the earlier study it was divided into 3 broad parts. Participants first were told that the aim of the study was to give them an opportunity to use the PlayWrite system and give their feedback on whether or not it could be useful in adolescent MHIs. The participants were asked to complete a consent form and pre-trial questionnaire. Demonstrations of the PlayWrite Dialogue Builder and PI were then given. In the second part of the study each participant was asked to create a dialogue which they felt was relevant to their day-to-day work with clients. The participants worked separately at their own computer, however they were told to ask questions if they required help and were also permitted to move around and talk amongst themselves. Having given participants approximately one hour to become familiar with PlayWrite and attempt to create a dialogue, a post task questionnaire was administered. This questionnaire included the adapted version of SUS used in the initial trials. Participants were again asked to list the three most negative and three most positive aspects of the system. Finally they were asked five questions about the potential usefulness of the system and gave a brief description of the dialogue they had built. Having completed the questionnaires the group took the time to view each other's dialogues and an informal discussion was held. During this discussion each participant described their intentions in creating their dialogue.

The results of the group study are divided into three sections: (1) a description and discussion of dialogues created by the participants, (2) usability, and (3) usefulness.

6.10.2.1 Dialogues created by participants

Each of the participants successfully created a new dialogue. Further details of each dialogue are included in Appendix K. Given the overall time constraint of the study, participants had approximately one hour to experiment with the Dialogue Builder, plan and create their dialogues. Whilst several of the dialogues were incomplete (e.g. the text of some dialogue elements was been left blank), participants created dialogues which use a broad variety of dialogue elements and which they felt were relevant to their day to day work. Each participant gave a brief description of the dialogue they created. For example:

"Aim: to develop child's pragmatic (social use of language) skills....Child is given multiple choice Qs + required to choose what sentence (response) would be most inappropriate in each context."

"Aim: to explore relationships with the family and how all are getting on together. To help client problem-solve and reflect on possible options."

"I created this dialogue in order to have a way of avoiding getting bogged down in the clients discussion of how bad things are, and to help them move to a position of feeling they can make things a bit better, and they have some control."

The dialogues make use of a combination of conversation, various types of spoken and written questions and also video elements. One therapist created a dialogue that used a video file provided in the study. Two other participants used place holders for video content. For example one created a dialogue designed to help clients with high functioning autism to understand *"how the language and style of communication we use varies*

according to our relationship with the listener". The dialogue uses placeholders for video. The participant explained:

"The video clips would show a boy/girl talking to someone (the listener). The listener would be blacked out as in Crimewatch style and the questions would guide the student to explore the formality of language, intonation, choice of language etc."

One issue which did emerge with two participants was the tendency to create dialogues which pre-suppose that clients will give specific answers to questions. For example the following is an outtake for one dialogue:

openNoteBook:

scaledQuestion: Could you tell me how much your anger gets you into trouble? 0 means it never gets you into trouble 10 means it gets you into trouble all the time.

openQuestion: If you had to give your anger a name, what name would you give it?

closeNoteBook:

conversation: Well done! It can be really helpful to give your anger a name. The 'Angry Tiger' is a really good name. If you wanted to ask some people to help you to tame that 'Angry Tiger' who would you ask? Write down in your notebook the people you would ask to help you...

In this case the dialogue asks an open question in which the client gives a name to the anger they are experiencing. The follow on conversation pre-supposes that the client has chosen the name the "Angry Tiger". When asked about this the participant explained that while building the dialogue she had considered a specific conversation, with a specific client, and had then built the dialogue based on how she would react to similar clients in future.

6.10.2.2 Usability results

Table 6.8 summaries the usability scores which participants gave to the Dialogue Builder. Whilst lower than those of the initial usability trial, the mean score remains high and again indicates that the system is usable by the target end users. That the scores were lower than the initial usability trial was not unexpected, as participants in this trial had the added challenge of having to create their own original content. In the initial usability trial participants built a series of pre-scripted dialogues, starting with a simple linear dialogue and moving gradually to more complex dialogues. Participants in the initial trial also received one-to-one demonstrations of the system and were able to freely ask questions as they moved through the tasks. Given the group nature of the second study, participants received less individual attention.

Table 6.8 - Usability scores from the group study, based on the adapted SUS questionnaire.

	T1	T2	T3	T4	T5	T6	Mean Score
Score (0-100)	75	77.5	90	72.5	67.5	65	74.6

When asked to list the most negative aspects of the system, the need for additional support and more time to plan content was chosen by four participants. These issues relate to the structure and time restraints of the study, as much as to the system itself. Comments included:

“I might need someone on hand at times for a few pointers if stuck.”

“I would need to give more time to plan my dialogue.”

The participant, who identified the need for more planning time, stated she was unsure about when it is appropriate to use the different types of dialogue elements. The issues she explained was *“not understanding fully when to use spoken elements vs. notebook elements.”* During the introduction to the study, the demonstration had shown how to add different types of elements, but had not discussed when to use each.

The other significant concern, raised by two participants, was the reliance on keyboard and literacy skills in the games created using PlayWrite. As described in Chapter 4 this was also one of the key usability issues identified in the initial evaluation of PI. Addressing this issue was not a priority in the development of PlayWrite. However, two participants did suggest that increasing the use of scaled and multiple choice questions could assist in easing the literacy difficulties experienced by some clients. One participant commented:

“I liked scaled questions – easy for clients to use.”

Participants were also asked to identify the most positive aspects of the system. Five participants commented on the interactive nature of the final games and the ability to combine written, spoken and video content, e.g.:

“Being able to add different media options e.g. video, voiceovers. And being able to type personal answers into notebook”

“The combination of book, different questions, video and voiceovers.”

“The interactive nature – use of video and questions to guide client thinking”

“Having a variety of ways of encouraging client to interact around their difficulty.”

Ease of use and the clear layout of the Dialogue Builder were identified as positive by two participants. Other positive factors mentioned by individual participants included:

“It can be used to introduce concepts in a very concrete visual way.”

“It can be flexible to meet the needs of a variety of clients.”

Table 6.9 – Participants’ responses to statements on the usefulness of PlayWrite.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The system takes advantage of my existing, non-technical skills.	T4	T1, T2, T3, T5, T6			
Dialogues built using this system could be useful in mental health interventions.	T1, T2, T3, T6	T4, T5			
The combination of conversation, questions and video is useful.	T1, T2, T3, T4, T6	T5			
The system is flexible enough to implement a wide range of therapeutic conversations and questionnaires.	T1, T2, T4	T3, T5	T6		

6.10.2.3 Opinions on usefulness

Table 6.9 summarises participants’ answers to questions on the potential usefulness of the system. Participants expressed positive opinions about both the potential usefulness and flexibility of the system.

The following open question was also posed: “Can you think of ways in which you would use this application in your work? If so, please give examples.” One participant expressed particular enthusiasm in response to this question:

“YES! This application would be very useful to develop an interactive communications/social skills programme for both young children and adolescents with language disorders and autism spectrum disorders. Video clips could be particularly helpful rather than using role play during sessions. It allows for v. focused discussions”

Other participants, while identifying potential ways in which the system could be used, expressed the need for more time to think about this issue. For example:

“It may be possible to have a series of dialogues for children and adolescents with a variety of difficulties. It may work well with difficulties such as depression, OCD, anxiety, anger control. However some further thought needs to be given as to whether a specific therapeutic model should be used for each type of difficulty.”

“I’d have to give it more thought. Would I need to ‘create’ a programme for the different disorders e.g. one for eating disorders, one for depression, one for behaviour problems; or would I use it to ‘create’ a very general package?”

What is significant in these comments is that, as well as identifying specific issues/disorders which could be addressed, the participants are considering issues related to how content should be created e.g. should content be general, or should it target specific disorders and use specific theoretical approaches. This is significant, as it indicates that having used the system these participants are considering not just whether content can be created, but also how content should be created. They are considering design issues relevant to the delivery of

MHC services. The flexibility of the system gives therapists the potential to consider such issues, experiment with various options, make decisions and implement content based on these decisions.

6.10.3 Experimental Observations and System modifications

A fine grained analysis of the usability issues identified in the formative evaluations described in this chapter is beyond the scope of this thesis. Several general usability issues did arise, including button placements and font sizes in several parts of the interface. Many of these issues were addressed in subsequent iterations. However several issues worth noting did emerge from observations and informal discussions during both the initial and group studies. These findings lead to significant modifications in later iterations of PlayWrite. For example it was found the participants' expectations regarding interaction with the system were strongly influenced by their familiarity with Microsoft Office products. Participants requested the addition of standard word processing shortcut keys and context sensitive help similar to that in Word. Several participants also compared inserting, configuring and moving dialogue elements to the creation of PowerPoint presentations. One participant commented:

“Inserting elements reminds me of using PowerPoint to move slides around, so I’m ok with that.”

Participants' familiarity with Microsoft Office led to the addition of an 'Export to Word' button in the Dialogue Builder toolbar. By clicking this button users can export any dialogue to a '.doc' file, which can then be read in Microsoft Word. This function allows MHC professionals to review dialogues in a form with which they are familiar and without the need to use the Dialogue Builder. This function proved to be particularly useful during the game building process described in Chapter 7.

The importance of high quality voiceovers, also highlighted in the pilot evaluation of PI, was confirmed in the formative evaluations of PlayWrite. Therapists also expressed a concern that it would be inappropriate to use their own voices in games that they would then use with their own clients. Seven of the participants in the initial trial enquired about the possibility of using synthetic voices. When available synthetic voices were demonstrated during the group study, the group felt such voices were inappropriate to MHIs. As previously noted, the separate voiceover screen in the Dialogue Builder was created partially in response to therapists concerns about recording voiceovers. This screen streamlines the process of recording voiceovers and makes it easier for a third party to record any voiceovers needed for a dialogue.

The standalone player screen (Fig 6.4c) was added to later iterations of the Dialogue Builder as a result of observations made in the group study. In this study participants regularly moved around and viewed each other's dialogues. In several cases participants mentioned that the dialogue building screen (Fig 6.5) was not always ideal for reviewing dialogues, as it includes all the functionality required for building dialogues. Again the standalone player screen proved useful during the game building process described in Chapter 7.

Finally it is worth noting the benefits of applying the Cognitive Dimensions Framework in the development of PlayWrite. The Cognitive Dimensions were found to be a useful mechanism for structuring discussions at the design stage, and in reviews of early prototypes of the system. They also proved useful in structuring

discussions during evaluations with MHC professionals. They provided a set of discussion tools which were accessible and useful, to both HCI and MHC professionals. During the evaluations of PlayWrite design issues such as making options clearly visible and allowing for easy testing at any stage of the build process were clearly identified as contributing to the usability of the system. These design decisions were influenced by the use of the Cognitive Dimensions Framework from the early stages of design and prototyping.

6.10.4 Further Usability Scores

Chapter 7 describes four workshops conducted as part of the later, more detailed evaluations of PlayWrite. The modifications described above were made prior to these workshops. Whilst usability assessments were not the primary focus of later workshops, usability questionnaires were administered in two of the four workshops. Both workshops involved MHC professionals actively working with the PlayWrite system to create initial prototypes of new games. As such participants used the full system. They created original content using the Dialogue Builder, inserted this content in a game using the Game Builder and then published and played the game they had created. In all 13 MHC professionals participated in these workshops. Each completed the modified SUS questionnaire based on their use of PlayWrite. The mean usability score achieved by the system in these workshops was 82.9, again confirming that the system is sufficiently usable by MHC professionals.

6.11 Discussion and Initial Conclusions on the PlayWrite System

The PlayWrite system has provided a set of applications with which to evaluate the adaptable design approach proposed in this thesis. It has also provided the means with which to further explore the factors involved in successfully applying this approach in the MHC domain. As proposed in Chapter 5 the system consists of separate content creation and delivery applications. The system also focuses on enabling MHC professionals to make content based adaptations.

Evaluations with MHC professionals are an important part of stage one - the iterative development stage - of the two stage adaptable design approach proposed in this thesis. The aims of the studies presented in this chapter were first to ensure that the content creation and adaptation applications are usable by the target end users, i.e. MHC professionals, and secondly to gather initial evidence of the potential usefulness of PlayWrite. The studies provided strong initial evidence that the content creation applications are usable by a broad variety of MHC professionals. The system received high usability and user satisfaction ratings and MHC professionals were able to both complete pre-scripted tasks and create new content using the Dialogue Builder. Participants also expressed the view that the system is sufficiently flexible to target a broad variety of MHC issues and has the potential to be useful in adolescent MHIs. These results provide a strong initial validation of the forms of adaptation made available in the PlayWrite system. One of the interesting issues to emerge is that, as well as thinking about what content could be created, participants also gave consideration to how content should be created. This can be seen in the examples of Section 6.9.2.3. The flexibility of the PlayWrite system enables MHC professionals to consider and evaluate such issues.

Finally, whilst the difference in usability scores between the initial trial and the group study could be explained by the higher levels of confidence and computer experience of participants in the initial trial, it could also be explained by the lower degree of support participants of the group study received. The tasks of the initial trial were structured to give participants a gradual introduction to the features of the Dialogue Builder. Participants of the group study received a less structured introduction and were asked to create original content. This suggests that the handover process, in which adaptable technologies are transferred to MHC professionals, will be important to the overall success of the adaptable design approach.

The next chapter describes the handover process, in which PlayWrite was made more generally available to MHC professionals. It also describes the different approaches taken to creating new games and provides an analysis of the new games and content created by MHC professionals.

7 Using PlayWrite to Create New Games

Chapter 6 has described the development and formative evaluations of the PlayWrite system. These evaluations confirmed that PlayWrite is sufficiently usable by MHC professionals and also provided initial evidence of the potential usefulness of the system. This chapter describes the second stage in the evaluation of PlayWrite, in which the system was made more generally available to MHC professionals. This chapter focuses on three main issues:

1. The handover process – this section describes the processes involved in making PlayWrite available to MHC professionals and providing them with some initial training in how to use the system.
2. The game creation process – this section describes the work done by MHC professionals to create new games.
3. An analysis of the games created by MHC professionals.

A total of 37 MHC professionals, from 18 different MHC services, participated in the different aspects of the handover and game building process.

7.1 Making PlayWrite Available to Mental Health Care Professionals

In order to make PlayWrite more generally available a Windows installation CD was created. This CD contained the full PlayWrite system, including the Dialogue Builder, the Game Builder, the administration tool and a set of help files. The installation CD also contained a copy of the re-implemented version of PI. See Appendix K for further details.

At the outset of the research presented in this thesis a mailing list was created, to which MHC professionals interested in the potential of technology were invited to subscribe. An email to this list was the initial point of contact with many of the participants in the evaluation of PlayWrite. Several presentations, about PlayWrite and PI, were also given at practitioner and research conferences in Ireland. Finally an article about PI was published in *Therapy Today*, a practitioners journal with circulation throughout the UK and Ireland (Matthews, Coyle, & Anthony, 2006). In each case, interested parties were invited to make contact if they required further information or wished to become involved.

The basic requirements for participation in the evaluation of PlayWrite were outlined as follows:

1. Provide us with feedback on your use of the game Personal Investigator.
2. Take some time to create some new therapeutic content for the PlayWrite system.

MHC professionals who chose to participate were required to sign a research agreement prior to receiving an installation CD. As well as establishing the ownership of the PlayWrite system, the agreement required participants to take full responsibility for their use of the system in clinical settings and provide feedback on this use. Having signed the research agreement and received a copy of the installation CD, participants were invited to attend a workshop on the PlayWrite system.

Therapists from each of the services highlighted in Fig 7.1 ultimately participated in the evaluation of PlayWrite. In many case several therapists from each service participated. Fig 7.1 also shows the games used or created by each centre.

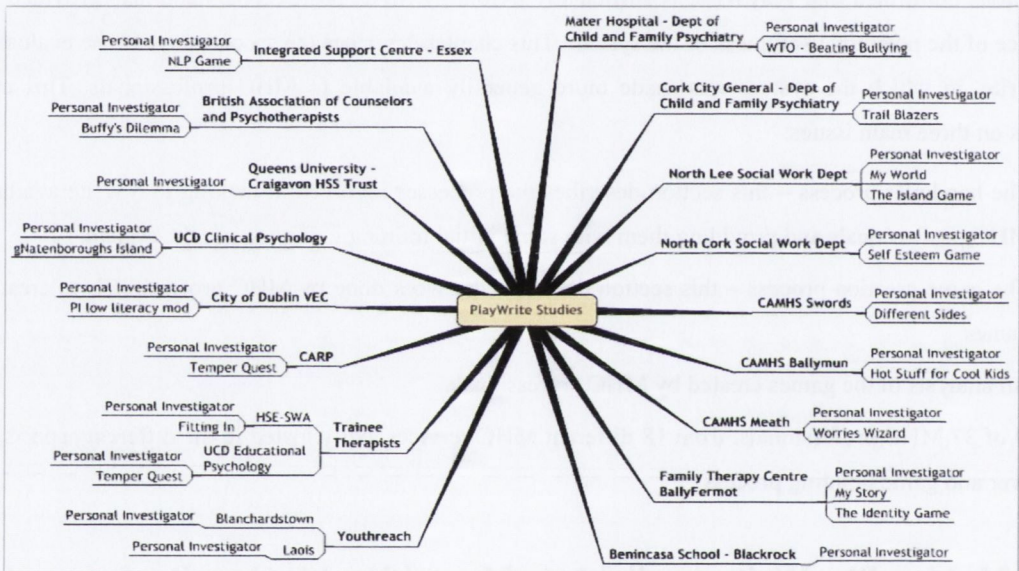


Figure 7.1 - The mental health care service which participated in the evaluation of PlayWrite.

It is worth briefly noting that the MHC professionals who participated in this study did so on a voluntary basis. No specific attempts were made to ensure that the attitudes of the group regarding computer technologies in general or the potential of such technologies in MHC settings were representative of an entirely random sample of MHC professionals. As such, and given the voluntary nature of participation, it is possible that the attitudes towards technology of the participating MHC professionals may be more positive than an entirely random sample. During the course of the studies presented in this thesis participants were encouraged to review PlayWrite in a critical manner, addressing both positive and negative aspects of the system. It is also worth noting that MHC professionals are, as a result of their training, generally predisposed to place concerns for clients at the forefront of any considerations and to adopt a critic stance towards any new interventions approach. It is hoped that these factors helped to minimise the possibility for bias in the results presented in later chapters.

7.2 The Handover Process

The handover process is one of the major communication channels identified in the adaptable design approach proposed in this thesis. It was predicted that this process would be essential to the success of the design approach. Chapter 5 Section 5.2.4 identified the following priorities for the handover process:

1. To introduce therapists to the system and show them how to create and adapt content. Given therapists' limited experience of using technology, it is important to help them overcome any anxiety they might have and build their confidence in their ability to use the system.
2. To introduce participants to how the content delivery applications (in this case computer games) can be used in clinical sessions with clients.
3. The handover process should also encourage MHC professionals to become active participants in the overall design process. As they use a system they can be encouraged to actively review and evaluate it, focusing not just on therapeutic issues, but also on ideas for extending and improving the system.

In evaluating PlayWrite the handover process took two forms, workshops and individual meetings.

7.2.1 PlayWrite workshops

In all four workshops were held. Table 7.1 contains brief details of each workshop. Further details have been included in Appendix F. Three workshops were held in Trinity College Dublin and were 3.5 hours in duration. The fourth workshop was held in Cork. This workshop was 6 hours in duration and was attended by a group of therapists working together in a child and adolescent MHC service. With two exceptions, the participants of each workshop were MHC professionals who worked on a day to day basis with adolescent clients. The two exceptions were a trainee psychotherapist, training to work with adolescent clients, and a researcher representing the British Association of Counsellors and Psychotherapists.

Table 7.1 - Brief details of each PlayWrite workshop.

	No. of participants	Location	Duration
Workshop 1	6	Trinity College Dublin	3.5 hours
Workshop 2	7	Trinity College Dublin	3.5 hours
Workshop 3	10	North Lee Social Work Dept	6 hours
Workshop 4	7	Trinity College Dublin	3.5 hours

In each workshop the emphasis was placed on allowing participants gain experience of using PlayWrite, first to create content and then to transfer this content into a playable game. Time was also set aside for group discussions. While the activities did vary from workshop to workshop, the general outline of each workshop was as follows:

1. Participants completed a pre-workshop questionnaire.
2. Participants were shown a brief presentation and introduced to the potential of using computers, and specifically computer games, in adolescent MHIs.

3. Participants were given some time to play a game created with PlayWrite. In early workshops only PI was available. In later workshops other games, created by MHC professionals, were also available.
4. The PlayWrite system was introduced and demonstrated.
5. A series of content and game creation activities then took place.
6. A group discussion was held and participants completed a post-workshop questionnaire.

In each workshop the author was present, participated in group discussions and moved around the room while participants worked with the system.

The main areas in which workshops varied were in points 4 and 5 above. One of the significant aspects of the workshops was how the content present and activities involved changed over the course of the four workshops. Later workshops placed a greater emphasis on providing therapists with a more structured approach to building new games, and also introduced them to some initial design concepts e.g. iterative design. This issue is discussed in greater detail in Section 7.2.1.2.

The other major difference in the workshops was that, in some, participants worked individually, whereas in others various size groups were formed. In workshop 1 each of the participants worked separately. In workshop 2 the participants worked in a single group. In workshop 3 the participants worked in groups of two to four. Finally in workshop 4 the participants had the choice of how to work. Three chose to work separately, while the other participants worked in pairs.

7.2.1.1 Workshop activities

One of the priorities for the handover process was to help participants overcome any anxiety and lack of confidence they might have in their own ability to create therapeutic content on a computer. As in the formative evaluations the majority of participants had limited experience of using computers. Most were familiar with word processing, email and Internet browsers. Some had limited experience of using technology with clients, mainly through emails and text messages. Prior to and at the beginning of workshops many participants expressed reservations about their own ability to use computers and to create computer games. For example one therapist wrote:

"I am 55 years of age and not very computer literate. I have never played a computer game in my life. However I have noticed how young people take to them and am in the process of seeking funding for a second computer in the [clinic name removed] to be ready for PI or whatever the new version is called..... So I have come clean. No good at computer games and it would probably be a waste of time to both us if I give you the two hours you request and you plonk me in front of a computer and say, "Test!""

Having been reassured about the aims of the workshops, and the way in which PlayWrite works, this therapist decided to attend a workshop and ultimately created two new games using the system.

To varying degrees, the concerns expressed by this therapist are representative of those expressed by many of the participants of the workshops. In many cases the issue lay, not in the participants' ability to use

computers, rather in their lack of confidence in their own ability to do something new on a computer. Overcoming this lack of confidence was one of the key aims for each workshop. To this end each workshop was very much activity based and in each case participants were given time to create content and games using PlayWrite. Appendix F contains an outline of one workshop, including a description of the activities involved.

In workshop 1 the participants were provided with pre-scripted dialogues, in Word format, which they implemented using the Dialogue Builder, including creating voiceovers, and then added to games using the GameBuilder. They then published and played the games they had created. Each participant successfully created a new game, containing at least one dialogue. In workshop 2, the seven therapists worked as a single group. They first worked together to decide on the aims and content of a game and then worked at a single computer to implement a first prototype of this game. In workshop 3, three initial game prototypes were created, and in workshop 4, four were created. Further details of the prototypes games created in workshops are included in Appendix K.

7.2.1.2 The Evolution of Workshop Content

In workshop 1 the participants worked with pre-scripted content. Workshop 2 was the first occasion on which participants were asked to create original content and games. One of the issues which emerged from observations of workshop 2 was the participants' tendency to become involved in lengthy discussions and analysis of the fine grained details of individual dialogues they were creating. This was partially due to the fact that the participants chose to work as a single group and several had differing theoretical backgrounds (e.g. narrative vs. cognitive behavioural), however this was not always the case. The group agreed to work together on a game targeting anger management, based on a workbook one participant had brought to the workshop. They then began brainstorming ideas for the game, which would include 6 dialogues. During this brainstorming session the participants became involved in several detailed conversations and debates about potential conversational strategies for individual game dialogues. At several points it was necessary for the author to step in and suggest that participants move on and focus on the overall ideas for the game rather than the specific details for each individual dialogue. Once a rough outline for a game had been created the participants were then encouraged to begin implementing an initial prototype using PlayWrite.

Having begun working with PlayWrite the participants again became bogged down in the fine details of individual dialogues. Sometimes this was due to differences in theoretical approaches, but in many cases it was not. For example, in one case the participants spent in excess of five minutes discussing how a particular game character should greet the player.

In MHC settings the choice of language used by therapists is significant, and therapists are trained to consider carefully both what they say and how they say it. The participants appeared to be applying the same degree of rigour and scrutiny to the dialogues used in the game. However, while it is appropriate that this level of scrutiny is applied to later versions of a game, particularly prior to use in clinical settings, it had the potential to be a hindrance to the creation of an initial prototype. On occasions such as the one described above the author again stepped in and suggested that, at this initial stage, participants focus on the overall game, rather

than the fine details. The participants were encouraged to create rough dialogues and include placeholders for future content. The participants acted on this advice and the game prototype created in the workshop contains many placeholders for future content. For example the following is an outtake from the first dialogue in the game:

conversation: Welcome to Temper Quest. In Temper Quest we visit the Temper Lab and research the effects of Tempers in your life

.....

conversation: Great, I'll give you an overview of the game here.

conversation: Gameoverview, Gameoverview, Gameoverview, Gameoverview

conversation: Ok, enjoy the rest of the game.

conversation: We'll see each other again later. Then you can fill me in on how you got on in the Temper Lab. See you later.

In other cases simple initial versions of future dialogues were created. The following is the entire initial content of a dialogue intended to help players explore other peoples' opinions of times when the player loses their temper:

conversation: What would other people say about the Tempers?

conversation: More details to follow.

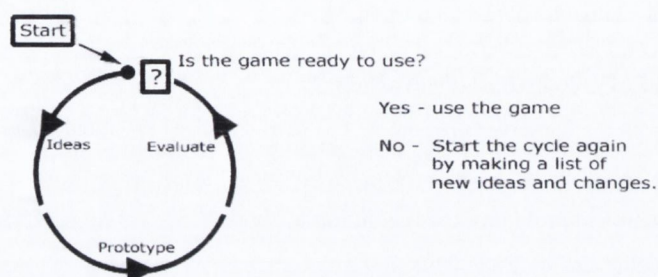
Later in the workshop, having created rough versions of the 6 dialogues, the participants had a lengthy discussion about the order in which the player should meet particular characters. The author stepped in and suggested it might be worthwhile trying one of the options. The participants proceeded to publish the game twice, trying both options, and thereby agreed on the appropriate order. At the end of this workshop one participant commented that one of the most helpful aspects of the workshop was *"getting down to it quickly, using Dave's expertise to keep from getting stuck in the details"*.

As described above, the tendency for participants to become bogged down in fine details in the initial stages of designing a game, emerged during workshop 2. Encouraging participants to create rough initial versions of dialogues and to try various options, helped participants to move forward and create an initial game prototype. The lessons learned in this workshop were applied in a more pre-planned manner in workshops 3 and 4.

In workshops 3 and 4, prior to using PlayWrite, participants were briefly introduced to some initial ideas of iterative design. A series of PowerPoint slides were used and participants were given a one page handout introducing a three stage design cycle, Table 7.2. Each cycle ends with a decision: Is the game ready to use? The presentation stressed that it was not necessary to create a detailed game at the initial stage. To reinforce this idea the participants were shown early versions of other games created using PlayWrite. For example they were shown the prototype game created by participants of workshop 2. Finally before using PlayWrite the participants were given a brainstorming document in which they filled in some initial ideas for their game (Appendix F). Having outlined these initial ideas the participants then began using PlayWrite to create an initial prototype for a game. Using these steps the participants of workshops 3 and 4 were given a more

structured approach to creating initial prototypes. This approach encouraged them to focus on testing initial ideas and creating an initial artefact. During these workshops prototypes for 7 new games were created.

Table 7.2 - The three stage design cycle to which mental health care professionals were introduced.



Stage 1 - Ideas

- Think about what type of game you want to build. E.g.
 - Who is the game being designed for?
 - What issues is the game going to address?
 - How will these issues be addressed?
- Some of the best new games can be made by either adapting existing games or by taking traditional therapeutic materials and translating them into game dialogues.
- **Note:** It is not necessary to make a full game (6 dialogues) during the first design cycle. You only need a few ideas and can then build on this in later cycles.

Stage 2 - Prototype

- Using the PlayWrite Dialogue Builder begin creating the initial therapeutic content for your game.
- Using the PlayWrite Game Builder add this content to a game world
- Publish the game.
- **Note again:** It is not necessary to make a full game (e.g. 6 dialogues) during the first design cycle. You can just prototype a few ideas and then build on this later on.

Stage 3 - Evaluate

- Evaluate your game by running it and trying it out.
- Evaluations can be done to varying degrees. For example:
 - During the early cycles in a games development it is probably enough to try the game yourself and think about what works and what does not.
 - As the game develops through further cycles it is often good to get the opinions of, and test it with, other people e.g. colleagues.
 - As a game nears completion it may be necessary to have it independently reviewed to confirm it is ready for use.

Make a decision

- Is your game ready to be used with young people?
 - If no, make a list of the changes you think are needed and of any new ideas you have. Begin the cycle again.
 - If yes, begin using your game.

During workshop 4 one participant, who paints in her spare time, made the observation that iterative design is similar to the way in which she approaches a new painting. First she sketches out the rough details and then she gradually refines the painting until she is satisfied that it is finished. It is possible that metaphors such as this may provide a more meaningful way of introducing design concepts to MHC professionals; however this idea was not tested in the evaluations presented in this thesis.

7.2.1.3 The importance of activity based workshops

One of the primary aims of the handover process was to help MHC professionals overcome any anxiety they might have and build their confidence in their own ability to use PlayWrite. Allowing participants the time to experiment with the system and providing them with initial support in creating new content was an important part of this process. At the end of each workshop, participants were asked to give their opinions on the workshop. Comments included:

“I very much enjoyed participating and found it very empowering to be able to build my own scene.”

“Really helpful that we actually used the programme – hands on experience. Multidisciplinary input gave a broader context for conversation. Dave’s ability to use ‘plain English’ not computer speak really helped.”

“The workshop grounded my limited understanding of PlayWrite and left me feeling very excited about future development.”

“Hard to do but left with motivation (high) to have a go. Hard to see how to build up game – will have to take this slowly – trial and error. Non-threatening atmosphere, great sharing of ideas, getting down to it quickly.”

“Great to get started on working on a game. Lots to think about all at once. You really have to think to break down an idea.”

Actively using the system was a significant factor in building participants confidence. It is described as ‘very helpful’ and ‘very empowering’. It also helped to motivate participants to experiment further and think about new game ideas.

7.2.2 Meetings with individual therapists and teams

Alongside the workshops described above, several one-to-one and group meetings were also held. These meetings were shorter in duration than the workshops, typically 30 minutes to 1 hour. For example a group meeting was held with MHC professionals in the Department of Child and Family Psychiatry in Cork City General hospital. This group later completed a game called Trail Blazers. A one-to-one meeting was held with a clinical psychologist in the Department of Clinical Psychology in University College Dublin. This researcher subsequently created a game called gNatenborough’s Island.

In these meetings material similar to that used in the workshops was presented, alongside demonstrations of the PlayWrite system. Given the time constraints, the meetings did not include any content or game building activities.

7.2.3 Clarifying the aims of the evaluation process

At the end of each workshop, and in individual and group meetings, the MHC professionals involved were invited to participate in the ongoing evaluation of PlayWrite, either by evaluating PI or by creating and evaluating a new game. As well as evaluating the therapeutic impact of any game, participants were told that another key aim of the evaluation was to assess and provide feedback on the overall PlayWrite system. This included feedback on both the content creation and content delivery parts of the system. While using the PlayWrite system, participants were asked to keep the following questions in mind:

1. Are PlayWrite games useful in MHC settings? If so, how? If not, why not? What could be improved?
2. What is it like to build a new game using PlayWrite? How could the PlayWrite system be improved?
3. What ways would you like to see the PlayWrite system being developed and extended in the future?

The next section of this chapter describes the methods used and games created by MHC professionals. Having created new games or used existing games, the participants were then asked to provide feedback on the PlayWrite system. Feedback from MHC professionals is discussed in Chapter 8.

Finally it is worth briefly noting that, whilst it was hoped that participants would take the time to create new content and games, this was not a strict requirement for participation in the overall evaluation, and it was left to each MHC professional to decide to what degree they would participate. The majority of the participants in the evaluation of PlayWrite were practicing MHC professionals. As such they are faced with the time constraints typical of work in this area. Setting aside time to create a new game was not a trivial undertaking. The opportunity to share games was therefore introduced as an added incentive to participants in the PlayWrite evaluations. Participants were told that if they created a game, and were willing to share it, they would in return receive a copy of all the games made by other participants (provided these participants were also willing to share their games). In this way, by creating a single game, participants could gain access to the entire range of games and content created during the evaluation of PlayWrite.

7.3 The Game Building Process

Section 7.4 provides details of each of the games created by MHC professionals. This section provides brief details of how these games were created.

Having completed the handover process, different MHC professionals received varying levels of support in creating new games. A deadline was set for creating new games and time was set aside during which support from the author was made available. See Appendix G for further details. Many of the participants were previously aware of these details as they had been discussed in workshops and individual meetings. Participants were told that they could continue using PlayWrite after the agreed deadline, but that after that point only more limited support would be available to assist them in creating new games. While several therapists chose to work independently, others availed of the support offered.

7.3.1 Therapists working independently

Three of the new games created using PlayWrite were built by therapists/teams working independently. In each case the therapist had attended a PlayWrite workshop, in which they built a prototype game. Subsequent to the workshop they worked in their own time to complete their games. The games completed in this manner are entitled “My World”, “Fitting In” and “The Islands Game”. Another therapist worked independently to create a modified version of PI, better suited to the needs of her own clients. This modified game is discussed further in Section 7.4.1.3 below.

At the point of writing several therapists are continuing to work independently on other new games. Details of the current iterations of several of these games are included in Appendix K. The games are entitled: “Different Sides”, “The Self Esteem Game”, “The Worry Wizard” and “The NLP Game”.

7.3.2 Therapists who requested support

Alongside the therapists who worked independently, several therapists received varying degrees of support in creating new games. Whilst some therapists received minimal support, others received more. The examples below are representative of the differing degrees of support received by therapists.

7.3.2.1 Example 1 – My Story and The Identity Game

Section 7.2.1.1 described an exchange with a therapist, who introduced herself by stating: *“I am 55 years of age and not very computer literate”*. Having attended a workshop this therapist expressed an interest in creating a game based on narrative therapy techniques. However, despite having created game content during the workshop, she did not have confidence in her ability to build the new game. A series of meetings therefore took place during which this game was built. Prior to the first meeting the therapist used Microsoft Word to create initial scripts for six game dialogues. These scripts are included in Appendix I. A meeting then took place in which we sat together and using her laptop transferred the scripts into the Dialogue Builder and then published the game using the Game Builder. We then took some time to play the game. While we played the game the therapist suggested changes which were made using the Dialogue Builder. This meeting lasted approximately 2 hours. At the end of the meeting the new dialogues were exported back to Word. Finally another meeting was arranged for one month later.

Prior to the second meeting the therapist played her game and made changes to the dialogues using Word. These Word files were then emailed to me, and the changes were updated in the Dialogue Builder files. At the beginning of the second meeting a new version of the game was published. Again we played to game together, making changes as we went along. The same process was then repeated for a third meeting. Before the meeting the therapist took time to play her game, made changes in Word versions of the dialogue scripts and emailed them to me, to update the PlayWrite files. The current version of the game, entitled ‘My Story’, was finalised during the third meeting.

Prior to the third meeting the therapist also created scripts for a second game, again using Word. Whereas ‘My Story’ implements narrative techniques in a general way, not targeting a specific issue, the new game,

entitled 'The Identity Game', is targeted at addressing specific issues of personal identity. This game was implemented over the course of two further meetings.

Of the MHC professionals who created new games using PlayWrite, this therapist received the most support. Over the course of five meetings she gradually became more comfortable using the Dialogue Builder, although she preferred to work mainly in Word. She also developed other skills relevant to creating new games. For example, 'My Story' and 'The Identity Game' both feature stories told by young people. In the current versions of both games these stories are presented in written form in the game notebook. Placeholders have been used for videos, which, when recorded, will replace the written stories currently used. At one meeting the therapist was shown how to record videos using a webcam. At the beginning of the next meeting she presented a demo video she had created and inserted into a game. This was the first occasion on which she had created video content using a computer.

Having created the two games outlined above, this therapist has now outlined plans for six further games she would like to create. Each game will implement a specific aspect of narrative therapy. The issues to be addressed are: (1) engagement, (2) naming the problem, (3) externalising the problem, (4) the effects of the problem, (5) life without the problem story, and (6) moving forward. Creating these games is described as a year-long project.

7.3.2.2 Example 2 - Trail Blazers

Trail Blazers was created by a team in the Dept of Child and Family Psychiatry in Cork City General Hospital. In all three meetings were held with members of this team. In the first meeting they were given a demonstration of PlayWrite. Following this meeting the team worked together to develop a game idea and script the game dialogues. Again the team used Word to write the initial scripts. The scripts were very detailed and went through several iterations, before the team felt they were ready to be transferred to a game. A second meeting was then held, with one member of the team, in which the scripts were transferred from Word into the Dialogue Builder and then into a game. Following this meeting the team worked together to review the game and identify any modifications they felt were necessary. A final meeting was then held in which the current version of the game was finalised.

A similar process was used to create several other games. For example two meetings, each approximately 90 minutes in duration, were held with the therapist who created Temper Quest, and four meetings, ranging from 30 minutes to 1 hour in duration, were held with the creator of gNatenborough's Island. In both cases changes were made to the games during these meetings and the therapists then worked independently on their games between meetings.

7.3.2.3 Example 3 – Working Things Out – Beating Bullying

Working Things Out – Beating Bullying was created by the MHC professional who collaborated in the initial design of PI. After PI, this was the first game completed using PlayWrite. In the main this MHC professional worked independently to create the game, however at various stages meetings were held in which he and I

reviewed iterations of the game. In these meetings we played the game and discussed ideas for how it could be improved. In all four meetings were held, typically 30 minutes in duration. Aside from meeting to discuss game ideas, the game was implemented independently.

7.4 Games and Content Created by Mental Health Care Professionals

Alongside the re-implemented version of PI, nine completed games have now been created using PlayWrite. Each of these games was designed by a MHC professional. As described above some MHC professionals worked independently, whereas others received varying degrees of support. At the point of writing, several therapists are also working on further games. Table 7.3 summarises the games created with PlayWrite. Appendix H contains further details, including a brief summary and a description of the aims and objectives of each game. Further details of each game and the overall PlayWrite installation are also included in Appendix K.

Table 7.3 - A summary of the games created using PlayWrite.

Name of Game	Therapeutic Approach	Issues Addressed	Status
gNatenborough's Island	Cognitive Behavioural	Non-specific	Complete
Temper Quest	Narrative Therapy	Anger management	Complete
WTO – Beating Bullying	Non-specific	Bullying	Complete
My Story	Eclectic - Narrative	Non-specific	Complete
Trail Blazers	Cognitive Behavioural	Anxiety	Complete
My World	Person Centred	Life Story Work	Complete
The Identity Game	Narrative	Identity Issues	Complete
The Islands Game	Non-specific	Non-specific	Complete
Fitting In	Person Centred	Residential care	Complete
Personal Investigator: Mod 1	Solution Focused Therapy	Non-specific	Complete
The Worry Wizard	Cognitive Behavioural	Anxiety	Incomplete
Different Sides	Solution Focused & Narrative	Sexual Abuse	Incomplete
The NLP Game	Neuro Linguistic Programming	Non-specific	Incomplete
The Self Esteem Game	Social Constructionist	Self Esteem	Incomplete
Hot Stuff for Cool Kids	Cognitive Behavioural	Anger management	Incomplete

Each of the completed games outlined in table 7.3 consists of six dialogues. Therefore as well as the new games now available, there are in excess of sixty completed dialogue files. These dialogues can potentially be adapted and combined together in new ways to create further new games.

The following sections provide an analysis of the games and content created by MHC professionals.

7.4.1 Adaptation categories

One of the key aims of the adaptable design approach proposed in this thesis, and thus also for PlayWrite, is to develop systems that can be adapted by MHC professionals to suit:

1. A broad range of theoretical approaches
2. A broad range of mental health disorders
3. A broad range of socio-cultural groups
4. The specific needs of individual clients

Based on an analysis of the games created by MHC professionals, it is possible to say that PlayWrite has succeeded in achieving many of these aims. Fig.7.2 highlights the different forms of adaptation featured in games created using PlayWrite.

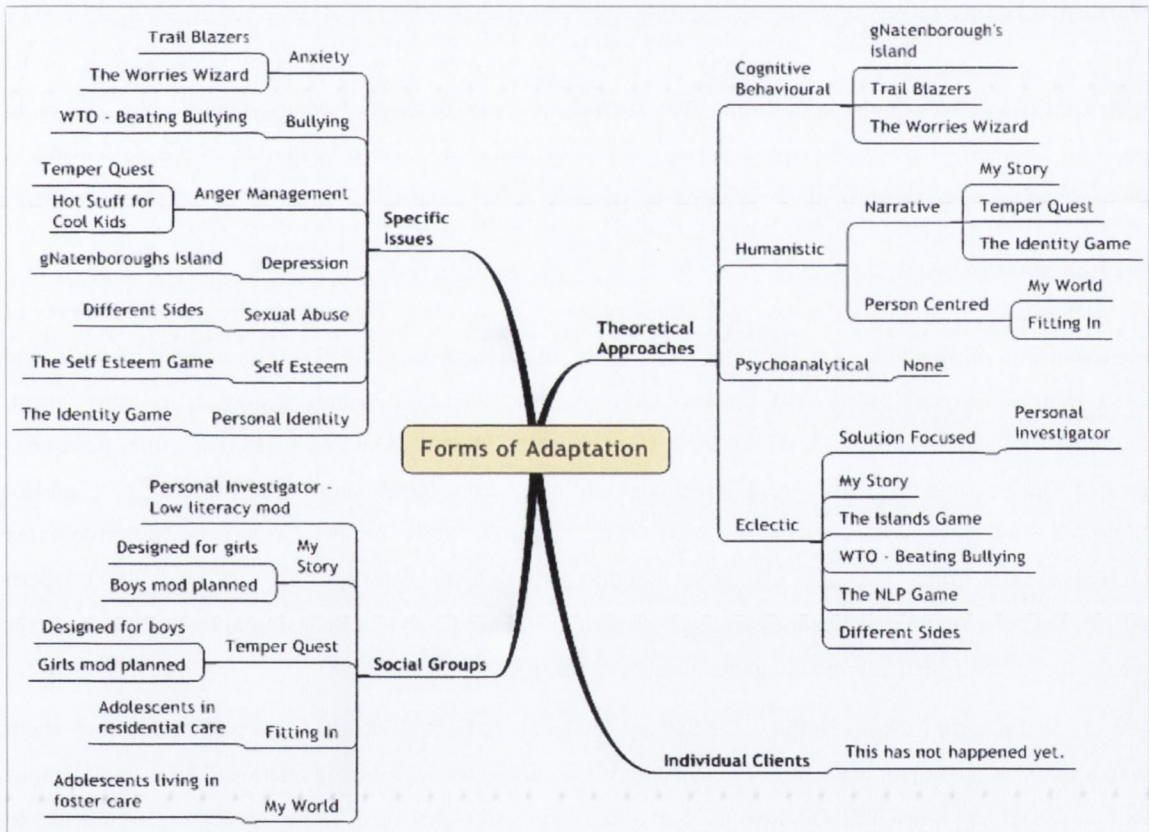


Figure 7.2 - The forms of adaptations in games created using PlayWrite.

7.4.1.1 Theoretical Approaches

The literature review provided in this thesis identified several major 'schools' of talk-based MHC. These were: Psychodynamic, Humanistic, Cognitive Behavioural, and Eclectic. As can be seen in Fig.7.2, with the exception of Psychodynamic approaches, games have been created using approaches from each of these major 'schools'. For example gNatenborough's Island, Trail Blazers and The Worries Wizard are based on

Cognitive Behavioural techniques. Several different forms of Humanistic approaches have also been used. My Story, Temper Quest and the Identity Game use Narrative based techniques. My World and Fitting In use Person Centred techniques, a different approach within the overall Humanistic school. It is worth noting that in the case of the Narrative based games My Story is implemented in a non-specific way, i.e. not targeting a specific disorder, whereas Temper Quest and The Identity Game both target specific issues. This is also the case with the games created using Cognitive Behavioural techniques. Trail Blazers and The Worry Wizard both target specific issues, whereas gNatenborough's Island is non-specific.

As can be seen in Fig 7.2 several of the games are based on eclectic approaches to treatment. The NLP Game uses techniques from Neuro Linguistic Programming, an approach generally designated as eclectic. Another game, My Story, while broadly narrative based, is described by its designer as containing elements of Solution Focused Therapy. This eclectic mix is representative of the day to day approach used by this therapist.

The specific theoretical approaches used in games reflect the theoretical training and working methods of the MHC professionals involved in the study. The absence of games based on Psychodynamic techniques is, in part, due to the fact that few therapists working in public health care services, and none of the participants in this particular study, currently use Psychodynamic approaches.

7.4.1.2 Specific Issues

As well as using differing theoretical approaches, games have also been created to address a broad variety of mental health difficulties and disorders. Again the issues addressed reflect the specific interests and specialities of the participating MHC professionals. The issues addressed include anxiety, anger management, bullying, personal identity and self esteem. It is worth noting that in some cases different games have been created which address the same general issue, but in differing ways. For example, both Temper Quest and Hot Stuff for Cool Kids both target anger management. However, while Temper Quest uses Narrative based techniques, Hot Stuff for Cool Kids uses a Cognitive Behavioural approach. Two games have also been created to address anxiety difficulties. In this case both games use Cognitive Behavioural techniques, however the content of the games and overall game metaphors are significantly different.

Alongside the games shown in Fig.7.2, MHC professionals have also identified many further issues about which they feel effective games could be created. For example, as described in Section 7.3.2.1, the therapist who designed My Story and The Identity Game has described plans for 6 further games she would like to create, each addressing a different aspect of Narrative Therapy. Other therapists have expressed an interest and created initial designs for games addressing issues including: obsessive compulsive disorders, drug and alcohol abuse, eating disorders, dealing with bereavement, personal safety and sexual abuse.

7.4.1.3 Social Groups

Creating games which target specific social groups was not a primary concern of the workshops and game building process described in the current study. It was initially envisioned that adaptations of games to suit

different social groups would happen later in the system life cycle, for example when therapists begin using each other's content and games. However, as can be seen in Fig 7.2, several games have been designed with specific social groups in mind.

My Story was created by a therapist who works mainly with adolescent girls. This therapist had earlier commented that PI was very male oriented. Female characters deliver all the dialogues in My Story. Several of the dialogues also make reference to stories told by other adolescents. In each case the adolescent telling the story is a girl.

Another game, Temper Quest, was designed by a therapist who works mainly with adolescent boys. Whilst not as clearly orientated towards a specific social group as My Story, this game does contain dialogue created specifically with boys in mind. For example, one dialogue contains the following outtake:

```
conversation: Thank you. Now I've been wondering about footballers who might
              feel a Temper coming on when a game is not going well.
conversation: I wonder what they think to themselves out there on the pitch.
openNoteBook:
  openQuestion: Do you have a footballer you admire? Can you write his name
               down here?
  openQuestion: How do you think he controls his Temper when a game is not
               going well? What would you say he thinks to himself?
  openQuestion: What advice would you give this player to make sure he never
               gets a red card?
closeNoteBook:
```

The therapists who created My Story and Temper Quest are both narrative therapists. Both have received copies of the others game and have proposed making the modifications necessary to make the games appropriate for their own clients, i.e. adapting My Story to suit adolescent boys and Temper Quest to suit adolescent girls.

Games targeting other social situations have also been created. Fitting In is designed specifically for children experiencing difficulties when living in residential care. It gives players an opportunity to describe their experience of their living situation and helps them to consider what they might like to do in future. My World, which like Fitting In is based on Person Centred approaches, is designed for children in foster care or whose parents have divorced and then remarried. In My World each of the characters describes their own experience of living in a foster family and asks the player to share parts of their own story. For example:

```
conversation: Hi My name is Pete.
conversation: I'm 23 and I'm a D.J with Cool FM.
conversation: I live with my foster parents and sister Amy
conversation: What's your story?
```

Finally one therapist has created a modified version of PI. This therapist had used the original version of PI with two clients, whom she described as having mild learning difficulties. Whilst she found that playing PI was helpful, she also found that the clients had difficulties reading long passages of text in the game notebook and also in typing answers. Chapter 9 includes a more detailed case study of this therapist's use of PI.

In the modified version of PI passages of text in the notebook have been simplified and shortened. The second important change was to increase the use of multiple-choice and scaled questions, in both written and spoken forms. The therapists felt these questions would be more suitable for her clients, as they do not require written answers. The use of video content has also been extended, with characters asking players more spoken questions based on videos shown in the game. The therapist who created this game stated:

"In the current version of the game I am working on I will try to change some of these features (referring to notebook issues) to accommodate my clients better."

Appendix L contains an example of a dialogue from the modified and original versions of PI.

7.4.1.4 Individual Clients

To date MHC professionals have not created or adapted games to suit the needs of specific clients. However, whilst expressing reservations about the time required, several participants have expressed an interest in such adaptations. When asked to list the three most positive aspects of PlayWrite, MHC professionals' comments have included:

"How it can be specific to each client"

"flexibility, individualisation"

"Adaptability of prog. to specific clients and variety of mental health issues."

"you could personalise details of the game and tailor it to clients"

As with the adaptation of games to suit specific social groups, it is expected that adaptations to the needs of specific clients may emerge after participants have begun to share games and use a variety of games, more regularly, with a variety of adolescent clients.

7.4.1.5 Using games in group interventions

PI was designed to target individual interventions involving one therapist working with one client. As each of the new games created with PlayWrite uses the same game template and interaction styles as PI, it was initially assumed that new games would also be aimed at individual interventions. During the handover and game building process the potential for using games in new ways has also emerged.

During workshop 2 the participants were given the opportunity to play WTO – Beating Bullying. During the group discussion which followed the group suggested that this game could potentially be used in group sessions with adolescent clients. The participants suggested that in a group session each of the young people would first play the game on their own and record their own ideas about the issues raised. Each young person

would then print out their game notebooks and a group discussion could then be held. This group discussion would be lead by a MHC professional. In this way the game becomes a way of introducing a group discussion about bullying.

Unlike many of the other games created with PlayWrite, the dialogues used in WTO – Beating Bullying focus mainly on discussing and giving opinions on other peoples stories. For example, in PI the player is asked to set personal goals and identify personal resources. By contrast, in WTO – Beating Bullying, the player is shown animations about young people who have experienced differing types of bullying in school, and then asked for their opinions on these people’s stories. This difference was identified as the factor which made WTO – Beating Bullying appropriate for use in group sessions. Rather than discussing bullying in a personal context, the game could provide a context for a group discussion about the impact of bullying in young people’s lives.

7.4.2 Game characters and overall game metaphors

One of the key findings in the pilot evaluation of PI was that various aspects of the game have the potential to alienate different adolescent clients. Issues raised included the use of a policeman character, the upper class English accent of another character and the fact that the game is set in a school - the Detective Academy.

Rather than producing bland games, which whilst less likely to cause alienation, may also reduce client engagement, one of the key aims of PlayWrite - and of the adaptable design approach proposed in this thesis - is to allow MHC professionals to create games which feature engaging and distinctive characters, without fear that such design decisions will limit the usefulness of a game. MHC professionals can create games and characters appropriate to their own situation. If others wish to use these games, but find some aspects of them inappropriate, they can make the necessary adaptations.

Table 7.4 - The characters created for Trail Blazers.

Trail Blazers	
C1	Oisín, an Irish explorer who travels the world investigating the effects of anxiety in peoples’ lives.
C2	Beverly, an investigative researcher who grew up on an animal reserve in South Africa and now researches the impact of anxiety on wild animals.
C3	Pedro is from a little town called Ushiaia in Argentina, the most southern town in the world. He now lives in the Antarctic and compares thoughts to icebergs – most of an iceberg lies below the surface.
C4	Ollie is a crocodile wrestler from Oz, who compares wrestling with negative thoughts to wrestling with a crocodile.
C5	Junu, an expert yoga instructor and philosopher of calm, who spent many years training in a remote area of Himalayan mountains in Northern India, and who offers to teach the player new relaxation techniques.

The new games created using PlayWrite feature a broad variety of distinctive characters. Table 7.4 highlights the characters used in one game. Several other games also feature distinctive characters. For example in gNatenborough's Island the main character is David gNatenborough, an explorer based on the wildlife presenter David Attenborough. In the Identify Game the first character players meet is inspired by J.K. Rowling and in Temper Quest the game characters are influenced by characters in the TV series CSI Miami⁶.

Alongside distinctive characters, several of the games also feature well developed overall metaphors. In Temper Quest players visit the Temper Lab, where they are invited to join the labs forensics team and help them put tempers under the spotlight. In both Trail Blazers and gNatenborough's Island the player becomes an explorer and meets several other explorers. In the Island Game the player is asked to imagine they are the king or queen of their own island kingdom.

7.4.3 Games based on existing materials

Several of the new games created using PlayWrite are adapted from existing paper based materials. For example gNatenborough's Island is based on "*Straight Thinking*", Chapter 6 of: "*A CBT Workbook for Children and Adolescents*", by Dr Gary O' Reilly. In building the game this chapter was first divided into six overall themes, which were then translated into game dialogues. In the book much of the content is conversational and is delivered by a character called David gNatenborough. In the game, instead of having David gNatenborough delivering all the dialogue, a series of new characters were created. These characters are introduced by David gNatenborough in the first dialogue in the game.

Temper Quest is based on a single questionnaire from the book "*The Trouble with Tempers: a book for people who want to claim their lives back from Temper Trouble*", by Therese Hegarty. The questions in this questionnaire were divided into four categories, around which four dialogues were developed. Introduction and wrap-up dialogues were also created. These dialogues introduce the overall aim of the game - to form an opinion about tempers - and then allow the player to take a final stance on tempers.

'WTO -Beating Bullying' uses video content from '*Working Things Out*' (WTO), a psychoeducational CDROM, in which adolescents share stories about how they overcame various difficulties. Three of the stories, each dealing with a different aspect of bullying, are used in the game. The WTO CDROM is also accompanied by a guidebook for therapists. The initial versions of the dialogues used in the game were adapted from content in this guidebook.

Whilst Working Things Out - Beating Bullying, Temper Quest and gNatenborough's Island were each developed in collaboration with the authors of the original materials, several other therapists have created games by adapting materials/approaches which they use in their day to day work. My World is based on ideas presented in the workbook "*My Personal Life History Book: A Guided Activity Workbook for Foster Children*". The team which created this game use this workbook on a regular basis and are very familiar with the techniques used. Another game, The Islands Game is based on a technique described by a therapist in

⁶ CSI Miami is a television series about a criminal forensics team.

workshop 3. She described how she will sometimes take a sheet of paper and draw three circles on it, Fig 7.3. She then asks young people to imagine that they are the ruler of an island kingdom. Each of the circles represents an island in this kingdom, on which the ruler can keep particular people and things. For example the ruler keeps people and things that are always important to them and they like to always have nearby on their home island. Another island is surrounded by sharks. Nothing and nobody can escape from this island. This is where the ruler sends people and things they do not like, and never want to deal with. The young person is then asked to describe who and what they would place on each island. This gives the therapists an insight into important people and things in the young person's life. In the Islands Game this simple technique has been translated into a game world. Each room in the game features a dialogue related to an island in the original diagram. A further dialogue has also been added, which gives the young person the opportunity to mention people and things without having to give them a particular association.

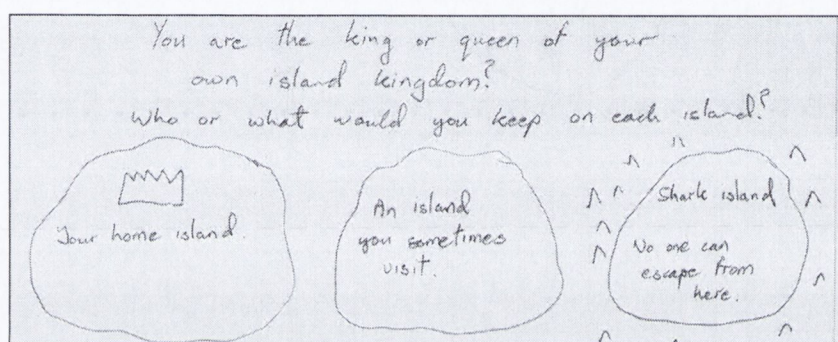


Figure 7.3 - A paper diagram of The Islands Game.

Creating games based on existing materials has the advantage of using materials which have been proven in clinical settings and with which MHC professionals are familiar. For example many therapists throughout Ireland use the workbook from which gNatenborough's Island has been adapted. By allowing existing materials to be easily translated into a new form, PlayWrite has provided therapists with a new way of presenting this material to, and interacting with, adolescent clients.

There may also be experimental advantages to games based on existing materials. For example, again in the case of gNatenborough's Island, the workbook from which this game was adapted was developed by researchers in the Department of Clinical Psychology in University College Dublin. Detailed evaluations of the therapeutic impact of using these materials in paper based form have been conducted. The results of these studies may, in future, provide a basis against which evaluations of game based interventions can be compared. Such games may also provide a suitable basis for randomised controlled trials, in which game-based interventions can be compared with accepted and proven methods.

7.4.4 Long and short dialogues

One of the most noticeable differences between the new games created with PlayWrite is the contrast in the level of detail and length of dialogues used in games. Several games (e.g. Trail Blazers and gNatenborough's Island) include long and very detailed dialogues. In other games (e.g. The Island Game and My World) the

dialogues are short. For example, based on simple word counts, one dialogue used in *My World* is just over 100 words long (*My World – my birth family.xml*). In contrast several of the dialogues used in *Trail Blazers* have word counts in excess of 750 words (e.g. *Trail Blazers – intro.xml*). For other games the length of dialogues falls between these two extremes.

During the later stages of the design of PI the length of dialogues, and the balance between spoken, written and video content, became one of the central issues in finalising the game. Whilst not wanting to make dialogues overly short, there was a concern that adolescents might become bored with overly long dialogues. In later iterations of PI the dialogues were typically shortened compared to earlier versions. The word count of dialogues in PI is typically between 300 and 400 words. Rather than packing large amounts of information into the game the aim was to create dialogues which would provide a context for more detailed conversations between therapists and clients.

The question of how the length of dialogues affects the impact of games remains an open one. However, as discussed in Section 7.5 below, there is a strong possibility that evaluations of new games, both through peer review and clinical use, will provide answers to this and other similar questions.

7.4.5 Other similarities and differences

Alongside the basic similarities (e.g. all games use the same game template) and differences (e.g. theoretical approach) there are several other similarities and differences in the games created using PlayWrite. In several cases these similarities and differences are representative of the overlap and contrasts between differing theoretical approaches to talk-based MHC.

Many of the games contain dialogues based on similar therapeutic techniques. For example several games contain dialogues featuring variations of what is sometimes called ‘The Miracle Question’. This is a technique whereby therapists ask clients to imagine a time in the future when their problems have disappeared. This technique is used in PI and variations are also used in *My Story* and *Fitting In*. Several games also use the technique of identifying exceptions. Exceptions are times in a person’s life when the problems they are experiencing are less prominent, or maybe disappear altogether. Identifying such times is an important step in many therapeutic approaches. PI contains a dialogue about exceptions and so do *My Story*, *Temper Quest* and *The Identity Game*. Similarities such as these highlight the similarities between differing theoretical approaches to talk-based MHC.

Other aspects of games reflect the differences between differing theoretical approaches. For example SFT is a structured, goal oriented approach to treatment. PI reflects this approach. At the beginning of the game the player is asked to set a therapeutic goal which they would like to achieve. Other approaches, e.g. Narrative Therapy, favour more open exploration over the setting of specific goals. This is reflected in games created using this approach, e.g. *Temper Quest* and *My Story*. *Temper Quest* involves an open exploration of the effects of tempers in the player’s life. The game does not set specific goals. It aims to help the player to understand the effects of tempers and to take a position about the future role of tempers in their life.

Before finishing this section there are several further issues worthy of a brief mention. The new games created with PlayWrite use a broad variety of dialogue elements, including both written and spoken elements, and a wide range of open, scaled and multiple choice questions. Several of the games use video content. In several further cases games contain placeholders for future video content. Several games also use branching dialogues. Finally the games make use of the key/door configuration feature to place a variety of orders on the dialogues in games. For example in WTO – Beating Bullying the key/door configuration requires the player to speak with a least four characters in a preset order, to complete the game. Meetings with the other two characters are optional.

7.5 Discussion

As can be seen in the analysis of the games created with PlayWrite, the system has successfully achieved one of the primary aims of the adaptable design approach proposed in this thesis. It has enabled MHC professionals to create therapeutic 3D computer games which implement a broad variety of theoretical approaches and target a broad variety of mental health disorders. MHC professionals also have the option of making adaptations to games to suit the needs of individual clients and broader social groups (e.g. boys instead of girls). Enabling MHC professionals to adapt the system has greatly increased its usefulness. It has lead to the creation of a system which can be adapted by end users to meet their own requirements. Given the importance of adaptability and the time required to evaluate any single application in a MHC setting, this is a significant benefit.

The range and variety of the games created with PlayWrite also offers another potential advantage. At the point of writing preparations are underway by several participating MHC professionals and research groups to conduct independent clinical evaluations of new games. Further details of these studies are included in Chapter 9. As well as providing independent evaluations of the interaction styles used in the current iteration of PlayWrite, these studies will provide the opportunity to investigate many issues related to the delivery of therapeutic content in games. For example:

- What therapeutic approaches are most suited to use in computer games?
- Are games that target specific issues more effective than games designed in a more general way?
- Is it important to have an overall game metaphor and distinctive game characters?
- Are games without video content as effective as those which use videos?
- Do long or short dialogues negatively affect the impact of games?

Collating the answers to such questions will be an important aspect of the future development of the PlayWrite system. As answers to these questions are gathered, recommendations could potentially be incorporated into future handover processes and could also be incorporated into future iterations of the system. For example, depending on the outcome of trials, if a user creates a dialogue which is overly long, the

system could offer a prompt suggesting that long dialogues have been found to negatively affect the usefulness of games.

Whilst definitive answers to questions such as those outlined above may require clinical evaluations, it is possible that answers may also be found through peer review evaluations and experimentation by individual MHC professionals. MHC professionals are now in a position where they can implement and evaluate variations on content and games. An effective handover process can assist in encouraging such experimentation and can also greatly increase the potential success of any system. This chapter has described the handover process used with PlayWrite. Activity based workshops, in which participants were encouraged to experiment with the system, were found to be an effective part of this process. During the handover process it was also found that the introduction of design ideas from the HCI domain had a significant impact on MHC professional's ability to create initial games. Further exploration of such ideas, and the incorporation of further design concepts into both handover processes and future iterations of systems, is likely to be a worthwhile area of future research.

Finally, the collection of feedback from MHC professionals is a key aspect of the adaptable design approach. It is hoped that by allowing MHC professionals to become more actively involved in the overall design process, they will provide feedback, not just on therapeutic issues, but also on ways in which a system can be improved and extended. For example are MHC professionals satisfied with the degree of flexibility offered by the current iteration of PlayWrite – i.e. largely content oriented flexibility – or do they want increased options to adapt other aspects of games, e.g. the layout of the game world. The next chapter discusses the feedback collected from MHC professionals' who have used PlayWrite and also discusses new ideas which have emerged through this process.

8 An Analysis of Feedback & Emergent Ideas

Feedback is one of the key communication channels identified by the adaptable design approach proposed in this thesis. If sufficient feedback can be gathered during the various stages of the overall two stage design approach (e.g. during the handover, adaptation and clinical evaluation processes) it can provide a valuable source of information for future iterations of a system. As therapists conduct clinical evaluations - which are likely to last at least several months and often significantly longer - this feedback can be applied by HCI researchers to improve and extend the functionality of the overall system. In this way stages one and two of the adaptable design approach can begin to overlap and complement one another, with stage one being lead by HCI researchers and stage two by MHC professionals.

Several forms of feedback have been gathered during the evaluations of the PlayWrite system:

1. Direct feedback from MHC professionals who have used the system.
2. Observations of MHC professionals' use of the system.
3. Emergent ideas based on an examination of content created by MHC professionals.

This chapter discusses these different forms of feedback in greater detail. It is worth noting that the aim here is not to provide an exhaustive list of all the ways in which PlayWrite could be improved, rather it is to demonstrate that the adaptable design approach provides many opportunities to gather effective feedback. The aim is also to consider the types feedback MHC professionals are providing, e.g. is there evidence that MHC professionals are now beginning to consider how PlayWrite can be used most effectively. Feedback on the therapeutic impact of games in clinical settings is not discussed in this chapter. Clinical evaluations are dealt with separately in Chapter 9.

8.1 Feedback from Mental Health Care Professionals

During the handover process MHC professionals were invited to become active participants in the overall design process. As they use PlayWrite they were encouraged to actively review and evaluate it, focusing not just on therapeutic issues but also on ideas for improving and extending the overall system. At the point of writing, two forms of direct feedback have been gathered from MHC professionals.

1. Feedback from workshops and the handover process.
2. Feedback from the game building process.

At the end of each workshop a group discussion was held and participants were asked to fill in a feedback questionnaire. At a later stage, having given MHC professionals the time to use PlayWrite, both to create games and use PI clinical settings, a group meeting was held.

8.1.1 Workshop feedback

At the end of each workshop participants were asked to comment on both the most positive and most negative aspects of PlayWrite and, if possible, offer suggestions on how the system could be improved or extended. The results of this feedback are collated in tables 8.1 to 8.3.

As can be seen on Table 8.1 the flexibility of PlayWrite was the feature most often identified as positive. Other positive features included the ability to mix different types of media, the ease with which content could be created, and the appropriateness of the content delivery medium to the interests of adolescent clients.

There is a large degree of overlap between the negative aspects of PlayWrite and ways in which participants felt the system could be improved. Much of the feedback focuses on practical issues e.g. the need to provide a greater range of game worlds and to improve aspects of the graphics in both the game building applications and game delivery template. Whilst some of this feedback is very general (e.g. *'some graphics need to be refined'*), other feedback is more specific. Several therapists highlighted the potential benefits of having a broader variety of non-player characters available. In particular several felt that adolescents would relate more closely and react well to younger characters. Younger non-player characters can be used to place the adolescent player in an expert position, in which they are asked to give advice to others facing difficulties similar to their own. Other character specific suggestions included changing the characters clothing to make it more casual e.g. characters wearing tracksuits. Participants also requested further game worlds and again made specific suggestions:

"To make the PI world more adapted to the young people's world e.g. in a school ground, in a disco, in the park etc."

Other feedback focused on interaction issues. For example the difficulties many young people may have in reading from and writing to the game notebook were highlighted. Participants also felt that it would be beneficial to improve and extend the reward system used in games and to allow players greater scope to personalise their games, e.g. choose background music for their game or increase the options for tailoring the player character. Participants felt that increased personalisation – particularly of the player character – could increase adolescents level of ownership over both the game and the overall therapeutic process.

The other major feature requested by participants was the inclusion of more gameplay elements. Participants suggested two distinct ways in which further gameplay could be added. First mini-games within the overall game could be designed to contain therapeutic content e.g. shoot the bad thoughts. Other participants felt

mini-games should be included as ‘brain-breaks’. In this case the games would not be directly therapeutic; rather they would serve as a time out space where the client can relax without having to think about therapeutic issues. A participant in one workshop made the interesting suggestion that, whilst mini-games should be used as brainbreaks, some of these games should be two player games, which the therapist and adolescent can play together. Whilst not containing therapeutic content, such games could prove therapeutically beneficial in another way. They could offer the therapist another way of interacting with and potentially building a stronger relationship with the client.

Many of the issues identified in workshop feedback were discussed further in the group meeting described in the next section.

Table 8.1 - Workshop participants list of the most positive aspects of PlayWrite.

System flexibility	<p>How it can be specific to each client.</p> <p>Flexibility, individualisation. Opportunity to use programme in many ways.</p> <p>You can adapt the conversation etc. Evolving program and topics.</p> <p>Flexibility, virtually unlimited therapeutic potential.</p> <p>Flexible, interactive.</p> <p>Ability to change, develop characters in an easy way.</p> <p>The ease with which the system can be modified.</p> <p>Adaptability of system to different therapeutic styles and forms of interventions e.g. anger, bullying. Narrative, CBT, SFT.</p> <p>Adaptability of prog to specific clients and variety of mental health issues.</p> <p>Ability to grow and develop new content.</p> <p>Voiceovers – again you can personalise details of game and tailor it so well – I found the game building system extremely user friendly.</p>
Visual tool & mixed media	<p>Visual Tool - great for learning difficulties. Including audio/video clips.</p> <p>Potential multimedia aspects.</p> <p>Easy to use video clips, good to have mix of video and language.</p> <p>Video, this is a hugely positive tool and something young people will enjoy.</p> <p>It presents a visual approach to old themes in therapy.</p> <p>Different use of spoken questions and notebook. Especially that you can print out notebook.</p>
Ease of use	<p>Simple clear format with achievable goals – designed for success of participant.</p> <p>Thought the process was reasonably easy to follow, step by step procedure.</p> <p>Easy once first dialogue has been created and you have established a pattern.</p> <p>Is a tool for the work I do.</p>
Client friendly	<p>Loved the 3D graphics – appears very young person friendly.</p> <p>Great for use with adolescents who do not find ‘face to face’ easy.</p> <p>It’s a great platform for engaging with teenagers on something that would interest them.</p> <p>Colourful, user friendly, child friendly.</p> <p>Teenage appropriate style of interaction.</p>

Table 8.2 - Workshop participants list of the most negative aspects of PlayWrite.

Graphics	Needs graphics to be sharper e.g. character in dialogue builder is v. basic. Some graphics need to be refined. Graphics/options to change graphics could be improved. Needs greater sophistication – graphics, game worlds. Speech bubbles rather than text boxes.
Character specific suggestions:	The hands of the characters – would prefer they didn't continually rotate. Hands on game characters are distracting – faces move, that's ok with just occasional hand gestures. Design of characters – more options, street friendly clothes e.g. tracksuits. Ability to customise characters, dress etc. Child characters. Can't change initial characters. The ability to choose initial characters, perhaps adding personalities to the character might be something the client could do in order to identify more with the character. Needs more choice in who the client/player will be – encourages ownership.
More worlds needed	Only 1 world! Children could get bored of the same world if used in different contexts. Having a single format – e.g. if you want to do both bullying and temper work with one young person, might be hampered by doing both same environment Overkill – same world used to often in a variety of sessions/lessons.
Notebook difficulties	More voiceovers would be good to take the pressure of reading. The use of a voiceover in the notebook would be useful. Some text a bit 'wordy'. Notebook is a difficult format for people who can't type or have literacy problems.
Reward system	Add extra 'bonus keep' for choosing good options in a multi-choice scenario e.g. choosing assertive option. Any content accepted so people can progress regardless of content. Consideration of different outcomes – rooms not allowing player to progress – need to achieve something.
Game play improvements	I would put more options within the rooms for activities before you get the key. Building in games and breaks. Thinking of teenagers who are used to gaming with a Playstation. I am not sure how interested they will be in such a format without high speed car chases. Emphasis in PI is on client's problem or issue. Gaming areas would allow for engagement with the system that went beyond problems.
Time required	If it becomes too specific it will become highly individualised and time consuming. The only difficulty is making time to do all this. Time frame required.
Technical assistance	Not being personally computer literate meant I required support to build dialogue. Need for technical backup.

Table 8.3 - Workshop participants list of ways in which PlayWrite could be improved or extended.

Graphics & game worlds	<p>Better graphics, more worlds, more characters.</p> <p>To make the PI world more adapted to the young people's world e.g. in a school ground, in a disco, in the park etc.</p> <p>Greater variety of characters; different ages.</p> <p>World transition from negative graphics to positive.</p> <p>Different backgrounds, images, scenarios in this game like format would be invaluable for different difficulties/ problems children may encounter.</p> <p>Having a bank of games/game worlds with levels of sophistication to purchase and adapt for needs of centre and individuals.</p> <p>More rooms or probably a number of different interlinking environments, housing different aspects of the content.</p>
Reward system	<p>The key system needs revising – you shouldn't always get a key.</p> <p>More reward based systems.</p> <p>Certificate/merit rewards. Being able to activate rewards e.g. computers, games, music etc.</p> <p>At the end of session client gets reward e.g. key or star to mark progress.</p>
Brain breaks & relaxation	<p>Brain break areas.</p> <p>Relaxation room at beginning of exercise.</p> <p>A time out space in the game where players can relax but not log off.</p>
Notebook issues and new interaction ideas	<p>Notebook could be put on a recorder for client to hear back.</p> <p>Text to speech in journal.</p> <p>Using webcams to help clients record themselves.</p> <p>Use of web cam to record client interaction, answers + voice recorder.</p> <p>You could have part of the game where you could insert photos/images where the client could describe what they are feeling about the images.</p>
Replay& rewind	<p>Replay on videos and dialogues.</p>
Extended game play	<p>More game-play aspects.</p> <p>Potentially have different levels of things to explore. Introducing element of choice in directing game (if choose A → room A. but of choose B → room B) to try and increase 2 way interest.</p> <p>Add mini games.</p>
Personalisation	<p>Introducing celebrity icons, popular music etc that the young person can choose to have playing in the background.</p>
Online games	<p>Some sort on online version.</p>
Security	<p>Security for full confidentiality.</p>
Building games with clients	<p>A space where the students could create their own game, dialogue and questions.</p> <p>Students could write game themselves.</p>

Table 8.4 - Improvements suggested in the group meeting.

Increased game play & relaxation areas	<p>Add an arcade room with games – shoot bad feelings?</p> <p>Mini games as reward after each room – particularly useful for groups if some clients work through game quicker than others, plus motivation to continue. Game ideas e.g. shooting down tempers. Need to beware of sidelining therapist.</p> <p>Introduction of activities not so obvious for use in therapeutic work. Maybe put more gaming into it – e.g. complete labyrinth, shooting bull's-eyes/targets – as a time out from serious work.</p> <p>Build in a relaxation room where the therapist and client play a fun game as opposed to a work game. Put in a time out button as a way to access game/time out room.</p>
Content creation ideas and issues	<p>Begin using questions for client and therapist</p> <p>Add questions for therapists to games</p> <p>Remove complicated language/sentence structure</p> <p>More scaled questions e.g. emotion check (happy – sad) especially for a young person who is not verbal.</p> <p>Increasing amount of video testimony + used it more as grounds for reflection</p>
Rewind/replay dialogues	<p>Need a back button</p> <p>Have a back button in dialogues</p> <p>Rewind button, replay dialogues</p> <p>Build in a back button.</p> <p>A back button</p>
More game worlds & characters	<p>Significant novelty in the physical environments from game to game.</p> <p>Integrate all the available games so you can visit different islands at different times.</p> <p>PlayWrite to be developed so that therapists can choose number of doors/ keys/ backgrounds etc. More game worlds available.</p> <p>Younger looking characters</p>
Interactive game worlds	<p>More interactive game worlds.</p> <p>Interacting with other objects in room</p> <p>Interactivity with posters and other content. More use of the physical environment</p>
Reward system	<p>Reward system: different audio visual rewards</p> <p>Better reward system</p>
Personalisation	<p>Can the characters remember the young person's name?</p> <p>Background music?? – something the client can choose</p>
Stock video content	<p>Video stock – a collection of videos available for therapists to use, to incorporate into the game.</p> <p>Stock of videos for therapists to use.</p>
Notebook issues	<p>Make the notebook more visual e.g. include images. Have a voiceover for notebook text.</p>
Collaborative game building	<p>Make it possible to build the game over the internet where therapists in different location can work together.</p> <p>Create a space where the students could create their own games, dialogue and questions.</p> <p>Allow students and counsellors to write games together.</p>

8.1.2 Group discussions

Having completed the game building process a group meeting was held. MHC professionals were invited to this meeting if they had (1) attended a workshop, (2) created a new game, or (3) used PI in a clinical setting. The meeting lasted approximately three hours and was attended by 16 MHC professionals. The meeting gave participants the opportunity to view each other's games, to discuss their experiences of using PI in clinical settings, and to discuss ideas for improving and extending PlayWrite.

At the beginning of the meeting several dialogues from new games were presented on a projector. The participants then broke up into four groups and took the time to play and discuss each other's games. They also discussed their experiences of using PI with adolescent clients. Each group was asked to make a list of five issues they would like to see improved in future versions of PlayWrite. A group discussion was then held. The author played an active part in these discussions, in many cases directing the overall discussion and probing for further information on issues raised by participants.

Table 8.4 contains the participant's lists of features they would like to see improved. Many of the issues are similar to those identified by participants of the workshops e.g. the need for a greater variety of game worlds, the potential of introducing differing types of gameplay, and the need to improve the reward system used in games. Several new issues did emerge. For example many of the participants had used PI in clinical settings and stressed the importance of having a back button in game dialogues and of being able to replay dialogues. Several new issues also emerged during the general group discussions. What is significant is that in several cases, as well as identifying possible difficulties with the system, the group also suggested potential solutions. Several of the suggestions involve experiments with alternative ways of delivering content, e.g. increasing the use of scaled questions or creating games that include questions for therapists as well as clients.

8.1.2.1 Interaction issues

Two key interaction issues were raised during the group discussions:

1. The need for greater flexibility in rewinding and replaying game content.
2. The need to take account of the literacy difficulties of many clients.

These issues - previously noted during the analysis of PI in Chapter 4 - have been raised consistently during the different stages in the evaluation of both PI and PlayWrite. They are again identified by MHC professionals in the clinical evaluations discussed in Chapter 9. As stated previously, addressing these issues was not a primary concern in the development of PlayWrite, but should be addressed in future iterations of the system.

With regard to the first concern outlined above it will be helpful if future iterations allow game dialogues to be easily rewound, paused and replayed. It is also desirable that players should be able to speak with individual characters on multiple occasions and that players should not always receive rewards for talking with characters. MHC professionals also requested that the game notebook can be reviewed and printed at any

stage and also that previous answers in the notebook can be edited. Such changes would support greater reflection on the overall process and allow therapists greater flexibility in the conversations they can have with clients during games.

With regard to the second issue – literacy difficulties – there are, within HCI literature, many documented ways of addressing this issue (e.g. the use of spoken language input, as noted in Section 6.4). In feedback from workshops several therapists did inquire about the use of webcams or voice recorders as an alternative to keyboard input, Table 8.3. Another possibility raised in the group discussion was to increase the amount of visual elements available within a game, e.g. the use of pictures within the notebook, the addition of pictorial multiple choice questions or the use of emoticons to complement or replace written answers. The potential benefits of increasing the use of scaled and multiple choice questions were also discussed. For example one of the suggestions for improving PlayWrite (Table 8.4) was:

“More scaled questions, e.g. emotion check (happy – sad), especially for young person who is not verbal”

As described in Chapter 7 one therapist has already taken the step of creating a modified version of PI. This new version includes greater use of scaled and multiple choice questions and is aimed at clients with learning and literacy difficulties. Other options discussed in the group meeting included providing a read-out for any text which appears in a game notebook and allowing players to record spoken answers to open questions.

8.1.2.2 Ensuring the therapist is not marginalised

One of the key concerns raised by therapists in the group meeting is that adolescents experiencing difficulties with engagement could potentially use games as another way of excluding or blocking out the therapist. As will be seen the Chapter 9 this concern was also raised in feedback from the clinical evaluations of PI.

During the group discussions several ideas were suggested that may help in addressing this concern. One suggestion was that players be required to choose a co-pilot at the start of each game. It was assumed that the therapist would be chosen as the co-pilot. Participants then suggested that it would be beneficial if the dialogues in future games include questions which the therapist is required to answer, rather than all the questions being addressed towards the client. In this way the therapist could become more directly involved in the game and is offered the opportunity to make observations and even talk out loud about ideas before answering questions. A significant aspect of this idea is that it has emerged through participants' experience of using of PlayWrite and PI. PlayWrite provides MHC professionals with the flexibility to implement and evaluate such ideas. Further significant ideas which have emerged through participants' use of PlayWrite are discussed in Section 8.3 below.

Another suggestion for increasing the therapist's involvement in games – the inclusion of two player mini games - had been suggested during the earlier workshops and was again discussed in the group meeting. Many of the group felt this was an idea worth exploring and that two player mini-games could potentially

assist in building and maintaining the client therapist relationship. Several participants did however express reservations about their own ability to play such games.

8.1.2.3 Designing effective dialogues

Alongside the issues discussed above – e.g. increasing the use of scaled questions or including questions for the therapist – several further aspects of creating effective dialogues were discussed. When asked to list potential improvements in the PlayWrite system (Table 8.4) several of the suggestions focused on exploring the use of different types of content. For example:

“Increasing amount of video testimony + use it more as grounds for reflection.”

As with several of the ideas discussed in Sections 8.1.2.1 and 8.1.2.2 above, this suggestion refers not to a change in the design of the system, rather to a way in which therapists would like to experiment with creating content. Participants also discussed issues including the appropriate length for a dialogue. For example, one therapist suggested that several of the dialogues in Trail Blazers are very long and that adolescents might lose interest. As noted above the group also suggested that it will be beneficial to incorporate more video elements and other visual elements into games and find the appropriate balance of spoken, visual and written materials. An interesting option emerged for the use of spoken and written questions. Participants suggested that spoken questions be used for non-personal issues and that written questions in a notebook can be reserved for more directly personal issues. For example, when using video-based peer storytelling, characters can begin by asking the player spoken questions about a person in the video, and then refer them to their notebook to answer more personal questions about their own situation.

These discussions are significant as they indicate that the group have moved beyond questions of whether the system can be used, and have begun to consider design issues, e.g. how can content be delivered effectively? The flexibility of the PlayWrite system has placed MHC professionals in a position where they can experiment with such issues, and identify how content can best be created to suit the needs of adolescent clients.

8.1.2.4 Issues of practice and protocol

Much of the discussion in the group meeting focused on issues of practice and protocol. As described above participants expressed an interest in exploring and creating guidelines on how to create effective dialogues. Participants also suggested that it would be beneficial to create a separate set of guidelines for therapists using games with clients.

As will be seen in Chapter 9 therapist who have used PI in clinical settings have suggested that the way in which a game is used can have a significant impact on its effectiveness. At the group meeting one therapist described how she found it helpful to establish rules with clients before using PI. These rules are aimed at ensuring the therapists are not marginalised and also at ensuring that the client engages with the issues raised in the game. Subsequent to the meeting the therapist wrote a note explaining these rules:

“In terms of establishing rules - Prior to commencing the game we have a discussion about the game - and gauge the interest level - if they are very interested in this I outline some important things to remember. I describe it as a thinking game. I would talk about needing to take time to think before we write down our answers so we are going to use a piece of paper to work out our answers - and report it is important to take time to write the answers as this may help us earn the key in the game, but most importantly help us work out our difficulties. So rule no 1 is therapist or child reads out question - and we have a talk about it before we write anything down. Once we have decided we type it, and only then press next. Rule 2 - if we are going too fast and not taking our time we may need to stop the game completely and work from the page instead. (This is a good strategy for assisting in patience in the game).”

The above is one example of the types of protocol which clinical evaluations of any new system should aim to provide. The adaptable design approach suggests that the development of protocol should be a key aim of any clinical evaluations. The benefits of applying rules such as these are likely to vary depending on the approaches favoured by individual therapists, and also depending on the clients involved. For example, the therapist above favours structured approaches to treatment and generally works with younger adolescents. Applying similar rules with older adolescents may prove less effective. However, collating and sharing experiences such as this, and creating guidelines for using games, will be an important aspect of future work on the PlayWrite system. It will be beneficial if this work is lead by MHC professionals. It is also important that future iterations of PlayWrite – or any other system – support such activities. Section 8.2.1 below describes one way in which later iterations of PlayWrite provided such support, through the use of secondary annotations in the game building process.

Participants also requested that protocols be put in place for sharing and effectively evaluating new games. Participants also expressed some concerns and requested that protocols be developed to ensure the security of client information stored on a therapist’s PC. A therapist present at the meeting, representing the British Association of Counselling and Psychotherapy (BACP), suggested that future versions of PlayWrite could incorporate relevant security guidelines which organisations, including the BACP and the International Society for Mental Health Online, have established for the practice of online counselling by MHC professionals.

8.1.2.5 Collaborative game building

A final issue to emerge in the group discussions, and worth noting here, is participants’ interest in collaborative game building. Two distinct forms of collaboration were discussed. Firstly several participants enquired about the possibility of extending PlayWrite to support collaboration between therapists in different locations. In one case two participants specialised in bereavement counselling and expressed an interest in working together to create a game. The second form of collaboration related to whether therapists and their clients could build games together in sessions. This collaboration could serve two proposes. It could be an

effective therapeutic task in its own right and could also create games that could then be played by other adolescents.

8.2 Researchers Observations

Alongside an analysis of direct feedback and involvement in discussions such as those described in the previous section, the handover and game building process provided many opportunities to observe MHC professionals use of the PlayWrite system. This section highlights several changes - and potential future changes - made as a result of researcher's observations. Again the aim is not to provide an exhaustive list, rather it is to demonstrate the opportunities for observation afforded by the adaptable design approach.

8.2.1 Formative evaluations

Several modifications were made to the PlayWrite system as a result of observations made during the formative evaluations described in Chapter 6. Many of these modifications were relatively small scale usability improvements e.g. button placements. Other changes were larger. For example the current version of the Dialogue Builder contains a separate voiceover recording screen. This screen was added based on observations made during the first workshop. It serves two purposes. Firstly it streamlines the process of recording voiceovers and secondly it enables a third party to easily record all the voiceovers required in a dialogue.

8.2.2 The evolution of workshop content

The evolution of workshop content - described in Chapter 7 Section 7.2.1.2 – resulted directly from observations of MHC professionals' tendency to become very involved in fine detailed analysis of game content at an early stage in the overall content creation process. In later workshops participants were introduced to some initial design ideas and provided with a more structured approach to creating initial game prototypes. This approach proved effective in helping MHC professionals to build initial game prototypes, many of which were later developed into completed games.

The example highlighted above raises an interesting question for future iterations of PlayWrite – should future iterations of the system incorporate functionality which helps users to structure the game building process? Perhaps a wizard could be included which guides users through the initial steps of creating the first prototype for a new game. The point here is not to suggest that wizards are a good idea, rather to show that observations of end user interactions with PlayWrite have raised questions which can be addressed by HCI researchers in future iterations of the system. A more detailed discussion of how such questions will be answered is beyond the scope of the current study.

8.2.3 Working with word processors

The current iteration of the Dialogue Builder allows MHC professionals to export dialogues to Microsoft Word documents. This function was added based on observations made during the initial stages of the game

building process. During meetings with individual therapists the Dialogue Builder was used to edit and test dialogues. However, whilst the majority of MHC professionals were able to use the Dialogue Builder, many preferred to create initial scripts using Word. Between meetings many also preferred to edit dialogues using Word. The export to Word function facilitated this approach and it is likely that future iterations of PlayWrite will benefit from supporting further such functionality. For example, as well as displaying the current tree based dialogue overview, future iterations of the Dialogue Builder could incorporate a word processor view or include an 'Import from Word' function which allows initial scripts - created in Word or another similar word processor - to be imported directly into the Dialogue Builder. As noted in Section 6.4 it is also possible that the tree-based representation of dialogues used in the Dialogue Builder may be a source of user difficulty in and of itself, and that future investigation of dialogue representations such as that used in SUEDE and the CSLU toolkit will prove beneficial, and may reduce users preference for using external text editors. Again a more detailed discussion of such modifications is beyond the scope of this discussion.

8.2.4 Secondary annotation

Early iterations of PlayWrite focused purely on allowing MHC professionals to create content for use with adolescent clients. However during the game building process an important issue emerged. The Dialogue Builder allows users to build dialogues using various types of dialogue elements. The overall dialogue is displayed in the Dialogue Overview Area. By right clicking on a dialogue element in the overview area it is possible to mark it as ignored, in which case it will be skipped when the dialogue is played. During the game building process MHC professionals began using these ignored elements as a way of adding additional information about dialogues. Rather than being created for adolescents this additional information/content is aimed at other therapists who might use the game. For example one dialogue contains the following element, which is marked as ignored:

```
conversation: Information for therapists: Many of us are living even as adults
according to some stories which may have begun in childhood and continue
right through to adulthood. If the story fits there is no problem. It has
become part of our identity. However some adults live a strained life
because they are living up to a story that does not fit all of the time.
Sometimes it only happens socially and you hear wives/husbands saying,
"she's the life and soul of the party but at home she's very quiet. I
think maybe she doesn't like to be with me anymore!" Often it is quite the
opposite. With him she is being herself and feeling the freedom to "not
be" the life and soul of the party. Properly understood it is a compliment
to him and not an insult. An early intervention is very helpful in this
work. It is good to notice and explore the story before it becomes
ingrained.
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It is likely that future iterations of PlayWrite will benefit from providing explicit means of including information such as this, e.g. guidelines for other therapists. Later iterations of the current system contain one such example. In the Game Builder an 'Information for Therapists' screen was added. This screen allows

MHC professionals who create games to add information which they think may be useful for other therapists wishing to use their game, e.g. suggestions on how to use the game. Such options are likely to prove important as therapists begin to share games or if future iterations support collaborative game and dialogue building. Increased support for this type of secondary annotation is likely to provide one means of supporting the development and sharing of protocols for using systems in clinical settings.

8.3 Emergent Ideas

One of the most significant aspects of the new games created with PlayWrite is the new ideas which have emerged through MHC professionals' use of the system. These are ideas which were not envisioned by the initial designers of PlayWrite, but which can now be applied in further games and expanded upon in future iterations of the system. What is significant here is that these ideas have emerged because PlayWrite allows MHC professionals to work independently and make adaptations based on their own ideas and needs. One such idea, discussed in greater detail in Chapter 7, is the suggestion by MHC professionals that 'WTO - Beating Bullying' is suitable for group work with adolescent clients. The potential for games to include questions directed at the therapist is another example. The following section describes further emergent ideas in greater detail.

8.3.1 Games as a context for other therapeutic activities

PI and new games created with PlayWrite were envisioned as therapeutic tools which could assist in creating a context in which therapists can more easily engage adolescents in therapeutically meaningful conversations. The key issue here is that games were envisioned as a context for therapeutic conversations. However in several new games MHC professionals have begun to use games not just as a context for conversations, but also as a context for other types of therapeutic activities.

8.3.1.1 Example 1 – Trail Blazers

Trail Blazers is a game designed to help young people to overcome difficulties with anxiety. In the main the dialogues in this game follows the same pattern as those in PI. The player meets characters who talk about specific therapeutic issues and ask the player to answer both written and spoken questions. Some video based content is also used to highlight ideas discussed in the game. However a new technique is used in a dialogue with a character called Junu, the fifth character players meet. This character introduces herself as follows:

conversation: Greetings my child, my name is Junu. I am an expert yoga instructor and a philosopher of calm.

Junu first asks the player some questions about how other people handle stressful situations and suggests some simple ideas for overcoming anxiety, e.g. talking to someone. However Junu then introduces a special technique and asks if the player would like to try it:

conversation: Another thing that many people find helpful is my specialist technique for calming down. I call this technique Relaxation Breathing and Visualisation.

conversation: I have guided many explorers in my techniques. If you ask your co-explorer maybe you can try these exercises too.

conversation: Once people have tested these techniques I always say they can try them any time they want. Even at home when they are feeling anxious.

multiChoice: Do you think you'd like to try some of these techniques at home when you're feeling anxious?

answer: Sure, why not.

answer: I can't hurt to try.

answer: I'll see how it goes.

answer: I'm not too sure.

At the beginning of Trail Blazers, the young person is asked to choose a co-explorer. It is assumed that they will choose the therapist with whom they play the game. As can be seen above, Junu invites the player to ask this co-explorer about the special relaxation technique, so that they too can try it. Relaxation, Breathing and Visualising is a common breathing exercise which can help with relaxation, and which therapists often teach to clients experiencing difficulties with anxiety. Each of the MHC professionals in the team which created Trail Blazers is familiar with this technique. In Trail Blazers as well as creating a context for conversations between the therapist and the young person, the dialogue with Junu is used to introduce this new activity, which the therapist and client can then try together. The game character also suggests that the player could try these techniques at home. Having taught a client relaxation exercises a therapist will typically ask the client to try these techniques at home in their own time. In Trail Blazers instead of the therapist making this suggestion, the suggestion is first made by the game character.

8.3.1.2 Example 2 – gNatenborough's Island

As describes in Chapter 7 gNatenborough's Island is based on a chapter from "*A CBT Workbook for Children and Adolescents*". The game was developed in collaboration with the book's author and is specifically designed for use in conjunction with the original written materials. At several points in gNatenborough's Island characters suggest activities in the workbook for players to try.

Fig 8.1 shows a diagram of a gNAT trap, designed to help young people understand the impact of negative automatic thoughts. In gNatenborough's Island Petra Venkman – the fourth character players meet – introduces the idea of catching gNATs (negative automatic thoughts) and shows players a gNAT trap:

conversation: Hi, how are you? I'm Petra Venkman.

conversation: I'm the pest control expert here in the gNAT lab.

conversation: Scott's probably shown you some pictures of different types of gNATS and told you what can happen when a gNAT stings.

conversation: The good thing is we've found a cure for the effects of gNAT stings.

conversation: The first step involves learning how to capture gNATS. You can do this using a gNAT trap.

. . . . [conversation removed]

conversation: Take a look at this picture. It might help.

videoReference: gNAT trap.avi

The video file 'gNAT trap.avi' is an animated version of the diagram shown in Fig 8.1. When this video finishes Petra Venkman also shows the player a copy of a gNAT trap made by a young girl called Shona. The player is then invited to build their own gNAT trap:

multiChoice: Ok, so now you've seen how to build gNAT traps and capture gNATS. Do you think you could build your own gNAT trap?

answer: I could give it a go.

conversation: Great. Here's one more look at a blank gNAT trap. Once you have a print out of this you can start to build your own traps.

answer: I'm not sure.

conversation: Ok, that's no problem. I reckon you're up to it. Here's one more look at a blank gNAT trap. Once you have a print out of this you can take it slowly and see how it goes.

videoReference: gNAT trap.avi

conversation: The best thing for you to do now is to get a blank gNAT trap and try filling it in for yourself.

As can be seen the game character suggests that the player gets a blank gNAT trap and then takes the time to fill it out. In this way the in game conversation with Petra Venkman is used to introduce another type of therapeutic activity, one which would traditionally be introduced by the therapist.

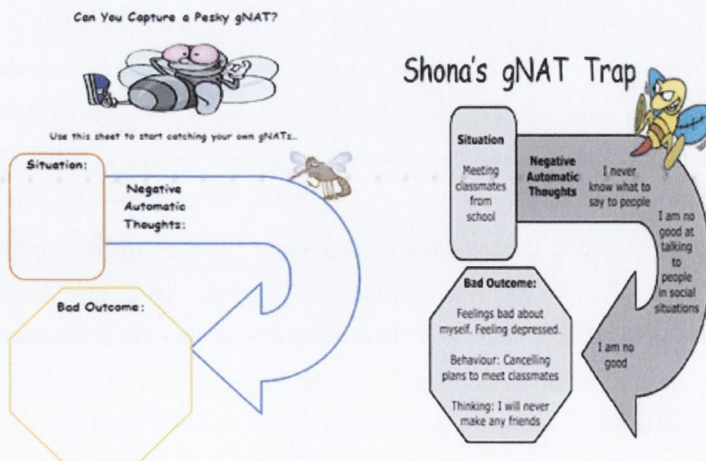


Figure 8.1 - A blank gNAT trap and a completed trap. Copyright © Dr Gary O'Reilly.

During a follow on meeting the author of gNatenborough's Island enquired about the possibility of transferring mp3 versions of game dialogues to young peoples' mobile phones or iPods, thereby allowing clients to recap on ideas when filling in paper based gNAT traps between sessions. This led to a conversation about the potential of creating a gNAT trap that works on mobile phones. An interesting aspect of this idea is that a gNAT trap is essentially a three part questionnaire. As such it could be implemented using PlayWrite. Chapter 5 discussed the potential of content being delivered on multiple platforms. A potential future expansion of PlayWrite is to enable content to be delivered on mobile phones. In future iterations of gNatenborough's Island instead of recommending that young people print a gNAT trap, the game character could provide players with a link to download a gNAT trap for their mobile phone. This mobile trap could then be used in homework activities between sessions. Finally if this approach does prove effective HCI researchers could then modify future iterations of PlayWrite to allow such ideas – e.g. the delivery of content on mobile phones – to be more effectively incorporated into further games.

8.4 Discussion

A detailed description of how future iterations of PlayWrite may evolve is beyond the scope of the present study. Whilst several potential directions have been discussed, the first main aim of this chapter has been to demonstrate that a large body of information now exists, upon which future decisions can be based. Much of this information has been collected through direct end-user involvement in the overall design process. The design approach applied in the development of PlayWrite provides many opportunities to collect such information. Alongside direct feedback from MHC professionals, the handover and game creation process provided many opportunities to observe end users working with a system and also to engage end users in further conversations and design activities. The group discussion described in Section 8.1.2 proved a particularly effective means of collecting feedback. It provided a forum in which issues could be raised and potential solutions could be discussed.

The second aim of this chapter has been to demonstrate the different types of feedback and new ideas which have emerged. Feedback has been received on a broad variety of issues, including both the strengths and weaknesses of the current system and idea to both improve and extend future iterations. In the terms of the development time and functional modifications required, these changes range from the relatively small scale to the more time intensive. For example the inclusion of a back button and the ability to replay game dialogues represents a relatively small scale functional modification. However these modifications are likely to positively impact the therapeutic effectiveness of PlayWrite. Other potential modifications are larger and will require a more intensive design process, e.g. incorporating more game play elements into future game worlds, implementing robust speech input to assist in overcoming the literacy difficulties experienced by some users, or allowing content to be delivered on multiple platforms. The design approach applied in developing PlayWrite can again be applied to new iterations.

A further important aspect of the feedback discussed in this chapter is that in many cases MHC professionals have identified therapeutically beneficial improvements which HCI researchers may not have considered. Examples include the inclusion of younger non-player characters or the development of two player mini-games, which clients and therapists can play together. The potential for games to be used as a context for other therapeutic activities is also significant. It is an open question as to whether introducing therapeutic activities in games will prove effective. What is significant here is that this new idea emerged through MHC professionals' use of PlayWrite. By allowing MHC professionals to play a more active part in the overall game development process and to create games based on their own interests and areas of expertise, new possibilities not envisioned by the initial designers have emerged. MHC professionals are now in the position in which the effectiveness of such possibilities can be investigated. If proven effective HCI researchers could then modify future iterations of PlayWrite to allow such ideas to be more effectively implemented and incorporated into further games.

A final significant aspect of the feedback presented in this chapter is the evidence from the group discussions that MHC professionals have now begun to consider how PlayWrite can be used most effectively – e.g. by increasing the use of scaled questions, incorporating questions for therapists into future games, and developing protocols for using games. Again the adaptable design approach applied in the development of PlayWrite encourages MHC professionals to begin considering such design issues and places them in a position in which they can implement and evaluate various options.

As will be seen in the next chapter clinical evaluations of games created with PlayWrite are now ongoing and in preparation. Alongside the large body of information already available, these evaluations are likely to provide further feedback on ways in which PlayWrite can be improved. As therapists conduct clinical evaluations of new games - which are likely to last at least several months and often significantly longer - feedback can be applied by HCI researchers to improve and expand the functionality of the overall system. In this way stages one and two of the adaptable design approach can begin to overlap and complement one another, with stage one being lead by HCI researchers and stage two by MHC professionals.

9 Clinical Evaluations of PlayWrite Games

Chapters 7 and 8 have described the processes through which new games were created and initial feedback was collected. The final important aspect in the overall evaluation of PlayWrite was to investigate the clinical effectiveness, or non-effectiveness, of games created with the system. This chapter provides details of a multi-site evaluation of the re-implemented version of PI, and also describes initial work and ongoing preparations for the clinical evaluation of other new games created using PlayWrite.

9.1 The Multi-Site Evaluation of Personal Investigator

As part of the evaluation of PlayWrite participating MHC professionals were given the opportunity to use PI with adolescent clients. At the point of writing PI had been used by therapists in 10 different clinics in Ireland and the UK. Results are only included for clients who had completed the game at the point of data collection (July 2007). In total feedback was received from 9 therapists, who had completed the game with 22 young people. Many of these therapists and several more have continued to use PI. Three questionnaires were used to gather feedback:

1. The client details form – this is a short form which MHC professionals were asked to complete once for each client with whom they used PI. Given the day to day time constraints facing practicing MHC professionals it was important that this form be brief.
2. The professional questionnaire – this is a longer questionnaire designed to gather MHC professionals' overall impressions. Each MHC professional filled this form in once.
3. The young person's questionnaire – this questionnaire allows young people to give their own opinions of PI. Therapists were asked to administer this form if they felt it was appropriate to do so, on a client by client basis.

The questionnaires were designed in collaboration with the MHC professional who collaborated on the design of the initial version of PI. Each questionnaire is included in Appendix J. The following sections summaries the results of the questionnaires.

Table 9.1 - Details of the mental health care professionals who used Personal Investigator.

Therapist	Position	Client numbers
T1	Clinical psychologist	1
T2	Psychotherapist	1
T3	Senior social worker	2
T4	Counselling psychologist	2
T5	Psychotherapist	7
T6	Community child care leader	2
T7	Psychiatric social worker	1
T8	Social worker, life skills trainer	2
T9	Psychotherapist	4

9.1.1 The scope and limitations of this evaluation

Before presenting the results it is important to clarify the scope of this evaluation and make a note of its limitations. As will be seen in the results sections, the majority of therapists were unable to collect questionnaires from the young people who played PI. There is also a broad variation in the numbers of clients with whom participating therapists used PI. For example, whilst T5 used the game with seven clients, several participants used the game only once. There is further variation in the age range and presenting issues of the adolescents (Table 9.2).

Formal clinical evaluations in MHC settings, e.g. randomised controlled trials, will generally be supervised by a senior MHC professional, will often involve multiple MHC researchers and will generally involve pre-trial screening to ensure results can be standardised across the client group. They will generally use standardised pre and post trial measures to monitor the impacts of new intervention approaches and will often involve questionnaires and interviews not just with therapists and clients involved, but also with parents, and sometimes with teachers and others familiar with the client's situation. Such trials often require extended durations, ranging from one to several years and are beyond the scope of the research presented in this thesis.

The study presented in the chapter was designed to provide initial evidence of the therapeutic potential of PI. Such a trial is necessary before MHC researchers can justify the time, resources and expense required to run larger scale clinical evaluations. Depending on the nature of the results larger scale evaluations may be justified.

Table 9.2 - Detail of the clients with whom Personal Investigator was used in the multisite evaluation.

Age	Sex	Presenting Issues	Sessions	Helpfulness rating
13	F	Anger management in context of living in residential care. From seriously neglectful family background.	2	Neutral
12	M	Impatience, bullying, wilfulness	1	Helpful
14	M	Had been sexually abused. Difficulty with concentration. Low mood. Low confidence.	3	Very Helpful
10	F	Behavioural difficulties. Anxieties and fear.	3	Helpful
16	M	Addiction, anger management, ADHD	2	Helpful
14	M	Lack of problem solving skills. Lack of family support.	2	Neutral
–	–	–	–	Helpful
–	–	–	–	Very Helpful
–	–	–	–	Very Helpful
–	–	–	–	Very Helpful
–	–	–	–	Helpful
–	–	–	–	Very Helpful
–	–	–	–	Very Helpful
14	M	Anger management, difficulties with father	6	Very Helpful
16	F	Self esteem, self harm & anger management	4	Helpful
12	M	ADHD. Low mood and poor self esteem. Suicidal ideation.	3	Helpful
10	M	Anger and behavioural difficulties	6	Very Helpful
10	M	Behaviour, coping skills difficulties, bullying	4	Neutral
15	F	–	1	Helpful
17	F	–	3	Very Helpful
15	F	–	2	Helpful
14	F	–	2	Helpful
*	T5 works in a service for high risk adolescents and was refused permission to reveal presenting issues, age and gender on a client by client basis.			
**	T9 stated that she was not ethically permitted to reveal clients' presenting issues.			

9.1.2 Individual client details and results

Therapists were asked to complete a client details form for each client with whom they used PI. The game was used with clients experiencing a broad range of difficulties and ranging in age from 10 to 16, Table 9.2. In the majority of cases therapists rated playing PI as ‘helpful’ or ‘very helpful’ (Fig 9.1). There were no cases in which PI was found to be unhelpful.

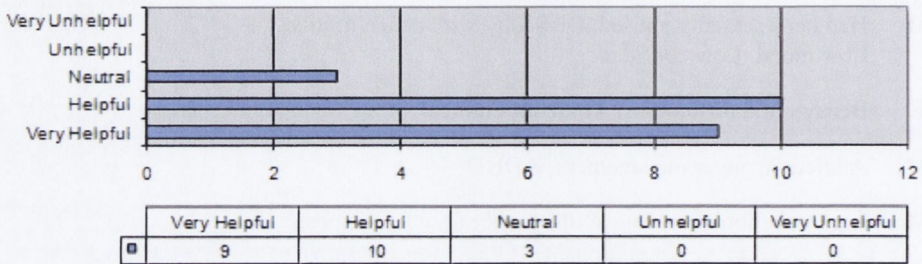


Figure 9.1 – Helpfulness ratings for Personal Investigator on a client by client basis.

Alongside helpfulness ratings, therapists also commented on the helpfulness of PI in individual cases. In the main these comments were positive, reflecting the helpfulness ratings. For example:

“He was very tired... and ambivalent about having a conversation with me. I suggested we do something different. He played PI right through and it became a kind of reflection on the work done so far. In particular it helped him recognise the support people in his life. In this way it was very positive for him.”

“PI helped this client to open up, to organise issues in his mind, to sit for longer, to engage with me and with his own problem solving skills.”

In three cases therapist gave neutral ratings on the effectiveness of the game. The therapists’ comments in these cases were:

“Young person is very troubled and currently not engaging with workers. PI did help get her to focus on some issues and take time to do so, but she chose to try to exclude me, interacting only with the computer. Subsequent discussions with her of her experience of this was also helpful to a certain extent. Difficult to assess impact at this stage. Need to do a lot more work with PI (and with this particular young person).”

“ Client has a big interest in computer games + I found that he was playing the game to get the keys to move on rather than focusing on content or the development of his knowledge or skills. It was not used as a tool in this incidence but more as a ‘game’ i.e. not to be taken seriously.”

“The client has poor literacy skills and lost interest, but enjoyed going into rooms and watching videos.”

As will be seen in Section 9.1.3 below, the concerns outlined in these comments – literacy difficulties, that clients could use the game as another means of excluding the therapist, or that the client does not engage with the therapeutic content of the game - have been identified as key concerns for MHC professionals using PI. These concerns were also reflected in the group feedback previously discussed in Chapter 8.

It is worth briefly noting that the new games created using PlayWrite were not available when therapists used PI in the multi-site evaluation. It is possible that new games may have been more appropriate and more effective with given clients. For example four clients were identified as having anger management difficulties. Temper Quest deals specifically with anger management. Having viewed Temper Quest, one therapist later stated that this new game would have been more appropriate to the given client.

9.1.3 Feedback from therapists

Therapists were asked to complete the therapists feedback questionnaire once, based on their overall experience of using PI with clients⁷. The questionnaire is divided into four sections:

1. Overall impressions – this section records the MHC professionals overall impression of PI.
2. Design features – this section is designed to identify which features of the design of PI are helpful or unhelpful, e.g. the use of a 3D world.
3. Specific Issues – this section asks MHC professionals to consider PI's impact on specific therapeutic issues, e.g. the client therapist relationship.
4. Final Opinions – this section consists of a series of open questions designed to gather MHC professional's more general opinions of PI.

9.1.3.1 Overall Impressions

As can be seen in Table 9.3, therapists expressed generally positive overall impressions of PI. Each therapist agreed that PI had a positive impact in the majority of sessions in which it was used. Each also agreed that PI complemented their traditional ways of working with clients and all but one stated that they would like to continue using PI with further clients. Two therapists gave neutral ratings to their own level of comfort in using PI with clients. In one case the therapist was using a Pentium 3 laptop – below the specifications recommended for use with PI - which crashed on two occasions due to low virtual memory. The second therapist works with clients who experience learning difficulties and expressed reservations about appropriateness of PI based on the level of literacy required to play the game.

Whilst one therapist, T9, rated the game as either 'helpful' or 'very helpful' with individual clients, she stated that she is unlikely to continue using PI. She also rated as neutral PI's ability to complement her traditional working methods. Brief details of a follow up conversation with this therapist have previously been presented in Chapter 4 Section 4.4.6. This therapist is generally adapts narrative approaches to working with clients and

⁷ T3 used PI with two clients and provided client details forms for each. However it was not possible to collect the therapist feedback form in this case.

stated that “my biggest difficulty is that PI does not fit with my way of working.... What excites me is working this way rather than the PI game”. Work done with this therapist to create two new narrative based games has been described in Chapter 7 Section 7.3.2.1. This therapist intends to use these new games with future clients.

Table 9.3 - Mental health care professionals’ overall impression ratings for Personal Investigator.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Overall PI had a positive impact in the majority of sessions in which it was used.	T2, T5, T6, T7	T1, T4, T8, T9			
I felt comfortable using PI with clients.	T1, T5, T6	T2, T8, T9	T4, T7		
PI complemented my traditional ways of working with clients.	T1, T2, T5, T6	T4, T7, T8	T9		
I would like to continue using PI with further clients.	T1, T5, T6, T7	T2, T4, T8		T9	

9.1.3.2 Design Features

As can be seen in Table 9.4 therapists again expressed generally positive opinions on different aspects in the design of PI. Alongside the scaled questions in Table 9.4, two open questions were also posed:

1. Did any of these features cause difficulties for you or any of your clients?
2. Were any of these features particularly beneficial?

The use of video based peer stories was identified as particularly effective by several therapists. For example:

“Video tapes of other young people were most powerful. Also getting the keys helped motivation.”

As well as commenting on beneficial features suggestions were also made on ways in which PI could be improved. Comments included:

“Watching the videos was very helpful- also other visuals. 3D environment with further enhancements- fluid moving and not jerky hands may also assist in visual appeal. Answering questions in the notebook was beneficial- but need to be able to return to previous page and revise those goals.”

Difficulties reading from and writing in the game notebook was the feature most frequently identified as difficult for clients. One therapist also identified the ‘local accents’ as problematic. This therapist works in a clinic in England and found that some of his clients had difficulties with the Irish accents used by game characters and the teenagers in videos.

Table 9.4 - Mental health care professionals' design feature ratings for Personal Investigator.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The 3D environment was helpful.	T1, T7, T9	T2, T4, T5, T6, T8			
Watching videos of other teenager's stories was helpful.	T2, T4, T5, T6, T7, T8, T9	T1			
Listening to the characters dialogue was helpful.	T4, T5, T7, T9	T1, T2, T6, T8			
Receiving rewards (e.g. keys) was helpful.	T2, T7	T4, T5, T6, T9	T1, T8		
Answering questions in the notebook was helpful.	T2, T5, T7, T8	T6, T9	T1, T4,		
Receiving a printed record of the notebook was helpful.	T2, T5, T7	T6, T8, T9	T1, T4		

9.1.3.3 Specific therapeutic issues

Table 9.5 summarises the results of section 3 of the professional questionnaire, in which therapists were asked to give their opinions on statements about specific ways in which playing PI can impact interventions. The 11 statements were divided into subsections on which therapists were asked to comment. The subsections were: an icebreaker (statements 1-2), the therapeutic relationship (3), structure (4), a distraction (5), engagement (6-9), goal setting (10), ownership (11).

The therapists agreed that while PI is a useful icebreaker, it is also more than just an icebreaker. Each of the therapists also agreed that playing PI can have a positive impact on the client therapist relationship. This is significant as a positive client therapist relationship is a key factor in the success of interventions, irrespective of the theoretical approach. Each therapist also agreed that PI can help in structuring sessions with young people. Comments included:

"It's my belief that a 'game' like PI enables the practitioner to enter the world of the young client congruently. It creates a safely 'barrier' that conventional talking therapies can't offer in the initial stages."

"It brings a 'third party' into the room, which for some clients makes the counselling relationship more approachable."

All but one therapist disagreed with the statement that PI is a distraction for beneficial therapeutic processes. One therapist expressed a neutral opinion. The reasons for this are discussed in Section 9.1.5.1 below.

Whilst no negative ratings were given, therapists expressed a greater degree of ambivalence about statements on engagement (statements 6-9), goal setting and ownership. In many cases therapists explained their neutral

responses by stating that they had insufficient experience of using PI to give more definitive opinions. For example:

“Haven’t really managed to use PI enough to form a clear view on most of the above section I’m afraid.” (T1 – referring to statements 6-9 and 11)

Don’t think I have used it enough to have strong views on these questions.” (T2 – referring to statements 6, 7 and 9)

The therapist who used PI with the most clients expressed the most positive opinions on the issues of engagement and ownership. This therapist’s views are discussed in greater details in Section 9.1.5.2.

Table 9.5 - The results of the specific issues section of the Personal Investigator questionnaire.

		Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
1	PI is a useful icebreaker.	T5, T9	T1, T2, T4, T6, T7, T8			
2	PI is a useful icebreaker, but it is also more than that.	T2, T5, T9	T1, T4, T6, T7, T8			
3	Playing PI can have a positive impact on the client-therapist relationship.	T5, T7	T1, T2, T4, T6, T8, T9			
4	Playing PI can help in structuring sessions with young people.	T2, T6	T1, T4, T5, T7, T8, T9			
5	PI is a distraction from beneficial therapeutic processes.			T4	T2, T5, T6, T7, T8	T1, T9
6	Playing PI can make it easier to engage constructively with adolescent clients.	T5, T6, T9	T1, T7, T8	T2, T4		
7	When PI was used clients were more enthusiastic about sessions than is usually the case.	T6	T5, T7, T8, T9	T1, T2, T4		
8	PI can help in maintaining the interest of young people during sessions.	T6	T2, T4, T5, T7, T8, T9	T1		
9	Playing PI helped to increase the amount of conversation between me and my clients.	T5, T9	T6, T7, T8	T1, T2, T4		
10	Playing PI can make it easier to agree therapeutic goals with clients.	T5, T6	T1, T9	T2, T4, T7, T8		
11	Young people playing PI experienced a greater sense of ownership of the therapeutic process than is usually the case.	T5	T2, T6, T9	T1, T4, T7, T8		

9.1.3.4 Positive features

The final section of the professional questionnaire asked therapists to answer open questions on their overall impressions of PI. Question 1 asked the participants to list the three most positive features of PI. The ability of the game to assist in building a client therapist relationship and the three-way dynamic created between the therapist, client and computer received the most positive comments:

“It helps to create a rapport and a three way dynamic. Therapist is not directly posing the questions. You sit alongside each other facing the problem.”

“Using technology (which is a common communication tool among adolescents) to assist the clinical process emphasises opening communication barriers and joining adolescents at their level. It provides a focus, and is in line with their interest level and adolescent methods of communicating. The computer screen becomes the third party in the room allowing sessions to be less directive and more relaxed, opening up the lines of communication”

One therapist did suggest that difficulties in managing the ‘three-way partnership’ could potentially be one of the most negative aspects of the game:

“Could be difficult to manage a three-way partnership i.e. client-therapist-computer, when the clients become very engaged with computer”

The appropriateness of the medium to adolescent clients was also identified as a positive feature by several therapists:

“The flexibility to use computer games instead of straight talk is valuable to teenagers. WE have to be able to communicate with young people in media they are comfortable with.”

“That it’s a computer game”

9.1.3.5 Negative features

Therapists were also asked to identify the most negative features of PI. The three most frequently identified negative features were:

1. The difficulties some clients experienced reading and writing in the game notebook.
2. A lack of functionality to replay and move backwards through dialogues.
3. Concerns that adolescents do not engage sufficiently with the therapeutic issues raised in the game.

The inability to open the notebook at any time and review previous progress was also identified as negative, as was the fact that clients receive keys irrespective of what answers they give to questions in the game notebook. Several participants also felt that the graphics used in the game, and particularly the animation of the characters, should be improved, e.g.:

“The talking characters are a bit basic for a 2007 child!”

9.1.3.6 Suggested improvements

The final question in professional questionnaire asked therapists to suggest ways in which future versions of PI could be improved. Many suggestions were made. For example one therapist wrote:

“Better graphics, hidden/discoverable content, references to other sources of help, practitioner created worlds based on client needs, links to the internet”.

Other suggestions focused on interactions issues. Suggestions included finding a way to overcome the literacy difficulties experienced by some clients, the need for greater flexibility in rewinding and replaying dialogues, and the inclusion of more game play elements. For example, one therapist made the following suggestions:

“A pause and rewind button would be great. Add sections that are purely ‘games’ in order to break up/differentiate between games and therapeutic tasks.”

9.1.3.7 Protocol for use and the importance of the therapist’s role

In general therapists provided limited feedback on questions 3, 4 and 5 of section 4 of the professional questionnaire, which asked them to identify the situations or clients with whom PI is most useful, or with whom the game should not be used. Much of this feedback was very general. One suggestion was that PI should not be used with clients who express a dislike for technology. Other feedback was more specific. One therapist suggested that the game should not be used *“as a first session as I wouldn’t like clients to think all therapy is going to be computer based”*. As discussed in Section 9.1.5.2 below one therapist has suggested that PI may prove particularly beneficial when working with elective mutes.

Several therapists made comments which highlight the importance of the therapist’s role in using PI effectively:

“Any tool in a therapist’s ‘toolkit’ that can open a dialogue of any sort can only be of benefit if used with skill.”

Another therapist commented that it is important that *“clinicians need to be aware to slow down the child’s progress and explore questions on paper as well”*. Chapter 8, Section 8.1.2.4, described a set of rules which this therapist has developed and now explains to clients before PI is used. Further development of such rules or guidelines will be an important aspect of future research. As will be seen in Section 9.2, such research is now ongoing.

9.1.4 Client feedback

Eight of the nine therapists were unable to collect client feedback questionnaires. In several cases permissions was refused by the MHC services with which they work. In other cases therapists felt it was inappropriate to ask clients to complete a questionnaire. One therapist did collect feedback questionnaires from two of the four clients with whom she used PI. Given such limited numbers, further details of these questionnaires have been omitted from this results section. The collection of client feedback should be a key objective of future studies.

9.1.5 Case studies

In order to provide a more detailed account of therapists' use of PI two case studies are now presented. The first describes the difficulties a therapist experienced when using PI with clients with learning difficulties. The second is on the therapist who used PI most often and spoke most positively of its therapeutic impact.

9.1.5.1 Case study 1

This therapist works with a service which provides support to adolescents experiencing both mental health and learning disorders. She has used PI with two clients and experienced difficulties in both cases. In the first case the client was identified as having ADHD and anger management problems and also has mild learning difficulties. Overall the therapist felt that playing PI was helpful for this client and stated:

"Client had attention difficulties – is a heavy hash user and has ADHD. Found PI was useful tool in keeping his attention for longer + giving him a focus. When we use the game his body language suggests he is more attentive. PI helped this client to open up, to organise his own mind, to sit for longer, to engage with me + his own problem solving skills."

However the amount of reading and writing in PI did cause difficulties:

"A lot of reading + writing required which client found difficult. For this client literacy and comprehension levels are quite low so it was quite difficult for him to read the blurbs in the journal (most of which I did), and also understanding what it meant at times was difficult for him. Led client to become frustrated."

The second client also had learning difficulties and again had difficulties with the game notebook:

"Again he did not understand some of the language used and could not read the blurbs."

With this client the game was introduced in sessions 3 "as a talking point to give the sessions some focus and structure". However the therapist felt that whilst "the client himself liked the game and was very keen to play it, he sees it just as that, i.e. he is more concerned with getting the keys and moving on than understanding and reflecting on the concept of the questions posed to him." When required to deal with issues in the game notebook he became bored, partially because of the difficulties he experienced in reading the text and writing answers. In this case PI received a neutral helpfulness rating. The therapist also chose not to complete the game with this client. This was partially because of the issues outlined above but also because issues arose, which the therapist felt were not compatible with the game:

"Issue not relevant/compatible with the game arose so the game was paused until the issues had been worked though."

This therapist made several recommendations for how games such as PI could be improved for clients such as this. She suggested the addition of a pause and rewind button would be beneficial and also suggested "sections that are purely games in order to breakup/differentiate between 'games' + therapeutic tasks".

The therapist in this case study is also the MHC professional who used PlayWrite to create a modified version of PI, in which the contents of the game notebook have been simplified and open questions have been replaced by multi-choice and scaled questions. This game has previously been discussed in Chapter 7. The therapists stated:

“In the current version of the game I am working on I will try to change some of these features (referring to notebook issues) to accommodate my clients better.”

Alongside modifications such as those made by this therapist, future iterations of PlayWrite will benefit from taking account of the learning difficulties experienced by many adolescent clients.

9.1.5.2 Case study 2

This case study describes the opinions of the therapist who has used PI most often. He is also the therapist who has expressed the most strongly positive views on the game. For example:

“I can't speak more highly of PI than it's a really fantastic idea. It's potential is only limited by the imagination. The notable benefit has to be removing the impact of face to face grilling, which for young people who want to oppose adults has to be a plus”

This therapist works in service for high risk adolescents, referred from other services due to behavioural difficulties. Such adolescents are often amongst the most difficult groups for therapists to successfully engage with. In all this therapist used PI with seven clients and stated that the game was ‘helpful’ in two cases and ‘very helpful’ in five.

The therapist strongly agreed with statements on PI benefits as an icebreaker, as an aid to the therapeutic relationship and client engagement. He is also the therapist who expressed the strongest opinions of PI’s ability to help clients take ownership of the therapeutic process:

“The cognitive goal of PI is to enable and encourage the client towards ownership of the problem. Talking therapy alone can take up to 3 or 4 times longer to reach the same small part of understanding that PI can bring out in 1 session.”

One of the issues also addressed in feedback is the importance of the therapist’s role in using PI effectively. For example he states:

“Skilful use of the introduction of PI into a session just makes for better and better interventions that students/clients can handle at their own pace. Any tool in a therapists ‘toolkit’ that can open a dialogue of any sort can only be of benefit if used with skill”

The therapist describes the way in which he used PI to complement some of his other day-to-day techniques. For example, if he feels that a client has a moment of significant understanding while playing PI, he will move away from the computer and address this issue in more detail:

“Playing PI created some nice ‘Aha moments’... Moving away from the PC at these points, using reflection flowcharts, mind maps etc helped to solidify the new learning and turn what was once a block or problem into a manageable challenge that can be dealt with one piece at a time.”

What is significant here is that this therapist has integrated the game with his traditional working methods and has begun to use PI as a context for, and complement to, other forms of therapeutic work. As such PI has become part of this therapist’s overall therapeutic toolkit, rather than a standalone game used in isolation.

When asked to identify situations in which PI proved particularly useful, the therapist identified work with clients who are ‘elective mutes’. Elective mutes are clients who repeatedly choose not to talk with therapists during sessions. One client with whom this therapist used PI was described by him as an elective mute. When PI was introduced this client began to engage in conversations, where none had previously occurred. It is worth noting at this point that a similar case arose during the initial pilot evaluation of PI. As described in Chapter 4 Section 4.3.2 a client, with whom the therapist had only limited dialogue during seven previous sessions, engaged in substantially more dialogue after PI was introduced. If these cases are corroborated by future evaluations of PlayWrite games, this would be a significant finding, as it would indicate that games such as PI offer therapists a new way of working with a client group which has proven difficult to engage by traditional means.

9.1.6 Conclusions on the therapeutic potential of Personal Investigator

In spite of the recognised limitation in the evaluation of PI, there are strong initial grounds to suggest that PI offers several therapeutic benefits. Such results further validate the collaborative design approach applied in developing the game. Feedback has been received from therapists working independently in 9 different MHC services. This feedback suggests that PI can serve as a useful icebreaker, can assist with the client-therapist relationship, can help in structuring sessions and can assist in engaging adolescent clients. Further studies are required to confirm these initial findings and establish if these benefits also apply to other games created with PlayWrite. Also, as a detailed examination of specific issues has been beyond the scope of the present study, it will be beneficial if future studies use established methods for measuring specific therapeutic outcomes. For example the Working Alliance Inventory is an established method for measuring the strength of the client therapist relationship (Horvath & Greenberg, 1989). As described in Section 9.2 below, several formal evaluations of this type have now been initiated by mental health research groups.

Many of the interaction difficulties identified by therapists who have used PI – e.g. literacy difficulties, the need for more flexible playback and concerns about clients engaging with the game but not with the issues – are similar to those identified in the original pilot study presented in Chapter 4. As previously noted addressing these issues will be a priority in future iterations of PlayWrite.

9.2 Evaluations of new games

At the point of writing preparations are underway for several formal studies of games created with PlayWrite. Details of these studies are given in Sections 9.2.2 and 9.2.3 below. To date one new game, Temper Quest, has been used in a clinical setting. Several further teams are also making preparations to use and evaluate the new games they have created. For example the team which created Trail Blazers have submitted an ethics proposal for the use of the game. One of the early issues to arise in this process is that several character voiceovers should be re-recorded, before the game is used clinically, as the review team felt they lacked the appropriate emotional tone. Preparations are also underway to evaluate the modified version of PI.

9.2.1 Temper Quest

Temper Quest is the first of the new games created with PlayWrite to be used in a clinical setting. At the point of writing the MHC professional who created Temper Quest had completed it with one client. The MHC professional was asked to provide a brief description of this case.

The client was experiencing “temper tantrums”, had “witnessed domestic violence in the past” and was described as “too restless to sit and talk”. The therapist and client played Temper Quest together and the therapist described it as ‘very helpful’, stating:

“The game gave us a focus. He sat with the laptop and wrote answers ... after a while this was tiring and he dictated his answers to me. We saved the game and I posted him the printout a few days later.

The original aim of this game was to support a child to take a position on Tempers ... so not to direct him but to help him clarify the place he would like Tempers to take in his life ... and I think the fact that the questions were structured and planned in advance freed my attention up to be more supportive and chatty. In that way it helped keep me on track without having to work so hard. Getting the printout also allowed his Mam to be included. She is usually present at sessions but was not at this one.”

Whilst it is not reasonable to draw conclusions based on a single use of Temper Quest, this case does provide preliminary evidence of the therapeutic potential of new games created with PlayWrite.

9.2.2 Queens University Belfast study

A clinical psychology research team associated with Queens University Belfast has submitted a proposal, and received funding for a project will allow a PhD student to conduct a three year study of games created using PlayWrite. The objectives of this study are as follows:

This study aims to add to the knowledge base about effective therapeutic approaches with looked after children, by addressing the following research questions:

1. *What strengths-focused therapeutic content and process can be represented in digital therapeutic game formats?*

2. *How can engagement, motivation and therapeutic alliance with LAC be facilitated by digital therapeutic gaming?*
3. *Can digital therapeutic gaming support positive therapeutic outcomes?*
4. *Can the therapeutic effectiveness of social-care staff be improved through the use of therapeutic gaming with clients?*

The overall project aim is to develop a number of digital therapeutic games, to establish the preferred ways of using these games and evaluate their effectiveness with young people in care.

The final line above is significant. It indicates that the team aim to create a number of games and also to explore how these games can be used most effectively. The flexibility of the PlayWrite system enables MHC professionals to address issues such as these. Developing protocols for using games effectively is also a key aspect of the study.

9.2.3 University College Dublin studies

The game gNatenborough's Island was created by the deputy director of the clinical psychology PhD program in University College Dublin (UCD). Each year this program provides placements for 10 doctoral students. The deputy director has placed a call for expressions of interest from students in the 2007 intake, to conduct a clinically controlled study of games created with PlayWrite. This study would be three years in duration. The aim is to provide a detailed clinical evaluation of PlayWrite games, using established methods for measuring therapeutic outcomes. The study would include pre and post-trial measures with both therapists and clients and also, where appropriate, with the client's parents and teachers.

A further study has also been initiated by a researcher with the Educational Psychology program in UCD. This is a one year study. It will investigate the use of an anger management game - possibly Temper Quest - in group interventions with adolescents in a local school. The aims of this study are as follows:

1. *To work in collaboration with the School Completion Programme who work in the school and regularly support students at risk of anger and aggressive behaviour*
2. *To gather baseline data from participants, their parents and their teachers, on*
 - a. *anger and externalising behaviour, using a standardised assessment tool*
 - b. *aggressive behaviour, using observation schedules*
3. *To deliver a 6 week programme (two forty minute sessions per week) using the computer game as the main intervention tool*
4. *To gather information on frequency and intensity of aggressive behaviours throughout the programme, using observation schedules*
5. *To gather data on anger, externalising behaviour and aggressive behaviour, post-intervention and at a 3 month follow up*

6. *To analyse the data to establish whether there has been a significant reduction in anger, externalising behaviour and aggressive behaviour, attributable to the intervention programme*

As can be seen this study will make use of standardised measures, will involve pre and post test measures, and will involve input from parents and teachers as well as the young people and the counsellor.

9.3 Discussion

The multi-site evaluation of PI has provided initial evidence that games created using PlayWrite can be therapeutically beneficial in adolescent MHIs. As described in Section 9.2 further studies of new games are now ongoing and in preparation. Each of these studies is being led by MHC professionals and will apply a degree of rigor not possible in the study presented in this thesis. These studies also have the advantage of simultaneously evaluating multiple adaptations of the PlayWrite application, e.g. delivering content which implements different therapeutic approaches or targets different disorders. Such evaluations have the potential to provide independent validation of the effectiveness, or indeed the non-effectiveness, of the interaction approaches used in the system.

One of the key objectives of the adaptable design approach proposed in this thesis was that it should enhance the potential for effective collaboration between HCI and MHC professionals. It was hoped that stages one and two of the adaptable design approach could begin to overlap and complement one another, with stage one being led by HCI researchers and stage two by MHC professionals. As systems are developed at stage one they can be taken to stage two for clinical evaluation. The results of this evaluation, and also of the handover process, will feed back into further design and development at stage one, which in turn provides further possibilities for clinical evaluation at stage two.

The PlayWrite system has now reached this stage. The potential for mutually beneficial collaboration has evolved, in which clinical evaluations and system development can proceed in parallel and complement one another. The initial evaluation process has provided a rich source of information for future development cycles. Ongoing studies are likely to provide further feedback. While HCI researchers focus on the designing, developing and improving frameworks for delivering therapeutic content, MHC researchers can adapt these systems for use in various interventions and evaluate their therapeutic benefits. As is the case of the Queens University study, developing protocols for using a system effectively should be one of the key aims of clinical studies. It is important to note that collaboration remains an important aspect of ongoing development and evaluation stages. While stage one is led by HCI researchers it will continue to benefit from the input of MHC professionals. Similarly stage two, while led by MHC professionals, will benefit from the input and support of HCI researchers. Whilst HCI researchers provide input to and collect feedback from clinical evaluations, MHC professionals can provide input into the ongoing design process and can also provide expert reviews of new iterations.

10 Discussion, Conclusions and Future Work

The introduction to this thesis suggested that previous research on the use of technology in talk-based MHIs has, in the main, focused on developing computerised approaches which copy existing non-computerised methods. Future research will benefit substantially from the involvement of both HCI and MHC professionals. Effective collaboration can help to move research to a new level, in which more specialist systems offer therapists new possibilities for working with clients. Whilst collaborative design, involving domain experts, is desirable in most design spaces it has a particular significance in the MHC domain. As outlined in this thesis, the ethical constraints and stigma associated with MHIs mean that it is generally not possible for HCI researchers or practitioners to have direct contact with people undergoing clinical treatment. Even limited second hand observation of clinical interactions is likely to prove ethically difficult. Difficulties caused by lack of access are further exacerbated by the fact that few MHC professionals currently have the experience required to design or develop new technologies or to rigorously evaluate them to the standards required for successful introduction to clinical settings. Alongside the challenges of access, design approaches must take account of the importance of adaptability and of the time required to conduct clinical evaluations in the MHC domain.

This thesis has proposed and provided a practical illustration of an adaptable approach to the design of technology in talk-based MHIs. The overall aims of this approach are twofold. Firstly it aims to support effective collaboration between HCI and MHC professionals and allow MHC professionals to become more active partners in the overall development process. Secondly it aims to provide a sustainable approach to the development of user-centred technologies, which takes advantage of the expertise of MHC professionals and takes account of the importance of adaptability in MHC settings.

PlayWrite is an implementation of proposed approach. The aims in developing PlayWrite were again twofold. Firstly to evaluate and attempt to provide a validation of the proposed design approach, and secondly, to explore the approach in greater detail and provide a better understanding of the methods required to successfully implement this approach in MHC settings. The final chapter of this thesis now addresses two key questions:

1. Has the evaluation of PlayWrite provided a validation of the adaptable design approach?

2. What lessons have been learned about the methods required to successfully implement the approach in MHC settings?

Having addressing these issues this chapter also discusses the limitations of the adaptable design approach and of current understanding in this domain. Based on this analysis future research directions are discussed.

10.1 Validation of the Adaptable Design Approach

This section discusses the validation of the adaptable design approach from two key perspectives. Firstly does the approach provide a sustainable approach to development of user-centred systems, which are suitable for use by a broad variety of therapists, with a broad variety clients? Secondly, does the approach support effective collaboration between HCI and MHC professionals?

10.1.1 Suitability to a broad variety of therapists and clients

The importance of adaptability in MHC settings has been discussed at various points in this thesis. For example, the evaluation of PI demonstrated that small design features can limit the effectiveness of a system, or even make it unusable for many therapists and clients. The adaptable design approach aims to overcome this difficulty by developing flexible systems which can be adapted by MHC professionals to suit their own needs and those of their clients. In this thesis the focus has been placed on content oriented adaptation. The approach separates systems development from content development. It allows HCI researchers to focus on developing and improving systems which support broad therapeutic objectives e.g. client engagement and improving the client therapist relationship. MHC professionals can then tailor systems to meet the needs of specific therapeutic interventions.

This thesis has identified several aims by which the success of a system can be judged. It is suggested that systems should ideally be adaptable to:

1. A broad range of theoretical approaches
2. A broad range of mental health disorders
3. A broad range of socio-cultural groups
4. The specific needs of individual clients

The evaluation of PlayWrite has demonstrated that it is possible to develop systems which achieve these aims. Games have been created which meet the first three aims. MHC professionals have also indicated in interest in adapting games to meet the needs of individual clients. Whilst clinical evaluations are necessary to confirm the therapeutic effectiveness of new games, it is likely that enabling MHC professionals to adapt games has greatly increased the usefulness of the PlayWrite system. The system can now be adapted by end users (therapists) to meet their own requirements and those of their clients. Given the time required to evaluate any single application in a MHC setting this is a significant benefit. Given the importance of client factors in

MHIs it is also significant that systems can be adapted to suit the needs of clients. When questioned about PlayWrite, the flexibility of the system is the feature most often identified as positive by MHC professionals.

10.1.2 Supporting effective collaboration

The second major aim for the adaptable design approach was that it should support effective collaboration between HCI and MHC professionals. The evaluations of PlayWrite have provided strong evidence that the approach does support effective collaboration. Fig 5.1 provided an initial overview of the two stage approach. Fig 10.1 describes the process which has evolved in the design and evaluation of PlayWrite. It is important to briefly note that Fig 10.1 acknowledges a further stage, clinical use, in the overall design picture. This stage is discussed in Section 10.1.2.4. However, for the purposes of the discussion presented here it is stages one and two which remain significant and discussions still refer to a two stage design approach.

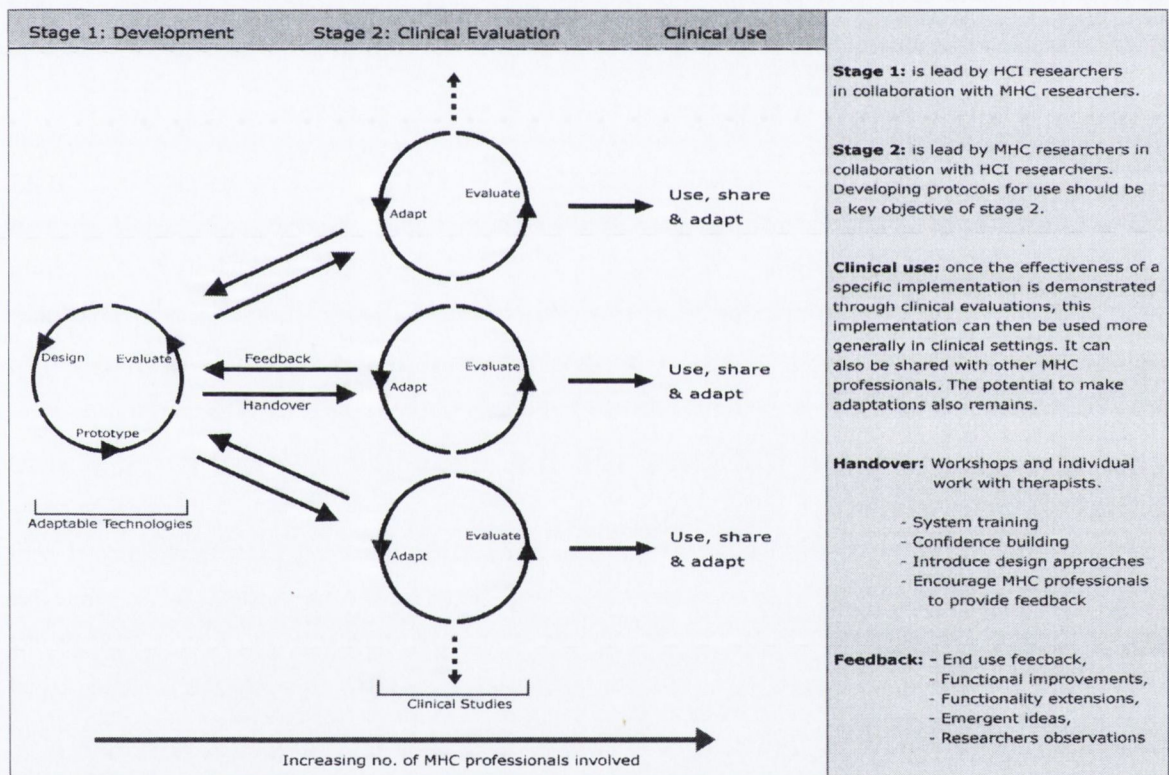


Figure 10.1 - Adaptable design with multiple clinical partners.

10.1.2.1 Stage one – the development cycle

Stage one of the adaptable design approach focuses on the design and development of adaptable technologies. The aim at stage one is to develop and evaluate systems to the point where they are shown to be usable by the target end users, are agreed to have clinical validity and are predicted to have therapeutic benefits. One of the predicted benefits of the adaptable design approach is that, as a system evolves, stages one and two can begin to overlap and complement one another, with stage two providing feedback for stage one. However the initial design process begins at stage one and as such, during the initial development phase, feedback from stage two

is not available. This limitation can be overcome by applying the lessons of previous research and through collaboration between HCI and MHC professionals.

Stage one must consider two sets of complementary applications: content creation applications and content delivery applications. As described in Chapter 5 a broad variety of established HCI techniques can be applied in the design, development and evaluation of content creation applications, as contact with MHC professionals is not restricted. MHC professionals can participate in a wide range of design activities and formative evaluations such as those described in Chapter 6 can be conducted. It is however ultimately the success of content delivery applications which will determine the success of any system. There is little point in developing a system which can be adapted to many situations, but is ineffective in each case.

Chapter 4 described the iterative approach, involving collaboration between HCI and MHC professionals, which was applied in the development of PI. The content delivery template designed in this project was later used in PlayWrite. Allowing for balanced input, from both the HCI and MHC domains, when significant design decisions were made, was a significant factor in the success of this process. The combination of a general user-centred ethos with direct input from MHC professionals and a consideration of MHC theory can provide a strong basis for decisions made during the development of content delivery applications. Fig. 4.1 shows one possible set of decision making criteria. The advantage of establishing an explicit set of criteria is that it can help to ensure that the discussions of different design decisions remain open. If important aspects of a decision are not being considered, be it HCI or MHC, the relevant party has an explicit map to which they can refer in order to ensure various perspectives are properly considered. For example, once agreed by the design team, a diagram such as that shown in Fig. 4.1 could be pasted on the wall of a design room.

The initial evaluation of PI also demonstrated the potential of another form of collaboration during the initial development cycles. Evaluations of PI by independent MHC professionals proved effective in identifying many interaction difficulties later confirmed by clinical evaluations. Improving the effectiveness of non-clinical evaluations will be a key aspect of future work. Alongside non-clinical evaluations it is possible that the development cycle should also include small scale (formative) clinical evaluations – such as the evaluation of PI described in Chapter 4 – prior to the ‘handover’ to stage two. Alongside providing an initial validation of the therapeutic potential of a system, such evaluations can reduce the potential for major functionality difficulties when a system is releasing for more intensive evaluations at stage two. Given the time and expense involved in longer clinical studies this is significant.

It is important to note that stage one of the adaptable design approach does not require regular input from a large number MHC professionals. Whilst activities such as requirements gathering may benefit from access to larger numbers of MHC professionals, the design team need only include a smaller number of MHC professionals, who have a direct input into design decisions.

10.1.2.2 Stage two – Evaluations with multiple clinical partners

Stage two of the adaptable design approach focuses on clinical evaluations. At this stage MHC professionals have the opportunity to adapt systems to suit their own needs and those of their clients, and then evaluate systems in clinical settings. As well as evaluating specific therapeutic issues, stage two should aim to develop protocols and guidelines for the clinical use of any system.

As described in chapters 7 to 9, and as shown in Fig 10.1, the evaluation of PlayWrite involved working with multiple clinical partners. In total 32 MHC professional from 18 different services participated in the handover and game building process. Each participant was actively involved in using PlayWrite to create new content and games, based on their own requirements and areas of expertise. Alongside creating new content and games each participants was also encouraged to contribute feedback on the system. It was hoped that by more actively involving therapists in the overall design process they would become active in providing feedback, not just on therapeutic issues, but also on usability issues and ideas for extending and improving a system.

As described in Chapter 8 a large body of feedback on the PlayWrite system has now been gathered. This feedback focuses on a broad variety of ways in which the system can be improved and extended. Alongside direct feedback from MHC professionals Chapter 8 also discussed researcher's observations. The handover and game building process provided many opportunities to observe MHC professionals use of the system. Finally by allowing MHC professionals more freedom to experiment and to independently develop content, several new ideas have emerged which were not envisioned by the original designers of PlayWrite, e.g. the potential to use games as a context for other therapeutic interactions. Fig 10.2 highlights several different forms of feedback which can be gathered during the adaptable design process.

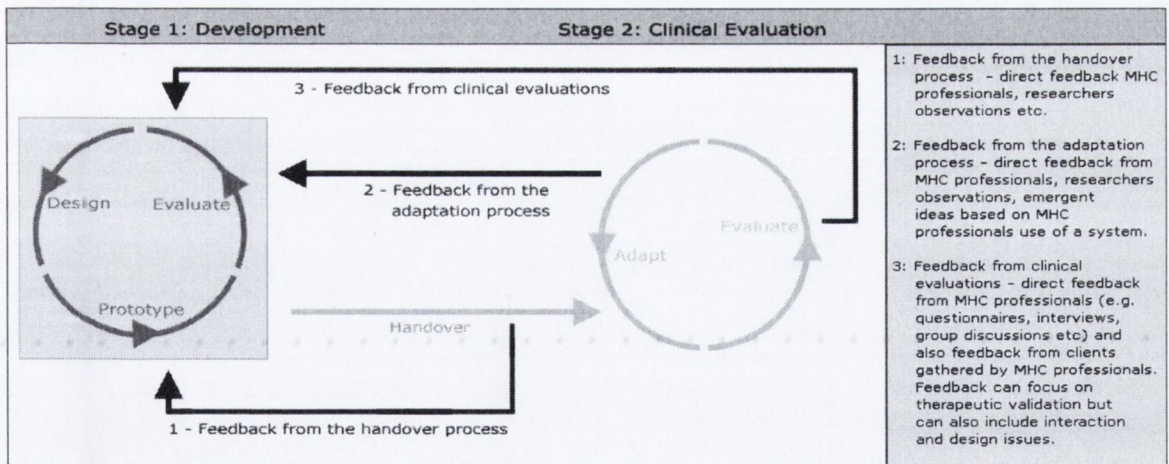


Figure 10.2 - Sources of feedback.

The PlayWrite system has now reached the point at which multiple simultaneous evaluations are both ongoing and planned. Each of these evaluations is being lead by a MHC professional and will be conducted in collaboration with Trinity College. It is likely that these evaluations will provide further feedback which can again be applied in future iterations. These evaluations will also provide multiple independent validations of

the therapeutic effectiveness, or non-effectiveness, of the interactions approaches used in PlayWrite. Further to this the evaluations will help to develop guidelines and protocols for the effective use of the system in clinical settings. In the case of the Queens University Belfast study, developing such guidelines is an explicit aim of the study. This team aim to create multiple games which they will assess and evaluate. It is the flexibility of the PlayWrite system, an implementation of the adaptable design approach, which has enabled such studies.

10.1.2.3 Complementary development and clinical evaluation cycles

One of the potential benefits of the adaptable design approach is that a process can evolve in which clinical evaluations and system development can proceed in parallel and complement one another. The PlayWrite system has reached this point. A new development cycle could now begin, in which HCI researchers can apply the large body of feedback gathered during the handover and evaluation phase to both improve and extend the system. HCI researchers can also provide support to clinical evaluations, whilst MHC professionals can provide input into the new design and development process and can provide expert reviews of new iterations.

10.1.2.4 Clinical use

The adaptable design approach, Fig5.1, describes a two stage approach to development and evaluation. Fig 10.1 acknowledges a further stage, clinical use. If the therapeutic effectiveness of a system is demonstrated through clinical evaluations, various adaptations/implementations can then be 'released' for use on a more general basis and can potentially be shared with other MHC professionals. The option to make adaptations also remains. Chapter 5 described a model of use for systems:

- Small groups of expert MHC researchers and practitioners develop and adapt content for use within their own areas of expertise e.g. targeting specific disorders and implementing specific intervention models.
- Larger groups of practitioners use these implementations with clients and have the option of making small scale adaptations to suit the needs of specific demographic groups or clients.

The general release stage in the lifecycle of a system has not been a major concern of the research presented in this thesis. Protocols and a further handover process will likely be required at this stage. For example it is likely that the handover process should include systems training and also protocols and guidelines for using the system in clinical settings. Protocols developed by MHC professionals at stage two can contribute to this process.

10.2 Lessons Learned

This section discusses some of the additional lessons learned during the development of the PlayWrite system, and based on the overall process and the issues discussed in this thesis, provides a set of guidelines for the development of technology in talk-based MHIs.

10.2.1 The handover process

The handover process is critical to the success of the adaptable design approach. Alongside providing MHC professionals with initial systems training, the handover process provides the opportunity to engage participants in many design activities. It is likely that the research presented in this thesis has only begun to explore the possibilities offered by the handover process, and further more detailed exploration of this process will be a key area for future work. However several lessons have been learned.

Many of the MHC professionals who participated in the evaluation of PlayWrite express anxieties about their own ability to use computers. Helping participants to overcome these anxieties is a key aspect of the handover process. Activity based workshops, in which participants are given the opportunity to experiment with a system, are an important aspect of building the confidence of MHC professionals. It is also important that the handover process should encourage participants to review and evaluate an overall system, focusing not just on therapeutic issues, but also on ideas for improving and extending the system. Again actively using a system can help with this process.

Finally, Chapter 7 described the evolution of the PlayWrite handover process and discussed an important lesson which emerged. Later workshops placed a greater emphasis on providing therapists with a more structured approach to building new games, and also introduced them to some initial design concepts e.g. iterative design. The introduction of these design ideas helped participants to create initial prototypes, and helped to overcome their tendency to become overly involved in a fine detail analysis of game content too early in the design process. It is likely that further studies of such issues, and the introduction of more structured design approaches, to both the handover process and within systems, will prove beneficial.

10.2.2 The importance of protocols

In developing any system for MHC settings the development of protocols for the use of that system should be a key element of the overall process. Given the sensitivity and ethical requirements of the MHC domain protocols must be developed for each aspect of an overall system. For example, during the group discussions of PlayWrite, described in Chapter 8, MHC professionals requested protocols be developed for issues including how to build effective games, how to use games effectively with adolescent clients and how to ensure the security and privacy of sensitive client information. In MHC settings it is not just the design of systems, but also the way in which systems are used, which will determine their therapeutic effectiveness.

10.2.3 The Cognitive Dimensions

The Cognitive Dimensions were mentioned briefly in Chapter 6 and are again mentioned briefly at this point. The value of the Cognitive Dimensions for design in this domain lies in the fact that firstly they are broad brush approach that can be applied at any stage of the development process, and secondly they are accessible to a wide range of technical and non-technical people. The Cognitive Dimensions were found to be a useful mechanism for structuring discussions during the design of PlayWrite, and in reviews of early prototypes. During formative evaluations they also provided a useful way of structuring reviews of issues such as the

visibility of options and ease of testing. The Cognitive Dimensions are one example of a HCI technique which can be applied within the overall structure of the adaptable design approach.

Future work is likely to benefit from the application of other HCI techniques. For example, the evaluations of PI and PlayWrite highlighted the importance of considering the literacy and learning difficulties of many adolescent clients attending MHC services. Dependent on the client group for which a system is designed, it is likely that further similar requirements may become apparent. It is possible that HCI research from the area of Inclusive Design will prove useful in addressing such issues. For example Poulson and Richards (1998) describe the USERFit methodology for user-centred design of technologies which are sensitive to the differing needs of various users.

10.2.4 Design guidelines

Based in the lesson learned and the issues discussed in this thesis, Table 10.1 describes a set of guidelines for the design of technology for talk-based MHIs. The guidelines presented in Table 10.1 are an updated version of those recently published in (Coyle et al., 2007). They are intended to complement the adaptable design approach.

The majority of the guidelines listed in Table 10.1 have been addressed in previous chapters. Table 10.1 does however include one new category, 'designing for outcomes'. This thesis has previously identified two key challenges facing MHC services: access and engagement. Whilst Table 10.1 describes many desirable outcomes, each of these outcomes can, in many respects, be classified as contributing to overall improvements in either access or engagement. For example outcomes such as cost savings or time savings can ultimately contribute to increasing the number of people to whom MHC services are available. Improvements in client self efficacy or the client-therapist relationship can ultimately improve the degree to which clients engage in the overall therapeutic process. Across a broad range of MHIs, improvements in access and engagement will likely contribute to improved outcomes and improved consistency in care.

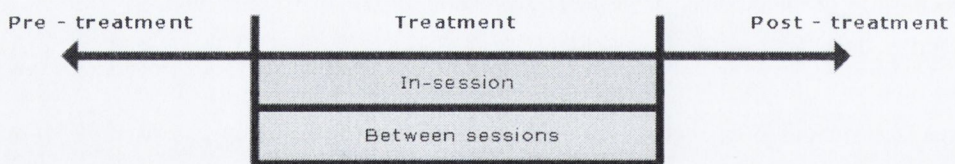


Figure 10.3 - The potential span of technology based support.

Finally, the design guidelines also make a note of the potential of technology to offer more flexible services and to offer support to clients between sessions. Whilst the practical application of the research presented in this thesis has focused on developing systems for use in clinical sessions, developing systems for use in a variety of settings will be an important aspect of future work. Fig.10.3 identifies the broad areas in which technology can be applied to assist in improving MHC services. Understanding and managing how computer based services are delivered and integrated across these settings will also be a key aspect of future work.

Table 10.1 - Guidelines for the design of technology in talk-based mental health interventions.**Clinical Validity:**

- Design systems based on accepted theoretical models of mental health care.
- Design systems in collaboration with mental health care professionals.
- Target important aspects of therapeutic interventions e.g. client engagement, the client therapist relationship, personal stories, psychoeducation.

Therapist Considerations:

- Design systems which take advantage of the existing skills and experience of therapists.
- Design systems which integrate with therapists current working methods.
- Do not place extra time pressure on already busy therapists.

Access and Engagement:

- Choose technologies appropriate to a given client group.
- Design for client engagement and reduced stigma.
- Systems which help to establish, maintain or enhance client-therapist relationships are highly beneficial.
- Design systems which encourage client self efficacy.
- Offer clients flexibility in the delivery of therapeutic services.
- Provide support to clients between therapeutic sessions.

Protocols:

- Developing protocols for the use of a system should be a key aspect of the overall design process.

Practical Considerations:

- Ensure the usability of systems by the target user groups
- Ensure the security and perceived security of systems

Adaptability and Sustainability:

- Design systems which can be adapted for use across a broad range theoretical approaches and disorders and with various demographic groups and individual clients
- Design for sustainability by placing the ability to make adaptations in the hands of MHC professionals

Collaborative Design

- Apply design approaches which support effective collaboration between multidisciplinary teams, e.g. HCI and MHC professionals.

Designing for Outcomes:

- | | |
|---|---|
| • Increased access | • Increased client engagement |
| • Cost savings | • Improved client-therapist relationships |
| • Time savings | • Increased dialogue between therapists and clients |
| • Increased flexibility in service delivery | • Increased client self efficacy |
| • Improved outcomes | • Support outside of clinical sessions |
| • Improved consistency | |

10.3 Limitations and Future Work

The adaptable design approach and design guidelines proposed in this thesis can assist in the design of technology for talk-based MHIs. However, by necessity the research presented in this thesis has addressed broad, high-level aspects of designing for the MHC domain. At the outset no context existed for the examination of more focused HCI issues. Further work is now required to provide a more detailed understanding of the techniques best suited to different stages of an overall design process. In related areas such as Assistive Technology and Inclusive Design, researchers have developed detailed domain specific techniques for user-centred design. For example Newell and Gregor (2000) have developed an approach entitled User Sensitive Inclusive Design. Poulson and Richardson (1998) have developed the USERFit methodology for user-centred design of assistive technology. Similarly detailed models are required for the development of technology in talk-based MHIs.

Several potential areas for more detailed exploration have been noted at various points in this thesis. For example, the oversight of the importance of literacy difficulties for clients in the design of PI has been discussed. Investigating techniques which minimise such oversights, and which help HCI researchers to gain access to the tacit knowledge of MHC professionals, is a worthwhile aim for future research. Approaches such as scenario based storytelling and role-playing may prove effective. Investigating techniques which increase the effectiveness of non-clinical evaluations is another worthwhile research objective. For example heuristic evaluations have been shown to be effective in other HCI domains. Is there an appropriate and effective heuristic checklist for technologies in the MHC domain?

The design approach proposed in this thesis is likely to prove most effective for systems in which beneficial forms of adaptation can be identified. It is also necessary that the forms of adaptation offered by a system are appropriate to the skills of MHC professionals. Whilst this thesis has focused on content oriented adaptation, future research may explore different forms of adaptation. For illustrative purposes, two examples are discussed. First, Kanis and Brinkman (2007) describe a mobile system in which message templates created by the designers determine the ways in which users are allowed to communicate. The templates are designed to encourage users to share positive thoughts. Such a system may prove beneficial in MHIs. However agreeing appropriate templates will not be a trivial task, and indeed any fixed template is likely to limit the usefulness of the system. A more interesting approach would be to develop a flexible system which allows MHC professionals to create and experiment with different templates, based on their own needs and those of their clients. The second, more speculative example is the application of early work on adaptive computer systems, which can begin to detect, label and react to the emotional and social needs of users. Bickmore and Picard (2005) have provided initial demonstrations of the benefits, in physical health care, of playful empathic conversation agents designed to create a perception of caring. It is an open question as to whether combining elements of fun with affective systems embodying fundamental therapeutic values (e.g. respect, empathy and genuineness) offers the potential to improve the effectiveness of computerised MHC delivery. For example, what are the optimal computer therapeutic values and are they the same as, or different to, the optimal human

therapeutic values? Is the absence of human values a forte of computerised systems, in that clients using such systems know they are dealing with a system, and don't feel judged or restricted in their presence? The identification of optimal computer therapeutic values, and of their appropriateness to differing situations, would be a valuable contribution to future research in this area. However such questions can only be addressed through experimentation. The development of systems which can be adapted by MHC professionals, and which allow for such experimentation, is a worthwhile and complementary research objective.

One limitation of the adaptable design approach is the absence of input from clients into the overall design process. Whilst limitations on access to clients are an inherent aspect of design in the MHC domain, future work should seek to find new ways of overcoming this challenge. The adaptable design approach seeks to address this challenge by increasing the potential for collaboration with MHC professionals and by allowing MHC professionals to adapt systems to suit the needs of clients. Feedback and input for MHC professionals is a critical element of the approach. It is likely that future developments of the approach will benefit from formalising and developing protocols for the gathering of more intensive feedback from clients, e.g. increasing the use of anonymised application logging or increasing input from relevant peers of the target client group, e.g. similarly aged adolescents who are not experiencing mental health difficulties. Another possible method for increasing client participation involves the development of systems which can be adapted not just by MHC professionals but also by clients. This thesis has focused on developing systems in which content is created or adapted by MHC professionals, and then delivered in clinical settings. Large bodies of research in educational areas have explored the benefits of systems which allow teachers/educators and learners to experiment together and co-construct personally meaningful artefacts, e.g. see (Bers, 2001; Jonassen, 1991, 1998; Papert, 1980). Research has shown that such systems can enhance engagement with learning activities, including personal development. It would be interesting to see if the adaptable design approach can be combined with such approaches, to create systems which can be adapted by therapists and clients, in order to co-create therapeutically meaningful artefacts. This co-creation process could serve two purposes. It could be an effective therapeutic task in its own right and could also create artefacts and content that could then be used with other adolescent clients. MHC professionals who participated in the evaluation of PlayWrite have indicated an interest in such systems.

Alongside the areas discussed above there is significant potential for research in many other areas of HCI to be applied in the MHC domain. For example ideas from computer supported co-operative work, computer mediated communication and trust in computer systems, are all likely to prove relevant. HCI researchers in each of these areas are well placed to apply this knowledge in MHC settings. However applying this knowledge will require an awareness of the challenges posed by working in MHC settings, and will also require close collaboration with MHC professionals. This thesis has provided an initial discussion of some of the factors affecting design for MHC settings and has also proposed one approach which supports effective collaboration. It is hoped that this thesis will act as a starting point for further discussion of such issues.

10.4 Conclusions

The primary contribution of the research presented in this thesis has been to propose and provide an evaluation of an adaptable approach to the design of technology for talk-based MHIs. This approach can assist in overcoming identified challenges of designing in the MHC domain. It has been found to support effective collaboration between HCI and MHC professionals. It also provides a sustainable approach to the development of user-centred systems which can be adapted to meet the needs of a broad variety of therapists and clients. The success of the approach is reflected in the interest the PlayWrite system has generated within the MHC community. Based on the lessons learned in developing and evaluating the adaptable design approach a broad set of guidelines for the design of new technologies has also been provided. Finally, it is hoped that the research presented in this thesis will help to provide a foundation and set an agenda for future research on the design of technology for talk-based MHIs.

Bibliography

- Ainsworth, S., & Fleming, P. (2006). Evaluating authoring tools for teachers as instructional designers. *Computers in Human Behavior*, 22(2006), 131–148.
- Alcañiz, M., Botella, C., Rey, B., Baños, R., Lozano, J. A., de la Vega, N. L., et al. (2007). EMMA: An Adaptive Display for Virtual Therapy. In D. D. Schmorow & L. M. Reeves (Eds.), *Foundations of Augmented Cognition* (Vol. 4565/2007, pp. 258-265): Springer Berlin / Heidelberg.
- Allen, D. H. (1984). The use of Computer Fantasy Games in Child Therapy. In M. D. Schwartz (Ed.), *Using Computers in Clinical Practice: Psychotherapy and Mental Health Applications* (pp. 329-334). New York, N.Y.: Haworth Press.
- Ananny, M., & Cassell, J. (2001). *Telling Tales: A new toy for encouraging written literacy through oral storytelling*. Proceedings of Society for Research in Child Development biennial meeting, Minneapolis, MN.
- Ananny, M., & Strohecker, C. (2002). *Sustained Open Dialogue with Citizen Photojournalism*. Proceedings of Development by Design Conference, December 1-2, 2002, Bangalore, India.
- Angelos, A., Lentziou, Z., Bekiaris, E., Fernanda, C., & Bullinger, A. H. (2005). The Island System: A Modular Non-Conventional E-Mental Health System to Support Services in Remote Areas. *Annual Review of Cybertherapy and Telemedicine*, 3, 218-219.
- Assay, T. P., & Lambert, M. J. (1999). The Empirical Case for Common Factors in Therapy: Quantitative Findings. In B. L. Duncan, M. L. Hubble & S. D. Miller (Eds.), *The Heart and Soul of Change* (pp. 23-55). Washington, DC: American Psychological Association.
- Bauer, S., Percevic, R., Okon, E., Meermann, R., & Kordy, H. (2003). Use of text messaging in the aftercare of patients with bulimia nervosa. *European Eating Disorders Review*, 11, 279-290.
- Berger, T. (2004). Computer-Based Technological Applications in Psychotherapy Training. *Journal of Clinical Psychology*, 60(3), 301-315.
- Bernsen, N. O., & Dybkjaer, L. (1997). *Designing Interactive Speech Systems: from first ideas to user testing*. Secaucus, NJ, USA: Springer-Verlag New York, Inc.
- Bers, M. (2001). Identity Construction Environments: Developing Personal and Moral Values Through the Design of a Virtual City. *The Journal of the Learning Sciences*, 10(4), 365-415.
- Beutler, L. E., & Harwood, T. M. (2004). Virtual Reality in Psychotherapy Training. *Journal of Clinical Psychology*, 60(3), 317-330.
- Bickmore, T. W., & Picard, R. W. (2005). Establishing and maintaining long-term human-computer relationships *ACM Transactions on Computer-Human Interaction*, 12(2), 293-327.

- BMA. (2006). *Child and adolescent mental health – a guide for healthcare professionals*, (British Library No. ISBN: 1-905545-09-6), London: Board of Science of the British Medical Association, Retrieved August 2006, from <http://www.bma.org.uk/ap.nsf/Content/Childadolescentmentalhealth>.
- Botella, C., Baños, R., Rey, B., Alcañiz, M., Guillen, V., Quero, S., et al. (2006). *Using an adaptive display for the treatment of emotional disorders: a preliminary analysis of effectiveness*. Proceedings of CHI2006 Conference on Human Factors in Computing Systems, pp. 586 - 591, Montréal, Québec, Canada.
- Boyd-Graber, J., Nikolova, S., Moffatt, K., Kin, K., Lee, J., Mackey, L., et al. (2006). *Participatory Design with Proxies: Developing a Desktop-PDA System to Support People with Aphasia*. Proceedings of CHI2006 pp. 151-160, April 22-27, Montréal, Québec, Canada.
- Brooke, J. (1996). SUS: a "quick and dirty" usability scale. In P. W. Jordan, B. Thomas, B. A. Weerdmeester & A. L. McClelland (Eds.), *Usability Evaluation in Industry*. London: Taylor and Francis.
- Brosnan, E., Fitzpatrick, C., Sharry, J., & Boyle, R. (2006). *An Evaluation of the Integrated Use of a Multimedia Storytelling System within a Psychotherapy Intervention for Adolescents*. Proceedings of ACM CHI'06 Conference on Human Factors in Computing Systems, pp. 598-603, April 22-27 2006, Montréal, Canada.
- Bruner, J. (1986). *Actual Minds, Possible Worlds*. Cambridge, MA.: Harvard University Press.
- Brusilovsky, P. (2004). Adaptive Hypermedia. *User Modeling and User-Adapted Interaction*, 11(1-2), 87-110.
- Burnett, M. (1999). Visual Programming. In J. G. Webster (Ed.), *Encyclopedia of Electrical and Electronics Engineering*. New York: John Wiley & Sons Inc.
- Butcher, J. N. (2004). Computers In Clinical Assessment: Historical Developments, Present Status and Future Challenges. *Journal of Clinical Psychology*, 60(3), 331-345.
- Butcher, J. N., Keller, L. S., & Bacon, S. F. (1985). Current developments and future directions in computerised personality testing. *Journal of Consulting and Clinical Psychology*, 53, 803-815.
- Capuzzi, D., & Gross, D. R. (Eds.). (2003). *Counselling and Psychotherapy: Theories and Interventions* (3rd Edition ed.): Prentice Hall.
- Caspar, F. (2004). Technological Developments and Applications in Clinical Psychology: Introduction. *Journal of Clinical Psychiatry*, 60(3), 221-238.
- Cassell, J. (2004). Towards a Model of Technology and Literacy Development: Story Listening Systems. *Applied Developmental Psychology*, 25(1), 75-105.
- Castelnuovo, G., Gaggioli, A., Mantovani, F., & Riva, G. (2003). New and Old Tools in Psychotherapy: The use of Technology for the Integration of Traditional Clinical Treatments. *Psychotherapy: Theory, Research, Practice, Training*, 40(1/2), 33-44.
- Cavanagh, K., Zack, S. Z., Shapiro, D. A., & Wright, J. H. (2003). Computer programs for Psychotherapy. In S. Goss & K. Anthony (Eds.), *Technology in Counselling and Psychotherapy* (pp. 143-164). New York: Palgrave Macmillan.

- Chechele, P. J., & Stofle, G. (2003). Individual therapy online via email and Internet Relay Chat. In S. Goss & K. Anthony (Eds.), *Technology in Counselling and Psychotherapy*. New York: Palgrave Macmillan.
- Clark, B., & Schoech, D. (1984). A Computer-Assisted Therapeutic Game for Adolescents: Initial Development and Comments. In M. D. Schwartz (Ed.), *Using Computers in Clinical Practice: Psychotherapy and Mental Health Applications* (pp. 335-353). New York, N.Y.: Haworth Press.
- Coyle, D., Doherty, G., Sharry, J., & Matthews, M. (2007). Computers in Talk-Based Mental Health Care. *Interacting with Computers*, 19(4), 545-562. Available at <http://dx.doi.org/510.1016/j.intcom.2007.1002.1001>.
- Coyle, D., Matthews, M., Sharry, J., Nisbet, A., & Doherty, G. (2005). Personal Investigator: A Therapeutic 3D Game for Adolescent Psychotherapy. *International Journal of Interactive Technology and Smart Education*, 2, 73-88.
- Culbert, T. P., Kajander, R. L., & Reaney, J. B. (1996). Biofeedback with children and adolescents: Clinical observations and patient perspectives. *Developmental and Behavioral Paediatrics*, 17, 342-350.
- Dandeneau, S. D., & Baldwin, M. W. (2004). The Inhibition of Socially Rejecting Information Among People with High versus Low Self-Esteem: The Role of Attentional Bias and the Effects of Bias Reduction Training. *Journal of Social and Clinical Psychology*, 23(4), 584-603.
- De Bra, P., Brusilovsky, P., & Houben, G.-J. (1999). Adaptive Hypermedia: From Systems to Framework. *ACM Computing Surveys*, 31(4es).
- De Shazer, S. (1988). *Clues: Investigating Solutions in Brief Therapy*. (1st edition ed.). New York, N.Y.: W. W. Norton & Company.
- Dishman, E. (2004). Inventing Wellness Systems for Aging in Place. *IEEE Computer Society*, 37(5), 34-41.
- Dodge, B. (1998). WebQuests: A strategy for scaffolding higher level learning. Retrieved October, 2007, from <http://edweb.sdsu.edu/webquest/necc98.htm>
- Dodge, B. (2001). FOCUS: Five rules for writing a great WebQuest. *Learning & Leading with Technology*, 28(8), 6-9.
- Druin, A., Stewart, J., Proft, D., Bederson, B., & Hollan, J. (1997). *KidPad: A Design Collaboration between Children, Technologists and Educators*. Proceedings of CHI'97: Human Factors in Computing Systems, pp. 463-470, 22-27 March 1997, Atlanta, Georgia.
- Dybkjaer, L., & Bernsen, N. O. (2000). Usability issues in spoken dialogue systems. *Natural Language Engineering* 6(3&4), 243-271.
- Egan, G. (2002). *The Skilled Helper: A Problem-Management and Opportunity-Development Approach to Helping* (7th ed.). Pacific Grove, CA, US: Wadsworth Publishing.
- Elliott, J., Adams, L., & Bruckman, A. (2002). *No Magic Bullet: 3d Video Games in Education*. Proceedings of ICLS2002 International Conference of the Learning Sciences, Seattle.
- Feltham, C., & Horton, I. (Eds.). (2000). *Handbook of Counselling and Psychotherapy*. London: Sage Publications.

- Fogg, B. J. (2003). *Persuasive Technology: Using Computers to Change what We Think and Do* (1st ed.): Morgan Kaufmann.
- Fox, D. J., Tharp, D. F., & L.C., F. (2005). Neurofeedback: an alternative and efficacious treatment for Attention Deficit Hyperactivity Disorder. *Applied psychophysiology and biofeedback*, 30(4), 365-373.
- Friedman, B., & Kahn, P. H. J. (2002). Human values, ethics, and design. In J. A. Jacko & A. Sears (Eds.), *The human-computer interaction handbook: fundamentals, evolving technologies and emerging applications archive* (pp. 1177 - 1201). Mahwah, NJ, US: Lawrence Erlbaum Associates, Inc.
- Gallo-Lopez, L., & Schaefer, C. E. (2005). *Play Therapy with Adolescents*: Jason Aronson.
- Gardner, J. E. (1991). Can the Mario Bros. help? Nintendo Games as an Adjunct in Psychotherapy with Children. *Psychotherapy*, 28, 667-670.
- Gega, L., Marks, I., & Mataix-Cols, D. (2004). Computer-Aided CBT Self-Help for Anxiety and Depressive Disorders: Experience of a London Clinic and Future Directions. *Journal of Clinical Psychology*, 60(2), 147-157.
- Gentile, D. A., Lynch, P. J., Linder, J. R., & Walsh, D. A. (2004). The effects of violent video game habits on adolescent hostility, aggressive behaviors, and school performance. *Journal of Adolescence* 27 5–22.
- Gentile, D. A., & Walsh, D. A. (2002). A normative study of family media habits. *Journal of Applied Developmental Psychology*, 23, 157–178.
- Glanz, K., Rizzo, A., & Graap, K. (2003). Virtual reality for psychotherapy: Current reality and future possibilities. *Psychotherapy: Theory, Research, Practice, Training*, 40(1-2), 55-67.
- Goldsworthy, R. (2002). Supporting the development of emotional intelligence through technology. *Computers in the Schools*, 19(1/2), 119 - 148.
- Goss, S., & Anthony, K. (2003). *Technology in Counselling and Psychotherapy*. New York: Palgrave Macmillan.
- Gould, R. A., Otto, M. W., Pollack, M. H., & Yap, L. (1997). Cognitive behavioral and pharmacological treatment of generalized anxiety disorder: A preliminary meta-analysis. *Behavior Therapy*, 28(2), 285-305.
- Green, T. G. (1996). *An Introduction to the Cognitive Dimension Framework*. Proceedings of MIRA workshop, Monselice, Italy.
- Green, T. R. G., & Petre, M. (1996). Usability analysis of visual programming environments: a 'cognitive dimensions' approach. *Journal of Visual Languages and Computing*, 7(2), 131-174.
- Griffiths, M. (1997). Video Games and Clinical Practice: Issues, Uses and Treatments. *British Journal of Clinical Psychology*, 36, 639-641.
- Griffiths, M. D. (2004). The Therapeutic Value of Videogames. In J. Goldstein & J. Raessens (Eds.), *Handbook of Computer Game Studies* (pp. 161-173). Boston, US: MIT Press.

- Gulliksen, J., Göransson, B., Boivie, I., Blomkvist, S., Persson, J., & Cajander, Å. (2003). Key principles for user-centred systems design. *Behaviour and Information Technology*, 22(6), 397–410.
- Handel, R. W., Ben-Porath, Y. S., & Watt, M. (1999). Computerised adaptive assessment with the MMIP-2 in a clinical setting. *Psychological Assessment*, 11, 369-380.
- HopeLab. (2006). Re-Mission™ Outcomes Study: A Research Trial of a Video Game Shows Improvement in Health-Related Outcomes for Young People with Cancer. Retrieved April 2006, from <http://www.hopelab.org/docs/Outcomes%20Study.pdf>
- Horvath, A., & Greenberg, L. (1989). Development and Validation of the Working Alliance Inventory. *Journal of Counseling Psychology*, 36(2), 223-233.
- Houston, T. K., Cooper, L. A., & Ford, D. E. (2002). Internet Support Groups for Depression: A 1-year prospective cohort study. *Journal of Psychiatry*, 159, 2062-2068.
- Jinks, G. (2000). Specific Strategies and Techniques. In C. Feltham & I. Horton (Eds.), *Handbook of Counselling and Psychotherapy* (pp. 122-151). London: Sage Publications.
- Johnson, C. M., Johnson, T. R., & Zhang, J. (2005). A user-centred framework for redesigning health care interfaces. *Journal of Biomedical Informatics*, 38(1), 75-87.
- Jonassen, D. (1991). Objectivism vs. Constructivism. *Educational Technology Research and Development*, 39(3), 5-14.
- Jonassen, D. (1998). Computers as Mindtools for Engaging Learners in Critical Thinking. *TechTrends*, 43(2), 24-32.
- Kanis, M., & Brinkman, W. P. (2007). *What do people like? The design of a mobile tool to harness and share positive thoughts*. Proceedings of ECCE07, August 28-31, London, UK. .
- Karasu, T. B. (1986). The specificity versus nonspecificity dilemma: Toward identifying therapeutic change agents *American Journal of Psychiatry*, 143(6), 687-695.
- Kato, P. M. (2006). Factors Affecting Acceptability to Young Cancer Patients of a Psychoeducational Video Game About Cancer. *Journal of Pediatric Oncology Nursing*, 23(5), 269-275.
- Kirriemuir, J., & McFarlane, A. (2004). *Literature Review in Games and Learning*, (No. 8), Bristol: NESTA Futurelab, Retrieved June 2007, from http://www.futurelab.org.uk/research/lit_reviews.htm#lr08.
- Klemmer, S. R., Sinha, A. K., Chen, J., Landay, J. A., Aboobaker, N., & Wang, A. (2000). *SUEDE: A Wizard of Oz Prototyping Tool for Speech User Interfaces*. Proceedings of UIST 2000: ACM Symposium on User Interface Software and Technology, pp. 1-10, San Diego, CA, USA.
- Kraus, L. M. (1980). Therapeutic Strategies with Adolescents. *Social Casework*, 61(5), 313-316.
- Layard, R. (2004). *Mental Health: Britain's biggest social problem?* : Strategy Unit Seminar Paper, Retrieved August 2006, from http://www.strategy.gov.uk/downloads/files/mh_layard.pdf.
- Lindley, C. A. (2002). *Conditioning, Learning and Creation in Games: Narrative, The Gameplay Gestalt and Creative Simulation*. Proceedings of NILE2002, Narrative Interaction and Learning Environments, pp. 16-23, 6-9 August, Edinburgh.

- Maheu, M. M. (2003). The Online Clinical Practice Management Model. *Psychotherapy: Theory, Research, Practice, Training*, 40(1/2), 20-32.
- Marks, I. (1999). Computer Aids to Mental Health Care. *Canadian Journal of Psychiatry*, 44(6), 548-555.
- Marsella, S. C., Johnson, W. L., & LaBore, C. M. (2003). *Interactive Pedagogical Drama for Health Interventions*. Proceedings of AIED 2003: 11th International Conference on Artificial Intelligence in Education, Australia
- Matthews, M., Coyle, D., & Anthony, K. (2006). Personal Investigator. *Therapy Today: The Magazine for Counselling and Psychotherapy Professionals*, 17(7), 30-33.
- Matthews, M., Doherty, G., Coyle, D., & Sharry, J. (2007). Designing mobile applications to support mental health interventions. In J. Lumsden (Ed.), *Handbook of Research on User Interface Design and Evaluation for Mobile Technology*.
- Maybury, M. T., & Wahlster, W. (Eds.). (1998). *Readings in Intelligent User Interfaces* (1st ed.): Morgan Kaufmann.
- McFarlane, A., Sparrowhawk, A., & Heald, Y. (2002). *Report on Educational Use of Games: Teachers Evaluating Educational Multimedia Report: TEEM*, Retrieved, from <http://www.teem.org.uk/publications/>.
- McTear, M. F. (2002). Spoken dialogue technology: Enabling the conversational user interface. *ACM Computing Surveys*, 34(1), 90-169.
- Molich, R., Laurel, B., Snyder, C., Quesenbery, W., & Wilson, C. E. (2001). *Ethics in HCI, Panel Session*. Proceedings of CHI2001 Conference on Human Factors in Computing Systems, pp. 217 - 218, Seattle, Washington
- Monastra, V. J., Monastra, D. M., & George, S. (2002). The effects of stimulant therapy, EEG biofeedback, and parenting style on the primary symptoms of attention-deficit/hyperactivity disorder. *Applied Psychophysiology and Biofeedback*, 27(4), 231-249.
- Monk, A., Hassenzahl, M., Blythe, M., & Reed, D. (2002). *Funology: designing enjoyment*. Proceedings of ACM CHI'02 Conference on Human Factors in Computing Systems, April 20-25 2002, Minneapolis, Minnesota.
- Moran, P. J., & Carroll, J. M. (1996). Overview of Design Rationale. In P. J. Moran & J. M. Carroll (Eds.), *Design Rational: Concepts, Techniques, and Use* (pp. 1-19). Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Murray, C. L., & Lopez, A. D. (Eds.). (1996). *The Global Burden of Disease: A comprehensive assessment of mortality and disability from disease, injuries, and risk factors in 1990 and projected to 2020*. Cambridge, MA: Harvard University.
- Murray, T. (2003). An overview of intelligent tutoring system authoring tools: updated analysis of the state of the art. In T. Murray, S. Blessing & S. E. Ainsworth (Eds.), *Tools for advanced technology learning environments* (pp. 491-544). Amsterdam: Kluwer.

- National Institute for Clinical Excellence. (2004 - 2005). *National Clinical Practice Guidelines*: National Institute for Clinical Excellence, Retrieved August 2006, from <http://www.nice.org.uk/page.aspx?o=guidelines.completed>.
- Newell, A. F., & Gregor, P. (2000). *User Sensitive Inclusive Design - in search of a new paradigm*. Proceedings of CUU 2000, First ACM Conference on Universal Usability, pp. 39-44, November 16-17 2000, Arlington, VA.
- Newman, M. G., Erickson, T., Przeworski, A., & Dzus, E. (2003). Self-help and minimal-contact therapies for anxiety disorders: Is human contact necessary for therapeutic efficacy? *Journal of Clinical Psychology*, 59(3), 251-274.
- Oakley, C. (1994). SMACK: A Computer Driven Game for at-risk Teens. *Computers in Human Services*, 11(1), 97-99.
- Orlinsky, D. E., & Howard, K. I. (1987). A generic model of psychotherapy. *Journal of Integrative and Eclectic Psychology*, 6, 6-27.
- Page, B. J., Delmonico, D. L., Walsh, J., L'Amoreaux, N. A., Nanninirsh, C., Thompson, R. S., et al. (2000). Setting up online support groups using the Palace software. *Journal for Specialists in Group Work*, 25, 133-145.
- Palmer, S. (1996). The Multimodal Approach: theory, assessment, techniques and interventions. In S. Palmer & W. Dryden (Eds.), *Stress Management and Counselling: Theory, Practice, Research and Methodology*. London: Cassell.
- Papert, S. (1980). *Mindstorms: Children, Computers and Powerful Ideas*. New York: Basic Books.
- Paris, C. L., & Sidner, C. L. (Eds.). (2006). *IUI 06: 2006 International Conference on Intelligent User Interfaces*. Sydney, Australia: ACM SIGART.
- Parkin, A. (2000). Computers in clinical practice: applying experience from child psychiatry. *British Medical Journal*, 321, 615-618.
- Payne, M. (1997). *Modern Social Work Theory*. Hampshire, UK: Palgrave.
- Percevic, R., Lambert, M. J., & Kordy, H. (2004). Computer Supported Monitoring of Patient Treatment Response. *Journal of Clinical Psychology*, 60(3), 285-299.
- Picard, R. W., & Klein, J. (2002). Computers that recognise and respond to user emotion: theoretical and practical implications. *Interacting with Computers*, 14, 141-169.
- Pope, A. T., & Paison, O. S. (2001). *Helping Video Games 'Rewire Our Minds'*. Proceedings of Playing by the Rules Conference, Oct 26.-27, Chicago, IL.
- Poulson, D., & Richardson, S. (1998). USERfit: a framework for user centred design in assistive technology. *Technology and Disability*, 9(3), 163-171.
- Pratchett, R. (2005). *Gamers in the UK: Digital play, digital lifestyles*, (White Paper): BBC, Retrieved, from http://crystalltips.typepad.com/wonderland/files/bbc_uk_games_research_2005.pdf.

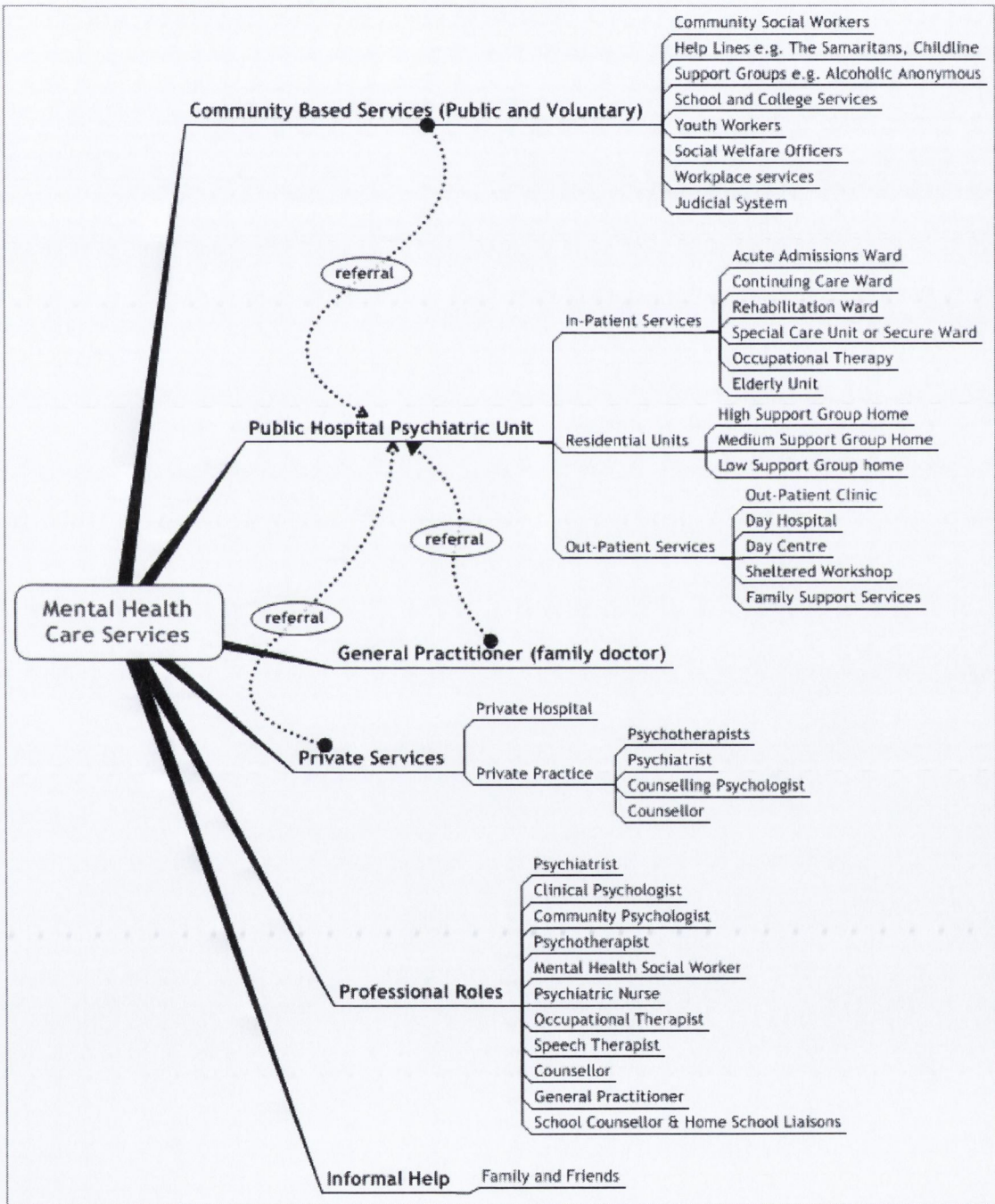
- Proudfoot, J., Goldberg, D., Mann, A., Everitt, B., Marks, I., & Gray, J. (2003). Computerised, interactive, multimedia cognitive behavioural therapy reduces anxiety and depression in general practice: A randomised control trial. *Psychological Medicine*, *33*(2), 217-227.
- Proudfoot, J., Swain, S., Widmer, S., Watkins, E., Goldberg, D., Marks, I., et al. (2003). The development and beta-testing of a computer-therapy program for anxiety and depression: Hurdles and preliminary outcomes. *Computers In Human Behaviour*, *19*(3), 277-289.
- Przeworski, A., & Newman, M. G. (2004). Palmtop Computer-Assisted Group Therapy for Social Phobia. *Journal of Clinical Psychology*, *60*(2), 179-188.
- Redish, J., & Wixon, D. (2003). Task Analysis. In J. A. Jacko & A. Sears (Eds.), *The Human-Computer Interaction Handbook* (pp. 992-940). Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Resnick, H., & Sherer, M. (1994). Computer Games in the Human Services - A Review. *Computers in Human Services*, *11*(1/2), 17-29.
- Rice, K. M., Blanchard, E. B., & Purcell, M. (1993). Biofeedback treatments of generalized anxiety disorder: Preliminary results. *Applied Psychophysiology and Biofeedback*, *18*(2), 93-105.
- Riva, G. (2005). Virtual Reality in Psychotherapy: Review. *CyberPsychology & Behavior*, *8*(3), 220-330.
- Riva, G., & Gaggioli, A. (2008). *Virtual Reality as Experiential Tool for Supporting Empowerment and Clinical Change*. Proceedings of Presented at the 'Technology in Mental Health' Workshop CHI2008 Conference on Human Factors in Computing Systems, 6th April 2008, Florence, Italy.
- Rizzo, A. A., Graap, K., Pair, J., G., R., Treskunov, A., & Parsons, T. (2006). *User-Centered Design Driven Development of a VR Therapy Application for Iraq War Combat-Related Post Traumatic Stress Disorder*. Proceedings of The 6th International Conference on Disability, Virtual Reality and Associated Technology, pp. 113-122, Aalborg, Denmark.
- Rizzo, A. A., Pair, J., Graap, K., Manson, B., McNerney, P. J., Wiederhold, B., et al. (2006). *A Virtual Reality Exposure Therapy Application for Iraq War Military Personnel with Post Traumatic Stress Disorder: From Training to Toy to Treatment*. . Proceedings of NATO Advanced Research Workshop on Novel Approaches to the Diagnosis and Treatment of Posttraumatic Stress Disorder, pp. 235-250.
- Roberts, L. W. M. D., & Dyer, A. R. (2004). *Concise Guide to Ethics in Mental Health Care*. Arlington, VA: American Psychiatric Publishing.
- Robertson, J., & Oberlander, J. (2002). Ghostwriter: Educational Drama and Presence in a Virtual Environment. *Journal of Computer Mediated Communication*, *8*(1).
- Rochlen, A. B., Zack, J. S., & Speyer, C. (2004). Online Therapy: Review of Relevant Definitions, Debates and Current Empirical Support. *Journal of Clinical Psychology*, *60*(3), 269-283.
- Ryokai, K., & Cassell, J. (1999). *Computer support for children's collaborative fantasy play and storytelling*. Proceedings of Computer Support for Collaborative Learning, pp. 510-517.
- Sainfort, F., Jacko, J. A., & Booske, B. C. (2003). Human-Computer Interaction in Health Care. In J. A. Jacko & A. Sears (Eds.), *The Human-Computer Interaction Handbook - Fundamentals, Evolving*

- Technologies and Emerging Applications* (2 ed., pp. 808-822). Mahwah, New Jersey: Lawrence Erlbaum Associates.
- Schaefer, C. E., & Reid, S. E. (2004). *Game Play: Therapeutic Use of Childhood Games* (2nd ed.). New York: John Wiley and Sons.
- Schaefer, C. E., & Reid, S. E. (Eds.). (2001). *Game play : therapeutic use of childhood games*. New York: Chichester : Wiley,.
- Schwartz, M. S., & Andrasik, F. (2003). *Biofeedback, Third Edition: A Practitioner's Guide* (3rd edition ed.): Guilford Press.
- Sharry, J. (2001). *Becoming a Solution Detective: Identifying your clients' strengths in Practical Brief Therapy*. London: Brief Therapy Press.
- Sharry, J. (2004). *Counselling Children, Adolescents and Families*. London: Sage.
- Sharry, J., Brosnan, E., Fitzpatrick, C., Forbes, J., Mills, C., & Collins, G. (2004). *Working Things Out: a therapeutic CD-ROM containing the stories of young people overcoming depression and other mental health problems*. Proceedings of NILE '04 Narrative and Interactive Learning Environments, pp. 67-74, August 10-13 2004, Edinburgh, Scotland.
- Simpson, S. (2003). Video Counselling and Psychotherapy in Practice. In S. Goss & K. Anthony (Eds.), *Technology in Counselling and Psychotherapy*. New York: Palgrave MacMillan.
- Squire, K. (2003). Video Games In Education. *International Journal of Intelligent Simulations and Gaming*, 2(1), 49-62.
- Suler, J. (1999). Psychotherapy in Cyberspace: A 5-Dimensional Model of Online and Computer Mediated Psychotherapy. *CyberPsychology and Behavior*, 3, 151-160.
- Surgeon General. (1999). *Mental Health: A Report of the Surgeon General - Executive Summary*, Washington, DC: Department of Health and Human Services, Retrieved August 2006, from <http://www.surgeongeneral.gov/library/mentalhealth/home.html>.
- Sutton, S., & Cole, R. (1997). *The CSLU Toolkit: rapid prototyping of spoken language systems*. Proceedings of UIST 97: ACM Symposium on User Interface Software and Technology, pp. 85-86, Banff, Alberta, Canada.
- White, M., & Epston, D. (1990). *Narrative means to therapeutic ends*. New York: Norton.
- WHO World Mental Health Survey Consortium. (2004). Prevalence, severity, and unmet need for treatment of mental disorders in the World Health Organization World Mental Health Surveys. *Journal of the American Medical Association*, 291(21).
- Wiederhold, B. K., & Wiederhold, M. D. (2004). *Virtual Reality Therapy for Anxiety Disorders: Advances in Education and Treatment*: APA Books.
- World Medical Association. (1949-2006). World Medical Association International Code of Medical Ethics. Retrieved November, 2006, from <http://www.wma.net/e/policy/c8.htm>

- World Medical Association. (1964-2004). World Medical Association Declaration of Helsinki: Ethical Principles for Medical Research Involving Human Subjects. Retrieved November, 2006, from <http://www.wma.net/e/policy/b3.htm>
- Wright, J. H., Wright, A. S., Salmon, P., Beck, A. T., Kuyendall, J., Goldsmith, J., et al. (2002). Development and initial testing of a multimedia program for computer-assisted cognitive therapy. *American Journal of Psychotherapy*, 56, 76-86.
- Yucha, C., & Gilbert, C. (2004). *Evidence-Based Practice in Biofeedback and Neurofeedback*. Wheat Ridge, CO: Association for Applied Psychophysiology and Biofeedback.
- Zhang, K. (2007). *Visual Languages and Applications*. New York: Springer.

Appendix A

This appendix shows an overview of the structure of mental health care services in Ireland.



Appendix B

This appendix contains the consent form and questionnaires used in the pilot clinical study of PI described in Chapter 4.

Consent for Personal Investigator Game

I consent to have the feedback I give in relation to the Personal Investigator game used as part of a research study evaluating the game. In this regard I consent to have my responses on the questionnaire evaluating the Personal Investigator game used as part of the research study.

I understand that no information that identifies me will be used and all personal details will be kept confidential.

Young Person Consent

_____	_____	_____
Name	Date	Signature

Parental Consent

_____	_____	_____
Name of Parent	Date	Signature

_____	_____	_____
Name of Parent	Date	Signature

_____	_____	_____
Doctor / Researcher	Date	Signature

'Personal Investigator' Professional Questionnaire for Individual Clients

Thank you for using the Personal Investigator video game in your work with this young person. We would be grateful if you would take a few moments to give your feedback. Please attach this form to the young person's feedback form

Name: _____ Occupation _____ Date: _____

Please describe briefly the issues and difficulties the young person was dealing with that made you decide to use Personal Investigator (PI)

Below is a list of statements about PI, designed to estimate how helpful the game was in your work with this young person. Please consider each statement carefully and circle your level of agreement.

Please consider each statement relative to your prior work with this young person (before you introduced PI) and also with respect to other similar young people with whom you have worked.

1. Playing PI was beneficial for this client.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
----------------	-------	------------------	---------	-------------------	----------	-------------------

Please say what was beneficial or unbeneficial.

2. Playing PI helped to structure and pace the therapeutic sessions.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
----------------	-------	------------------	---------	-------------------	----------	-------------------

Please Comment:

3. Playing PI made it easier to agree therapeutic goals with this client.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
----------------	-------	------------------	---------	-------------------	----------	-------------------

Please Comment:

4. Playing PI made it easier to engage constructively with this client.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
----------------	-------	------------------	---------	-------------------	----------	-------------------

Please Comment:

5. This client talked more as a result of playing PI.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
----------------	-------	------------------	---------	-------------------	----------	-------------------

How much more or less did this client talk?

6. Playing PI helped motivated this client to focus on and solve their problem.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
----------------	-------	------------------	---------	-------------------	----------	-------------------

Please Comment:

7. Using PI made it easier to help this client.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
----------------	-------	------------------	---------	-------------------	----------	-------------------

Please also answer the following question:

Were there any problems that hindered the use of PI in this case?

Any Other comments:

Thank you for your feedback.

'Personal Investigator' Young Person Questionnaire

Thank you for playing Personal Investigator. We would be grateful if you would take a few moments to give us your opinion of the game.

What age are you? _____ Date filling in form: _____

Gender male female

Below is a list of statements about the Personal Investigator (PI) game. Please think about each statement carefully and circle how much you agree with each one.

1. I liked playing PI

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

Please say what you liked or disliked.

2. Playing PI helped me to think about and solve a personal problem.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

What was helpful of unhelpful?

3. Playing PI made it easier to talk to my therapist.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

Please comment.

4. Playing PI made me more confident that I could find solutions to problems.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

Please comment.

5. Playing PI made coming back to see my therapist easier.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
----------------	-------	---------	----------	-------------------

Please comment

6. Please rate how helpful were the following aspects of PI

	Very Helpful	Helpful	Not sure	Unhelpful	Very Unhelpful
The 3D environment					
Writing in the note book					
Watching the videos					
Listening to the characters					
Collecting the keys					

Any Comments:

Your answers to the following questions will also be very helpful.

- 1. What do you remember most about playing PI?**
- 2. Is there anything you think that should be different in 'PI'?**
- 3. What problems do you think the game could help a person with?**

Thank you for you opinions they will be very helpful.

Appendix C

This appendix contains the details of the tasks and questionnaires used in the formative evaluations of PlayWrite described in Chapter 6. The tasks were used in the initial usability trials only. The questionnaires were used in both the usability trials and the workshop study.

Task 1 - Create an interactive dialogue using several spoken elements.

Create a new dialogue called “First Meeting”. Insert the following talking elements into the dialogue. Record a voiceover whenever one is required.

Conversation: Hi. How are you? My name is John/Jane.

Question: What's your name?

Conversation: It's nice to meet you. Tell me a little bit about yourself.

Multiple Choice: Are you in primary school or secondary school?

Answer: I'm in primary school.

Answer: I'm in secondary school.

Scaled Question: I always thought school was great. Do you agree?

Scale Type: Likert Scale

Scale Points: Strongly Agree, Agree, Unsure, Disagree,
Strongly Disagree.

Question: Some other things I like are football, listening to music and playing computer games. Can you tell me three things you like doing in your spare time?

Scaled Question: Please make a mark below to indicate how you are feeling today.

Scale Type: Visual Analog.

Scale Points: Stressed, Chilled.

Scaled Question: On a scale of one to ten how much energy do you have today?

Scale Type: Numerical

Scale Points: 1 – 10.

Conversation: Great! Thanks for talking to me. I enjoyed our chat. Bye now.

End of Dialogue

Task 2 - Part 1: Create a dialogue that incorporates a video and a notebook.

Create a new dialogue called “Backup”. Insert the following elements into the dialogue. Use the pre-recorded voiceover files indicated for each element.

Conversation: How you doing? I'm Detective Spade and I'd like to tell you about backup.
Voiceover file = spade1.wav

Conversation: When the police are in trouble, they call for backup. Even on TV the great detectives have a partner who helps them out.
Voiceover file = spade2.wav

Conversation: I'll let my partner tell you more.
Voiceover file = spade3.wav

Video: Video file = sarahsStory.avi
Play all of this video.

Conversation: So every good solution detective needs to call for backup to solve problems. Take a look at your notebook and think about who could help you.
Voiceover file = spade4.wav

Open a Notebook:

Add the following elements **inside** the notebook.

Question: Who in your life provides you with backup?

Question: How do they help you?

Add the following element **after** the notebook closes.

Conversation: I gotta tell ya, I think you're doing a fantastic job. You've earned another key!
Voiceover file = spade5.wav

End of Dialogue

Task 2 - Part 2: Add two optional elements to the end of the notebook.

Objective: The objective here is to give the user the option of deciding whether or not they would like to answer a few more questions inside their notebook. Multiple Choice questions can be used to create branching points in a dialogue. Different elements can be played after a Multiple Choice question depending on which Answer is chosen. Add the following Multiple Choice question and two possible Answers as the last elements **inside** the notebook.

Multiple Choice: Would you like to explore this further?

Answer: Sure, why not.

Answer: No thanks.

Now add the following elements so that they are played if the Answer 'Sure why not' is chosen.

Information: Information Heading: Strengths and resources

Information text: Another source of backup, when dealing with problems, is your own strengths and resources as a person.

Question: Can you make a list of things you like doing or are good at?

Task 2 - Part 3: Using GO TO Actions and Labels to control play back

Another way to control what part of a dialogue is played is to use **GO TO Actions** and **Labels**. Labels are used as reference points in a dialogue. GO TO Actions allow you to make playback jump to a specified point in the dialogue e.g. a Label or End of Dialogue.

Objective: The objective here is to add a Multiple Choice question, at the very start of the dialogue, which gives the user the choice of whether or not they would like to talk with Detective Spade. Labels and GO TO Actions will be used to achieve this. Here's how. Add a Multiple Choice question before the first piece of conversation with Detective Spade.

Multiple Choice: Would you like to talk with Detective Spade about backup?

Answer: Sure

Answer: No thanks

Now if the user chooses 'No thanks' say goodbye and go to the end of the dialogue.

Consent Form

Please read this agreement carefully before you decide to participate in this study.

Description: This research experiment is being conducted to evaluate the usability of a computer program, designed to allow professional mental health care workers and researchers to tailor the content of therapeutic computer games.

What you will do in this study: You will first be asked complete a pre-trial questionnaire designed to (1) record your position within the mental health care field and (2) record your experience as a computer user. Following that you will be asked to complete a series of tasks designed to evaluate the usability of the application. You will then be asked to complete a Post-Test Questionnaire regarding your experience. The computer session will be logged and video recorded for evaluation purposes.

Time required: The trial will take approximately 1 hour 30 minutes. Time is variable depending upon your own pace.

Benefits/Compensation: The software used in this study will be made available to you for further use, if you so wish. You will not receive any further compensation of any kind for participating in this study.

Right to withdraw: Your participation is completely voluntary and you may withdraw from the experiment at any time. No data from your experimental session will be retained until you agree to participate.

Use of Your Data: The most likely use of the data from this experiment is for data analysis, report generation and inclusion in the designer's PhD thesis. In the event that the cumulative information is perceived to be of value to Human-Computer Interaction or a related field, this report may be submitted to professional journals or conferences.

Confidentiality: The information that you provide during the study will be kept in strict confidence and your name or personal information will not be recorded with your responses.

I understand that my participation in this study is voluntary. I have the right to withdraw from the study at anytime without penalty. I have read and understand the information provided above, and willingly agree to participate in this study.

Signature: _____ Date: _____

Pre-Trial Questionnaire

Name:

There are two parts to this questionnaire. Part one collects information about your work in the mental health care area. Part two is a series of computer experience questions. Please type an 'X' to mark your selection on multiple choice questions.

Part 1: Professional Details

What is your professional training and current position?

Number of years experience or training within the broad mental health care area:

Do you, or have you ever, worked with children or teenagers?

Yes	No

If 'yes', how many years have you been working therapeutically with children or teenagers? Please give brief details of this work.

Have you used computers in your face-to-face work with clients before?

Yes	No

If 'yes' please give brief details.

Have you used computers for non-face-to-face communication with clients before? E.g. email, SMS, Internet discussion boards or forums.

Yes No

If 'yes' please give brief details.

Part 2: Computer Skills

How often do you use a computer?

Every day	
Every 2 – 3 days	
Once a week	
More than once a month	
Less than once a month	
Never	

How many hours on each occasion?

How would you rate your level of experience with computers?

Very Experienced	Experienced	Adequate	Inexperienced	Novice

How confident do you feel about using a computer today?

Very Confident	Confident	Some Confidence	Little Confidence	No Confidence

How would you rate your ability to use a mouse and keyboard and navigate about Microsoft Windows?

Very Experienced	Experienced	Adequate	Inexperienced	Novice

What do you use a computer for? (E.g. word processing, spreadsheet, statistics, SPSS, Email, Internet, Multi-Media, Computer Games, etc) Please give brief details.

Have you ever used a computer graphics program to create your own graphics?

Yes No

If 'yes', please give brief details and rate your level of experience:

Very Experienced	Experienced	Adequate	Inexperienced	Novice

Details:

Have you ever used a computer programming language or visual programming environment?

Yes No

If 'yes', please give brief details and rate your level of experience:

Very Experienced	Experienced	Adequate	Inexperienced	Novice

Details:

If 'no', how confident are you that you would be able to learn a computer programming language.

Very Confident	Confident	Some Confidence	Little Confidence	No Confidence

Thanks you for taking the time to complete this pre-trial questionnaire.

Post Trial Questionnaire

Name:

The first part of this questionnaire is designed to assess the usability of the Dialogue Builder application. The second part assesses its usefulness. Please answer the questions below based on your experience of using the application.

Type an 'X' in the box corresponding to your level of agreement with each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I thought the visual design and layout was clear.					
I think the system was unnecessarily complex.					
I found the system easy to use.					
I think I would have to look for assistance most times I used this system.					
I found the various functions in this system were well integrated.					
I thought there was too much inconsistency in this system.					
I imagine that most people would learn to use this system very quickly.					
I think the design of the system encouraged me to make mistakes.					
I am very confident that I could build my own dialogues using this system.					
I needed to learn a lot of things before I could get going with this system.					
I found the diagrammatic representation of dialogues clear and easy to follow.					
I found it easy to tell where new dialogue elements would be added.					

List the most negative aspects of the system: (if possible give brief details and suggest solutions)

- 1.
- 2.
- 3.

List the most positive aspects of the system: (if possible give brief details)

- 1.
- 2.
- 3.

Please answer the following questions, designed to assess the usefulness of the system. Dialogues built using this system could be used in computer games, on CDROMs, in web pages or on mobile phones.

Type an 'X' in the box corresponding to your level of agreement with each statement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The system takes advantage of existing, non-technical skills of mental health care professionals.					
Dialogues built using this system could be useful in mental health interventions.					
The combination of spoken and written questions is useful.					
The combination of conversation, questions and video is useful.					
The system is flexible enough to implement a wide range of therapeutic conversations and questionnaires.					

Can you think of ways in which you would use this application in your work?

If so, please give examples.

Appendix D

This appendix contains details of the dialogue elements used to create PlayWrite dialogues

PlayWrite Dialogues are built using different types of *dialogue elements*. There are four distinct categories of dialogue elements: Spoken Elements, Media Elements, Notebook Elements and Control Elements. Spoken, Notebook and Media elements allow MHC professionals to add content to a dialogue. The list below describes the purpose of different Spoken, Notebook and Media elements.

- **Conversation** elements are dialogue spoken by a character, which require no response from the player.
- **General Questions** are questions which require a descriptive answer from the player.
- **Scaled Questions** require the player to choose an answer from the scale provided. Three types of scale are available: Numerical, Likert and Analogue Visual.
- **Multiple Choice Questions** require the player to choose from a list of preset answers. Multiple choice questions can be used to create branching points in a dialogue.
- **Multiple Choice Answers** are defined as distinct elements in a dialogue and provide the preset answers for multiple choice questions.
- **Information** elements are used to add written psycho-educational content to the player's game notebook.
- **Video** elements allow the user to configure and playback video files imported into the system. All or part of a video file can be played.

General Questions, Scaled Questions and Multiple Choice Questions can be used either as Spoken Elements, in which case the question is asked directly by a talking character, or as Notebook Elements, in which case the question appears inside the player's notebook.

Control elements serve a different purpose to the content elements described above. Their purpose is to give the user additional control over the playback and organisation of a dialogue:

- **Go To actions** can be used to make playback of a dialogue 'go to' a specified point e.g. a Label or the end of the dialogue.
- **Labels** allow users to create reference points in a dialogue. These reference points can be used by 'Go To Actions' and also to highlight areas of a dialogue.

Groups - as a dialogue becomes larger groups can make it easier to manage the layout of the dialogue. Related elements can be placed in a group which can then be expanded and minimised to save screen space.

Appendix E

This appendix contains details of how to install PlayWrite. The current version of PlayWrite requires a computer running a Windows operating system. PlayWrite has been tested with Windows 2000, NT, XP and Vista. The graphics driver on a computer may require updating for PlayWrite games to function correctly.

Installation Instructions

To install the PlayWrite system place the installation CD in the CD/DVD drive of a PC. The installation should begin automatically. (Note - it may take a minute to begin).

If the installation does not begin automatically follow the instructions below:

Select *Start – My Computer*

Double click the CD drive (it should be labelled PlayWrite) to begin the installation.

When the installation begins please read the research agreement and follow the instructions given to install the PlayWrite system.

Once the PlayWrite system is installed it can be accessed using either the desktop shortcut or a Start menu shortcut. To access the start menu shortcut select '*Start – All Programs – PlayWrite v1.2*'.

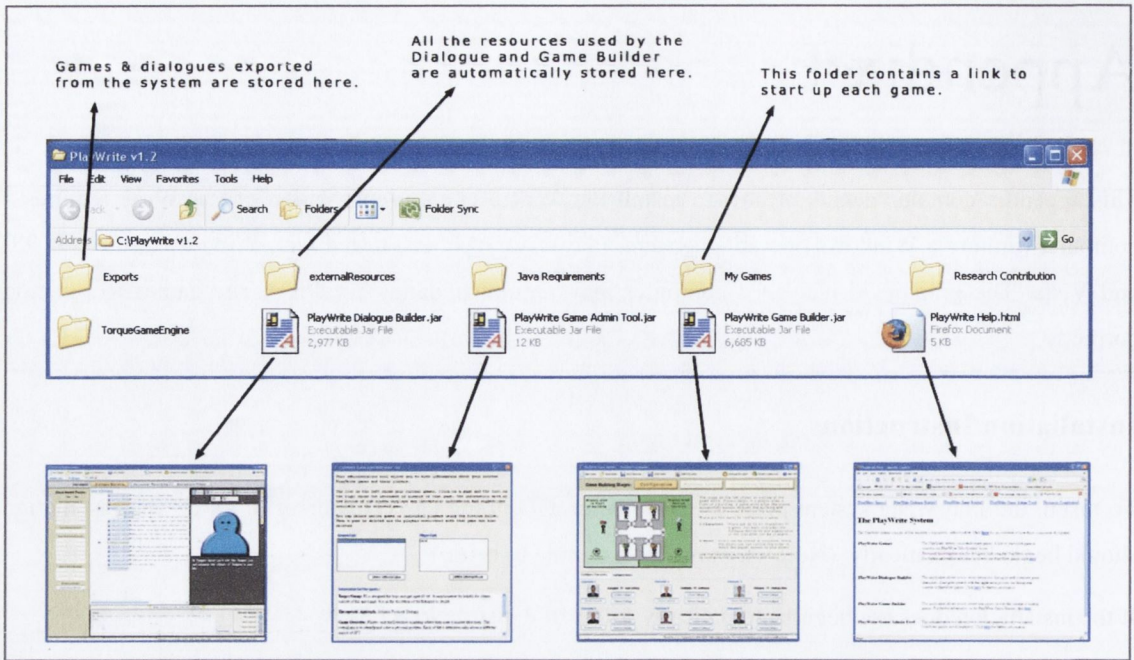
To make full use PlayWrite it is necessary to have Java Runtime 5 and the Java Media Framework installed on your computer. The installation of PlayWrite includes information on how to install these applications.

If you have any difficulties please contact david.coyle@cs.tcd.ie

PlayWrite Structure

When PlayWrite is installed a shortcut to the PlayWrite folder is added to the desktop of the computer. If you click on the desktop shortcut a folder similar to one shown below will open. From this folder you can access each element of PlayWrite.

- To open the PlayWrite Dialogue Builder double click on the “PlayWrite Dialogue Builder” link.
- To open the PlayWrite Dialogue Game double click on the “PlayWrite Game Builder” link.
- To open the PlayWrite Game Admin Tool double click on the “PlayWrite Game Admin Tool” link.
- A link to start each game is stored in the ‘My Games’ folder.
- To open the PlayWrite help files open the webpage “PlayWrite Help”.



Each element of PlayWrite can also be accessed using the Start Menu shortcuts. To access the Start Menu shortcuts select 'Start – All Programs – PlayWrite v1.2'.

PlayWrite Help Files

Details of how to use the different elements of the PlayWrite system, including Personal Investigator, are included in the PlayWrite help files.

Note: PlayWrite games, including Personal Investigator, can be displayed either in full screen mode or in a window. To switch between these modes click **ATL + Enter** when a game is running.

Uninstalling PlayWrite

To uninstall PlayWrite from your computer please follow these steps:

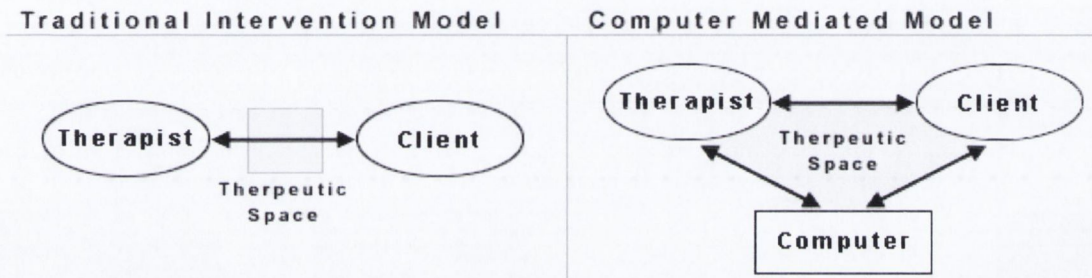
1. In the Start menu select "Start – Control Panel"
2. In the Control Panel select "Add and Remove Programs".
3. Select "PlayWrite v1.2" from the list of currently installed programs and choose "Remove".
4. PlayWrite will now be removed from the computer.

Appendix F

PlayWrite Workshops – This Appendix contains an example of the documents and tasks used in a PlayWrite workshop.

The Handout given to participants in workshop 3

Using computers as a communication tool in mental health interventions



Three key principles for using computers as communications tools:

- Computer based communication tools should appeal to the interests of the people seeking help.
- Computer based communication tools should be flexible enough to meet varying the needs of both professionals and their clients.
- If the computer based tool is useful in a given situation, use it. If it is not useful, don't use it.

Using computer games as communication tools with adolescents

- A recent UK survey reported that 53% of eleven to fourteen year olds play games four times a week or more, and that 44% play for more than one hour at a time (McFarlane, Sparrowhawk, & Heald, 2002).
- A 2005 survey commissioned by the BBC in the UK indicated that under-16's rank computer gaming as their number one entertainment form (Pratchett, 2005). The average American child aged 2–17 years plays video games for seven hours a week (Gentile & Walsh, 2002).
- Computer games currently constitute a client-centred approach to adolescent mental health interventions.
- Further details of the previous uses of computer games in mental health care are available in (Coyle, Matthews, Sharry, Nisbet, & Doherty, 2005)¹.

¹ Coyle, D., Matthews, M., Sharry, J., Nisbet, A., & Doherty, G. (2005). Personal Investigator: A Therapeutic 3D Game for Adolescent Psychotherapy. *International Journal of Interactive Technology and Smart Education*, 2, 73-88.

Personal Investigator - a proof of concept

Personal Investigator (PI) is a 3D computer game built as a proof of concept to evaluate the potential of modern therapeutic computer games. Only brief details of PI are presented here. For further details see (Coyle et al., 2005).

- PI incorporates a goal-oriented, strengths based intervention model called Solution Focused Therapy (SFT). It is the first game to integrate this established intervention approach into an engaging 3D game.
- The game employs a detective metaphor. Adolescents visit the Detective Academy and play the role of a ‘personal investigator’ hunting for the clues that will help them solve a personal problem. Players are given a detective notebook, where they are asked to record all their thoughts and ideas.
- Five solution focused conversational strategies are mapped into five distinct game areas. In each area the player meets a master detective who talks with the player in an informal way and asks the player to answer questions in their notebook.
- Three of the dialogues incorporate videos of adolescents describing how they overcame personal problems using the strategies described.
- To complete the game and graduate the academy players must complete the tasks set by each master detective. Upon completing the game, they receive a printout of their notebook.



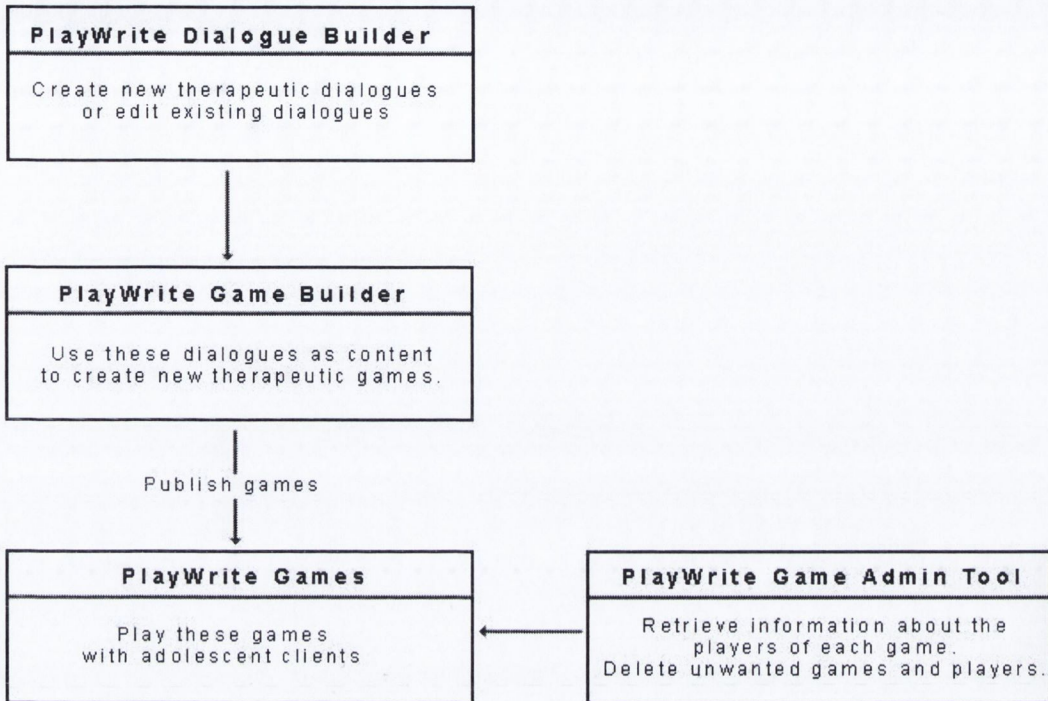
The original version of Personal Investigator

Key Findings in Personal Investigator

- A clinical evaluation of PI was conducted, in which three therapists used the game with five adolescents experiencing difficulties including anxiety and behaviour problems, attempted suicide, and social skills difficulties.
- In sessions the therapist and adolescent sat together at a computer, but the adolescent had full control of the game.
- Initial results indicate that playing PI in sessions can be very helpful in engaging adolescents.
- It can increase the amount of dialogue between therapists and adolescents, help to structure sessions, and help in setting therapeutic goals.
- The use of 3D had an empowering effect, allowing the adolescent more control over the pacing and direction of the therapeutic process.
- Both therapists and adolescents found the game very easy to use and therapists felt it integrated well with traditional approaches.
- The use of video-based peer storytelling proved particularly popular with adolescents.
- For further details of the therapeutic evaluation of PI see (Coyle et al., 2005).

PlayWrite Overview

PlayWrite is an application that can be used to both create and play therapeutic 3D computer games.



Help files on each aspect of the system are included in the installation of PlayWrite.

Demonstration 1 – a demonstration of the PlayWrite system

- Open each part of the PlayWrite system.
- Show how dialogues are built using the Dialogue Builder.
- Show how dialogues are added to a game using the Game Builder.
- Publish this game and view it.

Building and sharing new games

- The new version of Personal Investigator was the first game built using PlayWrite.
- PI is available to Irish professionals. The only condition for the use of PI is that you provide us with feedback on your use of the game.
- Over the next 2 months I shall be working with different mental health professionals to create a series of new games.
- Each person (or group) who builds a new game, and is willing to share it, will receive a copy of all the new games.

Exercise 1: Create a dialogue using the PlayWrite Dialogue Builder

Create a new dialogue called “First Meeting”. Insert the following elements into the dialogue. If you wish you can record a voiceover whenever one is required.

Conversation: Hi. How are you? My name is John/Jane.

Question: What's your name?

Conversation: It's nice to meet you. Tell me a little bit about yourself.

Multiple Choice: Are you in primary school or secondary school?

Answer 1: I'm in primary school. **Answer 2:** I'm in secondary school.

Scaled Question: I always thought school was great. Do you agree?

Scale Type: Likert Scale

Scale Points: Strongly Agree, Agree, Unsure, Disagree, Strongly Disagree.

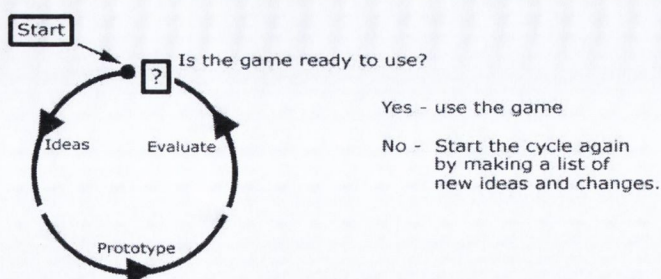
Conversation: Great! Thanks for talking to me. I enjoyed our chat. Bye now.

End of Dialogue

Exercise 2: Break into groups of 2/3 and brainstorm ideas for a new game. You can use the attached Game Design Document.

Exercise 3: Begin building the first prototype of a new game using PlayWrite

Exercise 4: Publish and evaluate the first prototype of the new game



Stage 1 - Ideas

- Think about what type of game you want to build. E.g.
 - Who is the game being designed for?
 - What issues is the game going to address?
 - How will these issues be addressed?
- Some of the best new games can be made by either adapting existing games or by taking traditional therapeutic materials and translating them into game dialogues.
- **Note:** It is not necessary to make a full game (6 dialogues) during the first design cycle. You only need a few ideas and can then build on this in later cycles.

Stage 2 - Prototype

- Using the PlayWrite Dialogue Builder begin creating the initial therapeutic content for your game.
- Using the PlayWrite Game Builder add this content to a game world
- Publish the game.
- **Note again:** It is not necessary to make a full game (e.g. 6 dialogues) during the first design cycle. You can just prototype a few ideas and then build on this later on.

Stage 3 - Evaluate

- Evaluate your game by running it and trying it out.
- Evaluations can be done to varying degrees. For example:
 - During the early cycles in a games development it is probably enough to try the game yourself and think about what works and what does not.
 - As the game develops through further cycles it is often good to get the opinions of and test it with other people e.g. colleagues.
 - As a game nears completion it may be necessary to have it independently reviewed to confirm it is ready for use.

Make a decision

- Is your game ready to be used with young people?
 - If no, make a list of the changes you think are needed and of any new ideas you have. Begin the cycle again.
 - If yes, begin using your game.

Game Design Document

Name of Game:

Issue/issues addressed:

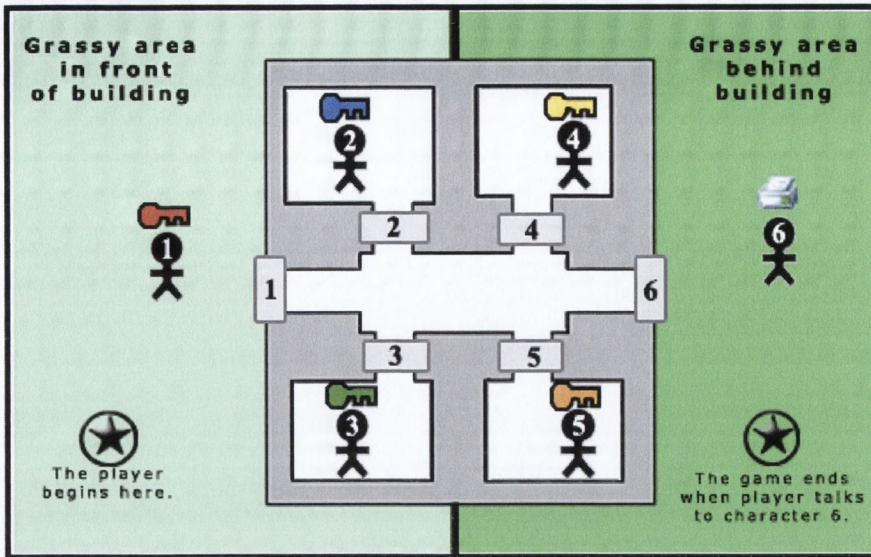
Target Group:

Therapeutic approach:

Source Materials:

	Add brief details of the dialogue each character will deliver e.g. theme, issue addressed.
Character 1 (introduction)	
Character 2	
Character 3	
Character 4	
Character 5	
Character 6 (wrapping up)	

Game Map



Notes:

Evaluation: Is the game ready for use with adolescents?

If no:

What changes are needed and what new ideas do you have?

The image below shows an example of a design document created by a MHC professional in a workshop. This document was used in the creation of a prototype game called "Different Sides".

Game Design Overview

Name of Game:

Different Sides Investigator.

Issue/issues addressed:

Sexually Abusive Behavior

Target Group:

Teenagers who have committed

Therapeutic approach:

sexually abusive acts.
Narrative + Solution Focused therapy.

Source Materials:

Contemporary papers on sexual abuse intervention using above approaches.

	Details of the dialogue the character will deliver e.g. theme, issue addressed. You can also add other details about the character e.g. male/female, a name, character traits.
--	--

Character 1
(introduction)

Different Sides 1 - Welcome + intro.

Character 2

Different Sides 2
Exploring negative effect of abuse on sex relationship.

Character 3

Different Sides 3
Exploring negative effects of abuse on person abused.

Character 4

Identifying Positive Sides of young person - Building the evidence of better side.

Character 5

Identifying steps to offending

Character 6
(wrapping up)

Well done - do more of what's working. Come back and play game 2 (relapse prevention plan) setting positive goals.

Game Authors:

Appendix G

This appendix contains the email sent to participating MHC professionals to inform them of various deadlines and of the support available to create new games

From: David Coyle [mailto:david.coyle@cs.tcd.ie]

Sent: 06 March 2007 12:20

To: [REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]
[REDACTED]

Subject: New PlayWrite Therapeutic Games

Hi all,

I just wanted to fill you all in on where things stand with the new games being built using PlayWrite. PlayWrite is the application, for creating and playing therapeutic 3D computer games, which I built as part of my PhD. There are also some deadlines and an event to let you know about.

As you are all (hopefully) aware, PlayWrite and Personal Investigator have been made available to Irish mental health professionals over the past few months. During this time I have also run a series of workshops and have been working with different therapists/teams to develop a series of new PlayWrite games. Depending on how things go over the next month or so, I'm hopeful of having between 5-10 (or maybe more) new games available. When the games are completed they will be shared out amongst the people that have contributed games and are will willing to share them.

Here are the details of how this is all going to work:

- The deadline for finishing up new games is **Friday the 6th of April**. Note: it is not necessary for games to be fully polished by this date. It's just important to have the dialogue content of the game ready. Character voiceovers etc can be added later.
- At the end of April (date to be confirmed) everyone involved in different stages of the project will be invited to a get together in Trinity College Dublin. At this get together you'll have the chance to take a look at and talk about the games built using PlayWrite. You'll also be able to talk to other mental health care professionals about their experiences of creating and using games.
- At the get together the new games will be shared out. This can also be done via post if you cannot make it on the day.

I'll be sending a more detailed email about the get together in Trinity over the next few days, we're just finalising the date.

I've set aside time over the next 5 weeks to work with therapists/teams who are interested in building new games to suit their needs. **If you want to work with me during this time, please email me asap and we can organise something.** The process is not that time consuming (or complicated), and the more people who participate the more games we'll all have to share. At this stage new games are only being made available to those who contribute to the new game building process.

If you'd like more information please email me or call me at [REDACTED]. Please pass on this email to anyone you feel would be interested.

Best regards,

Appendix H

This appendix contains details of the games created by MHC professionals using PlayWrite.

Personal Investigator

Authors – David Coyle, Mark Matthews, Dr John Sharry & Dr Gavin Doherty

Therapeutic Approach – Solution Focused Therapy

Issue Addressed – non-specific

In Personal Investigator (PI) young people visit the Detective Academy. They play the role of a trainee detective hunting for the clues that will help them to solve a personal problem. They meet five master detectives who talk to them about different aspects of Solution Focused Therapy and help them in their investigation. They also see video-based stories of other young people who have used the techniques described to help them overcome a personal problem. PI is designed for boys and girl aged 10-16 experiencing a range of issues. It may however be helpful for clients outside of this age range. It is at the discretion of the therapist to decide. PI is designed for therapist and clients to play together. It can be played over one or many sessions. The client has full control over the game and which they play at their own pace.

Working Thing Out: Beating Bullying

Authors – Dr John Sharry & David Coyle

Issue addressed - Bullying

In Working Things Out: Beating Bullying young people get the chance to give their opinions and share stories about the effects of bullying in schools. The players first see the stories of three other young people, who each had to deal with a different type of bullying. They have the chance to give their own opinions on each of the stories they see. After seeing other young people's stories the player then gets the chance to record any experiences of bullying they may have faced. The game also provides information on how to spot bullying and offer ideas and strategies for dealing with it.

The Islands Game

Authors – Tracey Dalton & Breda Kelly

Therapeutic Approach – Person Centred

In the Islands Game the player pretends they are the King/Queen of their own island kingdom. In this kingdom they get the chance to organise people and things into four categories. The categories are: (1) people and things that are always important to them, (2) people and things that are sometimes important, (3) people and things that they would prefer never to have to deal with, and (4) people and things they haven't mentioned in any of the other categories.

Temper Quest

Authors – Therese Hegarty & David Coyle

Issue addressed – Tempers and anger management

Therapeutic Approach – Narrative Therapy

In Temper Quest players visit the Temper Lab and put Tempers under the spotlight. They join the Temper Lab forensics team and help the team to discover all about Tempers. The player explores (1) the effects of Tempers in their life, (2) the effects of Tempers on other people in their life, (3) the effect they can have on the Tempers, and (4) times when the Tempers have less of an effect in their lives. Having put Tempers under the spotlight, the player then makes a decision about their opinion on Tempers and decides what place they want Tempers to have in their future. This game is adapted from the book *“The Trouble with Tempers: a book for people who want to claim their lives back from Temper Trouble”*, by Therese Hegarty.

gNatenborough’s Island

Authors – Dr Gary O’Reilly & David Coyle

Therapeutic Approach – Cognitive Behavioural Therapy

Issue Addressed – non-specific

In this game players visit David gNATenborough's island and learn all about strange little creatures called gNATs. These little creatures have a nasty sting for their size. When a gNAT stings a human it can cause Negative Automatic Thoughts, which can have a very bad impact on our feelings and behaviour. David gNatenborough and his team have been observing gNATs in their natural habitat for many years and show the players how to spot them. They also help players to think about how to deal with the nasty creatures and swot them when they spot one. The game is based on *“Straight Thinking”*, Chapter 6 of: *“A CBT Workbook for Children and Adolescents”*, by Dr Gary O’ Reilly, University College Dublin, January 2004.

Trail Blazers

Authors - Aoife McGrath, Dr Zoe Tyrell, Mary Healy and Dr Maura Delaney

Issue Addresses – Anxiety

Therapeutic Approach – Cognitive Behavioural Therapy

In this game players get the chance to visit Trail Blazers Island. On the island we have set up the Trail-Blazers Department and have gathered together intrepid travellers from the four corners of the world. These travellers were chosen because of their expert knowledge on ways to conquer anxiety. The Department's mission is to help young people understand their own anxiety and to gain control over anxious feelings, so they can begin to feel more confident. The game adopts a Cognitive Behavioural approach to anxiety. It aims to provide some normalisation of feelings, an understanding of the links between thoughts, feelings and behaviours in anxiety and help the player draw up a basic plan to manage an anxiety provoking situation.

My Story

Authors – Kathleen Fitzsimons & David Coyle

Therapeutic approach – Narrative Therapy

Issue Addressed – non-specific

My Story is a game that helps players to think about some things in their life that are not going so well at the moment. My Story uses an eclectic, narrative-based approach to working with young people and helps them to think about their own story in a very different way. In the game young people visit the Story Writing Island and begin writing their own story. On the island they meet characters who help them in writing their own story by asking some questions and letting them hear how other story writers got on. The player externalises their problem, looks at and records its effects, imagines life without the problem and makes a decision about their future. This decision is open-ended and may be changed later on. The player is also told it is ok if the decision is to do nothing more yet. Their story does not need to have an ending at this point in time, and that is fine. This game is designed to be used in a therapeutic setting, in the presence of a professional equipped to deal with issues which emerge.

My World

Authors – Mairead Hennebry, Mary O'Rourke, Alice Lynch & Ann Furlong

Issue Addresses – Life Story Work

Therapeutic Approach – Person Centred

In My World the player begins to map out their own life story. It covers four of the sections involved in life story work: (1) All About Me, (2) My Birth Family, (3) Special Memories, and (4) The Future. Players are encouraged to make a record of their family history and current situation. They are also encouraged to reflect on their own situation. In the game they meet characters who tell stories about their own family histories. The game is designed for young people with backgrounds in care or similar situations.

The Identity Game

Authors – Kathleen Fitzsimons & David Coyle

Therapeutic approach – Narrative Therapy

Issues Addressed - Identity issues

The Identity Game encourages young people to have a think about how things are in their life and, if necessary, make some changes. At the start of the game the young person is told: *"We managed to coax the famous author JK Rowling to work with us and it has been great fun. She always has a few Harry Potter tricks up her sleeve. In the game you will meet JK herself and four of her helpers. They will speak to you and share some stories with you. By the time you reach the end of the game you will be well on the way to writing your own story. Let's get going!"* Players need to be accompanied through every step of the process by a person qualified to handle what may emerge. It is good to include family members if they are present. They can play the game themselves or help the client to understand and answer the

questions. The game is not necessarily an end in itself but it brings to the fore issues which may have been difficult to locate in face to face conversation with children and teenagers.

Fitting In

Authors – Sinead Stafford

Issue Addresses – Gives children in care homes to opportunity to talk about their situation

Therapeutic Approach – Person Centred

This game is aimed at young people who are in living in care. The game begins by gauging the young person's feelings about meeting a therapist. It then gives them the opportunity think about and ask questions related to their own situation. Some examples include:

- If I could ask anybody any questions, these are the questions I would ask. (Young person fills in the details.)
- Is there anybody in your family that you are like, in what ways are you like them? How do you feel about this?
- What do you think of where you are living right now? (Scaled from 'It's great' to 'It's awful'.)
- If I could go back in time I would change.... (The young person fills in details.)
- Now let's use the time machine again to look into the future. What does that look like in your eyes? Please write it down or draw it!
- What are some good things that people have said about you?

Appendix I

This appendix contains the scripts used to build The Identity Game. This MHC professional who created this game preferred to work with Microsoft Word between meetings. During meetings PlayWrite was used to build and edit dialogues and test the game. At the end of each meeting the dialogue files were exported back to Word using the Dialogue Builder export function, e.g. see draft two below.

Draft 1 – created prior to meeting 1.

Dialogue with character: The editor of the Publishing House.

Conversation: Hi my name is Enid, called after a great writer of children’s fiction. I welcome you to the story writing centre of the Publishing House.

Conversation: I am here to help you write your unique story. No two stories are the same. I run the show in this department but I have four assistants who help me and each has her own room

Conversation: They help **me** and they will help you. When you go in, you will find them and then speak to them. You will have a notebook to help you along by jotting things down. Would you like to give your story a title?

Open notebook

Information:

All books have titles. Otherwise libraries would be chaotic and we would not be able to find anything.

Open question: What name would you like to give your book?

Close notebook

Conversation: The Publishing House gives prizes and you certainly deserve one right now. You have discovered that something in your life is not going well. You have made arrangements to come here and speak to us. I think that deserves a round of applause. Off you go then. I will see you later. (Applause)

Dialogue with Character.(Room 1)

Conversation: My name is Michelle and in this room you give your problem a name. It is very important to remember that problems do not live inside us all the time. They just visit from time to time. Let’s listen to Amy who tells us how she got on in this room.

Video plays here in which a young girl tells how she got on in this room.

“I was getting into a lot of trouble in school. Teachers said I was very very cheeky and when my Mam called up to the school I was scarlet. She didn’t even pick up for me. She told them I was cheeky at home too! I was devastated – felt I had no support.

Then I was told I could speak to the counsellor. She told me that I was not a cheeky person but that the ‘cheek’ visits sometimes. He is not always there. I was so relieved. I found it much easier to talk about the problem when I realised it didn’t live in my body. I called him “Cheeky Chops!” Then we were all able to talk about him and I didn’t feel awful inside.

Conversation: **Well, I hope that made some sense to you**

Open question: Can you choose a name for your problem visitor.

Open notebook.

Information:

Some people think of a name right away but others find it harder. If you are really stuck just put a “the” before it. It could be called, “The messer” or something like that. Later on if you think of a more accurate name you can go back and change it.

I think that hard work deserves another round of applause. (Applause)

Close notebook.

Dialogue with Character (Room 2)

Character: Hi my name is Jessica and my job is to record what the problem you have named does to you; how it affects you. Lets listen to Emily who will explain in more detail what this means.

Video plays here in which someone describes what the problem did to her. How it affected her life.

“Hi. After I named my problem I was asked what it did to me. At first I didn’t understand the question but then it came to me in a flash. I just closed my eyes and thought of a time when it came to visit. It did more than one thing to me. It did things to my mouth, my hands and sometimes my feet. It made words come out of my mouth which got me into trouble. It made my hands do things they were not meant to do and it even at times made my feet do things that I am not proud of. But the good news is that there were times when “the problem” was not in my body at all and during those times life was a lot easier for me. I also realised that I kinda forgot about the good times when it did not take over my body and remembered only the times that it did. And my teachers and parents were the same. THEY FORGOT THE GOOD TIMES WHEN I WAS IN CONTROL OF MY BODY.”

Conversation: So now I think you may be able to write into your notebook what the problem does when it pays you a visit.

Open notebook:

Information: It really is amazing what problems can do to us.

Open Question: Can you write down what the problem does to you. Maybe it only affects one part of you and that is fine. However it is good to close your eyes and remember a time when it came to visit. Then you will be able to see clearly what it does and you can write it down in great detail!

Close notebook

Dialogue with Character. (Room 3)

Conversation: Hi my name is Karen and this part of your story comes from your imagination. It goes like this. If the problem suddenly disappeared without trace how would your life be different in school and at home? Let Jennifer explain this one to you.

Video. I loved writing this part of the story. I was able to use my imagination the way J.K.Rowling did in Harry Potter. Just imagine that the problem is wrapped in the magic cloak which makes it totally invisible or someone waves a magic wand and beams it away- how would your life be different. You could also look into the magic mirror and see your life without the problem right before your eyes. I just closed my eyes and thought of home and school without the problem. It was super. I felt like laughing out loud!

Conversation: Now can you do this. Let's go to the notebook.

Open question: Can you magic the problem completely away. Jot down a few thoughts. You will probably find yourself laughing too. It could start with. With the problem gone, things at home and school were very different.....

Dialogue with character. (Room 4)

Conversation: Hi my name is Nicola and I am here to help you GET REAL!! By now you have named the problem, looked at how it affects your life, imagine life without it and now it is time to leave the world of imagination. It is now time to decide. Would you like to choose between the life imagined in Room 3 and the life you had before you came here. Maybe we could go back and remind ourselves of that. Return to notebook and look back.

Conversation: Now it's "make your mind up time". Just tell us what you have decided. Old troubled life or new happy life.

Open notebook

I have decided.....

Close notebook

Conversation: Well now you have decided to change how are you going to begin? Let's hear another story.

Video. After I thought about my life without the problem I decided to shove the problem right out of my life. I was warned not to change too quickly because I might give my teachers and parents a heart attack! I said I would go slowly but actually I left there determined to banish the problem right out of my life completely. Here's how I did it. I decided that every time the problem put even a toe into my life I would think of the different life that I imagined. I had a few slips and let him in when I was caught off guard but I was able to start again and stop him from taking me over.

Now I am so different.

That's how I did it. Would you like to write how you think you might do it? Will you try my way or one of your own? Let's go to the notebook.

Open notebook

I have an idea. When I feel the visitor coming I will....

Close notebook.

Dialogue with the editor of the Publishing House.

Conversation: Well now your story is complete.

Chapter 1	Naming the problem
Chapter 2	The effects of the problem
Chapter 3	Life without the problem
Chapter 4	How to do it.

You can write your conclusion later when you see how you get on and then your book will be published. It will be for your eyes only and for those you choose to share it with.

Most people just let everybody have a read but you may be different. It's up to you!

Draft 2 – created prior to meeting 2.

Dialogue - 'My Story - intro'

Conversation: Hi, my name is Enid. I'm called after the great writer of children's fiction.

Conversation: Welcome to the story writing centre of the Publishing House.

Conversation: I'm here to help you write your own unique story. No two stories are the same.

Conversation: I run the show in this department, but I have four assistants who help me and each has their own room.

Conversation: They help me and if you want they will help you.

Conversation: When you get into the building you can find them and speak to them too.

Conversation: But first, I like to give you a notebook where you can jot things down as you go along.

Conversation: Let's start by giving your story a name. Take a look.

openNoteBook

openQuestion: All books have titles. Otherwise libraries would be chaotic and we'd never be able to find anything. What title would you like to give your book?

closeNoteBook

Conversation: At the Publishing House we always acknowledge good work and you've certainly done some!

Conversation: You have discovered that something in your life is not going well. You've made arrangements to come here and speak to us.

Conversation: I think that deserves a reward.

Conversation: Here's the key to unlock the Publishing House.

Conversation: Off you then. I'll see you later.

Dialogue - 'My Story - Room1'

Conversation: Hi, I'm Michelle.

Conversation: In this room we'll give your problem a name.

Conversation: It's very important to remember that problems do not live inside us all the time.

Conversation: They just visit from time to time.

Conversation: Lets listen to Amy and she'll tell us how she got on in this room.

Video plays here in which a young girl tells how she got on in this room.

“I was getting into a lot of trouble in school. Teachers said I was very very cheeky and when my Mam called up to the school I was scarlet. She didn’t even pick up for me. She told them I was cheeky at home too! I was devastated – felt I had no support.

Then I was told I could speak to the therapist. She told me that I was not a cheeky person but that the ‘cheek’ visits sometimes. He is not always there. I was so relieved. I found it much easier to talk about the problem when I realised it didn’t live in my body. I called him “Cheeky Chops!” After that we were all able to talk about him and I didn’t feel awful inside.”

Conversation: Well I hope that made sense to you.

Conversation: Lets take a look at your notebook and choose a name for your problem visitor.

openNoteBook:

information: Sometimes it helps to give a problem a name. Some people think of a name right away but some find it harder. If you are really stuck just put a 'the' before it. It could be called 'The Messer' or something like that. Later on if you think of a better name you can always change it. When you've got a name click next.

openQuestion: Write the new name of the problem below.

closeNoteBook:

Conversation: Well done. I think you've come up with a good name.

Conversation: I reckon your hard work deserves another key.

Dialogue - 'My Story - Room2'

Conversation: Hi ya. My name's Jessica.

Conversation: My job is to help you make a record of what the problem you've named does to you and how it affects you.

Conversation: But before we look at your problem lets hear from Emily, who can explain in more detail what this means.

Video plays here in which someone describes what the problem did to her. How it affected her life.

“Hi. After I named my problem I was asked what it did to me. At first I didn’t understand the question but then it came to me in a flash. I just closed my eyes and thought of a time when it came to visit. It did more than one thing to me. It did things to my mouth, my hands and sometimes my feet. It made words come out of my mouth which got me into trouble. It made my hands do things they were not meant to do and it even at times made my feet do things that I am not proud of. But the good news is that there were times when “the problem” was not in my body at all and during those times life was a lot easier for me. I also realised that I kinda forgot about the good times when it did not take over my body and remembered only

the times that it did. And my teachers and parents were the same. THEY FORGOT THE GOOD TIMES WHEN I WAS IN CONTROL OF MY BODY."

Conversation: So now I think you might be able to write into your notebook what the problem you've named does when it pays a visit.

Conversation: Take a look at your notebook.

openNoteBook:

information: It really amazing what a problem can do to us. Maybe it only affects one part of you and that is fine. However it is good to close your eyes and remember a time when it came to visit. Then you will be able to see clearly what it does and you can write it down in great detail. Try it now if you like. When you're ready click next.

openQuestion: Can you write down what the problem does to you.

closeNoteBook:

Conversation: Great. I hope that helped.

Conversation: Now you have your own record of how your problem affects you when it comes to visit.

Conversation: You're taken another big step and earned you're next key.

Dialogue - 'My Story - room3'

Conversation: Hi my name is Karen and the next part of your story comes from your imagination.

Conversation: It goes like this!

Conversation: If the problem suddenly disappeared without trace how would your life be different in school and at home?

Conversation: When I met Jennifer she made a record of this part of her story.

Conversation: I'll let her explain this one to you.

Video plays here

"I loved writing this part of the story. I was able to use my imagination the way J.K.Rowling did in Harry Potter. Just imagine that the problem is wrapped in the magic cloak which makes it totally invisible or someone waves a magic wand and beams it away- how would your life be different. You could also look into the magic mirror and see your life without the problem right before your eyes. I just closed my eyes and thought of home and school without the problem. It was super. I felt like laughing out loud!"

Conversation: Now, I reckon you can do the same as Jenifer.

Conversation: Let's go to your notebook.

openNoteBook:

information: If you use your imagination you can magic the problem completely away. You might even find yourself laughing too. The story could begin some think like this, "with the problem gone, things at home and at school were very different...". When you're ready turn the page and you can start jotting down this part of your story.

openQuestion: Jot down a few of your thoughts below.

closeNoteBook:

Conversation: Congrats, you're earned another key.

Dialogue - 'My Story - Room4'

Conversation: Hi my name is Nicola and I'm here to GET REAL!

Conversation: By now you have named the problem, looked at how it affects your life and imagined your life without it.

Conversation: Now it's time to leave the world of imagination.

Conversation: It's now time to decide!

Conversation: Would you like to choose between the life imagined in Room 3 and the life you had before you came here.

Conversation: Note to Dave! It would be good to open the notebook and review it here.

Conversation: Now's it's make your mind up time!

Conversation: Just record what you've decided. Old troubled life or new happy life?

openNoteBook:

information: Summary of the decision.

openQuestion: Ok please make a record of your decision. Are you going to change or not?

closeNoteBook:

Conversation: That's great. I think we've come a long way and made a big decision.

Conversation: Now you're ready to leave the Publishing House and finish up your story.

Conversation: Here's the key which unlocks the last door.

Conversation: All the best and bye now!

Dialogue - 'My Story - wrapup'

Conversation: Hello. It's good to see you again.

Conversation: I hope my assistants helped you out.

Conversation: I hear you've made a decision.

Conversation: Before we talk about that let's take a look at one final story.

Video plays here

"After I thought about my life without the problem I decided to shove the problem right out of my life. I was warned not to change too quickly because I might give my teachers and parents a heart attack! I said I would go slowly but actually I left there determined to banish the problem right out of my life completely. Here's how I did it. I decided that every time the problem put even a toe into my life I would think of the different life that I imagined. I had a few slips and let him in when I was caught off guard but I was able to start again and stop him from taking me over. Now I am so different."

Conversation: So that's what Melissa decided to do next.

multiChoice: Would you like to write how you think you might do it?

Answer 1: Sure, why not.

Conversation: Great, let's take a look at your notebook.

openNoteBook:

openQuestion: Please make a record of what you've decided to do.

closeNoteBook:

Answer 2: Not right now. Maybe later.

Conversation: Ok no problem.

Conversation: Well I think your story has developed nicely.

Conversation: Though it may not even seem so to you, you've really done a lot.

Conversation: First you named your problem.

Conversation: Then you looked at the effects of it.

Conversation: Then you imagined the life without the problem you named.

Conversation: And finally you made a decision about what to do next.

Conversation: Just for the record I've also added these achievements to your notebook.

openNoteBook:

information: 1. You named the problem. 2. You explored the effects of the problem. 3. You imagined life without it. 4. You made an important decision about what to do next.

closeNoteBook:

Conversation: You've made great progress with you story.

Conversation: But the last thing I say to my visitor is,

Conversation: Your story is not yet finished. Remember you can change it any time you like.

Conversation: If you come up with new ideas they can be added later.

Conversation: Remember from now on it's your story!

Conversation: You can tell it anyway you like.

Conversation: It's time to go. Have a think about all the new ideas you've found.

Conversation: Congratulations and good luck.

Appendix J

This appendix contains the questionnaires used in the multi-site evaluation of Personal Investigator described in Chapter 10.

Client details form

Please fill in this form for each young person with whom you used Personal Investigator. Add extra space as required. The information you provide will be kept in strict confidence and personal information will not be included in any published material. If possible, please also attach the young person's feedback to this page. Feedback from young people who have used the game is very valuable in assessing the impact of the game.

For each young person please choose a unique number by which we can identify them. Please write the same number on any feedback provided by the young person.

Your name: _____

Young person's number: _____

Was the young person male or female?

What age was the young person?

Over how many sessions was the game used?

Did the young person complete the game? If not, why not?

Please briefly describe the issues and difficulties the young person was dealing with:

Please briefly describe how you used PI with this client:

Do you feel playing PI was helpful for this client?

Very Helpful	Helpful	Neutral	Unhelpful	Very Unhelpful

Please comment:

Did you have any difficulties using PI with this client?

'Personal Investigator' - Professional Questionnaire

Thank you for using Personal Investigator (PI) in your work. This is the final feedback form, where you are asked to assess the overall value of having used PI with your clients. The information you give us will contribute to our assessment of the overall usefulness of PI as a therapeutic tool. The information you provide will be kept in strict confidence and personal information will not be included in any published material.

Name: _____

Occupation: _____

Organisation: _____

Date: _____

In total, how many clients did you use PI with? _____

Note: For each young person, with whom you used PI, please attach a separate client details page. If possible, please also attach each young person's feedback. Feedback from young people who have used the game is very valuable in assessing the impact of the game.

Section 1 – Overall impression

The statements below are designed to record your overall impression of how helpful or unhelpful PI was in your work with young people. Please consider each statement carefully and, based on your experience of using PI, mark your level of agreement or disagreement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
Overall PI had a positive impact in the majority of sessions in which it was used.					
I felt comfortable using PI with clients.					
PI complemented my traditional ways of working with clients.					
I would like to continue using PI with further clients.					

Section 2 - Design Features

The following statements are designed to identify which features of the design of PI are helpful or unhelpful. Please consider each statement carefully and, based on your experience of using PI, mark your level of agreement or disagreement.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
The 3D environment was helpful.					
Watching videos of other teenager's stories was helpful.					
Listening to the characters dialogue was helpful.					
Answering questions in the notebook was helpful.					
Receiving rewards (e.g. keys) was helpful.					
Receiving a printed record of the notebook was helpful.					

Did any of these features cause difficulties for you or any of your clients?

Were any of these features particularly beneficial?

If you have any further comments on any of the above statements, please add them here:

Section 3 - Specific Issues

The following statements are designed to identify specific positive and negative impacts of using PI with young people. Please consider each statement carefully and, based on your experience of using PI, mark your level of agreement or disagreement. There may be some overlap between statements, however please consider and answer each statement independently.

Issue 1: An icebreaker

PI is a useful icebreaker.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

PI is a useful icebreaker, but it is also more than that.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Issue 2: The therapeutic relationship

Playing PI can have a positive impact on the client-therapist relationship.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

If you have any comments on this statement, please add them here:

Issue 3: Structure

Playing PI can help in structuring sessions with young people.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

If you have any comments on this statement, please add them here:

Issue 4: A distraction

PI is a distraction from beneficial therapeutic processes.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

If you have any comments on this statement, please add them here:

Issue 4: Engagement:

Playing PI can make it easier to engage constructively with adolescent clients.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

When PI was used clients were more enthusiastic about sessions than is usually the case.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

PI can help in maintaining the interest of young people during sessions.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

Playing PI helped to increase the amount of conversation between me and my clients.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

If you have any comments on any of these statements, please add them here:

Issue 6: Goal Setting

Playing PI can make it easier to agree therapeutic goals with clients.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

If you have any comments on this statement, please add them here:

Issue 6: Ownership

Young people playing PI experienced a greater sense of ownership of the therapeutic process than is usually the case.

Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree

If you have any comments on this statement, please add them here:

Can you identify any other specific benefits or negative effects of playing PI? If so please make a note of them here. Add extra space as required.

Section 4 – Final Opinions

The following questions are designed to record your final opinions of PI. Please answer each question, based on your experience of using PI. Add extra space as required.

Overall, what are the three most useful things about PI?

Overall, can you identify three weaknesses of PI?

Are there situations or clients with whom PI is particularly useful?

Did you have any negative experiences when using PI with young people?

Are there situations or clients with whom you feel PI should not be used?

What new features would you like to see added to future versions of PI?

Thank you for taking the time to complete this feedback form. If you have any further thoughts or opinions about PI please add them on a new page.

'Personal Investigator' Young Person Questionnaire

Thank you for playing Personal Investigator. We would be grateful if you would take a few moments to give your feedback.

What age are you? _____ Date filling in form: _____

Gender:

male		female	
------	--	--------	--

Please circle how easy was it to play Personal Investigator.

Very easy	Easy	Not easy	Difficult	Very Difficult

Please say what was easy or difficult?

Please rate how helpful Personal Investigator was in assisting you to think about and solve a personal problem.

Very Helpful	Helpful	Not sure	Unhelpful	Very Unhelpful

Please say what was helpful or unhelpful?

What did you like most about Personal Investigator?

Is there anything you think that should be different in Personal Investigator?

Please rate how helpful were the following aspects of Personal Investigator.

	Very Helpful	Helpful	Not sure	Unhelpful	Very Unhelpful
The 3D environment					
Writing in the note book					
Watching the videos					
Listening to the characters					

Are there any parts of the game you particularly remember?

What age range do you think the game is best suited to?

Is there anything else you would like to say about the game?

Thank you for completing this questionnaire

Appendix K

This appendix contains details supplementary materials submitted on a CD alongside the written thesis.

The CD included with this thesis is an installation CD for the PlayWrite system. As well as containing the full PlayWrite system – the Dialogue Builder, Game Builder, Admin tool and help files – the CD also includes content created by MHC professionals during the evaluation of playWrite. Chapters 7 to 9 make reference to this content.

Details of how to install PlayWrite are included in Appendix E. The following sections provide details of the content included in the PlayWrite installation.

PlayWrite games

Each of the games listed in table L.1 is included in the PlayWrite installation. Each of these games was created by MHC professionals. A link to start each game is stored in the PlayWrite ‘My Games’ folder.

Table L.1 – the games included in the PlayWrite installation CD

Name of Game	Therapeutic Approach	Issues Addressed
Personal Investigator	Solution Focused Therapy	Non-specific
gNatenborough’s Island	Cognitive Behavioural Therapy	Non-specific
Temper Quest	Narrative Therapy	Anger management
WTO – Beating Bullying	Non-specific	Bullying
My Story	Eclectic - Narrative	Non-specific
Trail Blazers	Cognitive Behavioural Therapy	Anxiety
My World	Person Centred	Life Story Work
The Identity Game	Narrative	Identity Issues
The Islands Game	Non-specific	Non-specific
Fitting In	Person Centred	Residential care
Personal Investigator: Mod 1	Solution Focused Therapy	Non-specific

The game description files for each game can be opened using the PlayWrite Game Builder. Each of the dialogues used in the games can be opened using the Dialogue Builder. The Game Admin Tool can also be used to browse information about each of the games.

Content Created in the Formative Workshop Study

Chapter 6 describes the formative evaluations of PlayWrite. During these evaluations a group study was held in which MHC professionals were asked to create original content using the PlayWrite Dialogue Builder. Each of the dialogues created in this study are included on the installation CD and can be viewed using the Dialogue Builder. The files are named “W1 – T*.xml”, where * equals 1-6.

Prototype Games Created by Workshop Participants

During the handover workshops, described in Chapter 7, MHC professionals created prototypes for eight games. Four of these prototypes were later developed into completed games: Temper Quest, The Islands Game, My World, Fitting In. The initial prototype for Temper Quest is included, alongside the completed version. Four further prototype games are also included. The prototype games are named as follows:

“Temper Quest – WS2”

“Stay Safe – WS3”

“Worry Wizard – WS4”

“Buffy’s Dilemma – WS4”

“Different Sides – WS4”

A link to start each game is stored in the ‘My Games’ folder. The game description files and dialogue files can also be view using the Game Builder and Dialogue Builder.

Note 1: As the copyright to the source videos used in WTO – Beating Bullying is not owned by Trinity College Dublin, these video files are not included in the installation CD. The converted ‘ogg’ video files are included in the completed game, but cannot be viewed or configured using the Dialogue Builder.

Note 2: The PlayWrite installation requires approximately 1GB of free disc space. This large installation size is due to the amount of media resources (e.g. voiceover and video files) used in the included games.

Note 3: The PlayWrite installation CD is designed for PC’s running a Windows operating system.

Appendix L

This appendix contains transcripts of a dialogue used in the original version of Personal Investigator and also the transcript of the corresponding dialogue of the modified version of the game. The modified version was created by a therapist who works with young people with learning and literacy difficulties. The modified version used

The Original Transcript

conversation: Hello I'm Damini, I'm the forensic scientist in the detective academy.

conversation: I help detectives find special evidence as they search for solutions to their problems.

conversation: The most important evidence is exceptions, that is times when the problem happens less or not at all

conversation: Please examine a testimony from one of our witnesses.

videoReference: petersStory.avi

conversation: Ok, I hope that story helped. I'd like you to make a note of exceptions to your problem in your notebook.

openNoteBook:

information: Exceptions to the problem, times when the problem occurs less or not at all, provide important evidence to finding solutions. For example, rather than analysing what makes you feel depressed, why not notice the times you feel happier and analyse what happens then. This way you can make the good times happen more often.

openQuestion: When does the problem occur less or not at all?

openQuestion: What happens at those times?

information: The more information you can get about 'Exceptions' the better. The more you know what was happening at these times and what you and others were thinking, feeling or doing the more you will be able to make them happen again. These are the clues that will eventually solve the problem unmask the solution.

openQuestion: What are you or others doing differently during exception times?

openQuestion: What could you do to make these 'exceptions' happen more often?

information: Sometimes, it takes a lot of thinking to find exception clues. You have to be patient. A friend of mine used to get very depressed and feel very negative. It was only when he realised that he felt particularly bad at the weekend, that he thought to himself 'well that means the weekdays are slightly better' After thinking about it, he realised he went out and talked to more people midweek. This became an important clue to him solving the problem.

openQuestion: What is particularly different during those exceptional times?

openQuestion: What else could you do to make them happen more often?

closeNoteBook:

conversation: Well done!

conversation: Now that you have carefully investigated exceptions to your problem, you have earned your next key.

endDialogue:

The Modified Transcript

conversation: Hello I'm Damini, I'm the forensic scientist in the detective academy.

conversation: I help detectives find extra evidence as they search for solutions to their problems.

conversation: The most important evidence is exceptions, that is times when the problem happens less or not at all

conversation: Please examine a testimony from one of our witnesses.

videoReference: petersStory.avi

multiChoice: How was Peter feeling about his problem?

answer: great

answer: bad

answer: not sure

multiChoice: How was Peter acting when he had this problem?

answer: always in a good mood

answer: got angry a lot

answer: chilled and happy

multiChoice: Was his problem always with him?

answer: yes

answer: no

answer: not sure

multiChoice: At times when his problem was not with him how did he feel?

answer: really good

answer: he was in bad mood

answer: not sure

openQuestion: What resources did Peter use to help him with his problem?

multiChoice: Great, thanks for answering those questions. Would you like to see Peters story again?

answer: Yes please

conversation: Ok here goes

videoReference: petersStory.avi

answer: Lets move on

conversation: Ok, I hope that story helped. I'd like you to make a note of exceptions to your problem in your notebook.

openNoteBook:

information: Exceptions to the problem, times when the problem occurs less or not at all, provide important evidence to finding solutions. For example, rather than thinking about what makes you feel depressed, why not notice the times you feel happier and analyse what happens then. This way you can make the good times happen more often.

openQuestion: When does the problem occur less or not at all?

openQuestion: What happens at those times?

information: The more information you can get about 'Exceptions' the better. The information you have about how you are feeling and what you or others are doing and thinking when your problem is not with you is very important. This information is one of the clues that will eventually help solve the problem.

openQuestion: What are you or others doing differently during exception times (times when your problem is not with you)?

openQuestion: What could you do to make these 'exceptions' happen more often?

information: Sometimes, it takes a lot of thinking & patience to find exception clues. A friend of mine used to get depressed & feel negative. When he realised that he felt worse at weekends, he thought to himself 'well that means the weekdays are better for me' After thinking about it, he realised he went out and talked to more people midweek. This was an important clue to him solving the problem. He realised that doing things & talking to people helped him feel better.

openQuestion: What is particularly different during those exceptional times when your problem is not with you or not with you as much?

openQuestion: What else could you do to make them happen more often?

closeNoteBook:

conversation: Well done!

conversation: Now that you have carefully investigated exceptions to your problem, you have earned your next key.

endDialogue: