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The design of systems to engage adolescents in
professional mental health services

Thesis submitted to

University of Dublin, Trinity College

For the degree of

Doctor of Philosophy

Mark Matthews

2009

Declaration

I, the undersigned, declare that this work has not been previously submitted as an exercise for a degree at this or any other University, and that, unless otherwise stated, is entirely my own work.



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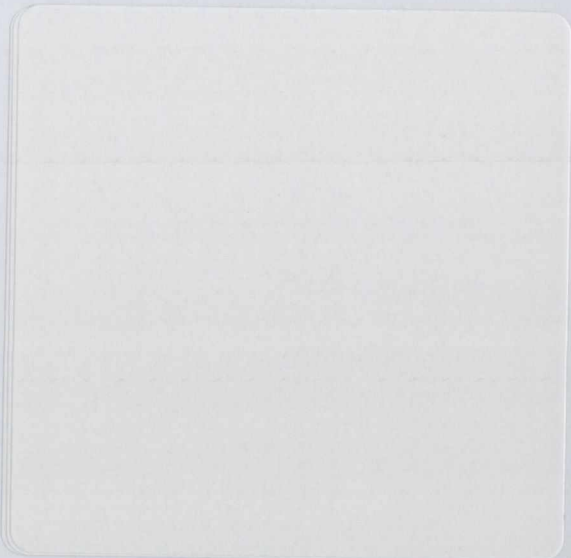
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This thesis has taken a considerable amount of time and significant effort. I hope it will make a difference in some way.

Mark Matthews

University of Dublin, Trinity College

2009

Related Publications

Book Chapters

Matthews, M., Doherty, G., Coyle, D. & Sharry, J. (2008). Designing mobile applications to support mental health interventions. In J. Lumsden (Ed.), *Handbook of Research on User Interface Design and Evaluation for Mobile Technology*.

Peer Reviewed Journals

Coyle, D., Doherty, G., Matthews, M., & Sharry, J. (2007). Computers in Talk-Based Mental Health Interventions. *Interacting with Computers*, 19(4), 429-586.

Matthews, M., Doherty, G., Sharry, J., & Fitzpatrick, C. (2008). Mobile Phone Mood Charting for Adolescents. *British Journal of Guidance and Counselling*, 36(2), 113-129.

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.

Practitioner 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

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 Papers & Presentations

- Matthews, M., Doherty, G. & Sharry, J. (2008). *My Mobile Story*: supporting content creation and analysis in mental health interventions. Presented at the 'Mental Health and Technology' Workshop. CHI2008 Conference on Human Factors in Computing Systems, 6th April 2008, Florence, Italy.
- Matthews, M., Sharry, J. & Doherty, G. (2007) *Mobile Mood Diary*. Presented at the XXIV World Congress – International Association for Suicide Prevention, 28 August – 1 September, 2007, Killarney Ireland.
- Matthews, M. & Coyle, D. (2004). *Personal Investigator*: a game tool for psychological interaction. Presented at the games for health conferences, Sept 17 2004, Madison, WI, USA.
- 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.

Abstracts & Posters

- Matthews, M., Doherty, G., Sharry, J. & FitzPatrick, C (2007). Monitoring mood using mobile phones - A comparative study. ESCAP 2007.
- Monitoring Mood using mobile phones – a comparative study. ACPP Abstract. Mark Matthews, John Sharry, Gavin Doherty et al. 2006.
- Matthews, M., Doherty, G. & Sharry, J. (2005) Wireless Therapy: mobile games as a means of engaging adolescent clients. Extended Abstract. *CyberPsychology and Behaviour*, 8(4), 29-31
- Matthews, M. & Coyle, D. (2007). *Positive Thoughts – therapeutic mobile games*. Proceedings of Games for Health Conference, Baltimore, MD, USA.

ABSTRACT

Human Computer Interaction (HCI) studies the interaction between people and computers. User-centred design (UCD), design which places the user at the centre of the development process, has become the dominant focus within the field. Many user-centred techniques have been developed to support the design and evaluation of systems. Recent years have seen the expansion of UCD in diverse fields, including learner-centred design, child centred-design and assistive design. The evaluation of user-centred systems usually involves observing these systems in use.

Mental health is a growing and important problem - many mental health problems have their root in childhood and adolescence. This thesis focuses on the development of systems to support talk-based interventions in adolescent mental healthcare. There are certain challenges in this area, including a lack of engagement and difficulties accessing services, with which technology may be able to help. Adolescent mental healthcare is a sensitive environment where 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 this environment. Restrictions in the area mean that many traditional user-centred techniques are not appropriate. It is therefore necessary to identify methods to address the problems of design and evaluation in these circumstances.

The aim of this thesis is to establish a user-centred process for the design of tools that encourage greater adolescent engagement in professional mental health services in and between sessions with a therapist. A central question of this thesis is to investigate to what extent User-Centred Design is possible in consideration of the significant limitations present in the domain. This thesis establishes a design approach for work in this field, which takes account of these limitations.

The method established in this thesis incorporates therapists as design partners early on and seeks to identify potential usability problems before adolescent clients participate in clinical evaluations. The design and evaluation of two systems using these techniques is presented and discussed. An ancillary aim of this work is to map out the main challenges and to provide design guidelines and recommendations to others working in this new area.

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1. Mental Health: A Sensitive Situation

1.1. Mental Health: a worldwide problem

Mental health is one of the most pressing concerns for public healthcare systems worldwide. A large-scale international study has identified mental illnesses as the second leading cause of disability and premature mortality in the developed world (Murray et al., 1996). In a 2001 report, the WHO reported that approximately one in four people will have a mental health problem at some point in their life, that "*major depression is now the leading cause of disability globally*" and that "*some 450 million people suffer from a mental or behavioural disorder*" (World Health Organization, 2001). The WHO's 2003 report, 'Shaping the Future', states: "more than 150 million people suffer from depression at any point in time; nearly 1 million commit suicide every year; and about 25 million suffer from schizophrenia, 38 million from epilepsy, and more than 90 million from an alcohol or drug use disorder" (World Health Organisation, 2003b). The number of people that suffer from mental health problems continues to grow and is predicted to continue increasing in the future (U.S. Department of Health and Human Services, 1999).

The economic cost associated with mental health problems has been identified in reports as substantial and wide-ranging throughout society (Greenberg et al., 1999; Layard, 2006). An International Labour Organization report estimated that treatment for mental health problems accounted for at least between 3 and 4% of EU member states' GNP (Gabriel et al., 2000). In the United States, it has been estimated that the direct costs of mental illness in 1996 was \$69.0 billion, or 7.3 percent of total health spending (U.S. Department of Health and Human Services, 1999). This figure relates to the direct cost of treatment. There are many indirect costs. In the US, they were estimated to be \$78.6 billion in 1990 (Rice et al., 1996). A more recent UK report estimated the indirect cost of lost work days, caused by depression and anxiety disorders, to be £12 billion a year (The Centre for Economic Performance's Mental Health Policy group, 2006).

The past 50 years have seen major advances in the treatment of mental problems. The efficacy of mental health treatments is well documented and a range of effective treatments exist for most mental disorders (Layard, 2005; U.S. Department of Health and Human Services, 1999). Only a small minority of people suffering from mental health problems

receive even the most basic treatment (World Health Organization, 2001). Intervention generally takes the form of talk-based treatments, physical treatment (drugs, ECT, biomedical), and social interventions. This thesis will focus on talk-based intervention methods. Studies have concluded that talk-based methods are equally as effective as drug-based interventions in the treatment of mental health disorders (US Surgeon General, 1999). For example, the UK's National Institute of Clinical Excellence (NICE) has provided guidelines which identify Cognitive Behavioural Therapy (CBT) to be as effective as drug treatments (National Institute for Clinical Excellence, 2006a).

Improving societal mental health can lead to increased stability and confidence, improved physical health and increased productivity; the failure to improve societal mental health can lead to increased crime, violence, unemployment, absenteeism, suicide and can have substantial economic impact.

1.2. Mental Health and Mental Illness

There is no one definition of mental health. It is a term that varies across cultures and from person to person. **Mental health** in this thesis is used to denote a scale running from mental wellness to mental illness. In this regard, it is similar to physical health which can range from positive to negative. It is considered an essential element of general health, as defined by WHO's constitution. A recent report by the Irish Government described the mental health spectrum:

"mental health is broader than an absence of mental disorders..... poor mental health affects our ability to cope with and manage our lives, particularly during personal change and through key life events, and decreases our ability to participate fully in life mental health is an essential component of general health which it underpins."
(Health Services Executive, 2005)

Poor mental health affects individuals, their families and friends. Individuals suffering from mental health problems can find it extremely difficult to manage their lives. This can have a knock-on effect to children, spouses, family and friends. The WHO has recently underlined the importance of mental health to society as a whole:

"Mental health and well-being are fundamental to quality of life, enabling people to experience life as meaningful and to be creative and active citizens. Mental health is an essential component of social cohesion, productivity and peace and stability in the

living environment, contributing to social capital and economic development in societies.” (WHO European Ministerial Conference on Mental Health, 2005)

The term **mental illness** is used throughout this thesis to describe a complete range of mental health difficulties, from mild depression to serious mental disorders and illnesses. There are several terms generally used to refer to professionals working in the mental health. The most commonly used term is mental health practitioner in the domain. For the sake of brevity and clarity, the term **therapist** will be used throughout this thesis, although the specific training of a professional will be explicitly mentioned where relevant. The term **client** is used to refer to children and adolescents attending talk-based mental health interventions with a therapist. While most clients discussed in this thesis are adolescents, in some cases clients as young as 10 participated in evaluations. Child and Adolescent Mental Health services are generally co-located. Furthermore, in relation to mental health problems, a client's age can be an unreliable gauge of their level of development.

1.3. Adolescent Mental Health

“The lack of attention to mental health of children and adolescents may lead to mental disorders with lifelong consequences,...and reduces the capacity of society to be safe and productive.” (World Health Organisation, 2003a)

This thesis focuses on developing systems to support adolescent mental health. Kraus defined adolescence as “the no-man's land” between childhood and adulthood (Kraus, 1980). An increase during adolescence in “at-risk” behaviours, as well as an increased prevalence for many psychiatric problems has been recognized in many reports (DiClemente et al., 1996; Fombonne, 1998; Weissman et al., 1999). Many later life mental health problems have their onset in adolescence (Harrington et al., 2001; Weissman et al., 1999; World Health Organisation, 2004). Their effects, including significant economic effects, often continue into adulthood (see for e.g. (Patterson et al., 1989), (BMA, 2006; Scott et al., 2001; World Health Organisation, 2003a), (Geller et al., 2001)).

Worldwide, between 17% and 22% children and adolescents suffer significant developmental, emotional or behavioural problems (Kazdin, 2003). In the US, the National Institute of Mental Health estimates that 1 in 10 children and adolescents suffers serious mental illness, with less than half of these receiving treatment (National Institute of Mental Health, 2004). In 1999, the US Surgeon General reported that a high proportion (approximately between 70-

80%) of young people with a diagnosable mental illness receive no treatment whatsoever (U.S. Department of Health and Human Services, 1999).

While adolescence is a crucial period for mental health development, it is a period where clients are most difficult to engage. Kazdin sums up the challenge as follows:

“The challenge is to involve the child in treatment and to work toward a change that the child may not view as necessary or even potentially useful” (Kazdin, 2003)

There are significant barriers to children and young people receiving treatment. These include: (1) the service location is inaccessible, (2) the clinic’s opening times are inconvenient, (3) considerable stigma associated with mental illness and therefore with attending mental health services, (4) treatments are perceived as not relevant or too demanding, (5) parents and children are reluctant to seek treatment, (6) dissatisfaction with the service and (7) the costs of the treatment (BMA, 2006; Kazdin et al., 1997; Pavuluri et al., 1996; U.S. Department of Health and Human Services, 1999). In order to overcome these barriers and reach young people, the British Medical Association recommends that service provision needs to be flexible and innovative providing access outside of typical hours (BMA, 2006). It follows that effective service provision would need to provide increased access, seek to overcome stigma, be engaging (i.e. be perceived as relevant), not too demanding and not be too expensive.

1.4. The promise of technology

Mental healthcare services will have to identify new treatment approaches in order to tackle the continuing worldwide growth of mental health problems. Initial research provides evidence that computer interventions may provide effective treatment (Anthony, 2003; Bauer et al., 2003; Coyle et al., 2005). Even small changes in the effectiveness of mental health services could significantly affect the general health of populations and greatly reduce the costs to society of mental illness. Surveys conducted in the course of this research indicate that technology has had a minimal impact on professional mental health services. Therapists were skeptical of the benefits of technology, citing fears such as the potential of damage to the client–therapist relationship, ethical and security issues and worries that the current skills of therapists may become obsolete. Therapists often use a standard range of administrative software such as Microsoft Word and Microsoft Outlook, but rarely make use of technology directly as part of an intervention with a client. Few, if any, mental health training courses include a technological element. Others fear that technology in and of itself has a damaging

impact on the mental health of society. Therapists typically have very low confidence in using technology.

There is disparity between the media adolescents are interested in and the materials being currently used to engage them in therapeutic activities. Examples of current everyday tools a therapist might use to engage an adolescent include storybooks, construction materials, artwork, puppets and board games. More recently, the use of CD-ROMS or websites has increased. By far the most dominant materials used are paper-based worksheets. Many clients, according to therapists interviewed as part of this research, have negative reactions to paper-based materials associating them with school and homework. The result of this is that the materials used to engage adolescents might not be sufficiently engaging or concurrent with young people's interests.

According to (Wartella et al., 2002), adolescents are the most frequent and enthusiastic users of interactive technology. Given this general enthusiasm for technology, an opportunity exists to use it to assist with adolescent interventions. Technology may be able to provide a channel through which indirect communication between the therapist and client can proceed in a less confrontational fashion. For example, one study on using a computer game in a therapeutic session, reported that clients found it easier to talk while looking at the screen (Coyle et al., 2005). It also found that the introduction of the game had an empowering effect on the adolescent clients. They were more comfortable with the technology than many of the therapists.

1.5. In and between therapeutic sessions

Client self-efficacy and the degree to which clients engage with their treatment has been identified as one of the most significant factors in achieving positive therapeutic outcomes (Assay et al., 1999). Alongside engagement during clinical sessions, increasing client engagement in therapeutic activities between sessions is equally important. Within public healthcare systems it is often the case that clients will see therapists at most once a week and sometimes will only attend once a month over the course of treatment. For this reason, it is particularly important to engage clients in therapeutic activities between sessions.

This thesis examines the design of systems that operate both during and between therapeutic sessions. Outside the clinical setting, the focus is on the design of software on adolescent clients' personal mobile phones to capture important personal information. Inside the session, the focus is on the design of software to display the captured information.

This thesis looks specifically at homework activities – which require the clients to complete therapeutic activities and bring back the results to the next session. Homework activities involve firstly collecting content between the session and viewing and structuring this content with a therapist in a session. Because of this, the systems discussed in this thesis have two aspects to them. This may involve bringing some photos of a family member or recording feelings or events that occur between sessions. Existing (e.g. paper-based) approaches have achieved limited success in engaging adolescent clients between therapeutic sessions. Identified problems with materials currently used include lack of client engagement, stigma associated with therapeutic activities and inconvenience.

Research shows that therapeutic interventions are most likely to be successful if the therapist engages with the client in a client-centred way (Assay et al., 1999). This has implications for the choice of technological platform for a therapeutic intervention. Technology such as personal computers and mobile phones hold great appeal for adolescents. The mobile phone represents a promising client-centred platform, which may provide access to adolescents' personal space and offer them persistent and continual access to therapeutic materials and activities outside of the therapy session. For technological interventions between sessions, this thesis focuses particularly on the design of mobile software for collecting data between sessions. For technological interventions in a session, this thesis focuses on the design of desktop-based browser-based software.

1.6. User-Centred Design in Adolescent Mental Health

As noted above, there are already significant challenges to providing treatment in this area such as stigma and client perceptions that treatment is out of touch. There is a danger that design which does not directly involve users may fail to meet their needs (Chambers, 1997). Software which does not meet adolescent clients' needs and is therefore difficult to use may be one more barrier to receiving effective treatment.

When designing software it is essential to consider the user's needs and requirements, as well as the context in which the tool will be used and the tasks that it will need to support. This is especially the case in adolescent mental healthcare (AMH) where end-users have very specific needs and very different characteristics to the people designing the software. Researchers often have different perspectives from participants (Chambers, 1997). Users are therefore typically the best source of information for designers, and for gaining an insight into the context in which a system will be used. User-Centred Design (UCD) is the dominant design approach in Human Computer Interaction field. It provides a set of design approaches, which

puts the user at the centre of the design process. Some UCD approaches, such as Participatory Design, require the active participation of end users in all stages of development (Namioka et al., 1993).

There are two major challenges to conducting User-Centred Design in this domain. Firstly, is it possible to involve users when access to them is extremely difficult to obtain. Ethical requirements place strict limitations on access by researchers to mental healthcare settings. Secondly, there is a significant question as to whether it is ethically sound to evaluate software, which might have significant usability problems, on clients who have come solely for treatment.

It is therefore necessary to find solutions for design and evaluation that take into account these constraints. The challenge then is to develop techniques, along user-centred lines, which overcome the restrictions the researcher faces in order to design software that meets clients' needs.

This thesis establishes design methods for conducting UCD in the area of mental health. A central question of this thesis is "to what extent is UCD possible in consideration of the significant limitations of AMH?" The significant challenge in this thesis is how to overcome the unique domain specific limitations in order to meet the needs of the end users.

Addressing the barriers facing researchers may have a significant impact on adolescent mental health. User-centred technological interventions may hold the potential to (1) increase adolescent engagement in therapeutic activities, (2) reducing the stigma associated with attending therapy, (3) provide more privacy and security than current therapeutic materials and (4) to saving therapist time for example by increasing client engagement between sessions.

1.7. Contributions

To date, there has been very little research into the design of technological interventions in AMH. This research is among the first in the world to examine the design of software for use by adolescent clients in and between sessions with a therapist. It is clear that, in this environment, placing the user at the centre of the design process is difficult. The benefits of well-designed software that is effective at a certain therapeutic task and suited for use by adolescent clients and therapist are evident.

The essential problem that this thesis addresses is how to design computer systems for talk-based mental health interventions which meets the needs of adolescents and therapists.

Answering this question, will first entail identifying a design approach, which addresses the significant barriers to implementing standard UCD approaches. Hence, the central question is therefore how, and to what extent, is it possible to apply User-Centred Design practices in adolescent mental health. The focus of the research is on establishing a robust and practical approach to design in this area which minimizes the significant barriers to undertaking design work. Such a process may be flexible enough to be applicable to the design of a wide range of systems for adolescent clients.

The contributions of this thesis are the following:

Client-Centred Design: The main contribution of this thesis is a detailed design approach for designing and evaluating software for use in AMH (see **Figure 1.1**). It is a flexible model, which incorporates techniques from other areas in User-Centred Design, such as *Participatory Design* and learner-centred design, as well as newly developed techniques. Recommended approaches are provided for each phase of development from idea generation to evaluation techniques. It aims to keep both sets of users' interests central throughout, despite the significant restrictions present.

Client-Centred Design Timeline

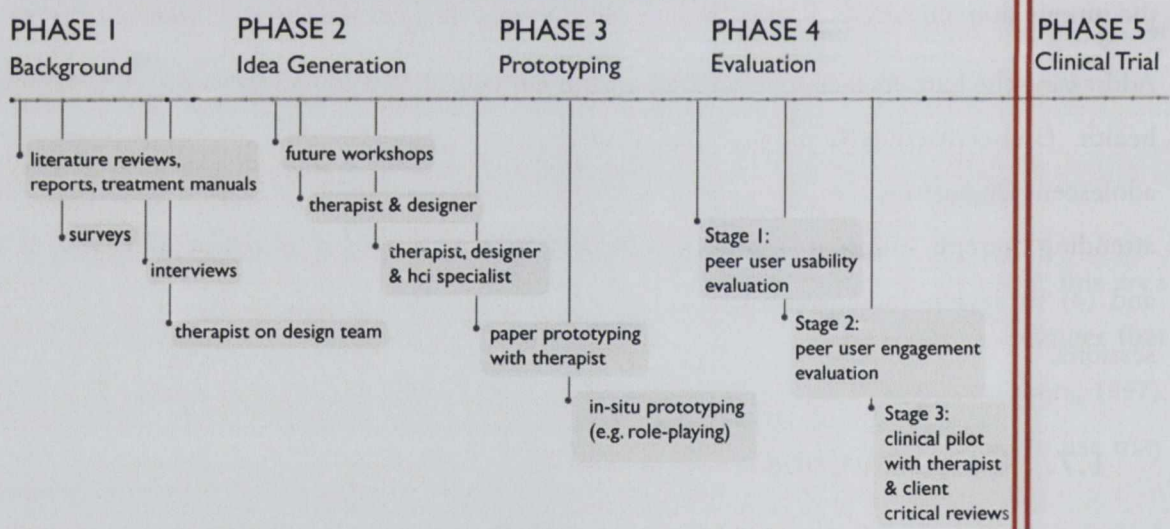


Figure 1.1 Client-Centred Design

Multi-Stage Evaluation: A substantial part of the proposed design approach is a multi-stage evaluation process, which overcomes these limitations and maximises evaluation possibilities. At the end of this process, the software should have been stringently evaluated and can proceed with minor revisions to full-scale mental health trials.

Guidelines: A secondary contribution of this thesis is a set of guidelines and recommendations for the design of software, which engages clients in therapeutic activities

both in and between sessions. The field of mental health is a new area with many unique characteristics. It involves many novel elements, which designers may have never encountered before in their work. Due to the sensitive nature of the area, it is important designers have a clear understanding of the area before design work begins.

Development of two systems using the design process: The design and evaluation of two therapeutic systems, which implement the *Client-Centred Design* is described. Both projects have been, and currently still are, in use in real clinical situations with actual adolescent clients suffering from a range of mental health problems.

My Mood Diary: This is a system for recording mood information away from a session and viewing this collected information in a session.

My Mobile Story: This is a system to support therapeutic storytelling. It involves the collection of multimedia content on a mobile phone and then analyzing and structuring this content in a session.

1.8. Structure of the thesis

Chapter 2: Adolescent Mental Health

This chapter provides an overview of adolescent mental health. This background material is essential to any work in this area and will have a bearing on HCI work described later in the thesis.

Chapter 3: Model of Interaction for Therapeutic Systems

This chapter begins with an overview of HCI work in mental health. The findings of an initial pilot study are discussed which provide initial requirements for future therapeutic systems. A contextual distinction is made between designing for inside and outside the clinic. With this in mind, a general interaction model adapted from other fields is proposed for use in AMH. It is argued that systems that seek to engage adolescents in therapeutic activities between sessions should design for adolescents' personal mobile phones. The chapter ends with a presentation of general design guidelines.

Chapter 4: Design in Constrained Environments

This chapter sets out the main challenges and difficulties of conducting UCD work in AMH. It provides an overview of typical UCD methods for evaluation and assesses their suitability

in this area. Because this is a new area of research, approaches from other domains are discussed.

Chapter 5: Designing for Adolescent Mental Health

A process for designing systems in adolescent mental health is presented. It addresses the challenges set out in Chapter 4. Several techniques for undertaking design work are described, including involving therapists as design partners. A three-stage evaluation method for systems in this area is described.

Chapter 6: Case Study: *Mobile Mood Diary*

In this chapter, a case study brings the approaches presented in the previous chapter together. It describes the design of a system for recording moods on client's mobile phones between therapeutic sessions and viewing them on a desktop computer in a session. The design of this system is discussed in detail as an illustration of the design process presented in the previous chapter. The three stages of this method are dealt with individually. The chapter finishes with a detailed discussion of the outcomes of this project.

Chapter 7: Case Study: *My Mobile Story*

This chapter presents a second case study describing a refinement and re-implementation of the design approach, exploring additional issues related to the use of multi-modal content and greater service access. This chapter describes the design of a storytelling system which uses clients' phones to record content and therapists' desktop computers for structuring this content. The chapter ends with an in depth assessment of the suitability of the final design for therapeutic use.

Chapter 8: Discussion

This chapter evaluates the effectiveness of Client-Centred design as used in both case studies, with particular reference to the significant limitations to UCD work identified in Chapter 3. The impact of this set of design techniques is addressed systematically. The suitability and acceptance by both clients and therapists of the proposed interaction model is discussed. Particular attention is paid to how the approach presented in this thesis meets the challenges of the domain as laid out in Chapter 2. The chapter ends with the presentation of general findings based on lessons learned throughout both projects.

Chapter 9: In Conclusion

Chapter 9 returns to the research questions raised in the introduction and assess how they have been addressed. In particular this chapter evaluates the design process set out in Chapter 5 and argues for its effectiveness based on the findings from the two case studies. Detailed guidelines which are supported by the evaluation data of the two case studies are provided for designing systems for adolescent mental health. General recommendations derive from this research are included for design work. The chapter ends by providing discussions of future directions for research.

2. Overview of Adolescent Mental Health

Mental health is an unfamiliar field to most computer scientists and HCI researchers. This chapter provides the reader with an overview of adolescent mental health. There is a particular focus on the Irish public mental health service. The chapter is divided into four main sections. The first provides an overview of adolescent mental health and the public mental health services in Ireland, which are the context for this research. The second part identifies the main challenges for mental health services. The next section presents a summary of best practice, taken from mental health research literature, for successful therapeutic outcomes. The chapter ends with an overview of some of the existing uses of technology in day-to-day clinical practice.

2.1. Brief Overview of Adolescent Mental Health

2.1.1. Talk-based treatments & psychotherapy

This research focuses on talk-based intervention methods. These methods include any approach that is based on talking to a therapist. Talking treatments provide a means of exploring issues with a therapist to develop a better understanding of problems, to develop coping mechanisms, and to help people change their behaviour. The US Surgeon General's office published its first report on mental health in 1999. The report concluded that (1) talk-based mental health treatments are effective and (2) that effective treatments are available for most mental health problems (US 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 improve the client's ability to manage and overcome future difficulties. There are many theoretical approaches to psychotherapy.

Psychotherapy is a set of techniques, which can be used to treat mental health and emotional problems and some psychiatric disorders. It involves a trained professional building a therapeutic relationship with a client. It can involve discovering ways of thinking that help the person to cope with situations they find difficult, and new ways of approaching them. Treatment usually lasts for several months, or in some cases years. This approach most often involves the therapist and client talking in a face-to-face situation in a treatment. The terms

psychotherapy and counselling are often used interchangeably, although there are differences, which are not important to emphasize here.

2.1.2. Adolescents

Adolescence is the transitional period between childhood and adulthood. Kraus defined it as “the no-man’s land” between childhood and adulthood (Kraus, 1980). 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 more confrontational than either younger children or adults.

Worldwide, suicide is the third leading cause of death amongst adolescents. The WHO estimated worldwide up to 20% of children and adolescents experience mental health problems (World Health Organization, 2001). In the US, the MECA study (Methodology for Epidemiology of Mental Disorders in Children and Adolescents) estimated that almost 21% of children aged 9-17 had a mental or addictive disorder associated with minimum impairment (Shaffer et al., 1996). Although mental health problems increase markedly during adolescent years, therapists often find it difficult to engage adolescents in therapy. The majority of disturbed adolescents do not receive professional mental health care and of those who do, even fewer will fully engage with the therapeutic process (Offer et al., 1991; The Children's Society, 2009; U.S. Department of Health and Human Services, 1999)

Typically young people presenting to mental health services have experienced “*distressing emotional, behavioural or relationship problems that can hinder learning and social development*”(World Health Organisation, 2003a). Factors which can negatively affect an adolescent’s mental health include bereavement, loss, separation, exposure to traumatic events, poverty, neglect, child abuse, family breakdown, a parent with a mental illness and living in rented housing (BMA, 2006; The Children's Society, 2009)

Mental health problems presented by adolescents attending mental health services are varied. They include depression, anxiety, personality and behaviour disorders, schizophrenia, bipolar disorder, obsessive-compulsive disorder (OCD) and attention deficit *hyperactive* disorder (ADHD). Because Ireland does not have a national morbidity survey there is no comprehensive resource on the number of people with mental health problems in the country. However, a recent report on mental health problems in the South East of Ireland estimated that “*14.98% of under 5s, 18.53% of 6-11 year olds, and 21.11% of 12-18 year olds met the criteria for at least one psychological disorder*”(Health Services Executive, 2006). The same report found that anxiety disorders were more frequent among girls and disruptive behaviour among boys. Major depressive disorder often has an onset in adolescence, and is

associated with substantial psychosocial impairment and risk of suicide (Weissman et al., 1999). (Harrington et al., 2001) have shown that depression in adolescence can often result in considerable psycho-social impairment into adulthood. A recent report in the UK, found that one in ten 5-16 year olds has significant mental health problems, including depression, anxiety, ADHD, anorexia, destructive and conduct disorders (The Children's Society, 2009).

Woodward and Fergusson found that significant associations remained between the number of anxiety disorders reported in adolescence and young people's later risks of anxiety disorder, major depression, illicit drug dependence, and failure to attend university (Woodward et al., 2001).

The Irish Health Service Executive (HSE) has identified the following categories of disorders for which it deems psychotherapy appropriate: emotional disorders, self-harm and suicide, eating disorders, conduct disorders, hyperkinetic disorders, autistic spectrum disorders, psychotic disorders, co-morbidity and alcohol and substance misuse.

There is a broad range of terms in current use to describe people who experience mental health difficulties. These include consumers, people with mental illness, service users, patients and clients.

2.1.3. Therapists

There is a broad range of professionals working in the mental health domain including psychiatrists, psychotherapists, social workers and counsellors. Many therapists work in both public and private care. This research focuses solely upon work with therapists in public care with the Health Service Executive (HSE) in Ireland.

The following is a brief overview of the main types of therapists:

Counsellors and psychotherapists have completed specialist training in counselling and therapy over a number of years. The two biggest psychotherapy organisations in Ireland are Irish Council of Psychotherapy and Irish Association for Counselling and Psychotherapy. In the UK and Ireland, there is currently no legal requirement for a therapist to have passed any exams, to have trained properly or to belong to a professional organisation.

Psychiatrists are medical doctors with specialist post-graduate training in psychiatry. They usually work in the health service and hospitals and many are in private practice. Along with GPs, psychiatrists are the only mental health professionals who can prescribe drugs, though they can also provide assessment and psychotherapy. Most

people are referred to a psychiatrist by their GP. A psychiatrist can be particularly useful for clients whose emotional problems are related to physical symptoms.

Counselling and Clinical Psychologists are the two main types of psychologist working in mental health in Ireland. Both have extensive postgraduate training. Clinical psychologists have a particular focus in clinical areas in health services such as child & adolescent mental health, adult mental health and people with intellectual disabilities. Counselling psychologists focus on providing similar to that described above. All psychologists are required to register with the Psychological Association of Ireland.

2.1.4. Therapeutic Approaches

Modern psychotherapy began with psychoanalysis and many modern approaches have developed out of this theoretical foundation or in opposition to it. Therapists vary greatly in their theoretical approach and style of working. Many have an eclectic approach to therapy, which employs various techniques depending on the client and the intervention.

There are hundreds of approaches to psychotherapy. The majority of treatments in current clinical usage have not been evaluated empirically. For adolescents and children alone, Kazdin has estimated that there are at least 550 different types of therapies (Kazdin, 2000). Roth urges caution when trying to determine whether one therapeutic approach is better than another because this could "*obscure the importance of common factors that operate across all therapies, such as the contribution of the therapeutic alliance or therapist skilfulness and competence*" (Roth, 2006).

The following theoretical therapeutic approaches are the most commonly used in the Irish health service:

- Cognitive Behavioural Therapy
- Psychodynamic Therapy
- Humanistic & Integrative Psychotherapy
- Systemic & Family Therapy

A short overview of these major schools of psychotherapy follows:

Cognitive-behavioural therapy (CBT) is an approach that attempts to modify negative belief systems and associated behaviours. The underlying notion of CBT is that distorted thoughts affect emotion negatively. CBT aims to help clients to change negative thinking and learn new healthier thoughts and actions. It focuses on

behavioural patterns that have developed from underlying thought patterns. The therapist develops a treatment plan to enable the client to change his or her thoughts and consequently their behaviours. Triggers in the client's environment are identified and coping mechanisms are implemented. The main aim is to help the individual to identify and modify negative thinking patterns. CBT makes use of three general approaches: 1) the process of guided discovery using the Socratic Method to provide alternative perspectives, 2) thought diaries, and 3) behavioural experiments.

CBT is the preferred method of counselling in primary care. Its effectiveness for a range of mental health disorders has been well documented (Derisley, 2004). This may be because its treatment model allows the therapist to predict how long each client will require the service and consequently allows better resource management. CBT is a highly structured approach and is typically used short-term. There is a body of research to support the benefits of CBT. It has been estimated that approximately 50% of child treatment research is based around cognitive-behavioural techniques (Durlak et al., 1995).

Psychodynamic therapy focuses on understanding the client's past, as it maintains that mental health difficulties arise out of early childhood problems that have not been resolved. The therapist encourages the client to explore their early life and to express thoughts and feelings that have not been expressed before. This form of therapeutic intervention typically takes some time in the region of 1-2 years of weekly sessions of one-hour duration.

Humanistic & Integrative Psychotherapy is based on the philosophy that the client has the ability to integrate their life experiences when facilitated in a safe, confidential environment. The counsellor provides a non-judgemental, unconditional approach and environment, which enables clients to develop a belief in their innate ability to achieve balance in their life. This form of psychotherapy is usually long-term (20+ sessions).

Family Systemic Therapy considers the distress of the individual client in the context of relationships within the family unit and society. This form of therapy focuses on the interaction of the individual with others and seeks to discover meaning and understanding of self and wider system. Typically this form of therapy is of a longer duration.

2.1.5. Therapeutic Sessions

Therapeutic sessions take place typically at the same place and time on a weekly or fortnightly basis. Sessions generally last 50 or 60 minutes and their content is confidential. In adult individual therapy, the client and therapist usually sit in chairs facing each other. In adolescent therapy, parents, siblings, peers and teachers –in various combinations – can take part in therapeutic sessions and often play an additional, supportive role in the treatment (Kazdin, 2003). In some cases, the young person's parent or guardian will accompany them to the therapeutic session and may even participate in three-way sessions with the therapist. Having strong family support is a significant factor in overcoming mental health problems. The majority of therapeutic sessions will involve direct dialogue between the therapist and the adolescent client.

The duration of treatment depends very much upon the type of treatment and complaint. For example, the National Institute of Clinical Excellence (NICE) in the U.K. recommends treatment of 6-8 sessions of CBT for the treatment of depression or 10-12 weeks of counselling (NICE, 2004).

2.1.6. The Irish Health System

In Ireland, if a person is experiencing a mental health problem and has been unable to resolve it themselves or through their informal care network (i.e. family and friends), then the first point of professional contact is a general practitioner. The majority of cases are dealt with at this level, although this is by no means a perfect service for dealing with these issues. There can be an over-emphasis on medication (Health Services Executive, 2005) and many general practitioners are not trained in dealing with mental health problems:

“For example, an individual may not want to go to their GP, or if they do, they may not want to, or feel able to discuss their mental health concerns with the GP. They may present their psychological distress in terms of physical symptoms. In this situation, the GP must investigate the physical symptoms described and it is often only through a process of elimination that the GP can arrive at a diagnosis related to mental health. It is also possible that the GP may not pick up their symptoms as signs of psychological distress” (Health Services Executive, 2005)

In a small percentage of cases, further specialized care is required and the young person is referred to their community child and adolescent mental health services. A young person will then be placed on a waiting list until the services can deal with their problem. It is not

unusual for this to take over a year. The majority of specialised treatment takes place in the community. Clients attend these services as an outpatient, in day centres, day hospitals or in certain circumstances, the therapist may visit the client at home. A very small percentage of cases are admitted to in-patient care.

The professional services to which an adolescent with a mental health problem can engage in Ireland is often depicted as organized into four tiers:

Level 1: Primary level of care, which includes: General practitioners, school counsellors, teachers and social workers. Adolescents can be referred from here to further levels of care.

Level 2: This level provides more specialized mental health care and includes: clinical child psychologists, paediatricians, educational psychologists, child and adolescent psychiatrists, psychotherapists and family therapists.

Level 3: This level provides extremely specialized mental health care services for extreme, complex or reoccurring disorders.

Level 4: More advanced hands on care including day units, inpatient and outpatient care.

2.2. Challenges in Adolescent Mental Health

This section identifies the main challenges facing public mental health services in Western countries. Although there are many effective therapeutic interventions for the treatment of clients with mental health problems, many individuals never receive professional treatment because of certain barriers. There are social, psychological and logistic barriers in society, which may prevent or make it extremely difficult for young people to attend mental health services.

2.2.1. Stigma and discrimination

In this context, stigma is a negative stereotype associated with mental health. Discrimination can be described as unfair behaviour toward someone that limits his or her opportunities. Both stigma and discrimination have been identified in many reports as significant barriers for anyone with a mental health problem (BMA, 2006; Health Services Executive, 2005; Layard, 2006). Stigma and discrimination are the result of a fundamental lack of understanding of mental health within society. One of the strongest concerns expressed in a recent Irish report on mental health by therapists and clients was the problem of stigma (Health Services

Executive, 2005). It can have a negative affect on individuals with mental health problems and lead to depression, poor self-esteem, anxiety and isolation (BMA 2006). Of particular concern is that discrimination can *“result in barriers to accessing mental health services; the fear of stigmatisation may lead people to be reluctant to seek treatment, and hide diagnoses from friends and family”* (BMA, 2006).

Evidence suggests that there is a lack of understanding among young people as to what mental health is: they view it as a serious illness or ‘madness’, and as such, not applicable to them (YoungMinds, 2005). Young people tend to have more discriminatory attitudes to mental health problems than adults do. A UK survey in 2001 found that 61 per cent of young people aged 16-24 admitted to using derogatory language in relation to those with mental health problems, and 55 per cent would not want others to know if they had such a problem (Mental Health Foundation, 2000).

The language used in connection with mental illness may contribute to young people’s negative conception of it. For example, some young people are alarmed when they are referred to see a psychologist. The word “mental” and “psychologist” may have similar negative connotations for young people, and this underlines the importance of well-chosen language when speaking to young people about mental health problems.

Because a combination of societal stigma and discrimination may result in young people being more reluctant to seek help from mental health services or even from family and friends, it is an extremely serious barrier to tackling adolescent mental health problems.

2.2.2. Limited Resources

The lack of financial, personnel and facility resources for child and adolescent mental health services is a universal problem. In developed countries mental health services are notoriously under-funded (World Health Organisation, 2003a). In Ireland, expenditure on mental health dropped from 13% in 1984 to 7.3% of the national health budget in 2004. Therapists working in under-funded services can become demoralized and are frequently under strain. The critical lack of resources can result in fewer high quality services being offered to adolescent clients at more restricted times (sometimes clashing with school times) and locations (BMA, 2006). Waiting lists for clients for mental health services are often extremely long. It is not unusual in the Irish system for a client to be on a waiting list for over a year, which may discourage adolescents from attending. The location or opening times of services can make them difficult for young people to access. Clearly, the more difficult therapy is to access for young people, the less likely young people are to attend.

2.2.3. Engaging Adolescents

Adolescence is a time when professional support for dealing with mental illness is in greatest need. However, most adolescents with mental health problems do not receive professional help and those who do can find it difficult to engage with the available services (Bates et al., 2009; Offer, 1991). This is characterized by the often poor attendance rates of adolescent clients to mental health services. The importance of client engagement spans all theoretical models of therapeutic interventions (Assay et al., 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 (Assay et al., 1999).

The first challenge is to engage adolescents in professional mental health services by seeking assistance. By engagement, we mean helping adolescents develop an active interest and confidence in the outcomes of therapy. There are various reasons for difficulties engaging adolescents. The limited access times and locations of mental health services, and the stigma associated with mental health problems can make it very difficult to attract adolescents in need of mental health treatment to the services (BMA, 2006). Adolescents may not believe they have a problem or that the therapist can help them. The most commonly referred problems are disruptive behaviours, which are easily noticed by others. Emotional problems can be far more difficult to identify even by parents.

Once adolescents have started seeing a therapist, it can be difficult to engage them in the therapeutic process. Self-referrals are extremely rare in adolescent mental health. Most clients attending mental health services are there under parental, guardian or teacher direction and consequently are not willing participants. Therapy is typically something imposed upon adolescents and because of this; they are often unwilling to accept it. Adolescents can view therapists as another authority figure, forcing them to obey rules. Treatment retention for non-hospitalized adolescents is extremely low (Spirito et al., 1992; Wierzbicki et al., 1993). Adolescents who are unwilling and lack the motivation to be 'in therapy' often have poor attendance records. It can be difficult for parents or guardians to get adolescents to keep an appointment. Indeed, *"Parents who stop bringing their child for treatment may simply be choosing a path less strenuous than weekly efforts to persuade the child of the potential value of treatment or to coerce attendance."* (Kazdin et al., 1997)

The materials and tools used with adolescents may not be sufficiently engaging. 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 a child playing games. Equally, many teenagers are private and self-conscious and often react confrontationally or not at all to direct dialogue with a therapist.

Due to adolescents' dependence on adults, they can be vulnerable to multiple influences over which they have little control:

"Parent mental health, marital and family functioning, stress in the home, difficult living circumstances, and socioeconomic disadvantage are a few of the factors that can influence the nature and severity of child impairment and the effectiveness of treatment. Psychotherapy for the child is often only a part of the intervention; significant efforts may be required to address parent and family dysfunction that may contribute to or maintain adjustment problems of the child." (Kazdin, 2003; Kazdin et al., 1997)

It can be very difficult for therapists to affect positive change in this complex environment. It can be equally challenging for therapists to work with parents in the therapeutic session. A critical obstacle facing mental health care services is adolescent client engagement in the therapeutic services and activities. Exploring new ways to engage adolescents in professional therapeutic services is one of the most important and difficult challenges in mental health.

2.3. Best Practice in AMH

This section sets out the most important indicators toward positive therapeutic outcomes in psychotherapy.

2.3.1. First do no harm

All therapists are required to obey the Hippocratic Oath – often summarised by the simple principle 'first do no harm'. This means that above all, every possible precaution must be taken to ensure that interventions do not have harmful effects on the client. Research into the use of technology must adhere to this strict ethical requirement. Roberts and Dyer have produced a guide to MHC ethics and provide solutions to ethical problems (Roberts et al., 2004). HCI researchers should be aware of these constraints, and with the protocols for

evaluation. Research into the use of technology in talk-based interventions for adolescents should adhere to the strict ethical guidelines of the domain. The sensitivity of this situation is further enhanced by the social stigma often associated with mental illness. Many activities are sensitive and even the most unobtrusive methods of observation by a third party could affect trust and the efficacy of the intervention.

2.3.2. Important factors in psychotherapy

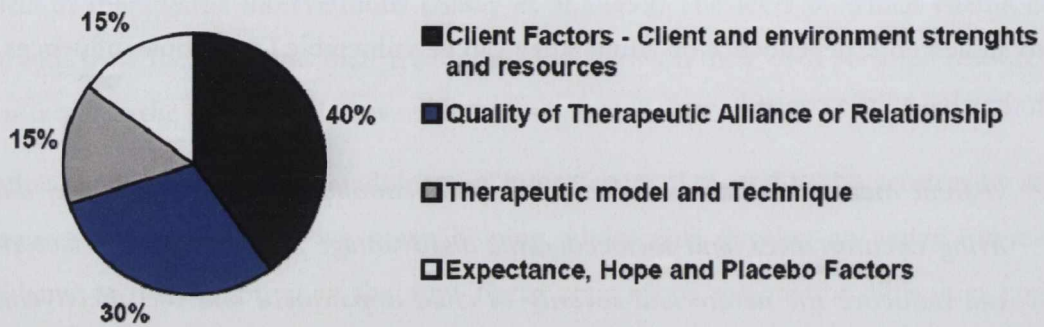


Figure 2.1 Important factors in psychotherapy

Assay and Lambert concluded that, across all therapeutic models, four main factors are responsible for achieving positive change through psychotherapy (Assay et al., 1999). They have also estimated the relative contribution of each of these factors:

- 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 outcomes and 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. A quality therapeutic process for adolescents will actively engage their participation, involving their interests, strengths and ideas.

2.3.3. Client-therapist relationship

Establishing an effective therapeutic alliance between the therapist and client is essential to any talk-based therapeutic process. In adolescent psychotherapy, an effective relationship needs to be achieved between the individual, the therapist and the individual’s career. Adolescents can be sceptical and hostile to therapeutic treatment at the outset, which makes achieving a strong therapeutic alliance essential and challenging. Four core values have

emerged as fundamental to establishing a beneficial working relationship across all approaches: (1) respect, (2) empathy, (3) genuineness and (4) client empowerment (Egan, 2002).

2.3.4. Client self-efficacy

There is evidence to suggest that recovery from mental health problems can depend on a client's ability to self-advocate. This is often referred to as client self-efficacy or self-advocacy, and involves an individual "*not only speaking up for oneself, but also gaining confidence, supporting other people, not being afraid to 'ask', having specific skills and knowledge, and gaining new skills*" (Health Services Executive, 2005). There is also a need for clients to take an active role in their recovery, rather than be or be seen as passive receivers of care from an expert (Health Services Executive, 2005).

A key aim in improving client self-efficacy is to increase the degree to which clients engage in prescribed therapeutic activities between therapeutic sessions. As identified earlier, client attendance to therapeutic sessions can be infrequent. For this reason, it is particularly important to engage clients with the therapeutic process between sessions. Existing approaches have achieved limited success in improving client engagement between therapeutic sessions.

2.3.5. Client-centred methods

Client-centred approaches to therapy actively engage clients by considering their strengths, ideas and beliefs. Research has shown that client-centred methods to psychotherapy which engage the interests and strengths of clients are more likely to be successful (Assay et al., 1999; Duncan et al., 1999). This applies to materials used to engage adolescents in therapeutic interventions. Methods should be used which are friendly and familiar to the client.

2.3.6. Design for clinical practice not research environment

According to Kazdin, "*the ways in which psychotherapy is studied depart considerably from how treatment is implemented in clinical practice*" (Kazdin, 2003). There are several reasons for this: (1) clinical studies into more engaging interventions for young people often exclude high risk adolescents because of litigation and ethical concerns (Rudd et al., 1999), (2) participants tend to have less severe and fewer comorbid conditions (Kazdin, 2003), (3) they are less likely to have parents with psychiatric dysfunction (Kazdin, 2003), (4) many studies are administered in schools without the involvement of parents, (5) the manner in which treatments are administered in research departs from actual practice (Kazdin, 2003), (6)

research treatments are often administered as standalone treatments out of the context of an eclectic treatment approach commonly used in clinical work (Kazdin, 2003) and (7) treatment in research studies is typically administered by trainee therapists or graduate students (Kazdin, 2003).

(Kazdin, 2003) recommends that research in AMH should be undertaken in full consideration of the practicalities of day-to-day practice. While this might present significant challenges, it is more likely that research outcomes will be more relevant to clinical practice. Consequently, the relevance of research study findings to actual day-to-day clinical practice can be called into question. For this reason, the research in this thesis focuses on designing and evaluating software for use in actual clinics with actual clients, regardless of the seriousness of their mental health problem.

2.3.7. Flexible Service Delivery

A recent report in Ireland has reported that many of young people's significant mental health needs are not being addressed by current mental health services (Bates et al., 2009). This report suggests that in order to overcome the challenges of long waiting lists, high service costs and inaccessible clinic opening times, adolescent mental health services should aim to be more youth-friendly, more engaging and relevant for young people and more accessible (Bates et al., 2009).

2.4. Technology in mental health

Therapists often use props and tools to assist them in engaging children in therapy, or as an icebreaker to break the tension with older children. For example, there are many examples of board games, from the 1960s to the present, which are designed to develop the therapeutic alliance and often to elicit information from young clients. In play therapy, puppets are often used as a way of projecting emotions and taking the focus off the young client. In contrast to the use of technology in other disciplines, psychotherapy has yet to embrace technological innovation.

This section provides a brief overview of the current uses of technology in mental health interventions with clients. For an in depth discussion of technology in psychotherapy, see the following sources: for a discussion of the role and the use of technology in psychotherapy see (Anthony, 2003), for a detailed discussion of stand-alone computerized therapeutic approaches see (Cavanagh et al., 2003), for a discussion and history of the uses of computers

games in psychotherapy see (Griffiths, 1997; Griffiths, 2004; Resnick et al., 1994), (Berger, 2004) catalogues the use of software for therapist training.

2.4.1. Barriers to therapeutic technology

One of the first uses of technology for talk-based therapies was implemented by Carl Rogers in the 1940s (Rogers, 1942). He recognized the possibilities of using audio recordings principally for therapeutic analysis. However, the concept of technology in therapy is controversial within the discipline. There can be a fear, often implicitly expressed by some therapists, that computers might replace them.

Security and Privacy: Therapists have also expressed their concerns in relation to security of information, confidentiality and privacy. Digital information is easily replicated and therapeutic communication might be transmitted to third parties or used out of context, or sensitive client information might find their way into the wrong hands. Certainly, the ethics of each technological intervention in psychological interventions need to be clarified and protocols need to be developed to make their use clear.

Therapist Fears: Similar to other professions, therapists can feel undermined by technological interventions. They may feel that the technological elements are beyond them or that they do not have sufficient comprehension over how they function in order to confidently introduce them into their practice. As a therapist it is their main role to protect their client – the ‘first do no harm’ principle of the provision of mental health care. This is a considerable and understandable barrier to introducing technological innovation that is of benefit to therapists and clients.

Lack of Training: A further barrier is a lack of opportunities to learn about new technologies. Few professional psychotherapeutic training courses currently cover the use of technological tools or methods in clinical practice. This means that many therapists have received no guidance on how to use technology in their practice. If they choose to use a technological intervention then it would be desirable to have some guidance as to which one to choose.

Limited Resources: Due to the significantly limited resources of AMH (see **Section 2.2.2**) clinics mostly have out-dated computers which are not upgraded very often. AMH Services are unlikely to be willing to spend large amount of their funding on technological solutions, particularly if they would require significant technical support or the risk of loss and damage if clients use them outside of the clinic. Because of this, it is extremely important that technological interventions take these constraints into consideration.

2.4.2. Use of technology in therapy

Therapists in the public system use technology in their day-to-day practice – although for most it is only for administrative purposes. For example, therapists use email to communicate with colleagues, and some clinics have client systems for keeping a record of sessions, and for organizing session notes. There is currently no broad use of technological tools for use with clients in general talk-based clinical practice.

Technology in mental health can take various offline and online forms including standalone CBT treatments, VR exposure therapy, therapeutic computer games and computer-mediated communication such as email therapy. More often, it takes the form of information websites.

Therapeutic use of technology can be categorized in two main ways. Firstly, by technology type (for example, email therapy, therapeutic computer games), and secondly by therapeutic function (for example programmes to provide information, to facilitate communication over distance). The latter categorization, according to therapeutic function, is more informative to computer scientists and HCI designers and perhaps more logical as it focuses on the therapeutic goal of each technological intervention.

Technological interventions in current clinical practice are catalogued below according to their therapeutic objectives:

Provision of therapeutic information

Technologies such as websites, SMS text messages and DVDs are used to provide clients with information (Anthony, 2003). This serves a similar therapeutic function to information leaflets and self-help books. An example is websites that provide information on mental health problems and coping strategies. These interventions take advantage of the extra privacy the medium provides to sidestep issues of stigma and provide greater access. Reach Out is one example of a website, which has had particular success with providing mental health information in Australia to young people.

Media for supporting therapeutic communication

Communication is the main tool within psychotherapy (Anthony, 2003). There are clear advantages to exploiting new communication technologies like email, chat, video conferencing and SMS text messages. The greatest advantage of these technologies is their obviation of the disadvantages of living in remote locations – creating greater access to mental health services. With some media, there can be greater disclosure than in face-to-face situations (Grinter et al., 2003).

Simulation software to place client in controlled situation

There is a large body of research into using virtual reality technology for exposure therapy. The effectiveness of virtual reality exposure therapy in combination with physiological monitoring and feedback, has been demonstrated to treat a range of anxiety and panic disorders including social phobia, fear of public speaking, fear of flying and post-traumatic stress disorder due to motor vehicle accidents (Rizzo et al., 2002).

Computerized therapeutic treatments

This branch of technological interventions is often called computerized therapy. It is usually self-directed therapeutic plans on a standalone computer. Highly structured therapies like CBT are particularly suited to this type of approach. Beating the Blues is one example of this type of tool. It is a computerized form of CBT therapy that can be used in a self-directed manner by adult clients. It consists of eight one-hour sessions – involving multimedia content of people in similar situations to the client and self-rating scales and questionnaires. Results from clinical trials of the software have shown that the standalone treatment can be as effective as the standard treatment for anxiety and depression (Proudfoot et al., 2003). Beating the Blues can be particularly effective where resources are limited – it is certainly a better alternative to long waiting lists. Beating the Blues is being used in many clinics throughout the UK and has gained NICE approval (National Institute for Clinical Excellence, 2006b).

Technology to observe physiological change

This type of technology is typically called biofeedback. It allows clients to see physiological trends represented as computer graphical displays. The aim can be to help the client become more aware of their physiological urges and develop coping strategies for dealing with them. Biofeedback treatments have been used with adolescent clients to treat anxiety disorders, ADHD and anger management, amongst other problems.

Therapeutic technology might have application at different stages to support positive mental health. These four stages are: (1) general support of positive mental health and wellness (i.e. prevention of mental health problems), (2) tools to support the client helping themselves – this could include tools to keep clients engaged while they are waiting to be referred to a therapist, as well as providing tools to help them address their own problems (3) software to support actual therapeutic interventions with a client and finally (4) tools that monitor past

clients' mental health and ensure they do not suffer a relapse (i.e. aftercare). For a more detailed discussion of the use of computers in talk-based mental health interventions please see (Coyle, Doherty, Matthews et al., 2007).

3. A Model of Interaction for Therapeutic Systems

This chapter discusses how to design for adolescent engagement in and between therapeutic sessions. It begins with an overview of related research in mental health. An initial pilot study is then presented which identified key issues for the design of future therapeutic systems. A distinction is made between the context of session time and the time between sessions. An interaction model is presented which incorporates this distinction. The chapter ends with a discussion of the potential of the personal mobile phone for therapeutic use and the proposal of design guidelines taken from existing research literature.

3.1. Research Methodology

3.2. Mental health

To date there has been little research focusing on usability and design work in AMH. In particular, there has been no work identifying approaches to systems design for adolescents attending mental health care interventions that focus on the client's needs and requirements. Initial research has begun to emerge in this multi-faceted and complex domain addressing various aspects of undertaking design work.

Some research has relied heavily on therapist manuals to provide insights. Bang and colleagues have conducted research into using the mobile phone for in-situ cognitive behavioural therapy with adults (Bang et al., 2007). They implemented a common CBT diary called the Dysfunctional Thought Record on a mobile phone. The diary can be used to record negative situations as they arise every day and related emotions and thoughts. The phone can be used to photograph places where participants feel uncomfortable, rate their level of discomfort (1-100 Beck scale) and annotate these pictures with text, audio or video. The design approach focused on reviewing and analyzing *"a set of treatment manuals to distinguish parts of CBT that can be improved and supported using mobile phone applications"* (Bang et al., 2007).

3.3. *Personal Investigator*

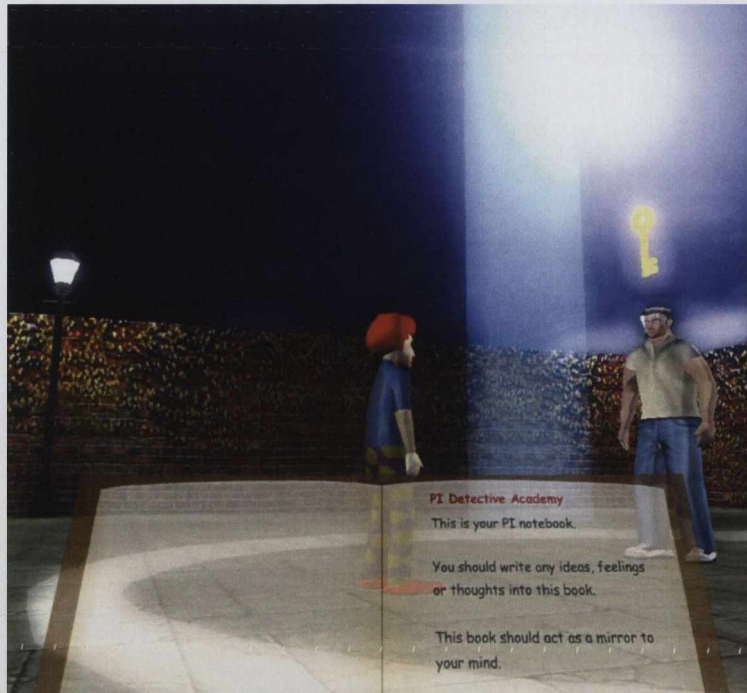


Figure 3.1 *Personal Investigator* Game

An initial project was undertaken by the author and another researcher, David Coyle, to discover the challenges of working in this area and to explore the potential of technology to support therapeutic interventions (Matthews et al., 2004). It also allowed an exploration of the therapeutic space and helped to identify the main challenges for design work.

Personal Investigator (PI) is a 3D computer game that was designed to help engage adolescents in psychotherapy in and between therapeutic sessions. The game targets adolescents with mental health problems such as depression, anxiety and social skills problems. It was designed to be used as a computer-mediated tool to aid therapeutic conversations between adolescents and therapists and for follow up self-directed use by adolescents outside a session on personal computers.

PI is one of the first therapeutic games for use in mental health services to incorporate 3D navigation and high quality graphics. It was designed to run over the Internet, as a game introduced to the client by the therapist then continued elsewhere between sessions (e.g. home or school). The therapist could review the client's progress in the game at each session, which would provide further material for discussion.

PI uses a detective narrative to engage adolescents and help them construct their own personal narrative and tell their own story in discussion with a therapist. The detective metaphor originated from a solution-focussed practitioner's manual (Sharry, 2001). The

existence of these ideas in SFT literature made it easier to design and ground the game therapeutically.

The adolescent plays the role of a trainee 'solution detective'. The overall goal is to learn how to find solutions to personal problems and graduate from the Detective Academy as a Master Detective. *PI* maps SFT's five therapeutic conversational strategies, discussed above, into five distinct and separate game areas. In each of these areas are five different computer characters, each of whom is a qualified master detective. The trainee learns to become a Master Detective by talking to these five master detectives. The detectives present video stories from other adolescents who have overcome personal problems. Each master detective has a key, which the trainee must collect. To collect a key the trainee must answer questions in a personal notebook. When a key is collected, a visual reward sequence, with triumphant music, is played to reinforce the player's sense of achievement. When all five keys are collected, the trainee can graduate from the academy and become a master detective.

3.3.1. Design

PI was designed in close collaboration with a therapist, who practiced Brief Solution Therapy and another HCI researcher. A panel of therapists were consulted at certain stages to give feedback on design elements. During the design process, there was concern and debate over how much and what type of gameplay the game should involve. Therapists expressed concerns that excessive gameplay would distract from the therapeutic process, that adolescents might focus too strongly on achieving game goals and lose focus on the overall therapeutic goal. Some therapists were also concerned that clients might purposely use the gameplay elements to avoid therapy.

When *PI* was used in a session, the therapist and adolescent sat together at the computer, with the adolescent taking control of the keyboard and mouse. In a one-hour session, the game could be used for twenty to thirty minutes. To begin, the adolescent chooses a username and logs into the game. The game creates an individual account for each adolescent, allowing him or her to save their progress as they go along and return to saved games later on. The adolescent has full control over the game; they play at their own pace and choose their own path through the world. The game affords the therapist an opportunity to observe the adolescent and quietly analyse their answers and actions. 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. Throughout the game, the therapist is a partner in the exploration of the game world and is no longer an interlocutor.

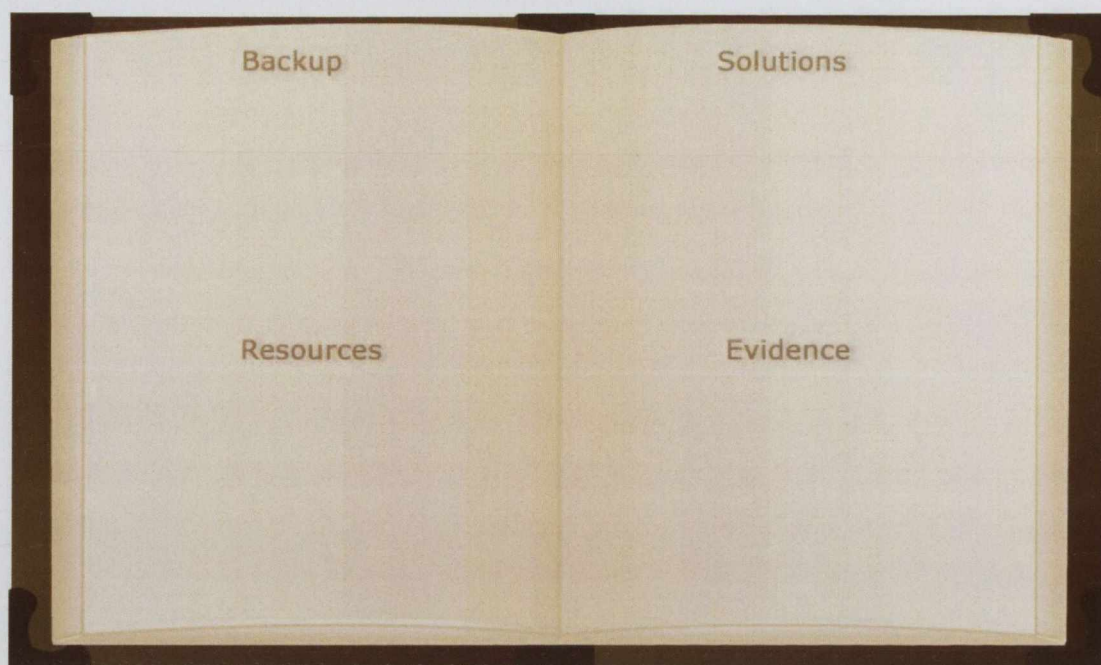


Figure 3.2 Detective Notebook

PI supports the clients in creating a personal record of their own game. In the game, the player has a virtual detective notebook (see **Figure 3.2**) in which they write down all their game information, their goals, objectives, ideas and thoughts. As a reward for completing the game, clients receive a printout of their notebook, which serves as a permanent record of their game. (Clark et al., 1984) reported benefits of having a tangible output from a game. The notebook is a tangible record, which can be used to encourage reflection by adolescents on lessons learned in the game. It was a mechanism for generating client content, which could lead to interesting discussions between therapist and client.

3.3.2. Findings

Four adolescents completed a pilot study using *PI* with three therapists in three Dublin clinics. A second larger scale evaluation of a re-implementation of the game has recently been completed with 22 adolescents. In the original evaluation adolescents ranged in age from 13 to 16 (two boys and two girls) and were referred for issues including anxiety and behaviour problems, attempted suicide, and social skills difficulties. Written consent was received for participation in the study from adolescents and their parents/guardians. On average the game took three sessions to complete, spread over three weeks. This was due to the amount of discussion the game produced between therapists and adolescents.

The access restrictions to the therapeutic setting made it very difficult to get detailed feedback from clients. Direct access to therapeutic sessions or clients by the researchers was not possible. Feedback was in the form of questionnaires from therapists and adolescents and

post-trial interviews with the therapists. Questionnaires consisted of a combination of multiple-choice questions and open questions.

All three therapists who used the game with clients commented that it was 'very easy' to integrate into their therapeutic work. Two therapists rated the game 'very helpful' and one 'helpful' in engaging adolescents in therapy and in helping clients to talk about their personal issues. One therapist commented that the game was a good medium through which to communicate with adolescents. All therapists thought the game was particularly helpful in keeping their clients focused on a therapeutic task for an extended period, 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*". For example, one therapist stated that it made the game "*interesting and appealing to the young person*".

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 out and that it was good for recording ideas which her client could then look back on later. 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. The printout of the notebook served as a record of the therapeutic session, which client and therapist 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. Watching video stories from adolescents, who had similar problems, was described as 'very helpful' by two therapists and 'helpful' by one therapist. 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'.

Critical feedback from the therapists centred on certain design issues. Requests were made for bigger fonts, more control of the game through pause, forward and rewind buttons, interim printouts of the detective notebook (rather than just at the end) and a more elaborate graduation ceremony to reward participants on completion of the game. In general, there was unanimous agreement that the use of *PI* helped increase adolescent engagement in therapy and helped therapists develop therapeutic relationships with their clients.

3.3.3. Discussion

PI provided evidence for general benefits of using client-centred materials, such as heightened engagement and motivation of the client and an increase of enjoyment in the sessions.

Therapeutic Alliance: Two therapists reported that the game acted as an icebreaker at the start of therapy. According to some therapists, the game helped the therapists to become allies with the adolescents playing the game. This might contribute to a more rapid development of a therapeutic alliance.

Therapeutic Model: The adaptation of SFT into the game, using a detective metaphor, appeared to engage the interest of clients. It gave them a more familiar framework through which they could understand the different therapeutic concepts. The overall therapeutic approach was broken down into a series of achievable tasks. This may have helped clients to stay focused and motivated during sessions. The game's detective metaphor gave clients a set of concepts and expressions, which they could use to talk about their situations more comfortably. For example, the game's use of concepts like 'solution detective', 'backup', 'finding clues', allowed clients to speak more comfortably about difficult personal issues, as well as helping them understand useful therapeutic concepts.

Structured Approach: Playing *PI* may have been beneficial in helping adolescents develop a structured personal story. As clients progressed through the game, making entries in their notebook, they gradually created a structured personal narrative. It can be argued that *PI*'s structured division of SFT within a computer game metaphor and the use of simple game goals and rewards helped adolescents engage and maintain focus during therapy.

Discussion: An important aspect of the game was the therapeutic conversation that was evoked between therapists and clients. Before and after answering the questions, some clients discussed their answers with the therapist. In some instances, these conversations lasted up to ten minutes.

Peer Stories: The use of peer video stories proved particularly popular in *PI*. Adolescents found it useful and encouraging to see stories of how other adolescents used the skills, taught in *PI*, to overcome a personal problem.

Control: The level of control over pacing which clients had may have been a significant factor in motivating them and giving them confidence. Clients could navigate the game space as they wished, choosing the order in which they entered each room, and consequently the order in which they experienced the different aspects of SFT. In one reported instance, a client intentionally used the control over the navigation to frustrate the therapist by avoiding all of the rooms and simply exploring the outside space.

Less confrontational: According to therapists, clients found it easier to talk while looking at the screen (Coyle et al., 2005). This less direct and potentially less confrontational

communication may have helped make sessions less stressful for clients. In all cases, clients were more comfortable with the technology than many of the therapists (Coyle et al., 2005). This may have had an empowering effect on clients. Adolescents may have had less difficulty answering questions, because they were not posed directly by the therapist but by the computer. Generally, clients can feel intimidated in therapy sessions. However, when the computer game was introduced into these therapeutic sessions, the role of expert was reversed to some degree. Adolescent clients are generally comfortable with technologies like computer games.

Pre-Evaluations Required: This pilot study identified the need for more detailed evaluation process in order to pre-trial use of the software in order to receive feedback that is more detailed and avoid usability problems. There were technical problems in trials that could have been tackled earlier on in the process. Therapists expressed frustration with certain technical problems. Each therapist experienced the system crashing at least once, making it necessary to restart the game. Such technical problems were a function of the prototype status of the project, but are especially unacceptable in a therapeutic setting.

Literacy: Two therapists were concerned about possible literacy difficulties some clients might experience with the game. *PI* was overly reliant on writing and literacy skills. One client reported having difficulties typing on the computer keyboard. The addition of several minor features would help reduce the amount of required reading, such as using computer characters to read onscreen text.

Not used outside sessions

A serious limitation in the use of *PI* was that it failed to engage clients away from a session. Although designed to be used in and out of sessions, it was only used in face-to-face sessions with a therapist. No client used the game outside of a session. The limitations regarding feedback and access, made it very difficult to get detailed information on why the game was not used outside of the session, apart from the obvious hardware problems.

No Interest: Two therapists reported that their clients were not interested in using the game outside the session.

Hardware Problems: Feedback from two therapists whose clients tried to use the game said the game did not work properly on the client's computer. As a 3D browser game, *PI* required a computer with a powerful CPU and graphics card. It is difficult to identify a common level of desktop hardware in client homes. Indeed clients may not have desktop computers at home. It is unrealistic to expect clients or clinics to purchase specialized hardware. Because of

this, tools to engage clients in therapeutic activities outside sessions should target a commonly available platform. This could help to ensure that therapeutic tools would be available to as many people as possible.

More competition: The slow dialogue and writing-based interactions with computer characters may have been unable to compete with the multiple elements drawing on adolescents' attention. *PI* may have worked in sessions with therapists because it made them feel in control and comfortable in an unfamiliar place. The alternative to the computer game was direct face-to-face conversation with a therapist or paper-based materials like work sheets. The limited gameplay, which satisfied therapists' worries, may have made the game less engaging between sessions – particularly when competing for adolescents' attention with high quality fast-paced console games.

Privacy: Playing *PI* on a desktop computer at home or in school may have failed to provide clients with sufficient privacy. At home, a family member might have been able to see what the client was writing in the notebook. In school, the game could have attracted the attention of peers. The failure of the system to provide easy discreet access could be an important factor.

	Inside session	Outside session
Positives	<ul style="list-style-type: none"> - Engagement - Control - Empowerment - Ability to navigate therapy - Therapist observer - Computer mediated communication - Notebook/ Printouts 	
Negatives	<ul style="list-style-type: none"> - Over-reliance on literacy skills - Keyboard input difficulties - Potential security issues 	<ul style="list-style-type: none"> - Insufficient hardware - No interest - Competing with other games - Insufficient privacy - Insufficient access

Table 3.1 *PI* In and Between Sessions

3.4. Context: In and between sessions

A key part of identifying requirements for the design of systems is identifying the context of use. That is to identify the users, their abilities (both physical and cognitive), what tasks are required and physical and social conditions they will use the system in (Bevan 1999). When designing systems for adolescent clients to use between and during sessions the designer is dealing with two very different environments and a user who will have different thresholds of engagement in each situation.

3.4.1. In a session

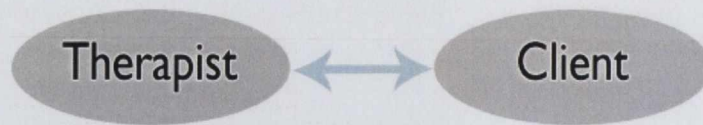
In a therapeutic session, there are few competing elements on the client's attention. The most important barrier is potentially the client's willingness to engage. Teenage clients are notoriously reticent and difficult to engage in face-to-face discussion, particularly about their personal feelings. This makes it extremely important to approach young clients using client-centred methods. In this setting, technological interventions may provide more appealing alternatives to face-to-face conversation.

Privacy and security issues are important to consider throughout the whole system design. In a session however, it may not be as important to design for security and privacy as it is outside a session. The therapeutic session is a protected space and what goes on during it is confidential.

In order to create a sense of trust and empowerment, it is proposed that clients have sole control over their account details for therapeutic systems. Protocols should be put in place to ensure this is the case. It is important that clients have control over their information – and that they can manage access by others (such as therapist or a parent) to their personal content.

Systems should aim to provide clients with mechanisms to express emotions and feelings without losing face or appearing weak. As part of a postal survey (see **Section 5.5.1**), a therapist suggested that the potential of technology in sessions was as a *“tool to focus child on particular areas of discussion without it becoming too threatening”*.

Traditional Model: Direct Communication



New Model: Computer-aided Communication

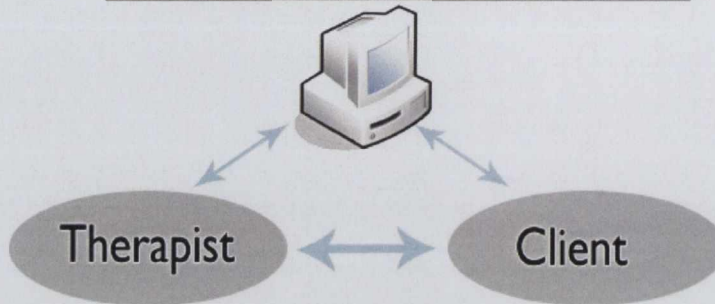


Figure 3.3 Computer-aided Communication

A useful model emerged from the *PI* prototype around technological interventions in a session a computer-aided model of how therapists can actively engage adolescents (**Figure 3.3**). Instead of engaging directly with an adolescent the therapist has the option of using the computer as a third party in their dialogue (Coyle et al., 2005). The model has its roots in traditional play therapy and therapeutic storytelling and applies current research on the benefits of computer gaming and narrative systems to this, in order to improve participation, motivation, self-esteem and problem solving skills. *Personal Investigator* is an implementation of this new model.

3.4.2. Between sessions

As mentioned earlier, engaging clients between sessions may be more difficult than in a session because there are many things and people competing for their attention. This is evident in the poor completion of homework activities by adolescent clients. There may also be less inclination from clients in engaging in therapeutic tasks between sessions due to the stigma associated with attending therapy. Further, self-efficacy, a key factor in successful rehabilitation, is often lacking in many clients. Finally, as many clients do not choose to attend therapy, they may equally not choose to engage in therapeutic activities.

In a session, technology can provide a medium through which to engage clients – outside the session commercial entertainment technology becomes a competing element for technological interventions. The standard for technology is much higher outside the session.

For example, *PI* had to compete with industry standard computer games on games consoles like the Xbox and the PS2.

There might be less opportunity for focused attention. Clients have a multitude of elements competing for their attention outside a session, including television, friends, schoolwork, sports and computers (including games). Because of this, systems for use between sessions should be readily available (“on hand”) and not require large amounts of focussed attention.

	Inside sessions	Between sessions
Interactions:	Longer	Short multiple interactions
	More focused	
	Structured	
Design for:	Fewer competing elements	Privacy
		Security
		Easy access
	Client an unwilling partner	Existing hardware
Engagement level :	Client’s reticence	Many competing elements, unlikely to engage in therapeutic activities
	Unwillingness to be there	
		Stronger stigma
Emphasise:	Take pressure off face-to-face discussions	Privacy,
		Security
		Wide access
		Ease of use more important
	Support therapeutic alliance	
	Control,	
	Physical printout	
Security		
Type of tasks:	More focused, longer actions.	Short interactions
		Capturing bits of information, thoughts.

	Structuring thoughts and experiences.	
	Discussion-based	
	Cooperative and collaborative	
Possible Outcomes?	More discussion	Bridge
	Develop therapeutic alliance quicker	Greater client self-efficacy
	Greater Engagement	
	Less Confrontational	

Table 3.2 Design considerations

In their personal lives, clients may have no time for long engaged tasks, or may not have sufficient personal space from peers or family to engage in them. Long structured therapeutic tasks are therefore unlikely to engage adolescents in self-directed work. Stigma is strongest outside a session. Because of this, it is important that systems are flexible and on hand for discreet access. The focus of system design should be on providing privacy, security and access. Ease of use is also very important as the client is using the system without the possibility of technical support.

3.5. Models for engaging users in tasks in their own lives

The following section examines models from a range of research areas that may be appropriate for engaging adolescents in tasks in their own lives and different tasks in a therapeutic session. The aim is to identify system models that are suitable to the two levels of engagement outlined in **Section 3.3** and the types of tasks that are suited to the two different contexts clients find themselves in: one hour face-to-face sessions with a therapist, and a week or more on their own in their own social environment.

3.5.1. ‘Capture Now – Organise Later’ – Models for engagement

(Bedford-Roberts et al., 1995) developed a notion called the Personal Information Lifecycle based around systems, which “*capture now and organise later*”. Two early systems combined a light mobile device for rapid collecting of information and a desktop computer for more focused long-term interactions with this collected information. The initial concept developed

out of a prototype project called “Piglet”. The mobile device in this project was similar to a PDA and allowed the user to scribble notes or messages on the screen with a stylus and store them in to-do lists, schedules or send them to another user. The system’s main information collection functions were completed using the portable mobile device. The organizing functions were almost always used back at the desk. The “Piglet” system was based upon multiple short interactions generally recorded on the go and a complementary more analytic interaction, which organized the collected data. Bergman and Haitani have described the design of the Palmpilot using a capture now – organise later approach (Bergmann et al., 2000)– *“applications share (the) load with the PC and focus on what aspects you really need with you on the road”* (Sharpe et al., 2002).

The following sections look at the uses of similar models in education and healthcare.

3.5.2. Systems in Education

Education has similar theoretical roots to many forms of psychotherapy. It deals with related issues such as engaging students in educational tasks, teachers’ fears of being replaced or the fear that technology will replace the human-human connections. It involves a professional who has often little technological experience, a young person who is sometimes an unwilling participant and other stakeholders like parents.

There has been considerable research into using mobile technologies in education (Naismith et al., 2004; Roschelle et al., 2005; Savill-Smith, 2005). Some of this research is relevant to mental health care as it deals with children in similar technological environments where pen and paper activities are still dominant. It is an area that requires some sensitivity, albeit significantly less than clinical situations.

Several potential benefits of mobile technologies have been identified in educational settings (Faux et al., 2006). Mobile devices provide increased access to content at the place where learning activities occur and allow students to record information about their environment. This can encourage reflective practice, allowing users to record their observations *“in which they are working (offline) and later upload this information to desktop computer where the information can be reviewed by the learner and their supervisor”* (Vavoula, Sharples et al., 2006). In this way, there is an emphasis is placed on storing information in the learning context for evaluation and reflection later. The mobile device is seen as well positioned as a technology to support contextual learning, because it takes learning out into the physical context where the knowledge will be used (Cereijo Roibás et al., 2002).

MyArtsSpace is a system designed to support enquiry-led museum learning (Vavoula, Meek et al., 2006). It involved school-going students using mobile phones (that they were given especially for the project) as they walked around the museum. They could collect pictures and artifacts as they walked around. Anything they captured was sent to a personal secure web portal for follow-up learning and reflection in class. This project made use of mobile phones for data collection in the museum, where the use of fixed technologies such as pen and paper would have been cumbersome and unappealing and where desktop (or even laptop) computers would have been unsuitable. The content collected was later viewed and organized through a web portal, which allowed for more detailed interaction. This project found that the mobile phone was less fragile and more engaging than the paper alternatives. It used the mobile device as a bridge to technologies used in other parts of the learning experience. They found that the mobile device was less fragile and more engaging than paper alternatives. Neither the children nor teachers needed to put any effort into ensuring that the information was collected.

(Vavoula, Meek et al., 2006) describe a 'lifecycle evaluation approach to the development of MyArtSpace which resembles formative evaluation and iterative design in HCI. Evaluation activities were undertaken at key points in the lifecycle of the system design process. Outcomes at each stage informed the next stage of system development. An emphasis was placed on involving stakeholders early on and throughout the process. Requirements were characterized as educational or user and considered both the learner's and the teacher's needs. The main usability evaluation method was Nielsen's Heuristic Evaluation (Nielsen, 1993b). This involved several HCI experts going through the software, flagging potential usability problems. Formative evaluations were carried out on paper-based prototypes of both components of the system. The main benefit of the lifecycle approach, identified by the authors, was that problems were identified at an early stage when they could be easily corrected. Evaluation and development took place at the same time (Vavoula, Sharples et al., 2006).

3.5.3. Systems in Medicine

Until recently, healthcare settings had not embraced technology (Schoen et al., 2000). Part of the drive for increased use of technology is in response to a tremendous increase in service demand. Barriers to the introduction of technology in the area included: complex organization structures, systems and workflow integration, security considerations, the need for speed and reliability. (Sainfort et al., 1996) reported however that *"many health care organisations are often not even fully aware of their own needs, do not know which*

technologies are available for what, and do not know how modern information and communication technologies can be effectively used to improve and simplify care delivery”.

In medical healthcare, professionals are often uncomfortable to find themselves in the role of computer novice (Gosbee et al., 1997). While therapists can lack technological expertise, unlike medical practitioners, they do not have a wide range of technological interventions to choose.

Healthcare informatics uses technology to improve healthcare delivery. It focuses on developing approaches to improving the delivery of healthcare with the focus on the patient, the provider and the interaction between the two (Sainfort et al., 2003). (Sainfort et al., 2003) recommend that *“a dual focus should be placed on (A) increasing job satisfaction and effectiveness for the medical personnel & (B) increasing quality of care as well as safety for patients”.*

Mobile software has been demonstrated to hold much promise in general health care, potentially supporting more attentive care at a reduced cost and with more comfort to the patient (Sneiderman et al., 2004; Weaver et al., 2007). There is a generally established model of patients for capturing biological data in multiple short interactions, which feeds back to an expert who can analyse this data in one longer interaction. (Sani-Kick et al., 2002) developed a pocket-PC tool which allowed patients to take pictures of their wounds from their home which then could be sent to a web server and stored into their digital patient record. (Ogasawara et al., 2003) have described the evaluation of a portable video system on a handheld device to allow patients to continue rehabilitation at home. The system transmitted video footage of the patient performing several actions. In preliminary evaluations, the system was found to be useful in helping physiotherapists to make judgements about the patient's condition.

Text messaging (SMS) has been used to generate daily medication reminders (Neville et al., 2002). Electronic patient monitors have been used, in all care settings, to collect, display, store and interpret physiological data. Systems for monitoring dialysis (Nakamoto et al., 2003) and asthma (Anderson et al., 2001) have been developed.

The use of mobile technology in medical healthcare has highlighted a potential for the remote engagement of patients in medical activities. Possible positive outcomes of this approach can include increased adherence to medication, greater patient empowerment and a reduction on demands on hospital services. A similar approach may have promise for AMH.

3.5.4. The potential of the “capture now, organise later” model for AMH

The “capture now - organise later” model may be an effective way of engaging adolescents in and between sessions. It may be a suitable model for engaging adolescents away from therapeutic sessions, as it takes into account the different levels of engagement in both settings. Therapeutic systems based around this concept might help engage adolescent clients in short multiple interactions at times of a significant mental health event with less significant demands on attention and memory. The more focused analytical functions could then be completed in a session with a desktop computer.

A successful implementation of this model between therapeutic sessions might support the therapeutic process by creating content for use in a session, engaging adolescents in therapy, making it more convenient to engage in therapeutic activities and similar to mobile learning where learning tasks can be completed in context (Cereijo Roibás et al., 2002), it may help take some of the lessons and techniques of therapy into the clients life where they are needed most. Any content collected since the last session might ease the pressure on clients to initiate discussions.

Personal Mobile Phone

The *Personal Investigator* study, described in **Section 3.2**, identified the need to design for hardware that clients already possess and to which they have easy discreet access. The evaluations of *PI* revealed that some clients either did not have desktop computers at home or simply did not use them. It is proposed that the implementation of a “capture now – analyze later” model for AMH make use of clients’ mobile phones for work between sessions and the clinic’s desktop computers for session activities (see **Figure 3.4**). Such a model would take advantage of existing hardware and could mean that systems that were shown to be successful could be more easily introduced into current practice.

There may be unique benefits for clients to use their own mobile phones. Mobile phones are in widespread use and represent a practical solution in terms of cost and accessibility. A mobile device would also seem most suitable to support a “capture now – organise later” system model.

High ownership

As therapist surveys conducted during this research and figures of ownership would suggest most adolescent clients have access to a mobile phone. The mobile phone is a promising client-centred platform. It can provide persistent and discreet access to both the adolescents’

personal space, and to the therapeutic materials and activities outside of the therapeutic session. It is a robust networked device that is designed to transmit and receive textual, audio and visual data. Most importantly, unlike desktop computers, adolescent ownership of mobile phones in European countries is widespread. For example, Norway has an almost 100% saturation of mobile phone ownership/use by both sexes between the ages of 13-20 (Ling, 2001); in the UK, 90% of young adults have access to a mobile phone (Crabtree et al., 2003); more specifically, a recent UK survey indicated that 90% of 12 year olds owned a mobile phone in 2006, and this age group sent three times as many text messages as their parents (BBC, 2006). Similar statistics are presented for pre-teens and adolescents across Europe, see for example (van Veen, 2007). Bull et al. state that it is inevitable that every student will have a portable wireless device in the UK (Bull et al., 2002).

Many therapists who participated in the second therapist survey (see **Section 6.5.1**) commented that most clients owned a mobile phone:

Therapist1: *“Most clients from 12 years (or even 10 years) have them – and really value them i.e. they have high status. They are small – easy to carry – generally user friendly”.*

Therapist2: *“accessible, cost effective, practical, may act as a bridge between sessions.”*

Therapist3: *“Every child appears to have one and have great skills in this area.”*

Therapist4: *“popular media for young not stigmatizing. Easily used by kids.”*

Familiarity

Familiarity with technology and how it functions may increase user efficacy. Adolescents are already familiar with how mobile phones work. They use them regularly on a daily basis to communicate with peers and family, to play games and download and transmit textual and multimedia content. The high rate of text message transmission by adolescents is indicative of this familiarity. This could be important for clients with literacy difficulties, who may be more comfortable entering text on their mobile phone than on paper. Pencil and paper activities can have negative connotations for many young people. Many associate such tasks with school and homework. In a study of adolescent and young adults usage of mobile phones, Geser reports that almost all participants have their mobile phone turned on all day (Geser, 2006). In its 2004 report the ITU found that most adolescents keep their phone with them all day and that many are afraid to leave home without it; at night many keep it under their pillows or on bedside tables (International Telecommunications Union, 2004).

The stigma of “special” devices

Many studies evaluate mobile software designed for PDAs or high-end phones, which are given to participants for the duration of the study. This is justifiable for many research projects and numerous situations. When compared with mobile phones, however, PDAs remain an expensive option. PDA ownership amongst adolescents is low. Moreover, many adolescents will not have previously used one meaning they may need training in order to use one. Research in the area of assistive design has found that there is often stigma associated to special assistive devices (Keates et al., 2000); people with cognitive limitations can be reluctant to use assistive technologies in public (Fluharty, 1993). (Allen et al., 2007) decided to use a PDA device in their work with aphasic patients for two main reasons: (1) they believed a mobile device would support the user everywhere they went, as opposed to the traditional paper-based tools; and (2) it had to be implemented on a standard device to avoid attracting attention to the user's deficit. For adolescents, a PDA is an unusual device. Because of this, the use of PDAs could attract unwanted attention from peers, making it unsuitable for use in AMH.

A Bridge to Therapy

Mobile devices have been shown to successfully bridge formal and informal learning (Vavoula, Sharples et al., 2006); they would seem equally well placed for use in therapeutic applications which could be on-hand to support clients in contexts where they are needed. The mobile phone, with its increased access could be used to record feelings and thoughts when they happen outside of a session, thereby providing material for a session. There is also potential for mobile phone to form bridges between formal care and less formal care in the client's life— between therapeutic work in a session with a therapist and work away from a session in their life – in the same way mobile devices have been shown to successfully bridge formal and informal learning. Using the mobile phone may encourage adolescents to consider issues raised during a therapeutic session. A 2003 study which used personal digital assistants (PDAs) as an extension of therapy, reported that information from the PDA reminded clients to consider issues such as the linkage between eating behaviour and mood (Norton et al., 2003).

Practicality

The mobile phone can simplify the transfer of client content to a secure, private place: data transmission to a secure server alleviates the client of the responsibility of storing and transporting paper files. There is no need for clinics to purchase or maintain mobile devices.

In keeping with the practical aims of this research, the use of clients' mobile phones as a therapeutic platform has the following benefits. Clients are already familiar with how their phone functions, so there is less need for training. As an established commercial device, there is less likelihood that the phone will malfunction. Since the phone is an established part of clients' lives, it can be more inconspicuous than a "special" mobile device, which would risk attracting the attention of peers. Because most clients already own a mobile phone there is no extra costs for providing or maintaining expensive hardware.

Security

Security of information and identity is of particular concern in adolescent mental health care. Software on a mobile phone can encrypt and protect client information. For example, using *javaME*, a mobile programming language for phones, it is straightforward to ensure sufficient security by providing a password and encrypting information. There is no need to transmit sensitive client information like mobile phone numbers. For clients it is particularly important that their mood information is secure from peers and family members. Adolescents are already protective of their phones. For example, Vincent has reported in a study that adolescents kept their phones close to them to stop parents from reading text messages or siblings from stealing them (Vincent, 2004). Many adolescents feel uncomfortable when others look through their phone (International Telecommunications Union, 2004). A 2006 UK study found that 68% of 15-17 year olds would not let their parents look through text messages or pictures on their phones (YouGov, 2006).

Privacy

Issues of privacy may be easier to overcome when designing mobile phone-based systems. Usage of mobile phones in public places is commonplace throughout many parts of the Western world. Clients using therapeutic applications on their mobile phone would not stand out over an adolescent using their phone to text their classmates. The small display screen and one-handed text entry might provide increased privacy.

In summary, the mobile phone may provide adolescents with greater convenience, privacy and security than paper materials. The mobile phone is a constant companion for a high percentage of adolescents and is therefore accessible almost everywhere. It is a low cost and client-centred platform that would seem suited to therapeutic services.

Design implications

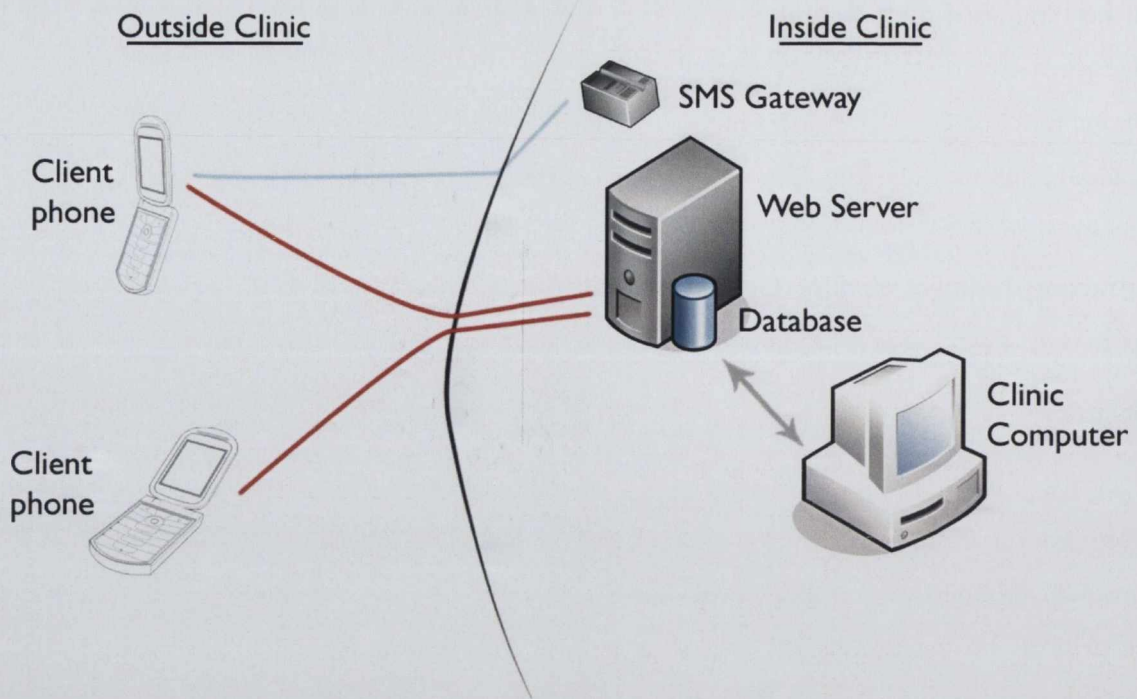


Figure 3.4 Potential System Model for AMH

The decision to use the client's own phone has implications for design and implementation. To achieve necessary accessibility coverage, the software must function on a wide range of models, including older models. Designing for such a broad base brings significant restrictions. Almost every device uses different hardware and a different user interface. It is a challenge to design and develop software for all devices in a particular market. At this time, the mobile version of java (*JavaME*) enables the researcher to design mobile software that will function and appear as a native application on each different handset. This has the advantage of building on the user's existing knowledge of their device. Software should aim to be accessible to as many mobile handsets as possible. This provides the widest inclusion of potential clients as is possible. Designing software for numerous handsets can be time-consuming, but it may help speed up evaluations by allowing more users to participate.

Research into the use of the mobile phone as a therapeutic support device is at an initial stage. Few, if any, studies have looked at HCI issues but have focused generally on therapeutic evaluation. One study using SMS messages in the aftercare of bulimia nervosa patients (Bauer et al., 2003) outlined the following benefits of mobile technology: (1) access is independent of space and time, (2) there is little temporal or monetary cost, (3) it is an interactive medium, (4) patients are encouraged to express themselves briefly and concisely, (5) it allows patients to stay in contact with therapy and (6) it can help to bridge the gap between inpatient and outpatient treatment.

There are significant issues related to the introduction of mobile phones in therapy. The cost of data transmission is an issue that therapeutic services would have to address. There are several options for the transmission of information from a mobile phone. The most convenient method for, the client and the therapist, is to send information over the mobile network. On average, this would amount to the cost of one or two text messages a week. There are other solutions available, which involve no cost. It could be possible to use Bluetooth or Infrared in a therapy session to send information to a desktop computer. However, these cost-free solutions may be a less convenient solution that would entail therapists getting involved in technical matters.

The advent of mobile computing has had a significant impact on the HCI field, underlining the importance of context. Current mobile devices are limited in the ways in which they can facilitate human-computer-interaction (Bergman, 2000; Buchanan et al., 2001; Melcher et al., 2003). This is due to the limitations required by their small size, such as the small low resolution screen, relatively poor sound quality and slow data input. While there are high-end devices that do not have as many limitation, most phones in circulation are severely limited in comparison to desktop computers. Mobile software for therapeutic use must be available to as many clients as possible. This entails ensuring that the software works even on the most basic mobile phones. The designer must consider how to overcome the challenges presented by the mobile phone.

It can be very difficult to get fine grained data on the use of the software in context since there can be no observation of adolescent clients. It is therefore important to consider mobile design guidelines and existing heuristics that may assist the design of mobile applications. Heuristic evaluation is a process that does not involve any end-users but uses HCI experts, typically five, to run through test scenarios on an interface and to flag problems. There is no accepted list of heuristics for mobile devices (Preece et al., 2002). Nielsen's heuristics for interface design are not tailored specifically to mobile interface design (Nielsen, 1993b). (Markopoulos et al., 2008) have questioned how well heuristic methods work for systems designed for children, particularly where the evaluation extends beyond usability. (Palmlblad et al., 2004), as a result of their work with electronic patient diaries, have provided recommendations for the design of mobile user interfaces for electronic patient reported outcomes. While their suggestions are directed toward general patient use, particularly on PDAs, many of them are relevant:

- Systems should be suitable for use by all types of patients included in the trial.

- Patients must be capable of using the system and be comfortable with it after a short period of training.
- Responses should always result from an action by the user (i.e. defaults should never be taken as data).
- All information necessary to answer a question should simultaneously be on the screen.
- The suitability of an application should be tested on similar subjects to determine if it is suitable.
- The designer should design for the person who may find the system the most challenging.
- All attempts should be made require no scrolling on any mobile screen.
- All screens should be self-contained.
- Colour should be used to enhance and clarify screen displays but not as the only or main cue for necessary information.
- Questions presented to the patient should require an active response.
- There should always be a good reason for displaying alert messages since they require user's time and attention.

3.6. Initial Design Guidelines

The following initial guidelines are intended as starting points for the design of software in mental health situations with adolescents. They are based on the analysis of HCI and AMH research literature and initial requirements gathering. They will be used to direct the design of the two systems described in the Chapter 6 and 7.

(1) **First do no harm:** Ethical considerations have become an integral part of HCI practice (Friedman et al., 2003). Human welfare is an important issue in the design of computer systems. Software can either cause users harm or improve their situation (Friedman et al., 2003). In keeping with the 'first do no harm' therapeutic principle, systems designed for mental health situations needs to first ensure that it does not cause any psychological harm to the client. Secondly, it should aim to enhance psychological welfare – encouraging mental wellness. This mirrors the theoretical foundations of therapy which state that first a mental health intervention (and a therapist) must seek to do no harm and secondly to improve the

client's mental health. Designers should design defensively, anticipating the worst possible outcome of the use of system.

(2) Design for privacy and security: Mental health remains an area that holds significant stigma for those affected; this is especially heightened during the period of adolescence, when individuals seek to assert control over their lives. Privacy and security are two issues that are of intense concern to adolescents and therapists.

Issues of control are bound together with security and privacy. According to Schoeman, the term 'privacy' has been used to refer to "*a claim, an entitlement, or a right of an individual to determine what information about himself or herself can be communicated to others*" (Schoeman, 1984). It has also been used to refer to the "*measure of control an individual has over: 1) information about himself; 2) intimacies of personal identity; or 3) who has sensory access to him*" (Schoeman, 1984). There are three traditional approaches to privacy in HCI (Friedman et al., 2003): to inform people when and what information about them is captured and who has access to it (Bellotti, 1998), to allow people to control what information they share and what they hold onto (Bellotti, 1998), and to prevent sensitive data from being tagged to a specific individual. In mental health, a combination of all three approaches is most suitable. For research data, which might include usability information such as the amount of time spent on a particular task, clients (and their parents) and therapists should be informed how this information will be captured, how long it will be kept, and who has access to it. For self-reported therapeutic information, for example, information relating to how a depressed client is feeling or how many hours they slept the previous night, the client should have control to decide whether to share this information, to whom, and for how long. Finally, all efforts should be made to ensure that no unnecessary identifying individual information is stored in a system. For example, there is no need to include an individual's name in software registration, particularly if they are using their phone.

Control is an important element in building trust in a system. (Tang, 1997) reports on a research study where there was a dilemma on how to power the microphone attached to the desktop. It could have been powered independently, which would require an on/off switch, or have taken the power from the pc. The second option was taken. During evaluations, some users were not happy with this design element. By not allowing users direct control over the microphone, users felt their privacy and security was undermined. In adolescent mental health, users may be more sensitive issues of control regarding personal information and volition than in this example.

Mobile software should be easily locked with a PIN so the adolescent alone has access to their information, providing a sense of security. Should the adolescent's phone be lost, taken from them by a peer, or shared with a family member, there is less opportunity for their data to be accessed. It is also vital that the software remains sensitive to the possible situations it might be used in. Above all it should avoid attracting attention since an adolescent may use it in public situations. For example, an application should avoid playing any audio files without explicit consent from the end-user.

Therapists have reported that most clients do not want their peers to know that they are attending mental health treatment (Health Services Executive, 2005). It is important that design in AMH takes into account the various stakeholders in a therapeutic intervention, while ensuring that clients feel trusted and in control of their private information. There is clearly an important but fine balance to be struck between giving primacy to privacy issues that are important to the client, and ensuring that best practice is achieved by including all stakeholders in the treatment process. It is particularly important to provide reassurance to the adolescent that they have full control of access to their personal information.

(3) Ease of use: It is recommended that any software designed for use in the therapeutic field should require as little training as possible for both clients and therapists. This is particularly important when a system is used away from a therapeutic session, when the therapist is not there to support or report any system problems. Systems should require very little technical support. Clinical settings allow no direct contact between designers and end-users. It is generally only possible to give automated support to adolescent clients; for example, the automated sending of forgotten passwords. While it is possible to give more technical support to therapists, it should be a last resort: therapists are unlikely to use software that requires significant training at the outset or relies on frequent support.

Because new technological systems are almost always introduced to clients by therapists, it is essential that these therapists have a clear understanding of them. Therapists should be given the opportunity to use a system themselves in advance of use with a client, in order to give them time to become comfortable with it. A short introduction session can help to demonstrate the purpose of the software. It should involve giving detailed suggestions on how therapists might introduce it to a client.

(4) Error handling: As with any well-designed application, program errors should be explained practically to the user and without use of technical jargon. Software should handle the burden of any failure, making any necessary operations in the background without requiring any further action from the end-user or any further notification. Information loss

must be avoided at all costs. Adolescents dislike being requested by their therapist to repeat their stories (Health Services Executive, 2005), and they are likely to similarly dislike having to re-record any content. This is particularly relevant in AMH, because it may not be always possible to provide support, and many clients may not be willing to ask for help because of stigma.

(5) Accessibility: Based on the findings from the *PI* pilot study, it is proposed that any technical treatment be available to as many people as possible. The choice of a mobile phone as a therapeutic platform for AMH is representative of this. Furthermore, it is recommended that where possible clients should be provided with alternative media to complete therapeutic activities.

(6) Importance of language: In their development of a mobile map service (Nivala et al., 2005) have recommended using the user's language in order to make the UI more useful. (Markopoulos et al., 2008) have highlighted the importance of using well-chosen language in evaluations with children. The choice of language in any software or documentation for use in mental health is an important decision to get right. The use of stereotyping language in mental health is stigmatizing and can be damaging. Language that stigmatises has been harmful to many people with mental health problems and has contributed to them feeling socially excluded and rejected. A Vision for Change highlighted that *"it is important that language is used more skilfully, so as to reshape attitudes to mental health problems and the people who experience them"* (Health Services Executive, 2005). The choice of language is very important also in light of the prevalence of literacy difficulties with mental health problems (BMA, 2006).

4.Design in constrained environments

Adolescents are not readily engaging in professional mental health services. Chapter 2 outlined the challenges facing mental health services when working with adolescent clients. These include stigma, unappealing materials for adolescents, lack of resources, lack of access and long waiting lists.

In order to increase client engagement in therapeutic activities it is important that software tools are easy-to-use, easy-to-learn, engaging, and free from errors. Design methods which place the user at the centre of the development process are more likely to result in user-friendly software. This chapter focuses on the strengths and challenges of applying and adapting User-Centred Design (UCD) practices and techniques to the mental health domain. The particular conditions present in adolescent mental healthcare pose problems for traditional User-Centred Design. A significant challenge for UCD in this environment is the unique user group. UCD approaches typically require high levels of user participation. The goal of this research is to establish if it is possible to implement a UCD approach, which takes into account the limitations of designing for AMH.

Because there are no existing UCD approaches for the design of software for adolescent mental health, this chapter identifies research from various areas, which experience similar constraints. The focus of this chapter is to identify techniques that may be of adapted for use in AMH.

4.1.1. User-Centred Design

The aim of User-Centred Design is to develop usable technology (Karat, 1997). The term User-Centred Design was first introduced to refer to the design of software which focuses on the user's needs (Norman et al., 1986). It is a design process which aims to result in accessible, easy to use and learn, and engaging technology. It puts the user at the centre of the development and encompasses processes, techniques and tools for identifying user requirements for a particular technology (Bevan, 1999). Software which does not consider these issues will most likely result in poor usability, less productivity, less engagement and less acceptance by end users of the tool (Gulliksen et al., 2003).

The benefits of applying User-Centred Design include: (1) increased efficiency, (2) greater accessibility (3) improved productivity, (4) reduction of software errors, (5) reduction in the

need for training (Dray et al., 1994) (6) a greater level of user engagement and acceptance, (7) and an overall cost benefit (Bevan, 1999).

4.1.2. Central characteristics of UCD

User focused: User-centred design requires a detailed understanding and specification of user requirements. It is important to understand the context the system will be used in, who the end-users are, their goals and tasks, their characteristics, including their abilities, attitudes, educational level, likely age-range, how they communicate, interact and cooperate (Gulliksen et al., 2003). By maintaining a user focus throughout development, designers ensure that they consider user needs at all stages of development.

Prototyping: Early and iterative prototypes are used in UCD to help designers critique and evaluate designs (Gould et al., 1997). Various materials are used, but it is recommended that early prototypes are of a low-fidelity, such as sketches or paper prototypes. This is intended to elicit more direct feedback at a time when it is least costly and time consuming to make changes. Some UCD approaches recommend that prototypes be designed with users and evaluated by them in their context.

Active User Involvement: Evaluation is necessary in order to assess if a given system meets the users' requirements (Dix et al., 2003). Designers have difficulties recognizing problems in their own designs and imagining the needs of others, particularly where the user-group is highly unusual. It is therefore essential to include representative end-users in evaluations, in order to see problems they are experiencing and to thereby improve the system (Bekker et al., 2000; Karat, 1997; Nielsen, 1993a). Although the role and degree of involvement of end-users varies (Kujala, 2003), UCD approaches typically require *"the active participation of users in an iterative process of evaluating whether proposed design solutions meet user needs"* (Gulliksen et al., 2003). Direct contact with users is also considered crucial to understand the various contexts the software will be used in (Kujala, 2003). A range of techniques can be used to improve usability and ensure compatibility with user needs. These techniques involve end-users - either directly (as with Participatory Design), or as a source of information for analysis (as with ethnography and contextual analysis). Even with analytic approaches (such as task and activity analysis), end-user validation of models is seen as an important aspect.

Evaluate use in context: There has been an emphasis in HCI on studying applications in the context where they will be used (Gulliksen et al., 2003; Suchman, 1987). In particular, mobile devices are typically used in a range of contexts, which traditional usability methods may fail to address (Been-Lirn Duh et al., 2006). Evaluating in realistic settings can help to establish

the ecological validity of a system by exposing it to random factors, which are difficult to recreate in the laboratory (Markopoulos et al., 2008).

4.1.3. The User-Centred Design Cycle

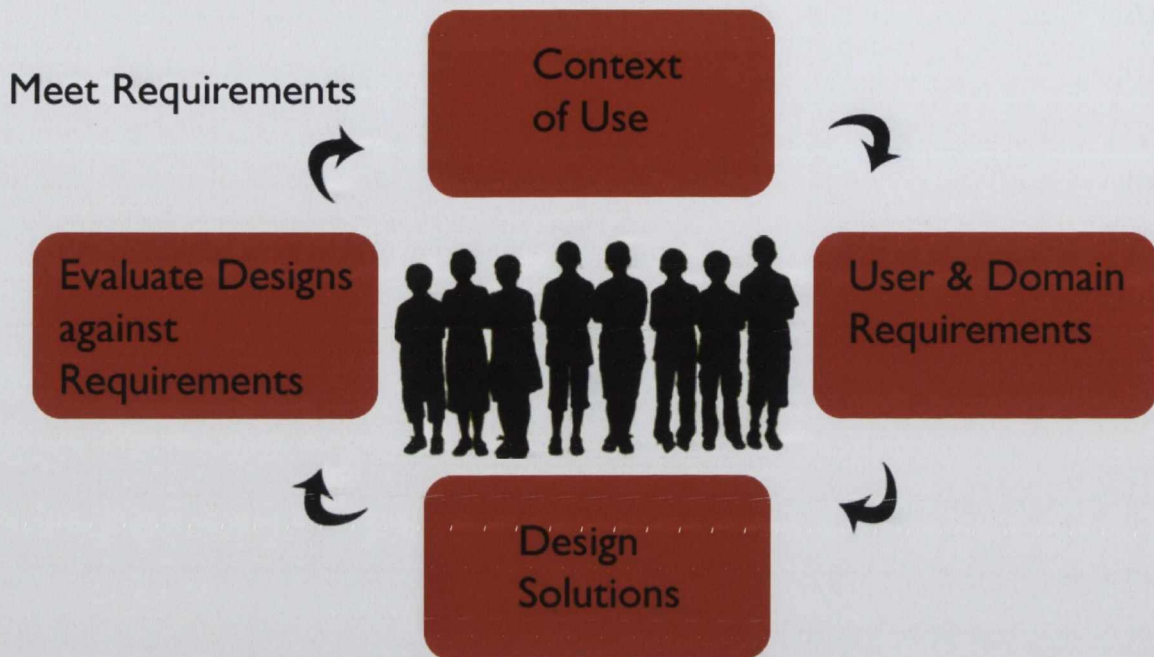


Figure 4.1 User-Centred Design Cycle

The first step in applying a UCD approach is to identify a need. Although there is much variation in UCD approaches, most generally share 4 main stages (Figure 4.1): (1) understand the context of use; (2) specify the user and organisational requirements; (3) produce design solutions; and (4) evaluate designs against requirements (ISO 13407, 1999). The first stage involves specifying the context in which the system will be used. In adolescent mental health, it will involve identifying the likely characteristics of: (1) the tasks the software is designed to support; and (2) the physical, emotional, social and organizational environments in which the tool is to be used. Next, the designer specifies the user and organisational requirements. This relates to any specific characteristics or properties of the users. In this setting there are two end-users; the adolescent client and the therapist (subject-matter expert). Stage 3 involves designing solutions to an identified need with varying input from end-users depending on the type of UCD approach. Finally, these designs are evaluated against requirements identified early-on. This process is highly iterative and incremental – designers can go through the four stages many times, improving the design each time, ideally until the requirements have been met, or more likely until practical limitations force the designer to finalize the design.

4.1.4. Participatory Design: in depth user involvement

Participatory Design (PD), also called Cooperative Design, is a User-Centred Design approach which gives the users a crucial role in the design process: it is an *“approach towards computer systems design in which the people destined to use the system play a crucial role in designing it”* (Schuler et al., 1993). PD developed from a Scandinavian approach to involving the user extensively in the development process (Ehn, 1993; Greenbaum et al., 1991). It is founded on fundamentally integrating the participant’s knowledge of the design space and practice. The user is involved at all phases of the design process. Involving the user early on and working closely with them can help avoid unpromising design paths and develop a more comprehensive understanding of the target domain; user feedback is sought at each stage of the process. This is because users are best placed to understand the context in which systems will be used and subtle problems that need to be addressed.

4.2. Barriers to User-Centred Development in AMH

The main benefit of designing for actual clinical practice is that research can have an impact on day-to-day clinical practice (Kazdin, 2003). **Section 2.3.6** identified the main reasons clinical research does not carry over to clinical practice. From a UCD perspective, there are clear benefits to evaluating systems in real contexts with real end-users (clients and therapists). However, there are considerable limitations to implementing UCD techniques in sensitive clinical situations.

4.2.1. Time Intensive Evaluations

Evaluations in actual clinical practice can take substantial time. It can take time to identify therapists who are willing to use new systems with clients. They need to be confident in how to use it, but also confident that it will not have any adverse effect on their clients. It can take a considerable amount of time to recruit clients and their parents who are willing to take part in evaluations. Once evaluations are underway, it can be difficult to get complete data from case studies. Clients may be hospitalized or drop out of therapy and so not complete the therapeutic intervention. Furthermore, adolescent attendance is extremely erratic which means it can take a substantial period to complete an evaluation. The numbers of clients that clinics deal with each year can be relatively low. For example, a very large AMH unit with five clinical teams could see fewer than two hundred adolescents each year. Some of these clients may already be participating in other research studies. If a client is already assigned to one treatment experiment they are not allowed to take part in any other research.

Another aspect that can delay clinical evaluations is the difficulty obtaining client feedback. There can also be a difficulty in getting usability information. This is partly because the focus of each session must remain, on the therapeutic intervention, but also that any focus on usability is beyond the expertise most therapists.

It can even be difficult or time consuming to get consistent feedback from practitioners. Therapists already have a significant workload and may find any additional paper work, on top of already significant administrative tasks, difficult to complete. Even contacting therapists in order to request feedback can be time intensive. They are often in session with clients and many will only check their email every two or three days.

4.2.2. Ethical Restrictions

There are important ethical issues to be considered when designing software for mental healthcare settings. Research into the use of technology in talk-based interventions for adolescents must adhere to the strict ethical guidelines of the domain. The sensitivity of this situation is further enhanced by the social stigma often associated with mental illness. All therapists are required to obey the Hippocratic Oath – often summarised by the simple principle ‘first do no harm’ (see **Section 2.3.1**). Research into the use of technology must adhere to this strict ethical requirement. Designers must obey this principle, which means that above all else any tool used will not have harmful effects on the clients. Roberts and Dyer have produced a guide to ethics and provided solutions to ethical problems in this domain (Roberts et al., 2004). Designers should be aware of these constraints, and with the protocols for evaluation.

There are practical implications to these constraints. To evaluate software in this environment, a detailed proposal has to be submitted to an ethics board. This can take at least a month and possibly longer should the board require changes to any part of the study. Furthermore if any substantial changes are made to the software then the ethics review procedure must be performed again. This can have a significant impact on the duration of evaluations and reduces the practicality of iterative design with end-users.

Ethical restrictions limit the amount of experimentation that designers can incorporate into designs. Clearly, it would be difficult to justify introducing unpredictable system elements into a clinical evaluation. This could lead toward a tendency toward more conservative solutions.

Finally, it could be argued that it is not ethically sound to undertake usability evaluations with adolescent clients. Usability problems could end up undermining the therapeutic process

and consuming the precious time of the therapeutic session. Any extra time spent figuring out how to use a program in a session, is time that could have been spent focusing on addressing the therapeutic problem. Any system that repeats the failings of current materials is unlikely to engage clients in the therapy. This might result in the client feeling frustrated or even withdrawing from therapy. Because of this, it can be argued that all software should be thoroughly evaluated before being made available for general clinical use.

4.2.3. No access to adolescent end users

The ethical restrictions above rule out traditional approaches to UCD with adolescent end-users. They place strict limitations on access to mental healthcare settings. It is unlikely that many designers will have the required qualifications that would allow direct access to this sensitive setting or for contact with young people suffering mental health disorders. It is therefore necessary to find solutions that take into account these access constraints. An important element of any approach is the ability to maximize the benefits of evaluations that can be conducted independent of clinical settings.

Data Collection

In the limited settings of mental health, it is important to gather as much information from clinical evaluations as possible and make the most of the available evaluation methods. Because new technologies need to be evaluated from both a therapeutic and a design perspective there may be a risk of overburdening the therapist and client with feedback measures.

Information gathering methods

The advent of mobile computing has had a significant impact on the HCI field, underlining the importance of context. Significant challenges have arisen regarding the conduct of usability studies for mobile systems, particularly concerning the gathering and analysis of data, and the difficulty of isolating contextual factors. Innovative solutions are sometimes required. A study examining the use of mobile phones by 16-22 year olds made use of several evaluation methods including scrapbooks with disposable cameras, online diaries and focus groups (Carroll et al., 2002). In clinical settings the restrictions on access make such rich information gathering difficult. This affects both analysis and usability improvement activities.

Below is a consideration of some common information gathering methods used in requirements analysis and usability improvement:

Interviews and discussion groups: Discussion groups have been used in non-mental health studies with adolescents to good effect, see for example (Grinter et al., 2001). However due to the ethical constraints, interviews and discussion groups between HCI researchers and adolescents in therapy are effectively impossible. By contrast, interviews with therapists may be a valuable source of information.

Think-aloud evaluation: Think-alouds have been used in non-mental health studies with adolescents and children. (Branch, 2001) used the technique to examine adolescents' interaction with CD-rom encyclopaedias. (Hanna et al., 1997a) have suggested that this technique is best suited to 13-14 year olds upwards. (Donker et al., 2002) provided evidence that a modified form of think-aloud could be effective with 7 year olds. The technique can be problematic in the evaluation of mobile systems; although not impossible with appropriate equipment. For sensitive situations however, they are subject to the same ethical constraints that curtail the use of video and audio recordings.

User notebooks: User notebooks are often used for longitudinal studies and have the advantage of being applicable to mobile systems, particularly where interaction with a system is relatively sparse and spread over a long period. There can however be difficulties recording entries in notebooks when the users are on the move (Grinter et al., 2001). One non-mental health HCI study implemented a voice mail diary technique for participants in a mobile technology study (Leysia et al., 2002). For many sensitive situations, these approaches are unlikely to work because of privacy concerns (in some cases related to stigma), or because the end-users are unlikely to find completing the notebook entries to be an engaging activity (as with adolescents). (Markopoulos et al., 2005) have proposed the parent-evaluator method whereby the adolescent's parent can act as an observer and record observations in a diary. However, this method is still unproven and in any case would be unsuitable for use in AMH. Some of these approaches may merit further exploration, although it is likely that any HCI evaluation technique which requires adolescent clients to focus more on usability evaluation than therapeutic engagement will not be acceptable. As it stands, it is extremely difficult to engage adolescents in therapeutic activities alone.

Questionnaires: Adherence to questionnaires can be very good in controlled clinical trials, due to the systematic nature of the trials and strong incentives for research students. This may not be the case for research taking place in day-to-day clinical practice. The *PI* pilot study, described in **Section 3.2**, had difficulties getting clients to

complete questionnaires. (Markopoulos et al., 2008) have provided guidelines for designing questionnaires for children, highlighting the importance of well-chosen language and pilot-testing.

User observation: User observation in context often involves either following users and observing their mobile use from afar or end-users wearing special video recording equipment. Both methods are inappropriate in adolescent mental health settings. It may be argued that observation of therapy sessions using video recordings could be used as an alternative to direct client contact. However, given the ethical constraints and privacy demanded of therapeutic interventions, 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 therapists there is a reliance on role-play rather than direct contact. While video of real sessions is used in training of therapists, it is not straightforward to receive clearance to make such recordings. Moreover, it is not generally possible for mobile users. A further difference is that video recordings made for training purposes can be reused many times over a period of years. This justifies the effort to overcome the ethical issues involved and is a consideration which does not apply to usability improvement.

Given the lack of direct access to end-users, it is unavoidable that the time taken to feed results back from end-users is greatly increased. Coupled with the constraints on information gathering, this effectively means that we cannot recommend applying standard approaches to User-Centred Design without modification.

The following section looks at areas where end-users can not directly contribute to the design process and highlights the techniques that designers have used to overcome this limitation.

4.3. Assistive Design

Assistive design, also known as universal design and inclusive design, is an established field dealing with designing for people with disabilities (Newell, 1995; Newell et al., 2000). One of the major challenges designers in this area face is how to design for a heterogeneous group of users. The aim is to design software that considers all users with a range of cognitive and physical impairments. (Newell et al., 2003) have described the design of technology for users with cognitive impairments. People with cognitive impairments have characteristics very different to HCI researchers and traditional users. Standard UCD methodologies are generally not appropriate. There is a great variety in user characteristics and consequently it can be difficult to find representative users. It can be extremely difficult to communicate with

users – meaning there can be difficulties obtaining informed consent from some users. Because of these challenges, (Newell et al., 2003) report that it is often necessary to involve clinicians in the design process. Because of this, they rely on professional advice about the use of technology rather than direct user involvement. They suggest that designers use a storytelling approach to elicit tacit information from professionals. Information is *“presented in narrative form with particular examples to illustrate generic principles”* (Newell et al., 2003).

4.4. Autism

In their work with children with autism, (Kientz et al., 2008) describe methods they have used to overcome limitations communicating with end users. In a related study, a year was spent conducting in depth contextual inquiries, including interviews with all the stakeholders in the intervention including parents, therapists and caregivers (Hayes, 2004). Detailed observation of classrooms, therapy sessions and other domain specific activities was undertaken. They strongly recommend the inclusion of individuals with expert knowledge of the domain and user population. Parents of children with autism and autism researchers were included on the design team: *“having first hand knowledge of children with autism allowed us to be more attuned to how well technologies would be adopted”* (Kientz et al., 2007). In order to provide the designer with first hand insights about user requirements, some of the researchers on the design team trained to be therapists and participated in therapy sessions and team meetings. They experienced similar difficulties relying on input from children in care and recommend falling back on input from experts, parents and caregivers. They also recommend making any changes that are part of the system as similar as possible to existing practices in order to make it easier for workers to incorporate these techniques into their current practice. Finally, they acknowledge that some technologies risk violating the children’s or caregiver’s privacy and emphasize that the design of software must consider privacy, security and legislative control in order to address these concerns.

Although care for children with low-level autism differs significantly from traditional mental health care, some of their design recommendations may be of relevance to work in adolescent mental health. It is not realistic for a designer to train as a therapist in mental health. This is partly because there are so many different therapeutic approaches, but also because the training is typically longer and more involved than the training to become an autism therapist. However, it may be possible to work more closely with therapists and involve them in the design process.

In AMH, designers can rely less on input and support from parents. This is due to several reasons. Very often the client is in the care of a single parent, who can be under a lot of pressure in work and also may feel embarrassed about their child's problem (privacy). Many mental health problems can occur because of problems between family members. Involving these stakeholders in the design process could be extremely problematic.

4.5. Aphasia

There has been research into adapting UCD approaches around designing for users with aphasia. Aphasia is a condition characterized by a partial or total loss of the ability to communicate through verbal or written means. An end user with aphasia may experience severe communication problems including difficulties speaking, writing or reading. Due to these communication difficulties, designers have had to develop other strategies in order to incorporate users' needs and interests. Two general approaches have been used: incorporate speech-language pathologists (subject-matter experts) as proxies and involve other stakeholders in the design process.

In the design for people with disabilities that limit their ability to participate in the design process, others can act as proxies (Carmien et al., 2005). (Allen et al., 2007) describe how they used a three-phased research process in their work on mobile digital photograph tool, Phototalk, for individuals with aphasia. They began with a rapid *Participatory Design* phase with two speech-language pathologists who acted as proxies for actual end users. The second phase was an informal usability study with aphasic participants over one hour. The final phase was a one-month field evaluation of the Phototalk system with two aphasic individuals. The last stage was incorporated in order to demonstrate the usability and usefulness of the system in real life situations. Similar to the autism approach by (Kientz et al., 2007), the researchers relied on stakeholders, in this case family members, to help with communication in the initial stages. This project demonstrated the potential of using subject matter experts as proxies for end users and the benefits of using real end users in even limited evaluations.

(Boyd-Graber et al., 2006) describe using speech-language pathologists in place of aphasic individuals, "*because of the difficulties of communicating with the target population and high variability in aphasic disorders*". They conducted interviews with the therapists to obtain background information. However, they found that the overall focus of the system changed when they used a storytelling approach. (Boyd-Graber et al., 2006) found that the storytelling approach was more effective at eliciting clinicians' "*wealth of tacit knowledge*". Therapists recounted their stories of therapeutic practice and their interactions with aphasic patients.

They also recommend role-playing and the workshop format as good methods for eliciting information from participants. When evaluating systems they again relied on therapists: *“we met again with speech language pathologists and asked them to complete each of the tasks as a group imagining the difficulties an individual with aphasia might have while interacting with the system”* (Boyd-Graber et al., 2006).

Some designers have developed a modified PD approach when designing for aphasic individuals. In order to conduct needs analysis, (Moffatt et al., 2004) supplemented discussions with aphasic individuals, with interviews with their caregivers, and speech-language pathologists. In their design of a sound and image planner, they provide general guidelines for working with special populations. (Moffatt et al., 2004) used paper prototypes to evaluate three interfaces with non-aphasic individuals. They also used non-aphasic participants to identify general usability problems, allowing them to focus on more disability specific issues when evaluating with aphasic users. This is an approach which may have promise for use in AMH.

4.6. Alzheimer’s disease

(Cohene et al., 2005) describe how they adapted traditional PD for work with end-users with Alzheimer’s disease. They recommend working closely with care givers and family members and being sensitive to the needs of primary end users. They also emphasize that it is important to maintain vigilance against incomplete user requirements and the difficulty in making “generalizations when designing for a dynamic and degenerating disease” (Cohene et al., 2005).

(Wu et al., 2004) have described how they used a modified PD approach for direct work with amnesiac end users. Their design team included six amnesiacs. They believe that research into design for users with extreme issues can provide interesting insights into work with users in more ordinary situation. Their work has demonstrated the possibility of developing supplementary techniques in order to support a PD approach.

4.7. Child Computer Interaction

Only relatively recently have children (including adolescents) been studied as a distinct group in HCI (Brukman et al., 2002). According to (Markopoulos et al., 2008), the participation of children in evaluations is still not at an established practice. Druin has presented a framework describing the roles that children can play in the evaluation of technology and urges active

participation from children as design partners (Druin, 2002). (Markopoulos et al., 2003) have written on the assessment of evaluation methods for children. There are existing guidelines for HCI researchers working with children (Barendregt et al., 2005; Hanna et al., 1997b; Hanna et al., 1999; Markopoulos et al., 2008). These approaches assume some degree of contact with end-users, and hence in this domain are subject to the same access difficulties as standard HCI techniques.

At the ages 7-11, called the concrete operational stage, children have nearly developed adult cognitive abilities although they cannot formulate hypotheses and they find abstract concepts difficult (Schneider, 1996). They are able to group items and categorize items. They can use relatively sophisticated software but still appreciate a playful approach. At this stage, it is reasonable to expect simple keyboard use and moderately fine control over the mouse. At the formal operational stage (aged 12 and up) the young person's thinking "*is generally similar to an adult but their interests and taste remain different*" (Brukman et al., 2002). According to Erickson, many user interfaces are based on metaphors from the adult world that are unfamiliar to children (Erickson, 1990). Children are certainly less likely to be familiar with office metaphors like in-out boxes and folder structures (Jones, 1992). (Brukman et al., 2002) recommend choosing metaphors that are more familiar to children. Because adolescents with mental health problems are a highly unusual and heterogeneous user group it is not clear that these observations are applicable.

4.8. Learner-Centred Design

Learner-centred design (LCD), an extension of User-Centred Design, is a design approach that aims to place the learner at the centre of the design process (Soloway et al., 1994). It is more involved than traditional User-Centred Design and takes considerably more time to complete. In some cases it can take several years to complete the process (Brukman et al., 2002).

Learner-Centred Design faces two similar challenges to design work for AMH: (1) the designer needs to consider the teacher (subject-matter expert) and the learner; (2) this approach aims to engage young people in meaningful activities. (Brukman et al., 2002) have described an idealized LCD design process (see **Table 4.1** below).

Learner-Centred Design Process
Needs analysis for learners and teachers
Select Pedagogy

Select media/technology
Prototype
Formative Evaluation <ul style="list-style-type: none"> • Usability • Learning outcomes
Iterative design
Summative evaluation <ul style="list-style-type: none"> • Usability • Learning outcomes

Table 4.1 Learned-Centred Design

The needs analysis stage needs to consider both learners and teachers. Teachers, like therapists, have substantial demands on their time. The next step is to decide upon a pedagogical approach that the software will embody. Then a suitable form of technology needs to be chosen bearing in mind the learning objectives and the pedagogical approach. Most educational software focuses on evaluating the learning outcomes of the software without evaluating usability, but *“usability is a pre-requisite for learning”* (Brukman et al., 2002). Usability evaluation needs to precede the evaluation of learning outcomes.

Formative evaluation is then used to understand what needs improvement and to guide iterative design. This stage of evaluations focuses firstly on usability and levels of engagement and then secondly on learning outcomes: *“If students can’t use the learning hardware or software, they certainly won’t learn through its use”* (Brukman et al., 2002). The final evaluation pays equal attention to both usability and learning outcomes and is designed to document the effectiveness of the system and to justify its use by learners and teachers.

(Druin, 2002) has described an approach called ‘cooperative inquiry’ where children form part of the design team. According to Brukman and Bandlow, it is not clear how successful this partnership can be; *“there are still many questions to be answered about the effectiveness of this approach”* (Brukman et al., 2002). They argue that it is not clear how to deal with the multitude of ideas suggested by kids some of which can be nonsensical. The transfer of information from teacher to learner is central to education. Because of this, there is generally a gulf of expertise between learner and teacher, which designers need to address (Quintana et al., 2001).

Children may not best placed to discuss learning goals or curriculum content, that they have not covered themselves (Scaife et al., 1998; Scaife et al., 1997).

This raises the question regarding the benefits of involving clients in the design process, were it even possible. Clients typically find themselves in a therapist's office principally because they have not had the skills or motivation to cope with certain life events or behaviours. It is not clear what degree of client involvement in the design process would be ideal. While clients may be well placed to provide feedback retrospectively on materials and treatments in their particular case, therapists generally have a wide range of experience of mental health problems and client cases.

(Scaife et al., 1998) believed it was not clear at what stage in the design process children could best contribute and what their contribution could be. They introduced the concept of Informant design which aims for efficiency of input from different stakeholders. The aim is to maximise the value of each participant's contribution. At each stage of the design process, different participants are best placed to offer a contribution. For example, at the outset of a project, teachers and educational psychologists can help formulate the learning goals of a project. Over the entire design process, teachers, children, psychologists and HCI analysts all participate, each at different stages. The objective is to *"value the use of a diversity of informants to maximise the variety of suggestions"* but also the recognition that different informants are best placed to shape the design process at different times (Scaife et al., 1997).

4.9. Summary

Usability has not been a central consideration in the development of therapeutic systems to date. User-Centred Design is a design approach for developing systems that are suited to users' needs. However, there are significant barriers to using traditional UCD techniques in AMH. Research from other fields facing similar restrictions has provided a range of techniques that might be suitable to work in this area. They include: 1) involving domain experts in the design of systems, 2) involving domain experts as proxies for end-users in evaluations, 3) involving stakeholders like parents and care-givers, 4) evaluating systems usability with non end-users, 5) evaluating systems in real-life situations to demonstrate their usability and usefulness, 6) ensuring that new systems fit existing work practices and 7) methods for eliciting tacit knowledge from domain experts. Learned-Centred Design provides a framework for designing systems for education, which, because of this domain's similarities to AMH, may be of use in the design of therapeutic systems.

5. Designing for Adolescent Mental Health

Chapter 4 provided an overview of User-Centred Design and *Participatory Design*. It identified User-Centred Design as an established approach for designing easy-to-use, easy-to-learn, useful and usable computer systems. It also highlighted significant constraints to applying UCD practices in the design of tools for adolescent mental health. These included access restrictions to end users and time-intensive evaluations. Lack of access to end users makes it extremely difficult to apply many UCD techniques. Existing design approaches, which faced similar restrictions, were examined in order to identify promising techniques for use in AMH. Possibilities included a greater involvement of domain experts in the design process, who in some cases acted as proxies in place of primary end users. An analysis of the LCD literature highlighted the importance in the design of educational tools of evaluating usability before higher system objectives. The use of peer users for evaluating general usability problems was identified as a possible technique for use in AMH.

This chapter proposes an appropriate design process for design work in AMH, which enables designers to take client needs and preferences into account. This will entail establishing an effective design process that does not require the first hand contact with end users. The chapter begins with a discussion of a learner-centred design (LCD), framework discussed in Chapter 4, which may be a suitable starting point to develop a design approach for AMH. A close working relationship with at least one therapist is proposed an essential foundation for beginning any work in the area. The remains of the chapter establish a rationale for each stage of the proposed design process. The following two chapters are presented as case studies of this design approach in action.

5.1. Client-centred design

In order to design tools that meet users' needs, there is a need for a design approach that (1) considers the specific requirements of adolescents attending mental healthcare, (2) considers the needs and attitudes of therapists working with these adolescents and (3) addresses the difficulties faced by researchers in evaluating systems designed in this area. **Section 4.8** identified similarities between designing for education and designing for AMH. For example, end-users in learner centred design are typically young children, ranging from 2 -18 years old.

LCD does not always involve the learner in the design process, but they are always considered in the design phase through contextual analysis and the participation of stakeholders and often take part in evaluations. UCD recommends that in

Learner Centered Design → **Client Centred Design**

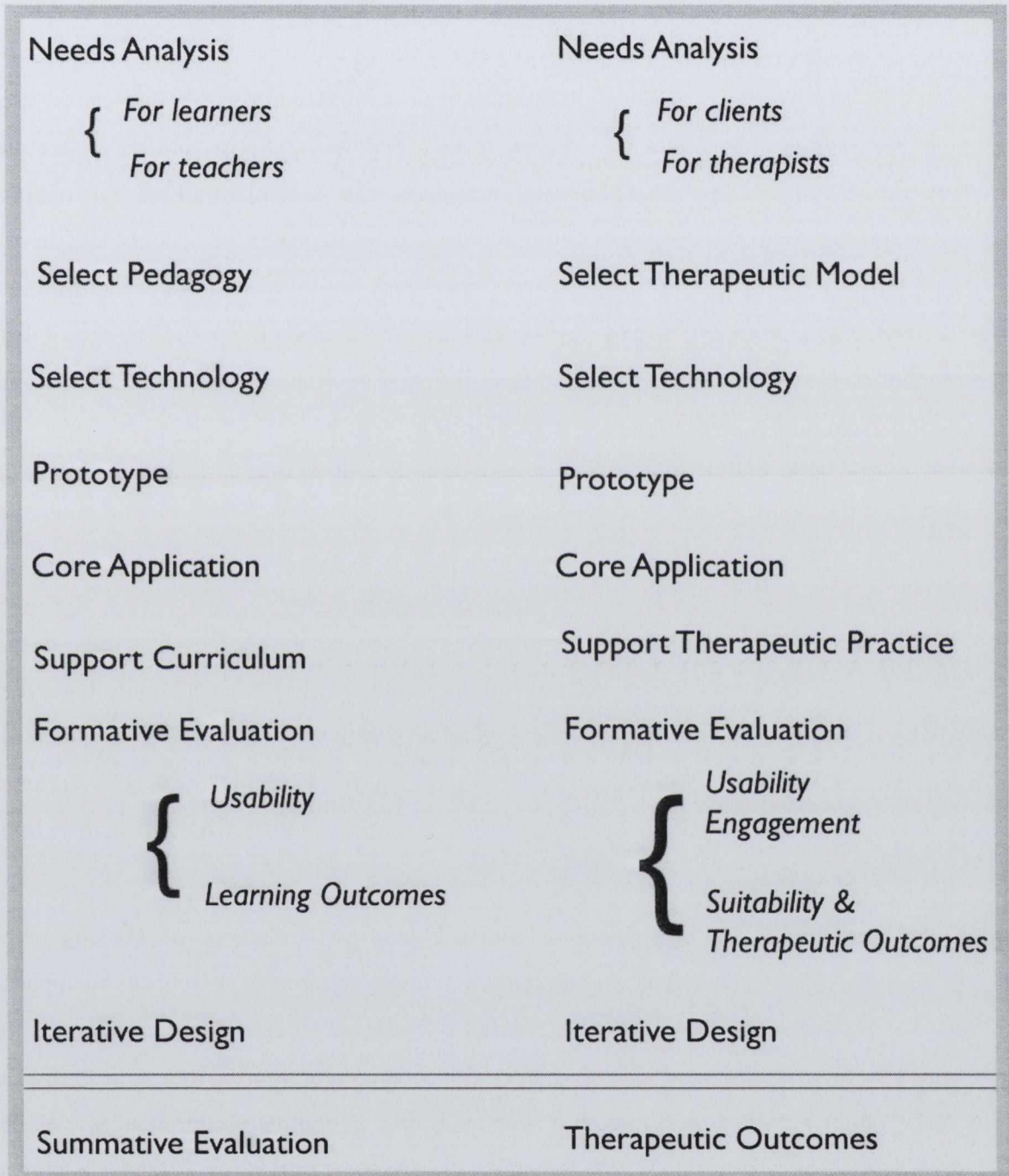


Figure 5.1 Learner-Centred Design as a starting point for AMH

order to achieve designs that work it is beneficial to identify all the people they directly or indirectly affect (Korpela et al., 1998).

LCD would seem a suitable starting framework around which to develop a new design approach for use in AMH. **Figure 5.1** displays a standard LCD process on the left hand side

alongside a similar approach adjusted for use in AMH. Similar to LCD, designers in AMH have to consider two end users: therapists who can be considered secondary end users and domain experts, and the adolescent clients, who are primary end users. In LCD, the choice of pedagogy is important. This is mirrored by the importance of choosing a therapeutic model in AMH. Finally, as in LCD, it is important that systems for AMH evaluate usability before evaluating therapeutic impact. In order, to assess a system's therapeutic impact it first needs to be usable. There are good ethical grounds for evaluating usability first before clients use therapeutic systems. **Section 2.3.1**, identified the 'first do no harm' principle that all therapists must respect. This should apply to clinical systems, particularly those that support clients outside a clinical environment. Systems need to be usable before clients use them. Difficult to use or error prone tools risk distracting from the therapeutic intervention that they are trying to support and may in certain cases lead to negative outcomes. The rest of this chapter assesses how this modified LCD framework might be adapted for use with adolescent clients and in conjunction with existing UCD methods.

5.2. Therapist on design team

While collaborative design, involving domain experts, is desirable in most design spaces, it has particular importance in AMH. Difficulties caused by lack of access and ethical constraints could be further exacerbated by the fact that few therapists 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. In order to overcome these limitations, it is proposed the design of therapeutic systems is based on the close collaboration of designers and therapists.

It is vital to identify a set of techniques, which address the limitations of working with adolescents in AMH. Other fields can offer methodologies and guides, which can be applied in AMH. Participatory Design provides methods for approaching a new domain unfamiliar to designers, for involving the end users in the design process (incorporating their knowledge of the work practice) and for developing new ideas for technological innovations. While traditional PD assumes that user and designer can cooperate and communicate, Chapter 4 demonstrated that it can be possible to modify PD in restricted settings. **Section 4.4** discussed work that relied on input from domain experts in order to overcome the lack of input from end users. In AMH, it may be possible to involve the therapist in a *Participatory Design* process. The production of successful and practical tools for mental health care requires significant domain-specific knowledge. The close participation of therapists in the design

process might provide insights into their workspace, work practices (including various therapeutic models) and into their clients. A close working relationship between designer and therapist could improve the usefulness and efficacy of the design process. Kuhn & Winograd have identified four ways to characterize user participation in a design team (Kuhn et al., 1996):

1. Directness of interaction with designers
2. Length of involvement in design process
3. Scope of participation
4. Degree of control over the design decisions

In order to make up for the significant lack of client input into the design process, it is advocated that therapists should be involved: 1) in direct, preferably frequent interaction with designers, 2) over the entire course of the design process, 3) to participate fully in the design process as co-creators, by playing a central role in developing ideas for technological interventions and 4) by participating in making decisions regarding fundamental design issues. It is proposed that at least one therapist be involved in the design team.

Alongside direct therapist involvement in the design process, other therapists may be able to contribute through contextual enquiry, surveys, the generation of ideas and the evaluation of system prototypes. Surveys and interviews with therapists may contribute detailed information about clients, therapeutic interventions and the clinical environment. Therapists have expert, and possibly tacit, knowledge of the user population and should be able to provide vital information about the characteristics of their clients.

5.3. Requirements gathering

Requirements analysis involves any action that provides insight into the needs or conditions that need to be met by a system. It includes identifying the overall goals of the software, identifying the tasks the users are to perform and in what conditions. A key part of identifying requirements for the design of systems is identifying the context of use. That is to identify the users, their ability (both physical and cognitive), the tasks they are required to complete and the physical and social conditions they will be in when they use the system (Bevan, 1999).

Designers need to have a strong understanding of the domain or practice in which they are working. The traditional approach to achieve this is to complete a needs analysis for end-users. This is not possible to the usual extent in the restricted environment of AMH.

Furthermore, because design work in this area is at an early stage there is very little previous research, which may help direct new efforts. Sources that can be used include:

- Research Literature (reports, journal papers, therapist manuals)
- Therapist on the design team
- Therapist interviews and surveys

It is important to consider both sets of end-users, clients and therapists, and their environments, in session and out of session, in which the system will be used. As was outlined in **Chapter 3**, it is difficult to study the client's external environment. Research literature and reports are critical to building up an idea of potential adolescent end-users and their likely environments. For example, the British Medical Association's report 'Child and Adolescent Mental Health' identifies groups of children and adolescents in the UK that are at an increased risk of suffering mental health problems and describes their likely characteristics and backgrounds: "*Looked after children (i.e. children brought in the care of local authorities) are at particular risk, as are refugee and asylum seeker children, and young offenders*" (BMA, 2006). Such reports can go some way towards bridging the gap between designer and client. Analyzing and reviewing treatment manuals, an approach taken by (Bang et al., 2007), can be useful in identifying characteristics and typical therapeutic settings.

Workplace ethnography is a PD process of documenting a group's practices and beliefs from the group's perspective. The benefit is a deeper understanding of their work practices. Methods include analyzing domain specific work documents, artefacts, participant observation, field observations, surveys, and both formal and informal interviews (Kensing et al., 1998a; Kensing et al., 1998b; Mackay et al., 1999).

5.4. Stakeholders

When designing technology for mental healthcare environments, designers have to carefully consider and characterize both the adolescent client and the therapist. Both are sensitive to the introduction of new technologies in a therapeutic setting. Designers must consider the potential involvement and impact of parents, guardians and peers.

5.4.1. Designing for Adolescents

An initial problem when designing for AMH is how to characterize adolescent clients. Since access is extremely limited, there needs to be an increased reliance on discussions with therapists and analysis of research literature.

Section 2.1.2 provided a descriptive overview of adolescents in therapy and the types of mental health problems they are likely to have. This section deals more with environmental and risk factors. Adolescents attending therapists suffer from a range of problems including emotional disorders (e.g. anxieties, depression, and phobias), eating disorders, conduct disorders and self-harm. They are a heterogeneous group and have varying backgrounds, motivations, abilities and interests. Certain groups of children and adolescents are at greater risk of suffering mental health problems. There is a higher prevalence of mental health problems among children from deprived backgrounds (Health Services Executive, 2006). Socio-economic factors play a significant role. A recent survey found that young people living in rented accommodation are twice as likely to suffer from a mental health problem (Office for National Statistics, 2005). Poor opportunities in education and employment are considered risk factors. Adolescents with learning disabilities are more at risk of developing mental health problems (Royal College of Psychiatrists, 2004). Significant mental health risk factors in childhood include loss, separation, trauma, child abuse, and family breakdown (Health Services Executive, 2005). In a 2006 report surveying the mental health of 12-18 year olds, the Health Service Executive found that of those identified with a clinical risk, they had more stress, poorer coping skills, more family problems, health problems and behavioural difficulties than other young people in the survey (Health Services Executive, 2006).

There is a strong sense of stigma surrounding mental illness (see **Section 2.2.1**). Research has identified it as a major concern of adolescents attending therapy (Office of the Deputy Prime Minister, 2004). A particular difficulty is that young people tend to have more discriminatory attitudes to mental health problems than adults (BMA, 2006).

A recent study has reported that in mental health care settings, adolescents need to feel respected, listened to and not judged by health professionals (BMA, 2006). They strongly value confidentiality and consistency of care is important (Bates et al., 2009). It was found to be essential that the clients do not have to repeat their story to different therapists. It is clear that in respect to these issues, technology can play a valuable role. Research has shown that clients want to be treated with dignity and respect by mental health care services (Health Services Executive, 2005).

5.4.2. Designing for Therapists

Sensitivity is required when dealing with therapists who may view technological solutions with suspicion. In medical healthcare, professionals are often uncomfortable to find themselves in the role of computer novice (Gosbee et al., 1997). For therapists, this may be the case to an even greater degree. Technology is rarely used in day-to-day client work or in

therapist training. As a result, therapists may feel the introduction of technology might undermine their authority. Any technology that is introduced should compliment a therapist's current practice, methods and not demand too much time in an already busy schedule. Small innovations are required to develop confidence in the possible benefits technology can offer.

Many therapists have pressurized work schedules and it is important that technologies do not add to this pressure by placing extra demands on their time. A postal survey (described in **Section 5.6.1** in more detail) undertaken by the authors revealed that while many therapists are familiar with Microsoft Office, Outlook and Internet Explorer. Few are likely to have had specific training or experience in the use of technology in client contact situations. 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 therapist training. These factors have a knock-on effect on the use of computers in clinical practice. When questioned about increased use of technology, many therapists express concerns over the need for additional training. They are concerned that existing skills may become obsolete (Caspar, 2004). At this early stage in the development of technology for therapeutic interventions, it is desirable that systems should be designed to take advantage of the existing skills of therapists and integrate with current working methods.

Many therapists cite fears over the security of sensitive information as one of their primary reasons for reluctance to use technology (source: postal survey). While many methods have evolved for ensuring the actual security of electronic data, perhaps more significant 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 trust of individuals be maintained and represented. Maximizing this sense of security and trust is thus an important topic for further HCI research in this area.

Few therapists currently use computers in sessions with clients. In a postal survey conducted at the outset of this research, 78% of respondents reported that they had never used a computer in therapy before. Of the 12% who had, they had used CD-rom programmes, using the computer to print-off pictures, and to create personal story lines with clients. Most of these activities used non-specialized standard software like Microsoft Word.

15% of respondents had used communication technology (e.g. email, mobile phones) for direct therapeutic contact. Therapists had used it solely to confirm appointment times. Most therapists had used their mobile phone to text appointment details to teenagers or their parents. One therapist used email to communicate about appointments. 68% of respondents

were open to the use of technology in their work with children or adolescents. The majority of therapists rated their computer ability as 'ok' (63%). 93% of therapists reported that they already used computers in their work outside of session for administrative purposes. These tasks included filing reports, keeping case notes, keeping client information updated, planning programmes, use of the Internet for research, making information sheets for clients, and statistical analysis.

The majority of therapists (regardless of age or experience) reported using computers on a daily basis. They were not using computers in sessions with clients. Using technology in face-to-face situations with clients is still a controversial issue (Anthony, 2003). Despite this, 68% of respondents were quite optimistic about the potential of technology in therapy. Experience working in this area confirms that many of the survey's findings are reflective of attitudes in the area. While most therapists were generally open to using technology in their practice, they had significant concerns regarding: privacy issues, added responsibility, the security of information, and the need for technical training.

It is important that the introduction of technology involves protocols for implementation and use. Such protocols can prevent misunderstandings and ease concerns related to the use of the technology. A particular concern for therapists is that the introduction of a new technology brings greater responsibility and more opportunities for client-therapist contact. For example, some therapists were concerned that the introduction of mobile technology may add to their workload and responsibility by introducing a constant line of communication between them and a client, which they would feel obliged to monitor. Such concerns must be taken into consideration when designing systems.

5.4.3. Other Stakeholders

Family members, guardians, school counsellors, teachers, and peers can all play a part in a successful therapeutic outcome for the client. Family members of the client can be stakeholders in the therapeutic intervention. Some parents not only bring their children to the clinic, but they may also participate in the therapeutic treatment. (A speech and language therapist reported to this author that: *"parents will usually sit in on treatment, learning how to help their kids, almost taking on the role of therapist helper outside of therapy"*). A therapist in a workshop reported that it was important to take into consideration the context of parents when dealing with adolescents; it was the view of this therapist that parents should be cc-ed in reminders sent to the client to ensure that feelings of exclusion or jealousy by parents did not occur. Other therapists, when interviewed by this author reported similar sentiments. One therapist said that parents may feel envious *"if they perceive the therapist is*

excluding them from their child's treatment...may feel their position as a parent is being undermined because of direct access between child and therapist' (postal survey). Some studies have involved stakeholders in the design process (Hayes, 2004). In evaluations of an orientation tool for amnesiacs (Wu et al., 2005) relied on family members and care givers to prompt amnesiac users and provide feedback. It is unlikely that designers can access stakeholders in AMH.

5.5. Environment

Designing systems for mental health services involves further challenges. Mental health clinics do not represent a cohesive environment. Conditions and materials vary from clinic to clinic. Some therapists have their own computers located in their own room. At the outset of this research, this was less common. Some clinics still have a computer room that all therapists share between them. Slowly AMH services are becoming computerised. Even so many computers are 3 years old or older. While some clinics have broadband now, Internet connections in general can still be slow and unreliable. The standard browser used by therapists is Internet Explorer 5.0. Slowly this is being upgraded to newer versions, and in some recent cases, Mozilla Firefox 3 is available as well. Most therapists encountered over the course of this research were unaware what browser they used or that there was a difference. Windows XP is the dominant Operating System.

The client's home environment is equally varied and is dependent on his/her social background. Some clients may have a family computer; some their own computer; some clients only have access to a school computer. It is however difficult to get any reliable information of clients' home settings, as highlighted in the pilot study (**Section 3.2**).

5.5.1. Surveys

Surveys, workshops and interviews provide ways of identifying broad themes and issues that can guide subsequent design work.

A postal survey was conducted in order to provide an overview of therapists' professional training, their current use of technology, and their attitudes to technology (see **Appendix A**). This survey was conducted in 2003. The questionnaire contained twelve elements. It was distributed through an Irish charity, Parents Plus, which had a large mailing list of therapists working in Ireland. A survey was sent out to every individual on this mailing list. Approximately 100 surveys were sent out with a stamp-addressed envelope. Thirty-two completed questionnaires were recuperated from therapists from a wide range of professional

backgrounds. Open questions were coded along common themes and these and other results are reported in **Table 5.1**.

How would you rate your level of experience with computers?					
Expert	Experienced	OK	Inexperienced	Novice	NR
1	6	20	4	0	1
Have you used computers in therapeutic sessions with adolescents or children before?					
YES: 7		NO: 25		NR: 0	
Use: CD-ROM, print out pictures, computer games					
Do you use computers outside of sessions (e.g. filing client information, using the Internet, playing computer games etc.)?					
YES: 29		NO: 2		NR: 1	
Use: Admin work, writing up case notes, planning programmes, writing reports					
Do you think computers could be useful in your therapeutic work with children or adolescents?					
YES: 22		NO: 4		Unsure: 4 NR: 2	

Table 5.1 Summary of Postal Survey

This postal survey revealed that many therapists were already using computers in their practice for administrative work, but only a small number were using computers with their clients. The results of this survey were discussed earlier (see **Section 5.4.2**).

A second survey was conducted at a later date during a workshop conducted by the author at a mental health conference in Ireland (see **Appendix A**). It covered similar areas to the original survey, but focussed more on current uses and attitudes to mobile phones. The survey took place three years after the initial survey in 2006. It asked therapists about their clients' use of technology in clinical practice and contained 8 elements. Some questions were changed from the earlier survey to focus more on therapists' experience and use of mobile devices in their practice. Some questions, for example on computer ability, were changed as they were deemed more readily understandable by therapists. There were 28 respondents from a wide range of mental health backgrounds.

How often do you use a computer?					
Every day		Every 2-3 days			
22	6				
How confident do you feel about using a computer?					
Very Confident		Confident		Some Confidence	
Little Confidence		No Confidence			
7	12	8	1	0	
Do you use a computer for work?					
Yes 28 No 0 NR 0					
Use: Admin work = 28 Client work = 6					
How confident do you feel about using a mobile phone?					
Very Confident		Confident		Some Confidence	
Little Confidence		No Confidence			
11	15	2	0	0	
Have you ever used a mobile phone in your practice with a client?					
Yes: 7 No: 21					
Use: Remind clients about appointment=5; Therapeutic Conversations=2					

Table 5.2 Summary of Conference Survey

Two open-ended questions asked therapists about their thoughts on the potential advantages and disadvantages of using mobile phones for AMH and the potential obstacles to introducing them to clinical practice. These responses were categorised based on common themes, which emerged from therapists' comments. Most therapists had concerns about the implications of using mobile phones, despite being generally positive about their appeal to young people. The greatest concern was around confidentiality and privacy issues.

"Others e.g. parents, friends, may have access to client's phone"

"Disadvantage – confidentiality – other kids getting hold of them – coding material & how it's written would be important"

"Danger of someone else accessing confidential information"

"Mistakes, going to wrong person"

"Texting the wrong person by mistake"

"Risk of disclosure of phone number"

Associated with this concern was an expressed need to protect the therapist from increased contact from clients - to maintain existing boundaries:

"Main obstacle is my own privacy as a therapist. Would not like to be contactable 24/7."

"Clients have your mobile number so you are on call 24/7. We do not provide this service".

"Effectively you are always working – either contactable or contacting clients"

"Good work practice – how therapist can work in a 'safe' way. Protected against allegations of inappropriate/unwanted contact"

A related concern was that the client might become dependent on the therapist:

"Staff become responsible for reacting to threats of self-harm – even if communication fails. Danger of fastening dependency on therapist"

"Risk of dependency"

"When child texts and response is not immediately forthcoming, may lead to feelings of rejection or feelings of not being listened to"

Several therapists commented that there would be a *"need for staff training"* and *"Some therapists are technophobes and would be anxious using it"*. Another concern was that unlike current practice, there would be *"no paper trail"*.

While there were more comments related to potential obstacles and disadvantages, most therapists thought the use of mobile phones held some promise. For example, several therapists thought it could help with engagement outside of sessions:

"It could improve engagement away from therapy. ~The young person could be enabled to take more control of their therapy. Teenagers probably prefer - less face to face - and just short bits of information."

"acceptable to young people, keeps up momentum of therapy between sessions"

Many therapists believed the appeal, the “high status”, the phone had with young people, could have a “de-stigmatizing” effect on therapy. Several therapists spoke about the potential to create a “*therapeutic space between client and therapist*” and the ability to “*give client feeling of being held in mind*”. Other advantages cited were that the therapeutic use of the mobile phones would “*not be obvious to other children*” and that it would represent a practical approach because most young people already owned phones and knew how to use them.

Both surveys helped establish that a “capture now – analyse later” model was potentially viable in a clinical setting, since most clients were reported to have personal mobile phones and all therapists in the surveys had access to a desktop computer. They also helped to provide the designer with a broad overview of the use of technology in therapy. This included therapists’ clinical use of technology and their self-perceived ability with technology. Of particular interest were their various concerns about the use of technology between sessions. To summarize, the main concerns regarding the application of mobile technology in AMH were (in the order of frequency):

- The need for confidentiality
- The fear of added responsibility, “being on call 24/7”
- Therapists’ perceived need for training
- Encouraging negative actions (neediness, dependency)

These concerns, and others, provided the designer with a set of basic system requirements that could be incorporated into the design of therapeutic systems. They also provided the designer with an awareness of therapists’ fears about technology, which could then inform the way the designer spoke and presented technology to therapists subsequently.

5.5.1.1. Interviews

In order to provide an overview of the clinical environment a number of interviews were conducted with eight self-selecting therapists in the public service: a psychiatrist, two psychologists, a play therapist, two psychotherapists, a speech therapist and a social worker. These therapists were recruited through their connections with the Mater Hospital, a collaborating partner in this research. All participants regularly saw adolescent clients. Each interviewee was sent a copy of the therapist survey beforehand and told that the interview will roughly follow a similar theme. They were asked to complete the survey before the interview.

Each interview took place in their work place; the average length of the interview was 60 minutes and the conversation was transcribed for analysis. The interviews had a defined structure, which was implemented by two interviewers, thus ensuring that all eight interviews were as similar as possible, regardless of interviewer style and interviewee. All interviews were recorded using a Dictaphone. This ensured two things: firstly, it allowed the designer to focus on the content of the interview and the clinical environment, rather than the distraction of taking hand-written notes; secondly, an accurate recording of the interview provides material resources for future designers and collaborators.

Each interview was segmented into the following sections:

- Interviewee background
- Discussion of materials used in the practice
- Discussion of a 'day in the life' of the interviewee
- Discussion of the relationship between clients and parents
- Discussion of technology: the technological proficiency of the therapist, the extent to which they use it in their workplace, their vision of how it could affect their work practices.

Interviewee background
<p>What is your profession or training?</p> <p>How long have you been working in this field?</p> <p>Experience with computers? Email? Word? Excel?</p>
Materials
<p>What tools/materials do you use to engage with clients (who are difficult to engage, specifically adolescents)?</p> <p>What is the goal of using tools or materials in therapy?</p>
Day in the life
<p>Please describe a typical day's work for you:</p> <p>What did you do yesterday?</p> <p>How do you start your day?</p>
Relationships

<p>What sort of relationships do you have with clients? Formal or informal?</p> <p>What type of relationship do you think is ideal for working with adolescent clients?</p>
<p>Computers:</p>
<p>How do you use computers in your work?</p> <p>Do computers ever play a role in a session with a client?</p> <p>How do you think computers can be of most benefit to therapists?</p>

Table 5.3 Checklist of structured interviews

Muller has written about the benefits of visiting end-users' work space (Muller, 2003; Muller et al., 1995). The environment is easily referenced and work materials are on hand. These interviews provided the designer with a broad introduction to the work practices of a range of therapists in public clinics. The designer visited several public clinics, saw the waiting rooms for clients, the office therapists worked in, their workspace, their computer and therapeutic materials. Physical therapeutic materials were readily called to hand to provide the designer with specific detail. This was particularly evident in the interview with a play therapist who demonstrated the materials he used with clients because they were on hand. These interviews were invaluable in providing the designer with grounding in the reality, demands and needs of a wide range of therapeutic practice.

5.6. Generating Ideas

When developing ideas for technological tools to support therapy, it is important to envision how the tool might support therapeutic interventions. The designer should identify early on how it would function and be used in and between sessions. Coyle has stated therapists may experience difficulties envisioning the use of future technologies because of their inexperience using computers (Coyle, 2008). However, a lack of expert knowledge may be an advantage in coming up with innovative solutions. (Prince, 1970) has suggested that experts are not necessarily the best source of innovative ideas and that historically much innovation originates from outsiders.

It is possible to identify several design approaches, which might provide a foundation to developing specific ideas for technological therapeutic interventions:

- **Close involvement with therapist.** This ideally would entail, as suggested earlier, having a practitioner as part of the research team
- **Identify an area where there is a need.** Audit therapeutic materials in current usage. This research has identified therapeutic activities between sessions as an area where technology could have an impact and a successful design could have significant impact.
- **Familiarity with current clinical practice.** Analyzing and reviewing treatment manuals, an approach taken by (Bang et al., 2007) can also be useful in identifying areas for work.

5.6.1. Future Design Workshop

A 'Future Design Workshop' is a PD technique of generating ideas (Muller, 2003). It is a three-stage process that involves:

- Critiquing current practice
- Envisioning the future
- Implementing movements from present to future

(Kensing et al., 1991)

It involves a coming together of end-users and designers to identify problems and imagine future solutions to these problems. It is recommended that the workshops be held at a neutral location. During the course of this research, one future design workshop was conducted.

The future workshop is described by (Friedman et al., 2003) as a method to "*uncover common problems in the workplace and to solve them*". This process can "*involve participants in new perspectives on their work and help to develop new concepts and new initiatives*" (Muller, 2003).

The future design workshop has application in establishing common ground at the outset of the design process. It can help facilitate the creation of a third space - particularly at the start of the design process. It can also help to generate new ideas and new ways of looking at the workspace (Friedman et al., 2003).

Hybridity

Muller has discussed the benefits of creating a third space, a hybrid space, between designers and end-users (Muller, 2003). He has called this concept 'hybridity'. This can be a

metaphorical space between two domains. Muller believes its strengths lie in: challenging assumptions, developing new ideas and encouraging reciprocal learning (Muller, 2003). A hybrid space is a collaborative space where both parties can learn from the other. One method for encouraging hybridity is location – to bring the designers to the workspace, in this case the clinic or to bring the therapists to the computer lab. Each space provides different possibilities. In the workplace, the designers can see therapists in their work context, at ease and in control. The environment is easily referenced – materials and equipment are on hand. Conversations can be grounded in concrete work experiences. Visiting the design place may help demystify technology for therapists. There are other benefits. (Pedersen et al., 2000) report that:

“Being in a foreign environment (and with other users) users will tend to take a more general view of things.”

Facilitating events in both spaces can help develop this third space (Muller, 2003). In a study with telephone operators, (Muller et al., 1995) report that work place meetings were strongly tied to practice and research meetings, which took place in the research team’s building, were less specific and tended to lead to more innovative ideas.

The development of a third space would be particularly desirable in AMH where there is a considerable disparity in perspectives between therapists and designers. An awareness of the strengths of hybridity informs the design work described in this thesis. The potential advantages of hybridity for mental health include:

- Identifying innovative new directions and ideas that are grounded in current practice
- Engagement of the stakeholders and helping each see the limitations and possibilities of the others’ domain ideas that are the result of combined sets of expertise
- Informing the designer about work practices, environment and therapeutic materials

5.7. Development

5.7.1. Choosing a therapeutic model

It is proposed that systems designed for AMH be based on current therapeutic techniques. Systems that are based on therapeutic models that therapists are familiar with, are easier to introduce into current practice and consequently they are more likely to be used. In their work with autism, (Kientz et al., 2008) recommend making systems as similar as possible to existing work practices in order to make it easier for workers to incorporate these techniques

into their current practice. It is proposed that this is equally important in AMH. Furthermore, it is more practical to support an existing process, with a pre-existing structure, which has defined tasks and goals,

It is essential for the designer to have a good understanding of any therapeutic approach that a system is intending to support. An initial review and critique of current materials and tools used with this approach can provide a means of identifying weaknesses and inform the design of new systems. Again it is a good idea for designers to review the most relevant literature related to the therapeutic approach. Finally, designers can talk to therapists who work using this treatment approach.

It is important to decide upon the theoretical approach before the technological intervention is chosen or at least ensure that the intervention is suitable to the technological medium. The therapeutic approach will have a significant impact on which technology is most appropriate to the intervention and the types of interactions that are desirable. It will also have low-level implications for the design of the software. Structured approaches like CBT can be broken down into clear tasks and objectives at relatively precise stages of the therapeutic intervention. The goal of each therapeutic technique is often quite specific. On the other hand, some therapeutic approaches are less goal-oriented and more open-ended, such as art therapy or therapeutic storytelling. In less structured approaches, the tasks and interactions are less defined. In this way, the therapeutic model can have implications for the design of therapeutic systems.

The *Personal Investigator* pilot study, discussed in **Section 3.2**, implemented a Solution Focused therapeutic approach. It is a highly structured and goal oriented form of therapy. It can be divided into five conversational strategies:

- ***Setting Goals:*** Instead of focusing on problems, the therapist asks the client to set goals they want to achieve.
- ***Recognising Exceptions:*** Exceptions are times when the client's problem is not present or is less acute.
- ***Coping:*** SFT helps clients to recognise ways they currently have of dealing with their problem and explores how they have successfully overcome past problems.
- ***Identifying resources:*** SFT helps clients identify resources, in particular support from family and friends, which they can draw upon.

- **The Miracle Question:** The therapist asks the client to describe their life without their problem. By imagining a future without their problems, clients are motivated to seek a solution.

The game's structure mirrors SFT's five strategies. The goal setting process is completed in a conversation at the beginning with the game's first character. Inside the Detective Academy in the game, each corresponding character and game area corresponds directly to the four remaining aspects of SFT:

- **Recognizing Exceptions:** The player meets Damini, a forensic scientist who specializes in spotting hidden evidence. This section aims to help the player recognize times when their problem is less acute.
- **Coping:** In this area, the player meets Inspector Clueso. He helps players recognize ways they currently have of dealing with their problem and explores how they might have successfully overcome problems in the past.
- **Identifying Resources:** The player meets Detective Spade, a New York detective. He helps the player identify 'Backup', family and friends whose support they can draw on in future times of need. He also discusses other resources, such as their own strengths, which the player can use.
- **Miracle Question:** In this area, the player meets Siobhán, an artist, who helps people visualise their life without their current problems. This dialogue is based on the SFT miracle question. By imagining a future without their problems, clients are motivated to seek a solution.

5.7.2. Choosing a technology

"Computers could increase the fun factor in therapy. Most kids play with them."

Therapist (Conference Survey)

The choice of technology depends on the therapeutic model a system is based upon. For example, a system that requires clients to record detailed reflections may not be suited to mobile phones. On the other hand, a model which requires short momentary interactions, would seem more suited to mobile devices. The systems described in this thesis are both based on the 'capture now – analyse later' model described in **Section 3.4.4**. It argued for the benefits of this model, which would make use of clients' personal mobile phones to collect data and desktop computers in clinics to display and structure this information.

Interventions using technology may have a greater potential to engage adolescents than current paper-based equivalents. Throughout both surveys and interviews, therapists highlighted how interested their clients were in technology. Below is a typical selection of quotations from therapists who took part in the conference survey:

Therapist A: *"When children come to the clinic...they frequently refer to computers and technology"*

Therapist B: *"Young people today are very familiar with technology and using tools that interest them makes it easier"*

Therapist C: *"Teenagers particularly difficult to engage. Sometimes computers are their only interest. Older teenagers can feel board games etc. are too childish and worksheets boring."*

The most practical way to design technological interventions for therapeutic sessions is to utilize the technology that is already available to the therapists in their clinics. Both surveys indicated that the majority of therapists have full access to computers in their workplace. The computers were mostly between 3-6 years old, but had more recent Operating Systems installed, such as Windows XP, and ran Internet Explorer 5.0. Computer monitors were between 15" and 19" and had resolutions between 800x600 and 1024x768. The main effect of running more recent software on older hardware was that the computer responded slowly.

However, the use of desktop computers may not be so widespread amongst clients. A child psychiatrist emphasised *"remember, those in the most need may have no PC access"* (Conference Questionnaire.). Moreover, those with literacy difficulties, poor keyboard skills and lack of personal space in their home, would all be at a severe disadvantage if the design intervention relied on desktop computers.

5.7.3. Prototyping

Prototyping involves creating physical representations of technological designs in order to provide feedback on design ideas. Prototypes incrementally embed functionality into the artefact through successive iterations. According to Greenbaum and Kyng, the use of prototypes can help end-users envision the potential for the proposed technology and the resulting changes in work practice (Greenbaum et al., 1991). As such, they could represent an effective method of engaging therapists in the design of therapeutic systems at each stage of development.

Low-fi prototyping can be an effective technique in the early stages of development. It can allow designers to evaluate ideas without the commitment of significant resources. These

mock-ups look roughly like the artefact they represent, but lack its functionality. Their main advantages are that they are quick to develop, inexpensive and encourage hands on experience. Frequently used materials and techniques include post-its and sketching on paper. Low-fi prototypes have been reported to encourage more feedback from participants (Jones et al., 2006). The use of paper prototypes has also been shown to prevent design errors later on in the design process (Kangas et al., 2005). (Virzi et al., 1996) found that lo-fi prototyping might be as effective as hi-fidelity prototyping in identifying usability problems. (Sa et al., 2006) found low-fi prototyping to be of particular value in their development of mobile technology for psychotherapy. They used a wooden model of a PDA in early evaluations with paper cards representing screens, which could slide in and out of the model as necessary. (Boyd-Graber et al., 2006) found that speech-language therapists *“were relatively poor at evaluating paper prototypes because they could not envision the problems users would have with the detailed interaction with the systems.”* The suitability of paper-prototyping in design work with therapists is still an open question.

5.8. Evaluations

In the limited settings of mental health interventions, it is important to gather as much information from evaluations as possible and make the most of the available evaluation methods. As highlighted earlier (see **Section 4.2.3**), there may be a risk of overburdening the therapist and client. The focus of the approaches set out in this section is on reducing the amount of evaluation required by clients and a provision of an intervention-free evaluation approach during clinical pilots.

5.8.1. Therapist as proxy to designer

As there is an imbalance in access to the therapists and clients, the obvious option is to rely heavily on therapists for evaluations. It is proposed that therapists act as proxies in two ways: 1) as a proxy for end-users evaluating systems, 2) as a proxy in clinical situations in place of the designer collecting feedback. In some research, professionals have been used as proxies for inaccessible end-users (Boyd-Graber et al., 2006). In AMH, it is not yet clear that this is feasible due to a large difference in ages and computer ability to potential client end-users.

In clinical pilots, therapists participating in evaluations might act as proxies for the absent designer. They are then responsible for observing the use of the tool and for collecting feedback data. This could involve administering pre- and post-questionnaires to their clients. In some cases, therapists will have a client attend their clinic over a period of a few months

prior to, and after, a technological intervention is introduced. This gives the therapist a unique and extremely useful perspective to assess the technology and its impact on the client and the intervention. For this reason, a questionnaire that focuses on both how the technology affected usual practice, and how the client perceived the technological intervention, would be useful.

5.8.2. Data collection

Section 4.2.1 and **4.2.2** identified difficulties getting feedback from clinical evaluations, including a difficulty in getting clean data and complete client cases. Data collection at this stage can be a time intensive process that involves following up with therapists to get their completed feedback.

It is not always possible to collect feedback from clients. Often even very brief questionnaires are not recuperated in clinical practice. It is important that questionnaires be very well designed because the designer will not be present to clarify any misunderstandings when they are administered. Furthermore, literacy difficulties, prevalent in clients with mental health problems, require that the language used is straightforward and readily understandable.

When software is evaluated in a therapeutic session the therapist can witness, to some extent, how the client uses the technology. They are well placed to comment on the effect a technology has on a therapeutic intervention. They may also be able to report on significant usability issues.

Software Logging

Software is available which can record fine-grained data of users' interactions; for example, cursor movement on desktop computers. The idea to conduct remote usability for desktop usability trials tests emerged over ten years ago (Andreasen et al., 2007). Today many companies like Cisco use remote usability testing to evaluate their web pages (Hardee, 2009). From a distance, it is extremely difficult to know in what context mobile software is being used. There has been the exploration of remote mobile software logging using PDAs (Paternò et al., 2007). (Curtis et al., 2002) used logging to record the interactions of students using a handheld PDA device. (Allen et al., 2007) have used software logging in their Phototalk application to capture user interactions using a PDA device – including when a photograph was taken, moved and deleted. This low level interaction data was used to cross-reference with other feedback data from their field study. Their log did not record private information like users' photographs. (Paternò et al., 2007) has presented a method for mobile logging on a PDA device, which captures contextual data during usage of a system such as

noise levels and reception signal. They highlight that visualising this captured information is a key challenge.

In AMH, the implementation of logging within mobile applications may help to provide interaction information from client users that is otherwise inaccessible. The mobile phone, with its limited power and storage capacity, faces more challenges to logging than the studies described above which use PDAs. For example, (Paternò et al., 2007) used a PDA device running Windows CE which allowed them to develop a separate logging tool which interacted with the operating system and stored log files as xml files. This is not a possibility for the majority of mobile phones. For example, mobile applications built with *javaME* are sandboxed and can only interact with other tools in extremely limited ways. Furthermore, few phones support the writing of data to log files on the device, or have the availability of a wi-fi connection to stream usability data to a server. More modest logging may be possible – capturing the navigation choices of the user, the time they spent on a certain task and timestamping interactions. This may be a useful means of gathering data once client and therapist approval has been established. Appropriate permissions and awareness of this data collection must be part of the protocol. While data logging of system use is potentially invasive to the privacy of the adolescent client, the benefits to be gained may justify the measure, provided that there are strict protocols for dealing with this information. Available measures for logging on a mobile phone could include time stamping interactions, analyzing time spent on task and examining which functions of the software were used and with what frequency. This information could provide insights into what areas of the software adolescents are spending most time on and any difficulties they may be experiencing. Depending on the purpose of the software, further measures may be possible. For example, if a tool is primarily designed to gather client content, then appraising the quality and frequency of this content can go some way to evaluating its effectiveness.

5.8.3. Role-playing

It is generally not possible to obtain ethical clearance to observe actual therapeutic sessions. However, therapists may be willing to participate in role-playing with the designer. For example, it can be possible to role-play a typical session with the designer in place of the client. It could serve as a method of taking the designer into a simulation of a therapeutic session. Role-playing would seem particularly suited to use in AMH. Therapists are extremely comfortable with a role-playing approach. In most therapist training, therapists are required to practice role playing therapeutic sessions in their training (Liddle et al., 1988). Role-plays typically simulate a therapeutic session between a therapist and client, and can be based on

actual client cases. In some cases, other students often observe the role play and provide feedback afterward. Consequently, therapists are used to highly introspective sessions examining each role-play afterwards. Liddle describes a typical role-play for family therapy training:

“Normally in a role play the players are given a description of their roles and some of the rules by which their system functions, often based on an actual family or case presented by a student.” (Liddle et al., 1988)

Some therapeutic approaches involve the therapist enacting a role-play in direct clinical practice with the client. For example, some CBT approaches recommend using role-plays with children with acute anxiety problems (Kendall et al., 2005; Khanna et al., 2008). This entails the client and therapist enacting a feared situation.

Role-play has been used in PD in various ways (Boess et al., 2007; Boess, 2006a, 2006b; Boess, 2008; Simsarian, 2003; Svanaes et al., 2004). (Burns et al., 1995) believed it could engage designers more effectively with the design space, helping them *“imagine better....to empathise better”*. (Brandt et al., 2000) have used role-playing to create a dialogue between designers and users about ideas. Role-play has been used most often during the early phases of design, e.g. (Buchenau et al., 2000; Svanaes et al., 2004), for example to help with idea generation (Kuutti et al., 2002). (Simsarian, 2003) has described how role-playing has been used at IDEO at all stages of the design process. These included: to uncover issues early on, sharing field information, exploring new ideas and “debugging”, *“working out, and working through, details of possible scenarios before delivery or implementation”*. Role-playing can help clarify a designer’s ideas about the context of use. (Boyd-Graber et al., 2006) have found role-playing a good method for eliciting tacit information from domain experts: *“developers get input into the design from observing how users stage and act out current and future user scenarios”*.

Most mental health therapists have no formal training in the use of technological tools with their clients. Added to this, many therapists have very little confidence in their computer skills. Because of this, therapists are often reluctant to introduce an element to a client with which they do not have full confidence. Role-playing might help therapists envision how a system might fit into their current practice and build up their confidence with a system. It could be an effective indirect method of training therapists how to use a system, as well as giving them a channel to ask questions. Additionally, few designers have experience of clinical settings. Role-plays could allow designers to witness a simulation of therapeutic

practice. In this way, role-playing might represent a technique with reciprocal benefits for participating therapists and designers.

5.8.4. Multi-Stage Evaluation

Evaluating systems for use in clinical settings is a lengthy process. It starts with the application of detailed proposals for ethical clearance to an ethics board. It is characterised by unspecified delays in time, as therapists judge when the technologies are best introduced into a therapeutic intervention with the client. This, along with clients' infrequent attendance and other delaying factors, commonly leads to lengthy overruns during testing. All these factors, along with the lack of direct access for the design, mean that clinical evaluations cannot reasonably form the basis for an iterative design process. Furthermore, it would not be ethically sound to run usability tests of systems with clients attending sessions.

There is a need to establish an evaluation process, which does not require a significant amount of session time. This section proposes a multi-stage evaluation process, the aim of which is to complete as much design work as possible before evaluating systems in clinical situations.

A standard usability evaluation typically measures a system's effectiveness, efficiency and satisfaction when completing a task (Bevan, 1999). The context of evaluation requires the following:

- Users are representative of the population of users who will use the product
- Tasks are representative of those the system is intended to support
- Evaluation conditions are representative of conditions the system will be used in

(Bevan, 1999)

Evaluations that do not take follow these guidelines risk failing to meet users' needs.

Other areas have used peer users to evaluate usability issues. As described in **Section 4.5**, (Moffatt et al., 2004) made use of non-aphasic individuals to evaluate usability issues. They concluded that some usability problems were common to all users. In order to overcome these limitations and to maximise evaluation possibilities, the use of peer users is advocated at the first two stages of evaluation. The aim of this approach is to emulate the standard usability evaluation set out above. This process is intended not just to provide the designer feedback on usability, but also on the levels of engagement, and on the suitability and practicality of a therapeutic system. Peer users should be as close as possible in age, mental capacities, social background and interests to the targeted end users. This approach will

necessarily be flexible. For some systems, it may be difficult or seemingly redundant for peer users to complete tasks designed for users with mental health problems. For example, it would be of questionable benefit to evaluate a system for clients with eating disorders with peers who had no experience of eating disorders. Designers might be able to modify the task or system slightly in order to add meaning for peer users. In this case, it may be possible to modify the eating disorder system to monitor peer users general diet or calorific consumption. In other cases, it may be possible to provide a suitable background context to the task, which would provide meaning for peer users.

This approach proposes using the different stages of evaluation to evaluate different aspects of a system. In the first two stages, the user groups consist of adolescents from similar backgrounds to the targeted end-users, but who do not have mental health problems. The most detailed evaluation takes place in the early stages of this process while there are fewer limitations to the methodologies available. At each subsequent stage, the evaluation and data collection possibilities become restricted as access and ethical limitations increase.

The main goal of the first two stages of evaluation is to increase the validity and robustness of the design before clinical pilots with real users. These stages refine the design with adolescent peer groups. The first stage is intended mainly to tackle usability problems, the second stage aims to evaluate the system in use in the context of the peer user's life and the third stage evaluates the system with actual users.

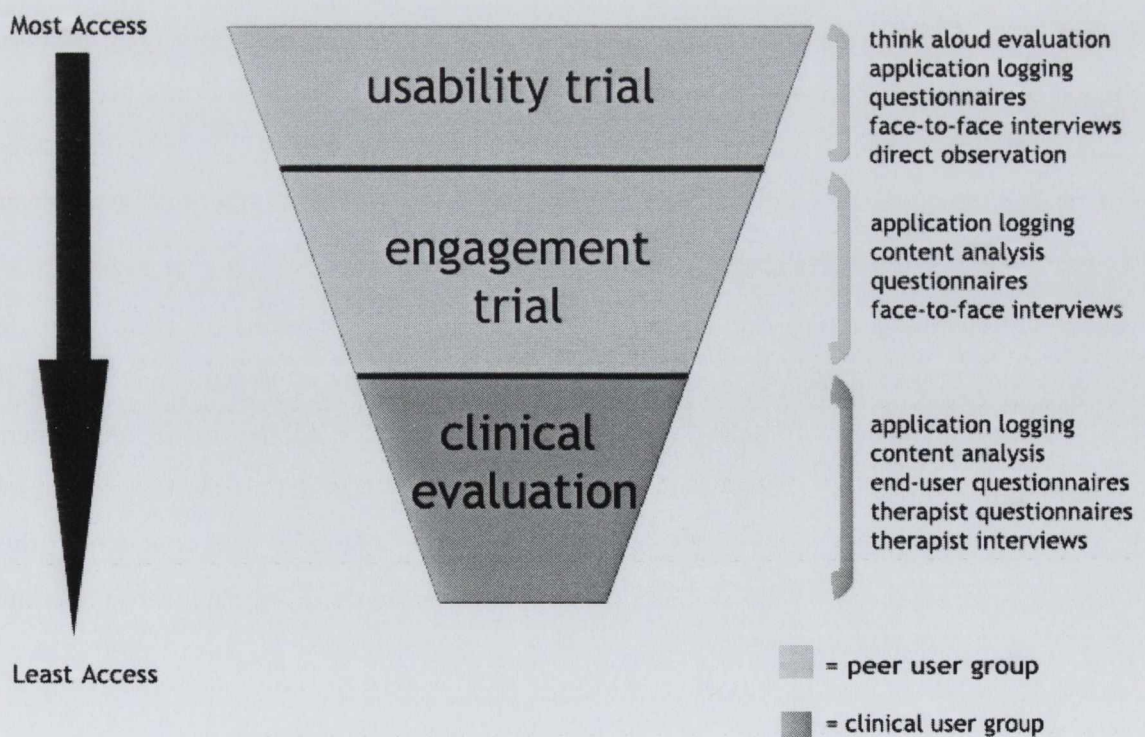


Figure 5.2 Multi-Stage Evaluation

5.8.4.1. Stage 1: Usability

Section 4.2.2 stated that it might not be ethically sound to evaluate systems in clinical settings. Stage 1 evaluations are intended to address this concern by providing early feedback on the usability and appeal of working prototypes. The end users in this pilot do not have mental health problems, but should be selected based on similar socio-economic, educational and geographical backgrounds as the adolescent end-users. This stage permits the designer with face-to-face interaction with participants. Because of this, these evaluations might be used to test design alternatives. The duration of the evaluation will vary depending on the system under evaluation. Its main aims are to identify usability problems at an early stage in the design process and to provide feedback on the potential usefulness of a system. The data collected from this stage should be used to inform any changes to the original prototype. Substantial design changes can still be made at this point. The evaluation methods possible at this stage include: think-aloud evaluation, application logging, questionnaires, interviews and direct observation in a controlled environment.

While there has been disagreement around the optimum number of participants for usability evaluations, it is recommended that a pilot group of between five and fifteen peer users be used at this stage, although consideration must be given to practical constraints. In the past, some research claimed that 5 users will identify up to 80% of the usability problems (Nielsen, 1994; Virzi, 1992). More recent research has found that 90% of problems are identified with 10 participants (Law et al., 2000). As acknowledged by Nielsen, in many practical situations, the exact number of participants depends on the available resources and time pressures. In order to identify usability problems in AMH situations, it is suggested that designers adopt a practical approach to evaluations, evaluating with as many users as is practically possible and trying to achieve a minimum number of 5 participants.

When completing usability evaluations with children it is important to make them feel comfortable (Druin, 2002; Markopoulos et al., 2008). They can become anxious at the thought of taking test, bringing up thoughts of school. (Rubin, 1994) recommends emphasizing that it is the software, not the participant being tested. In laboratory settings, he has recommended showing participants where the video camera is, who is watching them and all the elements behind the evaluation as a way of giving them a greater sense of control and trust in the evaluations.

Stage 2: Engagement

The goal of Stage 2 is to evaluate the system in situations that are closer to the context it will be used in. The focus is on the appeal of the system, practicality and any further usability problems. Designers should ensure that the evaluation conditions are as close as possible to that of targeted end users. Where possible, participants should use the system in their daily life. If a mobile system is under evaluation, attempts should be made for participants to use it at home, on the go and so on. Participants should use their own mobile phones.

This stage aims to evaluate the design across a wider group of adolescents, from similar backgrounds to the intended end-users, in order to evaluate the system in an environment closer to the actual use environment. There should be an appropriate number of participants to provide the team with confidence in the clinical suitability and usability of the system. This will depend on the experimental design for each system. It is also recommended that evaluations at this stage take place over a longer period, such as one or two weeks. This allows participants to use the system in context closer to the end use. Participants should use systems in their real life environment, with real world distractions.

Ethical clearance from an ethics board or professional therapeutic review may be required at this stage; likewise, parental and participant written permission should be obtained. Schools may be the most convenient partners to obtain access to large groups of adolescents. Testing can take place over a number of weeks, depending on the requirements of the evaluation. Whether training or technical support are provided again depends on the system being evaluated and the aim of the study. A short group introduction should be given to participants explaining the purpose of the testing. It should be made clear that it is the software rather than the participant, which is being tested. Contacts should be provided in the case of emergencies.

At this stage, there is a focus on usability across a wide range of users and handsets as well as on any content created by end users and emotional engagement with the software. Appropriate data collection at this stage depends on the nature of the system being evaluated, but can involve qualitative and quantitative measures. Due to the sensitive nature of the participant group, it can be difficult to use many data collection methods. It could be useful for designers to use software logging to provide more detailed information of mobile interactions in the participant's environment. Further data collection methods available to designers at this stage include: analysis of any content created, questionnaires and face-to-face interviews.

5.8.4.2. Stage 3: Suitability and Therapeutic Outcome

This is the final stage of evaluation and involves evaluating systems in real situations with actual adolescent clients attending therapeutic sessions. Research must not proceed to this stage until there is a high degree of confidence in the outcomes. This stage focuses on client engagement in the system, confirming findings from the previous two stages, and therapeutic outcomes. Some issues, however, will only emerge in a clinical context. The process must acknowledge the special status of the interactions at the clinical pilot stage.

Clinical pilot vs. Clinical Evaluation

It is important to clarify the difference between the clinical pilot proposed here and outcome focussed clinical trials such as randomized control trials (RCTs). The goal of the clinical pilot is to establish that a particular system is usable and to provide initial evidence of its therapeutic benefits. It is in no way a substitute for RCTs, but rather is intended to ensure that software is suitable for therapeutic use before it goes forward for an RCT. This is similar to the Learner-Centred Design evaluation process, where the focus is initially on usability before considering learning outcomes. Formal clinical trials are designed to evaluate the therapeutic impact of a particular treatment. In the case of RCTs, participants, having completed pre-screening, are randomly assigned to one of two or more treatments. Researchers administer pre- and post-measures to assess the impact of each intervention. **Figure 5.3** provides an example of a standard RCT structure. The National Institute for Clinical Excellence has stated that research must be evaluated through large RCTs with sufficient statistical power and the inclusion of a representative sample taking into account socio-economic and ethnic factors (National Institute for Clinical Excellence, 2006a).

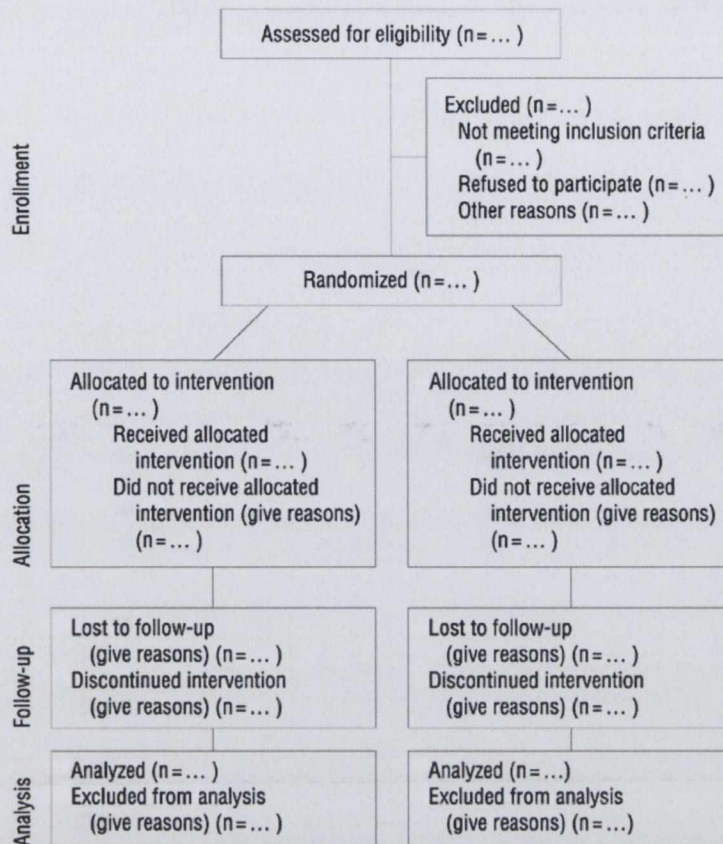


Figure 5.3 Traditional Randomised Control Trial Format for Archives of General Psychiatry Journal (Moher et al., 2001)

Section 4.2.1 argued that conducting clinical pilots can be challenging. Unlike controlled research trials, whereby clients are randomly referred to a treatment measure, evaluations in real clinical settings are particularly slow to get started. It can take a long time to recruit a suitable client. Ethically, since the system is being used in actual practice, it is necessary to support this use for as long as required.

The number of participants at this stage will vary according to research resources and therapist and client availability. (Moffatt et al., 2004) in the evaluation of Phototalk with individuals with aphasia ran trials with two aphasic individuals over a month. The trials of *PI* described earlier involved four end users. It is recommended that evaluations at this stage evaluate the software with as many clients as feasible.

Evaluation proceeds in conjunction with participating therapists acting as proxies for the designer. Due to ethical and time constraints, data collection measures available to designers are more limited. Application logging may only be used with ethical clearance and client permission. Because of the sensitivity of the situation, it is essential to establish protocols for dealing with client content and information. The analysis of client content may be useful to the designer, but it might be very difficult to obtain permission. Questionnaires for therapist

and client should be kept succinct. Due to time constraints, client questionnaires are generally only feasible at the end of evaluations. Designers may be able to obtain more detailed feedback from interviews with therapists.

The objective of the Multi-Stage Evaluation approach is to provide the designer with feedback on therapeutic systems, where standard usability methods are not possible. Its aims are to:

1. Reduce the burden of evaluating the therapeutic systems on the clinical situation
2. Permit iterative design (with adolescent peers)
3. Emulate real world conditions as closely possible through the use of peer users and similar contexts of use
4. Reduce the possibility of poor quality solutions having a negative impact in a clinical situation
5. Allow more design experimentation

5.9. Summary

This chapter has proposed a design approach for AMH based on a modified LCD structure. This approach addresses the limitations to conducting UCD in AMH, taking into account some of the solutions offered in the previous chapter, and offering some new approaches. At the end of the proposed approach, the therapeutic system should have been evaluated for usability, appeal and initial therapeutic suitability. It is then ready to go forward to full-randomised control trials to assess their therapeutic validity in detail. **Figure 5.4** presents the proposed techniques available to designers at each stage of the design process. Chapter 6 and Chapter 7 provide detailed examples of *Client-Centred Design* in action.

6. Case Study: *Mobile Mood Diary*

This chapter provides an illustration of the principles and guidelines set out in Chapter 5. It describes the design of a therapeutic system for monitoring moods. The *Mobile Mood Diary* (*MMD*) is designed to support clients in self-recording their moods between therapeutic sessions and to provide an in-session visualization of this information. The system accordingly has two elements: a mobile phone element for recording moods and a desktop element for viewing graphs of these moods. Mood recording is used, in the form of paper-based charts, by many therapists and is typically considered part of a CBT therapeutic approach.

The aim of this chapter is to assess the effectiveness of *Mobile Mood Diary* for clinical use, to assess the effectiveness of the *Client-Centred Design* approach and to establish if the 'capture now- organise later' model is effective in AMH. The chapter begins with an overview of mood charting in therapy, providing a summary of the most relevant research in the area. A discussion of the design of *Mobile Mood Diary* follows, including the use of future workshops to develop ideas, paper prototyping to evaluate early designs of the system, the use of role-playing to ensure the system complimented existing work practices and the involvement of a therapist on the design team. The chapter ends by presenting an evaluation of *Mobile Mood Diary* using the multi-stage evaluation process.

6.1. Mood Charting

Mood charting – also known as “symptom charting” or “mood monitoring” – is used in therapeutic treatments for a wide range of complaints, including bipolar disorder, attention deficit hyperactive disorder (ADHD), obsessive compulsive disorder (OCD) and non-verbal learning disorder. Mood charting involves clients recording their moods at regular intervals to help identify contributing factors to their emotional state and behaviours. It is an important component of Cognitive Behavioural Therapy (CBT). Several studies have found that regular and reliable client self-charting has a positive effect on therapeutic outcomes (Bauer, Rasgon, Grof, Gyulai et al., 2005; Leverich et al., 1996). Mood charts provide a method to track clients' symptoms, behaviours and feelings on a regular basis. They provide an account of the emotional state of clients during their daily lives outside of therapeutic sessions. This information can be used to identify triggers of moods and help develop coping

strategies. They may help clients develop greater self-awareness, affording them subsequent control and understanding of their behaviour. By gathering therapeutic content between sessions they may save therapists' time. Finally, they can help identify effects on a client that a change in medication might have and they help provide an emotional history of the client.

Mood charting often involves the client recording other factors such as energy levels, medication taken or the amount of hours slept. The make up of a mood chart can vary depending on the client. Therapists often find it useful to have clients record other factors like anger outbursts, alcohol consumption or negative thoughts. Various scales have been used to record moods. For example, both ChronoRecord (Bauer et al., 2004), a computer-based chart, and Life Chart Method (Post et al., 2001) use a visual analogue scale between 1-100. Some charts use 7 point textual labels. Chronosheet, a paper chart uses a 100mm visual analogue scale between extreme states. Charts designed for parents to chart their children's moods typically provide more detailed and consistent information and are not required to be particularly visually appealing. Self-reporting charts for adolescents need to be more easily understood and engaging (Feldman Barrett et al., 2001).

The following sections will briefly examine current methods for recording moods. These have been dealt with in more depth elsewhere (Bolger et al., 2003).

6.1.1. Paper Diaries

Paper mood charts are the most widely used method for charting moods in current clinical practice. However, they offer little appeal to adolescent clients and consequently are rarely used. The main benefit of paper-based mood charting is its ease of use. Adolescents are familiar with pen-and-paper activities and they are straightforward for therapists to implement. No technical training is required. It is an inclusive method available to the majority of clients with basic literacy skills. It also allows a degree of creativity and individuality in the expression of moods and feelings, by enabling the client to draw the feeling or thought instead of using words to describe them. Paper-based mood charting is low in resource costs. Charts can be easily reproduced using a photocopier or a computer printer.

Significant limitations to paper-based charting have been identified by several independent studies. Several studies have shown that paper-based charts have very low compliance rates (Feldman Barrett et al., 2001; Stone et al., 2002). Paper diaries are often completed retrospectively. Shiffman and colleagues have shown that recollection is a constructive process that does not always represent actual events (Shiffman et al., 1997). The major difficulty with paper-based methods is that it is usually impossible for a therapist to know whether the data has been distorted by the client in these ways. Entering this data into a

computer absorbs significant time and may result in errors. Paper charts may be difficult to fill out unobtrusively, and so it can be argued that this method does not offer clients sufficient privacy in a family, school or peer environment. For example, it may be possible for someone to look over the shoulder of a client filling in a mood diary on a paper chart. Furthermore, the information recorded is not satisfactorily secure, and extra measures and responsibility are required by the client to keep it safe, such as locking the chart in a drawer. If the client does not feel that their chart is safe from other people, then they may be unlikely to record their moods honestly. If the chart is lost then all the charted data is lost. Clients' access to charting is limited. Few adolescents carry pen and paper around with them. Should they remember to record a mood entry when they are out without pen and paper, then they have to wait until they have their mood chart to record an entry. Furthermore, they may lose their paper chart or forget to bring it to the therapeutic session.

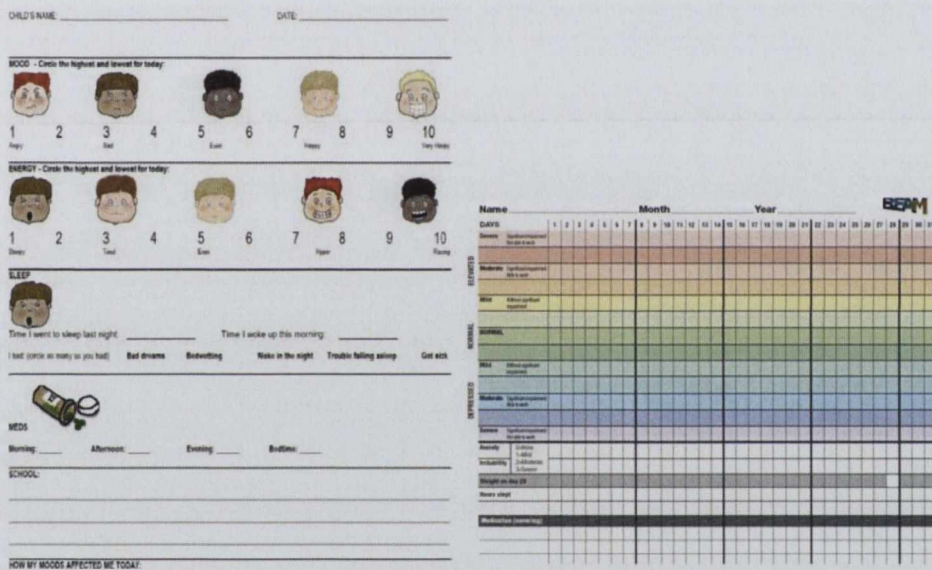


Figure 6.2 examples of paper mood charts used for adolescents

Although significant limitations to paper mood charts have been identified, they continue to provide a low-tech and relatively low-cost solution to mood charting which has yet to be made more convenient and straightforward by any other method.

6.1.2. Electronic Diaries

An electronic diary can be used to provide a computerized mood chart. Over the past ten years, electronic diaries have become available and been increasingly used in clinical studies see for example (Raymond et al., 2000; Tseng et al., 1998). The two existing hardware technologies currently used are desktop computers and mobile computers. Electronic diaries have advantages over paper-based charting methods. They provide greater data quality than paper-based charting, because they can reliably record exactly when the client enters mood

data. This is often referred to as "time-stamping". It improves the quality of the data collected, and in removing the need to make a judgement on the validity of the information, can save the therapist's time (Bauer, Rasgon, Grof, Gyulai et al., 2005). By setting an automatic reminder that encourages the client to chart, an electronic diary can alleviate some of the responsibility on the client to remember to chart (Bolger et al., 2003). The effectiveness of reminders is dependent on how often the client has the signalling device with them. Electronic devices that are connected to a network (such as the internet) can transmit charted information to a secure location, which is then accessible to therapists during a session. They also remove the requirement for therapists to manually enter charted information. An electronic diary can allow the therapists to manipulate and transform the information according to chosen parameters. For example, with an electronic system the therapist may be able to print daily/monthly/yearly graphical charts at the touch of a button. This gives therapists a convenient overview of a client's situation without requiring extra time or expense.

Unlike paper-based mood charts, digital technologies can offer the client a higher degree of security. Access to the charts can be password-protected and data can be encrypted. Paradoxically, although paper charts provide little security, therapists often express more concern about the security provided by electronic systems. This may be due, in part, to the lack of transparency in how they handle (client) information. The level of security required for any system can be balanced against the value of the information to the person trying to break the security. This must be taken into account when designing computer systems, particularly for adolescents. There is generally no reason to, and software designers must be careful not to, record or transmit client-identifying information. For adolescent clients their greatest concern is that family or peers will get access to their mood charts. Lost paper charts could be identified by peers or family members by a client's hand-writing, an identifying factor. A lost electronic device can be password-protected. Even if the password is broken, the information does not necessarily identify the client. When introducing an electronic diary, it is important to provide clear protocols and explanations about how information is dealt with and what security provisions are in place.

Personal Digital Assistants (PDAs) are small portable hand-held devices which several studies have used to administer electronic diaries. Research has shown that this method overcomes many of the limitations of paper-based charts. For example, Bauer and colleagues explored this issue for adult patients with bipolar disorder self-reporting mood (Bauer, Rasgon, Grof, Altshuler et al., 2005). More generally, VanDenKerkhof found that PDAs were an efficient and comfortable tool for patients to complete patient questionnaires by comparison with

paper questionnaires (VanDenKerkhof et al., 2005). Studies report greater subject compliance rates using PDAs in comparison to paper-based charts (Raymond et al., 2000).

Although PDAs have been effective in clinical studies there are drawbacks and limitations to using them in day-to-day clinical practice as underlined by their lack of widespread use. **Section 3.4.4** argued against the use of PDAs in AMH. Training and technical support may be required for adolescents, most of whom would never have used a PDA before. In one study using PDAs, adolescent subjects were given training sessions and an instruction manual and there was a technician on-hand during the testing period in case anything went wrong with the device (Henker et al., 2002). The PDA is not commonly used by adolescents, and so it is difficult for the client to record their moods in an unobtrusive fashion as the device itself is likely to provoke comments. Finally, the cost of a PDA is still prohibitive in a clinical situation.

6.2. *Mobile Mood Diary system*

The screenshot shows the homepage of the Mobile Mood Diary system. At the top, a yellow banner reads "Mood Diary - record your moods on the move". Below this, on the left, is an image of an open notebook. To the right of the notebook is a text box stating: "Mobile Mood Diary can be used to record your moods, energy and sleep patterns on the go." Below the notebook image, there is text: "Record your moods on the go", "Note the important things that happen in your life.", and two links: "Click here for more information." and "Click here for a list of compatible mobile phones." To the right of the notebook is a "Diary login:" section with "Username:" and "Pin:" labels, each followed by an input field. Below these fields is a button labeled "Finished". At the bottom, a yellow banner contains the text "©2006 home about MoodDiary phones contact".

Figure 6.2 Online Mood Diary

The goal of this project was to create a system to allow clients to record their mood and other information and to provide a means to visualize this information in a clinical setting. While there are clear benefits to using mood charts for therapeutic interventions, they are rarely used in adolescent mental health because few adolescents complete them. The central challenge was to design a system, which addresses this problem and engages adolescent clients in mood charting between sessions with a therapist. Throughout this chapter the term

MMD will be used to refer to the entire system. When discussing specific elements of the system, the term mobile *MMD* will be used to describe the mobile tool, and the term desktop *MMD* to describe the online tool.

The design team for this project was made up of the designer, a HCI specialist and a practicing therapist. This therapist formed part of the design team for the entire duration of the project. He attended design meetings and worked directly with designers.

6.3. Developing Ideas

The following section discusses various techniques that were used during the design process to assist with the development of suitable ideas around which to construct a therapeutic system.

Future design workshop

The *Future Design Workshop* format was used at an early stage of the design process. It was decided to hold the workshop in the design team's building, in order to encourage the generation of ideas, as recommended by (Muller et al., 1995). The workshop lasted half a day. A large meeting room was used, which allowed the group to break up into smaller groups within the same space. Professionals from three main backgrounds were invited to attend the workshop: therapists, computer scientists and educationalists. 17 participants took part on the day. Efforts were made to ensure an approximately equal representation from each field. This was intended to generate ideas from various perspectives. The theme of the workshop was to identify areas where technology could support therapeutic interventions.

The day began with several therapists providing the rest of the group with an overview of their current practice. There followed an open room discussion about how treatment could be assisted between therapeutic sessions. It was agreed that the mobile phone provides a promising platform for therapeutic activities between sessions. This agreement was founded on three points: 1) many clients already own mobile phones; 2) most adolescents are confident and comfortable using their mobile phone, and 3) the mobile phone is an adolescent-friendly piece of hardware that may provide a non-stigmatic approach to therapeutic activities.

Importantly for the therapists, it was widely agreed that any technological hardware used should reduce the burden on the therapists, so that their workload did not increase. This was a repeated concern by therapists – and had been raised in previous contextual interviews and surveys (see **Section 5.5.1**). At this stage, the group broke up into four sub-groups to

brainstorm ideas around several themes. Each group was made up of at least one professional (i.e. therapist, educationalist or computer scientist) from each group. Groups spent one hour developing ideas. Finally, the four groups came back together and reported their activities. Ideas that were generated included a tool which would allow clients to record their worries, the use of reminders to alert clients to adhere to a therapeutic plan and a tool which would encourage the development of social skills amongst young people.

The basic high-level concept for *MMD* developed from an idea that arose during these discussions. A range of other ideas were identified at this workshop, although as of yet they have not been pursued any further. The relevant discussion focused on narrative tools and the idea of allowing young people to record their thoughts on their mobile phone. The idea was to use “smiley faces” (emoticons) to rate mood levels because young people were very familiar with them and used them frequently in their online interactions. Initial scenarios of use imagining how such a system would fit into current practice were mapped out on paper. Therapists’ concerns were raised through this process that informed subsequent design work. For example, two participating therapists were concerned that such a system would increase the level of communication with clients outside of a session and hence contribute to a higher workload.

Design Requirements

Initial requirements for the *MMD* were agreed with the therapist on the design team. It was agreed that the main goal of the system should be to enable adolescents to record their mood (as well as energy, hours of sleep and diary recording) in a straightforward manner. A mobile tool would allow the client to record and review mood information and a desktop tool would allow the client and therapist to visualize this information. Recording a mood needed to be a series of clear and familiar actions that could be accomplished quickly by adolescent end-users. The objective was to design a mobile mood diary that was as intuitive to use as a paper diary. In order to maximize participant compliance it has been recommended to keep diaries short and to require less than a few minutes to complete (Bolger, Davis, & Rafaeli, 2003).

The main requirements for the Mood Diary system were:

- Client could record mood with sufficient privacy and security
- Client should be able to review past moods
- Client should be able to choose whether to send mood information to website
- System should complement therapists’ current work practice

- System should complement clients' life habits
- System should be easily used by clients and therapists
- System should provide ability to view graphs of mood information in clinical setting
- System should be able to print these graphs
- System should be able to send reminders to clients' phone
- System should be accessible across multiple platforms – mobile phone and desktop

Low level technical requirements were also identified. In accordance with the design recommendation to provide wide access, the software had to work on the majority of adolescents' own phones (see **Section 3.4.4.1**). From a technical viewpoint, it was important to appraise different solutions to achieving this. The transfer of data is possible via IR, Bluetooth, HTTP or SMS; however, the criterion of access ruled the first two out as current phones in the adolescent market did not provide sufficient support. Furthermore, both technologies would have required that the information be transferred during a therapy session, potentially taking up valuable time. It is also possible that there might have been technical hitches which could have undermined the client's confidence in the therapist.

The *MMD* could have run solely on SMS messaging. Previous studies have used SMS successfully with adult clients. It has the advantage that every mobile device has SMS capability. Young people are familiar with composing SMS messages. The drawbacks in the initial assessment of SMS messaging were that it could be cumbersome to write in the consistently structured manner required for efficiently recording mood and other scale elements. More importantly, it was deemed insufficiently engaging for young people. Finally, it provided no straightforward manner to record previous moods on the device. It was agreed by the design team that the use of SMS could increase the complexity of the task which could affect compliance rates.

An initial survey of current phones on the market over the past year revealed that there was stronger support for JavaME than other software platforms. Further surveys at the first two stages of evaluation supported this, revealing an even wider support base. This meant that clinical evaluation could proceed with the confidence that the majority of client devices would be supported by the software. JavaME provided a reliable method of providing an interface which behaves and looks like the native user interface of each individual phone, as well as a robust way of reaching a wide number of existing handsets. Also it made it possible to view past moods, view charts on the device of mood and overall much greater control of

the recorded data. The final important factor which was considered when making this decision was that a JavaME-based system had greater potential to be engaging – as evident from the many JavaME games for mobile devices.

6.3.1. Choice of mobile technology

From the perspective of mood charting, the mobile phone's main advantage over other methods is that it is already available to many adolescents at almost any time and any place. The convenience of a mobile phone may reduce the client's responsibility to remember to chart. The mobile phone provides adolescents with many opportunities when they can record their moods. A mobile diary may have unique access to an adolescent's idle time; for example when waiting for something or bored. Time waiting at a bus stop or queuing in a shop may become an opportunity to chart.

The mobile phone shares many of the advantages of other electronic diaries. It is straightforward to appraise compliance by recording a timestamp when an entry is recorded. Data entry costs are removed and it is possible to remind clients using electronic signalling. Signalling on a personal mobile device may be less invasive than other methods. In order to remind clients to chart, an automated text message can be sent to them at an agreed time every day. Adolescents may be more likely to respond to a 'New message' signal from their mobile phone. Unlike other mobile devices where a signalling message may attract peer attention, a reminder message is indistinguishable from any other message signal. It is unlikely to be invasive, since mobile phone users set the volume of their phone according to their preference.

Mobile ownership figures indicate that using a mobile phone in public is a common and accepted activity. Completing a mobile entry is indistinguishable to an observer from composing a text message or playing a game. A mobile diary might be completed unobtrusively by adolescent clients offering them sufficient privacy to chart their moods. The mood information recorded by a client can be easily and immediately sent to secure storage, preventing the loss of information. The client's phone can be password protected to prevent anyone accessing sensitive information. The privacy and security provided by the mobile phone may contribute to greater candour. Research has reported that SMS users are more likely to be intimate and revealing in text messages than in face-to-face conversations (Reid et al., 2003); possibly indicating an existing high level of trust in the device.

Diary studies typically require long training sessions (Reis et al., 2000). It is of course important to provide clear instruction on the protocols for recording mood information on any medium. It may not be necessary to provide detailed training sessions when instructing

adolescents how to use their own phones. Adolescents may find entering text on their phones significantly easier and more comfortable than entering information desktop computer, a PDA or even a paper chart. This could also be very important for clients with literacy difficulties.

6.4. Development

6.4.1. Prototyping

In the early stages of design, paper prototyping was used in individual meetings with the therapist and the HCI specialist. A set of paper-based cards were used as 1) to establish a common understanding and agreement on how the system would work and 2) to adjust and develop the system (see **Figure 6.3**). These cards consisted of blank mobile phone templates and desktop computer cards.

This method was particularly useful in the early stages of the design process. It allowed participants to very quickly add new mobile screens as well as to order and re-order the sequence of the task both on a mobile and system level, by sliding them around a tabletop. This helped establish the flow of the system from screen to screen.

Explaining the workings of a therapeutic system to therapists can be difficult using words alone. In meetings with the therapist, this technique helped provide a common ground for the therapist and designer to communicate about and discuss changes to the system. This method may have helped to give the therapist an overview of the system from a technical point of view. For example, the install process was easier to conceptualize for the therapist using the prototype; the sequence of actions could be represented by a sequence of cards. It may have helped the therapist envision how the system might have an impact on the therapeutic intervention both in and outside session. In this light, the mobile cards effectively represented the client outside of sessions and the desktop cards the therapeutic session.

Other research has found subject-matter experts of limited use in evaluating paper prototypes (Boyd-Graber et al., 2006). From this perspective, the therapist on the design team seemed to find it difficult or less interesting to engage in low-level usability evaluations of early designs with paper prototypes. It may have been that the therapist was more interested in the therapeutic high-level impact of the system. It was quickly apparent from initial attempts to use think-out-load protocols with the therapist, that the paper prototypes could not be used for long. This may have been because the therapist did not see the value of evaluating the design at this stage in this depth. On the other hand, the cards were helpful in evaluating

initial ideas in meetings with the HCI specialist. They facilitated discussions that ranged from specific screen detail to the overall flow of tasks within the system.



Figure 6.3 Paper prototyping

There was more success evaluating later designs with working prototypes of the mobile system. Initially, Netbeans, a freely available desktop JAVA IDE, was used to develop working prototypes from the paper cards (see Figure 6.4). This could be accomplished in a matter of minutes. They could be tested using a desktop mobile phone emulator and when ready could be immediately loaded onto actual phones.



Figure 6.4 Sample Screens from live-prototype using emulator of MMD

6.4.2. Design decisions

Access Rights

An important decision with *MMD* was to only provide the client with access to their online mood details. Therapists or parents would not be able to check the moods without the client giving them his username or password. This avoided placing more responsibility on therapist and provided clients with privacy from parents and peers. At each session, the therapist could ask the client if he would like to login to view his moods. It was the client's choice whether to show them or not. This was important to avoid the feeling of being monitored. Equally, every time the client completes recording a mood, he or she is asked if they would like to send this information to the website. The software could have invisibly sent the mood information in the background without troubling the user. It was decided that it was important to prevent clients feeling they were being monitored. It was also important that the software did not use their mobile phone credit without their permission.

Reminders

It was agreed that *MMD* would include a reminder element to help clients remember to record their moods. Clients could be sent reminders via SMS messages to their phones to perform a particular task. Different clients may like to receive these at different intervals or at different times. The design team was concerned that sending an automated reminder message might alienate the client, making the mood monitoring feel like a school task being checked by a teacher. The content of these reminder messages needed to be easily adaptable by therapists to the specific needs and motivations of each client. To address this issue, functionality was added to the desktop system, which allowed the client to compose a reminder message with their therapist during a session and choose a time to receive the message every day. Composing a message to oneself has precedent in therapeutic practice. There is a similar technique called writing a 'letter to yourself' which is often used in therapy as a means of providing the client with perspective on a situation. This design solution was suggested by the therapist on the design team, and is indicative of the insights that therapists can bring to the design process. It was equally important to allow clients to cancel or change this reminder, in the event it became annoying.

Security

When clients start the *Mobile Mood Diary* for the first time on their phones, they are asked to choose a username and a PIN. The therapist recommends that they use the same mobile

PIN they use to unlock their phone as this is used every time the phone starts and so may be easier to remember. These same details are used to login to the website element of the system.

In order to provide sufficient security for clients, it should not be possible to identify the client by accessing the diary or from transmitted data. The *MMD* on the client's phone is PIN protected so that a third party can not access the application. There is no identifying information on the website. Clients are encouraged also as an added measure of security to choose a non-identifying username. The phone is the only device that ties the activity directly to the client, which is why the design and access of the mobile software on the device is extremely important.

Installing Mood Diary

Because the designer could not be present in the therapeutic session and would not have access to clients' phones, it was important to provide a straightforward method for installing the mobile *MMD*. In role-play exercises installing the mobile *MMD* was of greatest concern and considerable difficulty for some therapists. Originally, it was necessary for the therapist or client to enter the address 'mood-diary.com' into the phone's browser. Therapists were provided with a one page instruction sheet on how to do this (see **Appendix D**). However, it became clear through role-playing introductory scenarios with therapists that it would be necessary to develop a more convenient method. Installing software on mobile phones can vary depending on the model of mobile phone and is rarely straightforward. An alternative method was developed which allowed therapists to send their clients sms messages with a link to download the Mood Diary. Once the client receives this message, they can click on the link and this takes them to the download page.

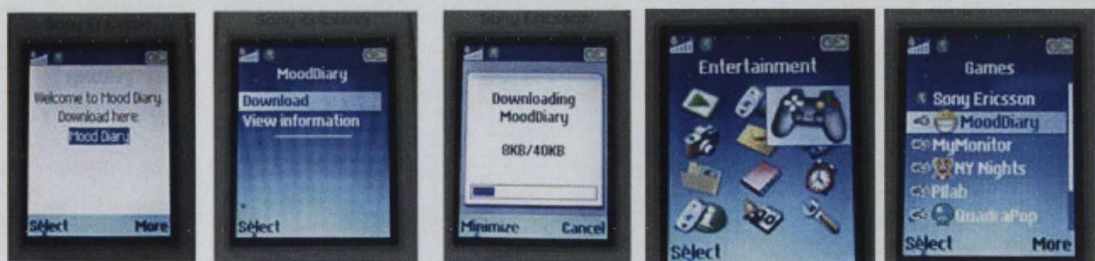


Figure 6.5 Installing the Mood Diary

6.4.3. Role-Playing: Fitting the mood diary into work practice

Role-playing was useful for both introducing *MMD* to therapists and for building up their confidence using it. One session involved seven therapists from the same clinic, with various therapeutic backgrounds. The session took place in the treatment room of a participating

therapist. This was intended to keep the session realistic and close to actual work practice and materials. The session was facilitated by the designer. Therapists used their own mobile phones where possible. They took turns playing the roles of therapist and client. Participants were given role-cards, which provided them with basic character information (see **Figure 6.6**) Therapist roles provided participants with basic objectives to complete with the client.

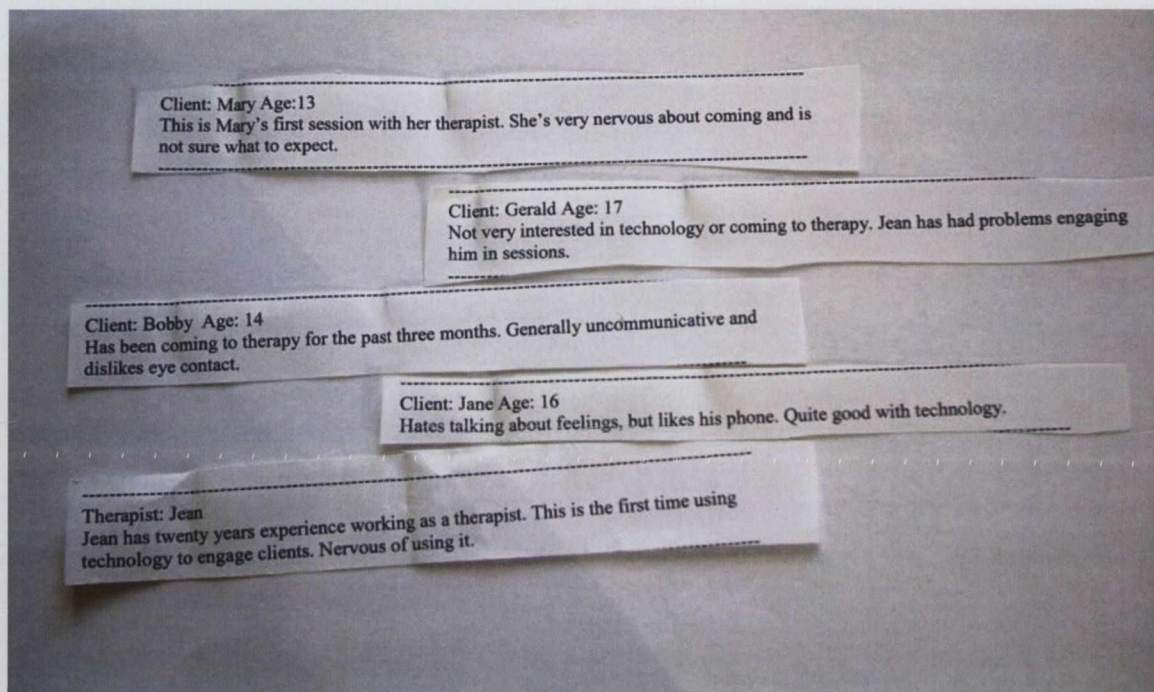


Figure 6.6 Role Playing Cards

The client role had basic background details: age, gender, mental health problem and current mood. The role-play began with the client arriving at a session. The person in the therapist role introduced the tool to the client and went through the process of installing the software. Once an initial mood was recorded, the therapist asked the client if they wished to show them their moods.

This role-playing technique was used in several in-situ workshops in clinics with therapists. Generally, groups consisted of between 4 and 8 therapists. Two therapists played the roles, while the other therapists observed. After the role-play the participants gave oral feedback on how they thought it went. Then the group discussed what they thought worked and what could be done differently.

Observing the role-plays also helped therapists critique various techniques for introducing the *MMD* to clients. Participating in the role-plays helped therapists build up their confidence using the system.

The role-plays allowed the designer to observe a simulated scenario of how the tool might be introduced and used by a therapist in a therapeutic session. They were useful in ensuring that

the system could be successfully introduced by therapists to clients without assistance. It identified common difficulties therapists might experience with the system. For example, installing the mood diary directly onto a mobile phone proved problematic in role-playing with several therapists.

Role-plays were useful in getting feedback on how the system would fit into existing work practice. Therapists were able to develop techniques for incorporating the system into their work practice, and to build up confidence using it in an actual clinical setting. They also helped the designer to refine guidelines for other therapists when using the system with clients.

6.4.4. Description of the Mood Diary System

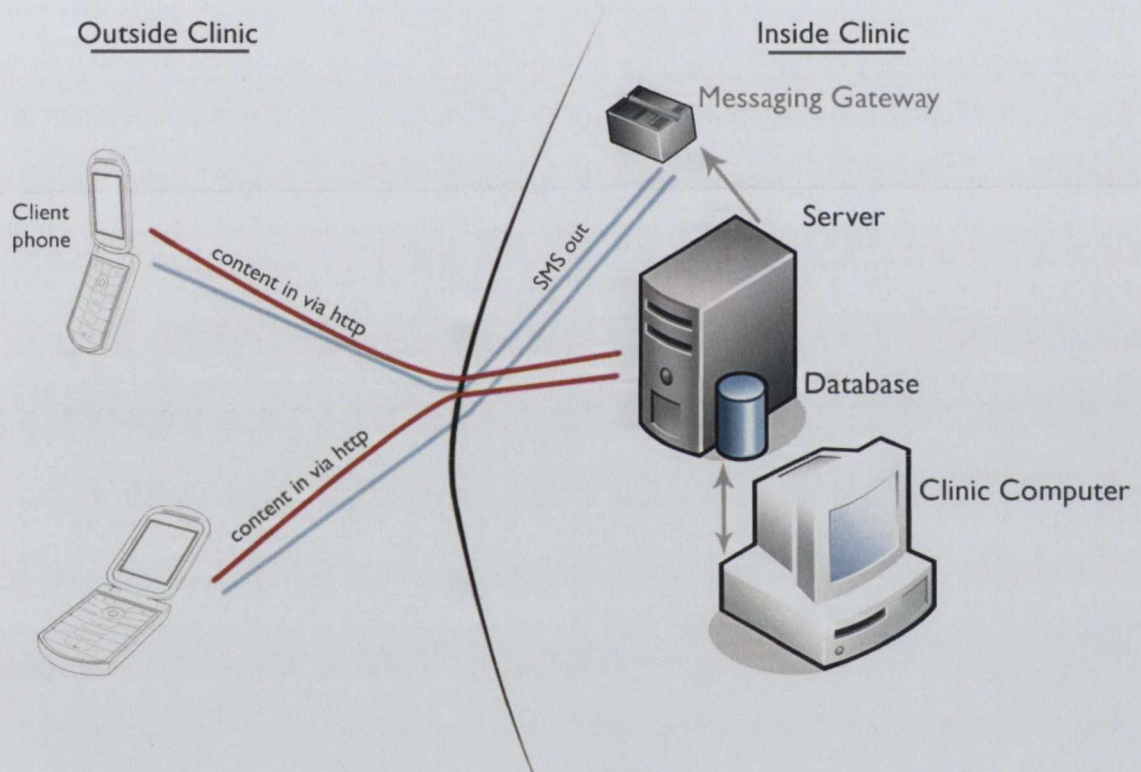


Figure 6.7 MMD architecture

Mobile Mood Diary was built by the design team for this study and consisted of a mobile tool for clients to use on their phones and a desktop tool for use in clinics. Both were designed in detailed consultation with therapists to get feedback on their suitability. Mobile *MMD* can be installed on the vast majority of mobile phones currently in circulation.



Figure 6.8 Photograph of *MMD* on a mobile handset

Mobile *MMD* can be downloaded from 'mood-diary.com'. As described in Section 6.4.2, can be entered manually into the phone's browser or the therapist can send the address as a link via SMS to the client's phone. On receipt of this SMS, the client can follow this link to the website and download the tool. It typically installs to the 'Games' or 'Applications' folder on a phone. When first started, the client chooses a username and a PIN. These details are also used to login to the website. After registering, the client can choose to 'Record' a new mood or to view past moods. Participants can record the following elements: their energy levels, their mood rating and how many hours they slept the previous night (see Figure 6.9).

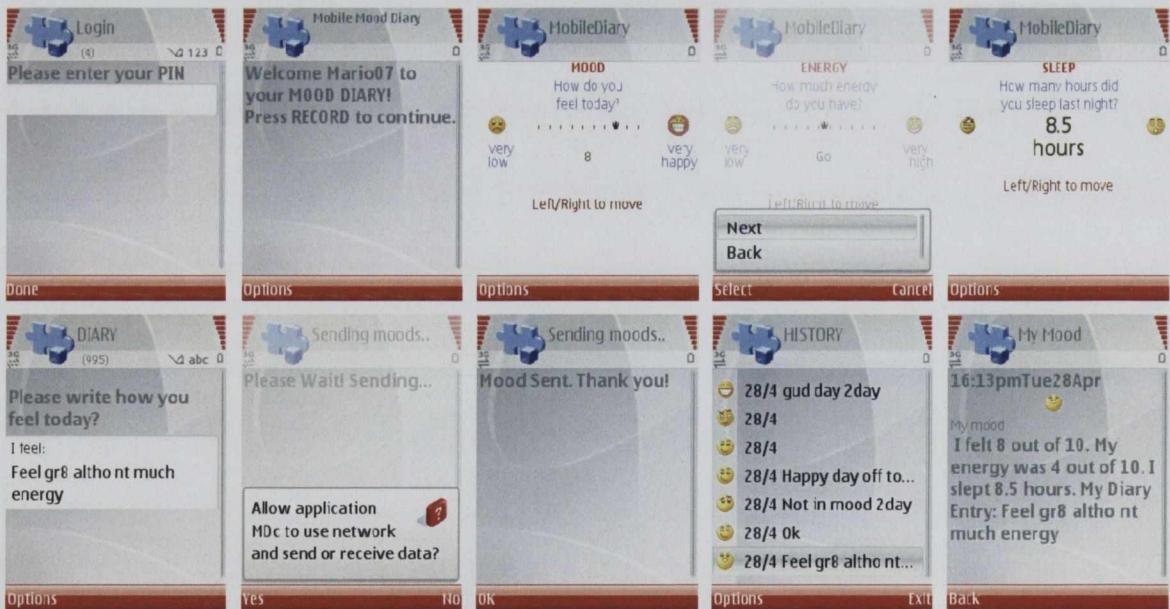
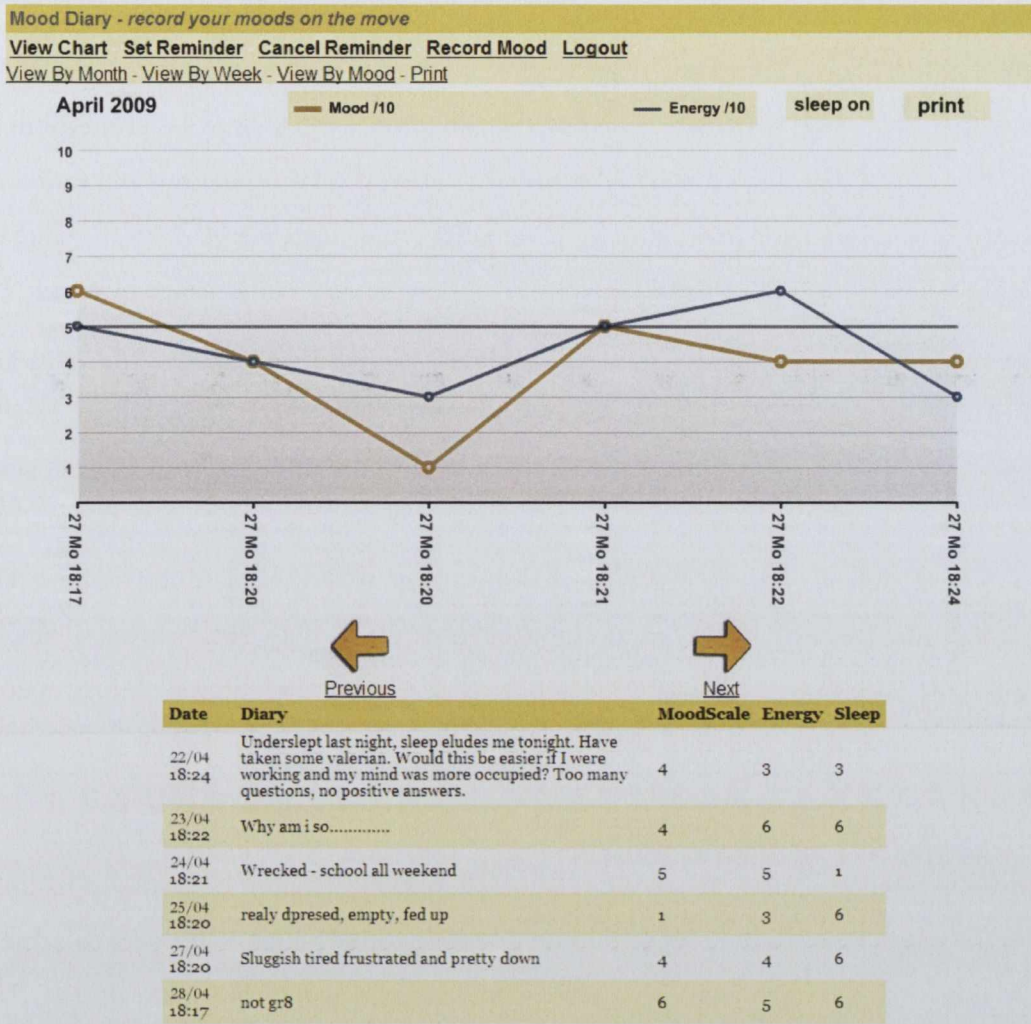


Figure 6.9 Screen captures from *Mobile Mood Diary* on actual device

The screens for these three elements are similar. The Mood screen presents the user with a question like 'How do you feel today?' To answer this question, the client moves a character on a 10 point scale, using either their phone's joystick or the '4' and '6' keys. An emoticon

character anchors each side of the scale and provides a brief textual description. The Energy



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Figure 6.10 Online Mood Diary

screen is of a similar format to the Mood screen. The Sleep screen is similar although there is no scale. The client can adjust the number of hours, which are in half hour increments. After this screen is a diary screen, which asks the client 'How do you feel today?' The client can "text" a response up to 1024 characters in length. The client is then asked for permission to send their mood to the website. If they choose 'No', then the mood is not sent and is only stored on the phone. If they choose 'Yes', it is sent to a database through a web server. After this is a "History" screen, which displays all past moods. Each entry has an emoticon, the date the mood was recorded and the beginnings of the diary entry. By selecting the entry, the client can view a summary of the mood entry. From this screen, the user can choose to exit the application, to record another mood or to re-send their mood information. Each subsequent time, the client starts mobile *MMD*, it is necessary to enter the chosen PIN number to unlock the diary.

The desktop *MMD* provided the client with a method to visualize their recorded moods. It could also be used to set up and cancel reminders, as well as recording moods. The client could login with the same details they used for the mobile *MMD*. Once logged in, the client can choose to view their information in graph and table format. This can be printed out in landscape format. The graph is a line-based time series chart displaying energy and mood on a scale of 1-10 and sleep on a 0-18 hour scale (with half an hour increments) with the time on the bottom of the chart. It is possible to view the entries by month, week or just by entry.

Text diary entries are displayed in a table below the graph and are also included in any printouts of the graph. By default, energy and mood are displayed. Sleep values can be viewed alongside these by clicking a button. There is a reminder screen, which allows clients to compose a reminder message and choose a time to receive the message each day. Finally, there is a 'Record Mood' screen which allows the client to record a mood online. The desktop *MMD* also has a therapist account, which can be used to send clients a link to download the mobile *MMD*. This account provides participating therapists with instructions on how to introduce and use the *MMD* with clients.

6.5. Multi-Stage Evaluations

Usability has been defined as the extent to which a system can be used by users to achieve their goals with "*effectiveness, efficiency, and satisfaction in a specified context of use*" (ISO 13407, 1999). Similar criteria were used to evaluate the *Mobile Mood Diary* system. Firstly, the system had to perform at least as well as existing mood charting methods. This was measured principally by compliance – how often did adolescents record their moods using the system? The efficiency of the system was judged by several factors including how long it took clients to record mood entries, how easy or difficult clients and therapists found the system to use and how easy or difficult it could fit into clients' lives outside of therapy and therapists' existing work practices and was the tool free from significant usability problems. Satisfaction with the system was measured by whether the system was used by both clients and therapists and by questionnaire feedback. A complete evaluation needs also to consider the ecological validity and practicality of the system; addressing issues like cost, installation, would therapists and clients be able to use the system with little or no assistance and so on.

6.5.1. Stage 1: Peer-User Usability Trial

At this stage, two working prototypes had been developed of the mobile *MMD*. The main difference was that they used different scale elements. Both versions of the tool were ready to

be evaluated with a peer user group. Testing took place with six twelve to fourteen year olds in an inner-city youth computer club and was in line with the technology-based activities carried out there. These adolescents did not have any identified mental health problems but were chosen based on similar socio-economic, educational and geographical backgrounds to the targeted end-users. The objectives at this stage were to identify any usability problems with the mobile *MMD*, to ensure participants could complete entries in a reasonable time and to collect feedback on how engaging the tool was. This stage allowed detailed qualitative data to be gathered through face-to-face interaction with participants. The main goal was to evaluate whether participants could download the mobile *MMD* without assistance and to evaluate and compare participants' effectiveness at recording moods using the two versions.

For both Stage 1 and Stage 2, participants were informed that the aim of their participation was to help people who can feel down or depressed and that their contributions and feedback could help improve the tool for these people. The designer spent between 15-20 minutes with each participant. This allowed time for each participant to use both versions of the *MMD*. For each version, the following process was followed. The designer began by providing participants with instructions on how to download the *MMD*. Participants were then asked to install the *MMD* on their own phones, to complete initial registration and then to complete a mood entry. They were asked to use a "think aloud" protocol while completing these tasks. The designer, standing just behind the participant, was able to observe these tasks. Most participants used sparse verbalisation, unless they encountered a difficulty. It may have been beneficial that all participants were very familiar and comfortable with the designer.

Significant usability issues with both prototypes were identified at this stage. The two prototypes at this stage were significantly different to the final system. On one version, the Mood, Energy and Sleep scales were all on the one mobile screen. In this version, some participants failed to notice some screen elements and became frustrated with navigating between different elements on the same screen. On some handsets this required vertical scrolling to navigate the content. The second prototype used four distinct screens for each element to be recorded. This supports the recommendation by (Palmbad et al., 2004) to ensure that no screens require the user to scroll. It also highlights the challenge of designing for a wide range of devices. Screen sizes can vary from 102x80 on the Alcatel OT-E105 to 320x240 on the Nokia N71.

Participants did not experience any difficulties installing and registering both versions of the tool. Each participant managed to complete the tasks with both versions of the *MMD*, but on

the one screen version several participants missed or skipped some scale elements. As a result of the initial evaluation, the prototype with four distinct pages was considered the most effective. When using this prototype some participants felt that the emoticons were not accurate representations of the mood. As a result, it was decided to modify the emoticons and to anchor the emoticons with explanatory words. For example, the scale on the mood scale had the phrases 'very sad' and 'very happy' added below the two emoticons. A new element was added to clarify the meaning of both ends of the scale. As the user moved down the scale toward the sad emoticon, it would glow blue and as the user moved up the scale the happy emoticon would glow red. Therapists confirmed that this was a suitable element. Other modifications made after Stage 1 evaluations included making the user interface more graphically appealing. For example the default standard scale in which the user moved a rectangle block along the scale was replaced with a moving character along a one to ten scale and streamlining the navigation structure.

The purpose of this stage was to reveal any significant interaction difficulties and get detailed usability feedback from adolescent peer users. This evaluation stage allowed for hands-on involvement from designers and the opportunity for participants to actively contribute to the design process. By the end of this stage, there was a clear idea of what worked and what needed to be changed.

6.5.2. Stage 2: Peer User Engagement Trial

After implementing changes identified at stage one, a large scale study in three schools was carried out. It was intended to provide large scale quantitative feedback on the use of the mobile in participants' day-to-day lives. It also provided a comparison between paper charting and mobile mood charting. Study participants were divided into two groups in order to compare traditional paper charts to the mobile *MMD*. The first group used the paper chart, which was designed especially for this study (**Figure 6.10**), while the second group used the mobile *MMD*. Significant effort was made to make the structure of diaries similar to current paper-based charts available for adolescents. The two formats were graphically very similar. Both charts use a 1-10 numerical scale for rating mood and energy. Sleep is recorded in hours and there is a free area to enter any thoughts.

Date & Time	Energy How much energy do you have out of ten? (please put an 'X' on the scale)	Sleep How many hours did you sleep last night?	Mood How do you feel today out of ten? (please put an 'X' on the scale)	Diary – please describe how you feel today.
1/05/06 10.15		I slept <u>8</u> hours.		I feel <u>great</u> today, loads of energy. Summer holidays are nearly here.
		I slept ___ hours.		

Figure 6.11 Paper Mood Diary

Method

This study took place in three schools in Dublin, Ireland between April-May, 2006. A non-clinical sample of 73 self-selecting students took part in the study with school and parental permission. Participants' ages ranged from 13 to 17 ($n=73$ mean=14.87 SD=1.141) and were mostly female (86.3%). 52 students (71%) were given paper-based charts and 21 students (29%) had the mood diary loaded onto their phones. None of the participants were suffering from apparent mental health problems but all were from similar socio-economic backgrounds to adolescents attending the Mater child and adolescent clinic. One school was randomly selected for the paper study and the other two schools had classes randomly assigned to paper or mobile. To avoid giving a strong financial incentive (i.e. mobile phone credit) to mobile phone participants, the mobile diary was only installed on phones where a simple and cost-free solution was available for retrieving data. This was dependent on the brand and model of the phone and was unrelated to the cost of the phone. As a result the number of mobile participants was lower than paper participants. Installation involved loading the software onto the phone in a face-to-face situation using either bluetooth, infrared or a connection cable. Brief instructions were given to each group explaining how to record an entry. Participants were instructed to record one mood at any time each day. This was used as the measure of compliance. They were told that if they forgot to record an entry on one particular day then to move on to the next day and not record a mood for the missed day. The study proposal was reviewed and approved by the Mater Hospital's ethics board.

Testing took place over a two week period. Both groups were asked to record their mood once a day, although they were not reminded to do so. It had been decided to not include a reminder element for these evaluations in order to evaluate baseline use of the tool. No financial incentive was given to either group. Data collection at this stage included data logging, analysis of the recorded content and post-experiment questionnaires. Post-trial face-to-face interviews with participants in pairs were also used with both groups to gauge general opinions, overall satisfaction and suggested improvements. No technical support was given to

the mobile group. All students were informed that if they felt upset during testing to contact the school counsellor.

At the end of testing all data was collected in person. Participants were given an eleven element questionnaire covering their use of the mood chart, their impressions and their ideas for improvements (see **Appendix D**). 70 questionnaires (96%) were collected from participants. Only 18 paper diaries were recovered (35% of paper group). The rest were either forgotten at home or lost. Mood charts from 17 mobile diary participants were collected (81% of mobile group). Adolescents who had opted not to participate in the full study completed a general survey about their use of mobile phones and their attitudes toward them.

For this stage, it was decided not to implement a password on the mobile diary. Since there was no means of contacting researchers during the study, it was deemed necessary to omit this feature in case a participant forgot their password and was locked out of their mobile diary for the duration of the study. In a clinical situation it would be straightforward to set up a system which would send a forgotten password to the client or which could send an automated reminder message at a regular time.

Results

The following section gives a breakdown of the major findings, under related headings, from the second stage of the evaluation process.

Compliance

In order to assess whether a paper versus mobile phone based platform influenced compliance behaviours, participants who had completed paper based diaries ($n=16/52$) and participants who had completed a mobile phone based diary ($n=17/21$) were assigned to two groups. Compliance was judged as completing at least one entry per day. Actual compliance for the paper diaries was based on filtering the most obvious cases of hoarding where participants directly admitted filling in all entries retrospectively. The mobile diary group automatically had their entries time stamped and therefore actual compliance was transparent. Data was analysed using an independent samples t-test in order to test for significant differences in the number of mood entries participants completed. Groups were found to differ in their rates of actual compliance $t = -2.324$, $p < .027$, with the mobile phone based diary group (mean=8.12) producing more entries than the paper based diary group (mean=5.44).

Due to the significant amount of lost or forgotten diaries and the difficulty in identifying cases of hoarding it is difficult to get an accurate overall picture of compliance in the paper-based diary group. Previous research would indicate that actual compliance would be considerably lower than reported compliance. For example in a study which appraised paper compliance using a specially developed paper diary, adult participants' reported compliance was 90% while actual compliance was as low as 11% (Stone et al., 2002). The same study also found that most participants engaged in hoarding. Based on teachers' comments, questionnaires from paper diary participants and interviews, we believe that this occurred in this study also. It became clear that many participants copied entries and dates from each other as well as filling out a lot of entries just before collection. For example several participants admitted (in discussion and in questionnaires) parking-lot compliance, filling out most of their entries just before data was collected. Comments like *"I filled loads in one go"*, *"I did them all today"* were common. In one class (n=12) a teacher mentioned that participants from the paper-based group were *"copying from each other"* before the diaries were collected.

Even discounting hoarding, the difference in compliance for the mobile diary group supports the hypothesis that the mobile phone is a suitable platform for mood charting.

Privacy and Security

In order to test whether there was a significant difference in participants' perceived privacy between phone and paper based groups while completing a mood entry, participants in the paper group (n= 48) were compared to participants in the phone group (n=19). Phone participants reported feeling more privacy when recording a mood than paper participants. 18 phone participants (95%) felt they had sufficient privacy and 1 did not (5%). Out of the paper group, 41 (85%) felt they had enough privacy and 7 (15%) did not. Comments made by both groups are particularly informative on this matter. 4 comments from paper participants identified a concern about the possibility of other people observing them entering moods and possibly even what they were entering. For example, one participant said that her friend *"kept stealing it"*. Other comments mention other people's curiosity: *"people would ask 'What's that page you're filling out?'"* or another *"I felt that other people could be reading it"*. Only one person in the mobile phone group commented at all on privacy, mentioning that his brother would ask him what he was doing. This is important as there was no expressed concern in the mobile group about the possibility of someone seeing what they were entering. In this regard the small personal screen of the mobile phone becomes an advantage. It is interesting to see some of the comments from users of the paper diary, expressed in the questionnaire, about why they would prefer a mobile diary if given the choice. In post-

interviews, several participants expressed the belief that the phone was more private than paper:

"You can conceal more easily so there is more privacy" or that "it would be much more private."

"I would prefer phones because phones are more private than paper and it easier to use and easier to remember."

"I'd prefer to do on the phone as its quicker and I'd find it safer than using paper which could get lost."

No significant difference was found between the perceived security of recorded moods for paper and phone-based diaries. This finding was expected since no password facility was provided for the mobile diary. Mobile participants expressed concern that *"if someone went into games they might think it was a game and find out about how you felt"*. Four of the five mobile participants who commented on this felt that their entries were not sufficiently secure and that there should be a password – *"It would have been better if I could set a lock code on it"*. In a study with a password protected mobile diary there may be a significant improvement in participants' response to this question. It is a simple matter to implement a password on the mobile phone, while it is not possible to do so for a paper diary. The password would be something memorable to the client, such as their mobile phone PIN code, which if lost is easily recovered.

The fact that so few paper diaries were recovered is indicative that paper diaries are liable to be misplaced or lost. Four comments from the mobile group reflected the idea that *"you can't lose it (the phone)"* and that *"it would be safer"*.

This study revealed trust issues relating to how the software was described to adolescents. At the outset, experimenters told participants they would be 'installing some software' on their mobile phones. This particular phrase made some adolescents suspicious of the testing, and potentially afraid they were being screened for mental health problems or that the software might 'damage' their phones. This latter issue is most likely as a result of using participants' own mobile phones. Describing the installation as a 'download' like a game or a ringtone rather than a program or an application was sufficient to allay such fears. The context and type of language used to describe new technologies to adolescents is important - protocols which deal with these language and context issues would help experimenters and therapists when they are introducing new technologies to adolescents.

Remembering and Availability

The mobile phone participants (mean=2.58 sd=1.121 where 1=very easy 5 = very difficult) felt that it was easier to remember to chart than the paper participants (mean=3.15 sd=1.185) in this study, but this result was only approaching significance ($p > .078$ under independent samples t-test).

It is interesting that an unmotivated non-clinical group of adolescents should find it easier to remember to record their moods using a mobile phone than paper. This is corroborated by the actual compliance rates discussed above. It is not immediately evident why mobile participants found it easier to remember to chart. It may be related to the availability of the device. Adolescents frequently have their phones with them, while they rarely carry pen and paper around with them. 68.4% of adolescents from the general survey group (n=20) said they had their phone with them "always", while a further 20% said they carried it with them "very often". The other 10% said they carried it "rarely". If a participant remembered to record a mood and had their phone with them, then they could do so immediately. If a paper participant remembered to chart and did not have a pen and paper with them, then further effort was required to remember to chart at a later time. The following comment illustrates this point: *"the phone might help me record it more frequently because I always have it with me so I wouldn't forget to fill it in."*

There may also be the factor that adolescents are likely to use their phone when bored or to "play" with their phone. Participants from the paper diary group who did remember to chart and had good compliance typically were independent enough to devise their own strategy to help them to remember. For example three participants put the mood diary in their homework journal so they would remember to do it when they opened their journal.

Four participants from the mobile group (n=20) suggested that a reminder function would have helped them remember. One participant from the same group actually set their own alarm to help. This shows a similar independence and initiative to the paper participants who devised their own signalling system.

Ease of use

Both types of chart were considered to be easy to use with no significant difference between the two groups (n=19, mean=1.63, sd=.761 for the mobile group, and n=49, mean=2.06 and sd=1.069 for the paper group, where 1= very easy and 5=very difficult). This supports the view that the mobile diary is deemed no harder to use than the paper diary, even though the paper method is viewed as extremely straightforward. This is encouraging since no technical

training sessions or technical support was provided. To our knowledge, there were no cases where adolescents did not know how to use the mobile phone chart.

For time taken to complete one mood entry the mobile phone diary group (n=19) perceived themselves to be quicker at completing mean=1.26 sd=.452 than the paper group (n=45) mean= 1.56 sd=.624 where 1="a few moments" and 3 ="more than 5 minutes". Again there was no significant difference, in spite of the speed with which the paper diary can be used. This demonstrates that recording a mood entry on the phone was not an involved and difficult process, and gives weight to the findings above that the mobile mood diary was straightforward to use. In post-interviews, several participants from the mobile group expressed the opinion that the scale "*number was handy you didn't have to think*".

Method bias

Administration methods can affect the measures of mood (Tseng et al., 1998). When evaluating any method for recording moods, it is therefore necessary to consider if the data collection method introduces bias into the collected data. It is for this reason that the potential bias introduced by the tool is very important to consider. In order to investigate if the mobile method created a bias on self-charted mood ratings all valid mood entries were compared across the two groups. The mean and standard deviation of self-charted mood ratings (on a scale of 1-10) between the two groups are very similar (paper: mean=7.28 sd=1.941, phone: mean=7.21 sd=1.894). A comparison of histograms also shows a similar distribution of mood values across the two groups.

Previous studies have shown that computer anxiety can affect mood ratings on desktop computers (Tseng et al., 1997). More recently, in a study with patients with bipolar disorder, it was found that, although computer access and ability are associated with bias, that using a computer did not appear to bias the collected data (Bauer, Rasgon, Grof, Gyulai et al., 2005). According to Bauer et al., this change was due to the increasing prevalence of computers in society. There may be fewer such issues using mobile phones as an administrative method because of their pervasiveness. (Tseng et al., 1998) have recommended easy-to-use interfaces as a way of reducing problems related to method bias. Participants in this study rated the mobile mood diary as equal to a paper diary in ease-of-use. Establishing a method's ease of use does not necessarily indicate that there is no bias, but it has been a significant factor in previous studies.

Preferred Method: Paper or Phone?

There was strong agreement between groups (paper n=43 mobile n=19) on a preferred method for recording moods. If given a choice between a phone or paper method, 88.7% of participants would prefer to complete such tasks on their mobile phones, with 11.3% preferring paper. Similar results were obtained from the general survey group (n=20) where 85% would prefer their mobile phones and 15% paper methods. This supports the proposition that many adolescents find the mobile phone to be a more appealing platform for this type of activity. Some comments illustrate this: *"things on paper seem like it's an assignment - more likely not to do it. Having it on the mobile made it less formal and it didn't seem like work"*.

Other findings

As discussed above, paper participants hoarded mood entries. Analysis of the mobile phone entries shows that there are no obvious attempts to back date entries through hoarding. Another interesting finding was that 6 mobile participants (n=17, 35% of mobile participants) had at least one day when they voluntarily recorded more than one valid mood entry. This is particularly interesting because participants were only instructed to complete one mood entry a day. Out of a total 172 mobile phone entries, 32 (19%) were extra entries not registered under compliance. Days with more than one entry are spread over the testing period which would indicate that it is not related to the adolescent learning how to use the program or to a short-lived novelty factor.

Overall, this study was a successful evaluation of *MMD* in a real-world environment. Most importantly, compliance was significantly higher for *MMD* (approx 58%) compared to the paper diary (approx 38%). The strength of the results provided ethical justification for proceeding to the third stage of the evaluation, firstly as there clearly seemed to be a benefit associated with the software, and secondly that no technical or major usability issues arose over the two week period of each evaluation.

6.5.3. Clinical end-user Pilot

Several changes, based on the feedback from Stage 2, were made before the clinical pilot. A security PIN was re-instated to mobile *MMD* to provide clients with increased security. The ability to send a reminder SMS message was added to the desktop *MMD*. Significant usability issues were not expected to be discovered at this stage of evaluation. Rather, the increased sensitivity of the client to therapy and the therapist to technology was expected to give feedback not possible at an earlier stage. The focus of this stage was on assessing the

suitability of *MMD* for clinical situations, as well as confirming that there were no significant usability problems with the system. With the therapist acting as a proxy for the designer, it was possible to receive feedback on the impact the system had on the client and on the therapeutic intervention.

Method

MMD was made available to clinics throughout the Republic of Ireland. Participants were requested to use the *MMD* system with clients for a minimum of 2 sessions. This allowed for an initial session to introduce the tool and a second session to view and discuss collected moods. Because the *MMD* is a clinical support tool, it was not appropriate to limit how long clients could use it for. Where necessary, clients were reimbursed for credit used. Questionnaires were provided for therapists and clients, although it was not always possible to collect complete records. These questionnaires were supplemented by interviews with therapists. Additionally, several therapists chose to provide the designer with feedback on each session in the form of phone calls and email communication.

Results Summary

To date, three therapists have used the *MMD* system with a total of nine clients. This includes one client who used a modified version of the *MMD*, an Anger diary. **Table 6.1** displays the compliance rate and number of days the *MMD* system was used by clients. Every client who used the *MMD* made at least several entries. Using a daily mood charting protocol, the mean compliance rate across all clients was 59% ($N=10$, $sd=25.85\%$). The mean number of entries was 34 ($N=9$, $sd = 27.02$). All clients used the *MMD* for the minimum of two sessions, with 8 out of the 9 clients using it for longer. In total the *MMD* system was used for 547 days, the longest period of use was 130 days, and the shortest was 7 days. It was used for a mean of 63 days ($N=9$, $sd=45.33$). Clients recorded a total of 307 mood entries. The mean number of entries was 27 ($N=9$, $sd=34.11$).

Client	Age	Gender	Mental Health Problem	Entries	Days	% compliance
Client1	12	Male	Mood problem	25	26	96%
Client 2	15	Male	Sleep Problem	15	20	75%
Client 3a	15	Male	Suicide Risk	85	130	65%
Client 3b	n/a	Female	Parent	68	75	90%

Client 4	16	Male	Mood Problem	25	120	20%
Client 5	17	Female	Self-Harming	32	93	34%
Client 6	n/a	n/a	n/a	43	72	60%
Client 7	n/a	n/a	n/a	4	7	57%
Client 8	18	Female	Asperger's Syndrome	10	28	35%
Client 9	14	Male	Depression & social anxiety	26	45	57%
Totals				321	581	55% *(58.9% including Client 3b)

Table 6.3 Mood Diary clinical pilot

All three therapists who used the Mood Diary with clients found it helpful to the intervention. In their opinion, they found the mobile phone was better than current paper materials for recording moods.

Question	Very Helpful	Helpful	OK	Unhelpful	Very Unhelpful
How helpful or unhelpful was the Mood Diary to the intervention?	T3, T1	T2			
	Very Interesting	Interesting	OK	Boring	Very Boring
How interesting or boring did your client find the Mood Diary?	T3, T1	T2			
	Very Easy	Easy	OK	Difficult	Very Difficult
How easy or difficult was it to use the Mood Diary?	T1	T2, T3			

Table 6.4 Therapist Feedback

Case Studies

This section presents several user studies from the clinical pilots which give an overview of the clinical use of *MMD* and highlight issues that are of interest.

Client 1

Therapist 1 (T1) was a male clinical psychologist who was comfortable using technology. He was aged over 50. Client 1 was a male aged 12 who agreed to use the mood diary in connection with a mood problem. The therapist sent the diary to the client's mobile phone using the desktop *MMD*'s SMS tool. He installed the diary himself. It was not possible in this evaluation to get any direct feedback from the client. Overall the compliance rate was extremely high and the system was considered very helpful by the therapist to the intervention.

The client opened the diary 37 times and recorded 25 moods on distinct days – only missing one day. 95% of entries were made between 10pm and midnight. The client never took longer than 2 minutes to complete. At this point the therapeutic treatment moved to another stage of therapy, and there was no longer a need to record moods.

(Curtis et al., 2002) used a tool to log and timestamp the actions of students using a handheld device as part of their learning programme. They attributed the success of their research to the combination of in-depth analysis supported by complimentary combination of log files, artifacts created by students and observations. Permission was granted by this client and his parent to log certain client interactions on the mobile *MMD*. Timestamps were recorded each time the client opened the *MMD* on his phone, when he started recording a mood, when he sent the entry to the server and finally when he closed the application.

The mobile client logged the time the client opened the diary, the time the client completed an entry and the time they closed the diary. This was designed to provide some information about their use of the diary, such as time-on-task and to give more detail to whether the client used the diary to review their moods. This example of logging gives an idea of the potential of this data to piece together the user's use of the software. **Table 6.2** provides an overview of the logging data from client 2's phone.

Day One

This client set up his account at 17.57, but did not record a mood and exited the software almost 3 minutes after opening it. He started it again 20 seconds later. Again he did not

record any mood information and exited it 38 seconds later. Almost two hours later, on the same day, the client opened the mood diary at 21.39.16. He recorded a mood in 1 minute 25 seconds (including logging in) and then exited the software 15 seconds later. He started the software immediately again and recorded another mood, this time in 35 seconds. He then spent 2 further minutes using the software before exiting it. This time might possibly have been spent reviewing his moods on the 'History' screen, but there is no data to support this assumption.

Day Two

Day two was similar in interaction patterns to the first day. The client opened the diary at 18.53 and closed it 25 seconds later without recording a mood. Then, almost an hour later, at 19.48 he opened it again, and closed it without making an entry, 14 seconds later. More than two hours later, he opened the diary again, at 21.57. He recorded a mood in 40 seconds and then spent 41 seconds using the software before exiting.

Day Three

On day three, he opened the diary at 22.20, recorded a mood in 53 seconds and then closed the software 19 seconds later.

Based on the other log information which recorded how many times the user opened the diary, whether he recorded a mood or not, it seems that this client continued the pattern of use started in the first two days, opening the diary sometimes two or three times a day, but not always recording a mood.

Start Time	Record Time	Stop Time	Server Time
7/2 17:57:02pm	No recording	17:59:39pm	No server time
7/2 17:59:58pm	No recording	18:00:36pm	No server time
8/2 21:39:16 pm	21:46:41pm	21:46:56pm	21:46:41
8/2 21:46:57pm	21:47:33pm	21:49:34pm	21:47:33
9/2 18:53:08pm	No recording	18:53:33pm	No server time
10/2 19:48:49pm	No recording	19:49:03pm	No server time
10/2 21:57:26pm	21:58:06pm	21:58:47pm	21:58:06
11/2 22:20:44pm	22:21:37pm	22:21:56pm	23:21:37

Table 6.5 Mobile *MMD* logging for client 1

Overall, therapist 1 reported that this client found the mood diary “Very Interesting” (where “Very Interesting”=5 and “Very Boring”=1). He believed that this was because the mood diary was on the client’s phone and the website graph helped the client be more aware and more able to talk about his moods. This therapist reported that the ability to print out the diary was particularly useful with this client. He thought the diary was “very helpful” (where “very helpful” = 5 and “very unhelpful”=1) to the overall intervention and “*engaged and enthused*” the client – making therapy “*appear up to date*” and the client’s mobile phone an “*important/useful tool in front of their parents*”. He believed the tool “*helped engage the client on task*”. The therapist reported the diary and website was “very easy” to use – saying the printout was very helpful.

Client 2

Therapist 2 (T2) was a very experienced Consultant Child and Adolescent Psychiatrist who had very little confidence in use of technology. She was interested in recording the client’s sleep times and cross checking them with mood and energy levels to identify any correlations. For this intervention the therapist did not place any emphasis on entering comments in the diary section of the diary. The client was a 15 year old male suffering with a chronic sleep disorder. His mother, who suffered from a similar problem, had been previously charting his sleep hours on a paper chart.

The client installed the Mood Diary on his phone at the first session. The client’s compliance was extremely high for this intervention. Out of a total of 21 days using the diary, he recorded 15 entries on separate days. *MMD* records whether clients provide an active response for each measure. All but two values, across all scales were initialized by this client. Most entries were made very close to midnight, and a couple were recorded at 3pm and a couple at dinner time. There is a strong correlation across the data between hours slept and energy and mood levels. The client’s situation can be seen to worsen through the three weeks. Half way into the evaluation the client’s sleep levels dropped to 6 hours (from a standard of 8 hours). Then it reduced to several entries at 5 – 5.5 hours and then down to the last entry of 2 hours. Most moods were sent immediately at the time of charting, although on two occasions moods were sent in batches of two entries. This client did not use the reminder text message from the website.

At the next session, the therapist and client could not find any moods on the online system when they logged in. Apparently, earlier in the week, the client had removed the battery from his phone and had re-set the date, although he had set the correct time. Consequently, all mood entries sent from the phone were timestamped according to the phone’s default

date of 2005-01-01. When they logged in, saw a blank graph for the current month. The graph allows the user to view the graph by week, month or by mood. If they had chosen 'View by Mood', the entries would have been viewable. However, the therapist did not have sufficient confidence using the system. To avoid this problem in the future, the desktop *MMD* should by default display the most recent moods received.

After this session, the client continued to use the mood diary. His condition deteriorated to such an extent that he was taken into hospital as an inpatient and consequently out of the therapist's care. For this reason, it was not possible to get direct client feedback.

Although, the therapist and client used the online system successfully, this case demonstrated the potential effectiveness of the mobile tool in clinical situations. This client was very good at recording his mood data on his mobile phone, where he previously would not keep a paper chart. He was able to self-manage this process quite successfully. Unfortunately, the therapist did not get the full benefit of the system's functionality – where she would have had graphical evidence of the deterioration of his condition. This raises questions about whether similar future systems should automatically monitor the charted information and notify someone or send useful information or an encouraging message when levels drop below a pre-agreed level. The introduction of such measures would raise a number of ethical issues and could potentially impose and increased burden of responsibility on therapists.

The therapist reported that the client found the diary 'Interesting' (where 5 = "Very Interesting" and 1 = "Very Boring"), citing its convenience as a particular strength. The main difficulty was setting up the mobile *MMD* and accessing the desktop *MMD*. The therapist believed the method was 'helpful' to the intervention (where 5 = "Very Helpful and 1 = "Very Unhelpful") because it allowed the client, and not his mother, to monitor his moods. The therapist believed that the mobile phone would be the best method for recording mood information.

Client 3 & Parent

This client was a 15 year old male in a single-parent family. He was considered a potential suicide risk. He and his mother met once a week with T1. All three also participated in a weekly meeting with a psychiatrist. T1 thought it would be useful for this client to record his mood, energy levels and sleep. The psychiatrist had asked the client to complete a paper mood diary. He was not aware that it was possible to complete the diary on the phone.

T1 sent a download link to the client's phone and he recorded the first entry in the session. Although the client initially agreed to use the diary for two weeks, he continued using it for

much longer. The client recorded 85 entries over 100 days. This is excellent compliance. Out of 344 possible values recorded (mood, energy, sleep and diary entry), 342 were active responses. This means the client provided an active response for an overwhelming majority of entries. The client opened the mood diary 18 times without recording a mood entry, possibly to review mood entries. This client had set up a daily reminder in the first session with the therapist, which he received each day at 21.10. The message he composed with his therapist was simply 'mood diary'. A high percentage of entries were made between 21.00 and 22.00. Most of them took place 5 minutes after the message was sent. This indicates that the reminder may have been significant in the high level of compliance for this client. Therapist1 believed that *"the SMS reminder was very good for this client"*, and that it was *"a great help for him to remember to chart"*. He believed this was particularly useful because it was the *"one and same device to get reminder and record"*.

This client was struggling very much with his condition during the course of treatment and the parent found it particularly difficult. This parent worked during the day and was frequently sick over the course of treatment. The therapist thought it would be helpful to see if there was a correspondence between the child's mood information and the parent's mood level. He suggested that the parent try the mood diary a week after the client began recording his mood entries.

The parent began using the mood diary a week after the client and continued to use it for 75 days. Her compliance rate was excellent; she recorded 68 mood entries on 75 distinct days. She opened the diary 18 times without recording a mood, which may indicate that they were looking at their past moods. The parent had set up a reminder in the therapist's office. It was sent at 19.10 every day. The content of the message was 'diary'. The parent recorded most entries very close to the time of the reminder. This parent entered text in the diary page on 10 occasions – usually when the client was in particularly bad form. She left more entries at their default value than her son. Her mood values were consistent; when they varied, they remained consistent with the client's entries.

Before face-to-face meetings with the psychiatrist, the therapist and the client would go to the computer room, login to the website and print out the past week's chart. They usually printed out four copies, one for each participant in the meeting. The psychiatrist used these graphs as an aid to make decisions about the intervention. He was able to see trends in the client's mood and sleep over time. He also used the graphs to monitor the risk factor (suicide risk) associated with this client and prescribed medication accordingly. In clinical team meetings in the clinics, these chart printouts were used to inform discussions of this case.

T1 reported that this client found the mood diary “Very Interesting” (where “Very Interesting”=5 and “Very Boring”=1). He thought the diary was “very helpful” (where “very helpful” = 5 and “very unhelpful”=1) to the overall intervention and reported that both the diary and website was “very easy” to use. T1 saw a correlation between the parent’s and child’s feelings. In particular, he thought that the graph *“was a lovely way of mapping child’s and parent’s mood”* and that it *“showed how there were influencing each other”*. This is something which the software could more formally support in future versions. According to the therapist, the use of the mood diary by both client and parent, helped both see the connection and inter-dependence of their moods. He believed that “the fact that it is confidential is very good – i.e. only client has access – some parents would want to see what information they were entering”.

Overall, this case study represents a successful use of the mobile diary both with the client and the client’s parent. Compliance for both users was excellent. The SMS reminder seemed to have a significant impact on compliance for both. T1 creatively administered the Mood Diary to engage the parent in the client’s condition and used the printed graphs as a way of bringing up the possibility of their moods affecting each other.

Client 4

T3 was a female clinical psychologist who had low confidence using technology. Because of this was initially reluctant to use the mood diary with clients. Seeing her colleague, therapist 1, use the diary successfully with clients and having him describe to her how it worked was an essential part of the process of her building up confidence to use it. The client found it hard to talk about his feelings. Initially he was not comfortable showing his moods (in the form of printouts) to his parents. Eventually, he was able to and brought the graphed printouts in and showed them to parents.

The client committed to using the diary over a two week period, but continued to use the diary over 93 days, making 34 entries. All scale values were initialized by the client, except one. He entered text entries in 26 of the 34 entries. He opened the diary 34 times, indicating that he recorded a mood each time he opened the diary. This may indicate that he did not find the ‘History’ screen particularly useful. He received a reminder message ‘update *MMD*’ every day at 7pm. There does not seem to be correspondence between the time of day reminders were sent and when moods were recorded. His entries varied throughout the day and did not exhibit any particular pattern. This may indicate that the reminder had less of a direct impact on this client. Entries were made both when the client was feeling good and when he was feeling bad or sick.

Even though compliance was low in this case (29%), by comparison to the other case studies, there was a regular pattern of use. For the first two weeks of the evaluation, there were 7 entries over 14 days. Then there was an entry every day for five days. From then on, there was a gap of three or four days between entries continuing over the next three months.

T3 reported that the technology became a medium around which the client, therapist and parents could have conversations about his mood. She reported that the *MMD* was “Very Helpful” to this intervention (where 1= “Very Helpful” and 5= “Very Unhelpful”). She reported that her client found the *MMD* “Very interesting” (where 1= “Very Interesting” and 5= “Very Boring”). She found the *MMD* “Easy” to use (where 1= “Very Easy” and 5= “Very Difficult”). She required help from therapist 1 to give her confidence to start using it initially. Overall, she reported that “*The overall outcome for this client using Mood Diary on their mobile was generally very positive despite severe complexity at the start of referral.*”

Client 5

The screenshot shows the 'Mood Diary' web application interface. At the top, there is a yellow header with the text 'Mood Diary - record your moods on the move'. Below the header, there are navigation links: 'View Chart', 'Set Reminder', 'Cancel Reminder', 'Record Mood', and 'Logout'. The main content area is titled 'Record your mood' and contains the following text: 'Please record your mood, energy, sleep and diary entry below. Click Finished when you're done.' There are three input fields with dropdown menus: 'How do you feel today?' (set to 3), 'How much energy do you have?' (set to 8), and 'How many hours did you sleep last night?' (set to 9). Below these is a text area for 'My Diary - Please write how you feel today.' with the text 'I feel great today!' entered. A 'Finished' button is located at the bottom left of the form.

Figure 6.12 Online Mood Recording

T1 asked if it was possible to submit moods online. He had a 17 year old female client who wanted to try the Mood Diary but had poor mobile phone network coverage in her area. She was at risk of self-harming. She used her family laptop to record moods. T3 reported that the client was initially concerned about confidentiality in relation to her parents because she was using the home laptop.

The client made 25 entries over 120 days. This represents relatively low compliance, although the client did get into a pattern of use, making entries typically 3 to 4 days apart. This client did not set up a reminder message to be sent to her phone, although with the poor network coverage it might not have been effective in any case. For most textual entries (90%), this

client entered a textual description of how she was feeling. Many of these entries are longer, and more closely resemble sentences, than entries on mobile phones from other clients.

On the outside, this client was “a bubbly character”. According to the therapist, the Mood Diary was helpful engaging the client, but also helped improve communications between the client and her parent, who had only seen a few of her anger outbursts. The graphs were useful for the parent, who was able to mentally match moods with dates and remember the details of different situations. The graphs helped both parents to see that there was a struggle and low mood behind her aggressive moods.

Anger Diary

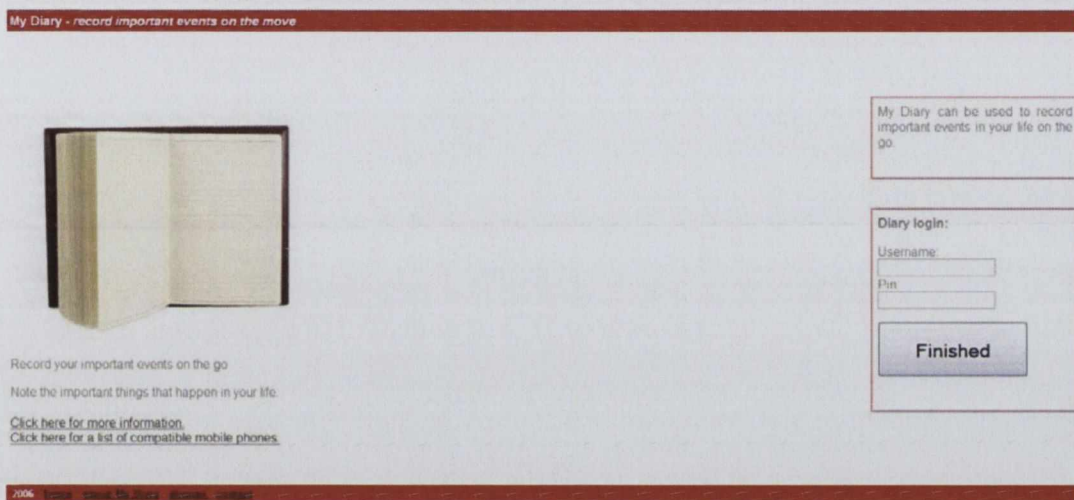


Figure 6.13 Online Anger Diary

T3 used paper anger diaries when working with young people on anger control. She usually asked clients to keep a record of their anger for two weeks prior to participating in a group session. There was very poor compliance with these diaries:

“In my clinical experience with Anger Management over 20 years now I have found it almost impossible to get Anger Diaries recorded by clients out of session....most often there is very poor compliance so we end up completing retrospective diaries which are less accurate.”

She thought it would be worth exploring if adolescent clients would be more willing to complete an anger diary on their mobile phones. This therapist already had an existing template for recording anger events. It was proposed to create an anger diary very similar to the mood diary. The main elements of the diary were:

- Date and Time
- Where were you?
- Who was there?
- What was happening before?
- What were you thinking?
- How angry did you feel?
- From 1 (No Anger) to 10 (Very Angry)
- How much control (of your anger) did you have?
- From 1 (No control) to 10 (Full Control)
- What did you do?

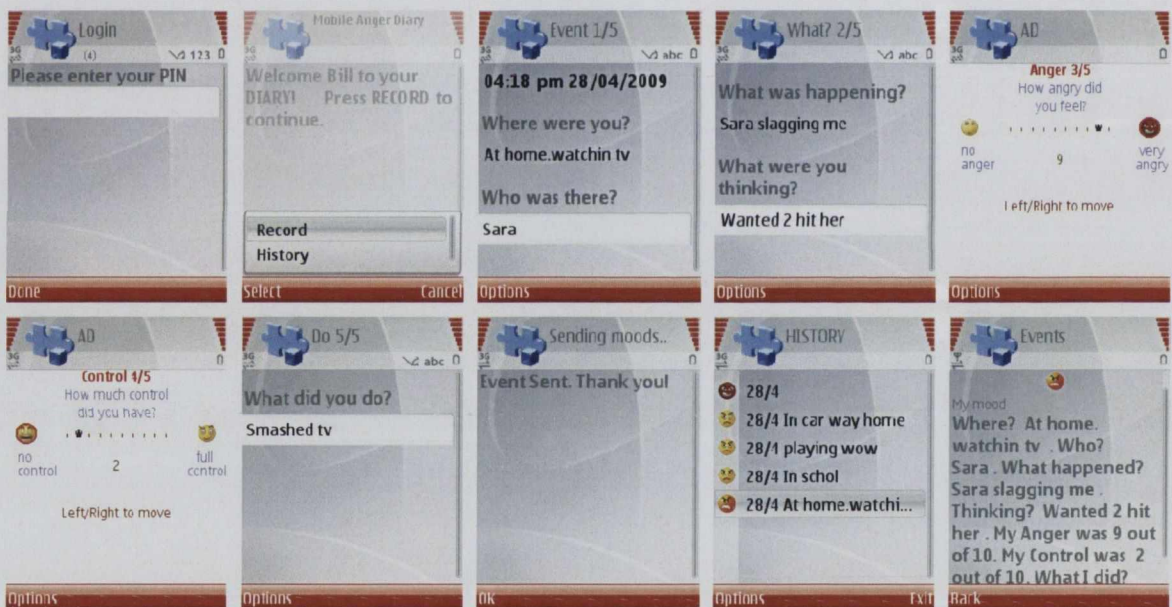


Figure 6.14 Anger Diary mobile screens

These details formed the basis of the mobile version of the anger diary (see <http://www.myangerchart.com>). They were distributed across five screens in the form of text entry elements and scale elements (see **Figure 6.13**). A balance had to be struck between on one hand fitting all elements onscreen without the necessity, on most mobile handsets, for scrolling and on the other hand of not having too many mobile screens, which might make the task of charting an anger event seem unduly involved. Screen one was labelled 'Event 1/5' and includes a date/time element, and two text entry fields: 'Where were you?' and 'Who was there?' This date element is initialized at the current time to make it easier for

clients to enter an accurate time. Screen two is labelled 'What? 2/5' and includes two text entry elements: 'What was happening?', 'What were you thinking?' Screen three is labelled 'Anger 3/5' and includes a scale element for levels of anger. Screen four is labelled 'Control 4/5' and includes a scale element of control levels. Screen five is labelled 'Do 5/5' and comprises one text entry element: 'What did you do?' It was also possible to record anger events online.

Client 8

T3 and T1 used the Anger Diary together with a client that they were already seeing. This client had Asperger's Syndrome, and consequently had difficulties with social interaction. She was 18 years old and was very connected with her phone and technology in general. She used the diary as part of an anger management programme. All of the sessions were jointly held with at least of one of the client's parents.

This client used the diary over two weeks (15 days). A reminder was sent daily with the message 'Record diary on my phone'. There was no daily protocol to record anger levels. The client was asked to record any anger events that happened just after they occurred. Compliance can not be judged on a daily basis because of the irregularity of anger outbursts. In total the client made 4 entries over 15 days. The anger diary has scope for more textual information than the mood diary. This client entered detailed entries for anger events. She reported four anger events over the 15 days. **Table 6.10** shows the reported event date, the timestamped date when the event was recorded and the difference in times. The events are all recorded very close to the reported event time. If the reported event date can be relied upon, then the client made all records of anger events very shortly after they occurred. This means the client recorded the event while the details of the event were still fresh in their mind and potentially her anger levels were closer to how they were at the time of the event. The major benefit of this would be that this method would avoid retrospective recall.

Event	Reported	Event recorded	Difference in times
1.	22:30:00	22:44:44	14 minutes 44 seconds
2.	17:45:00	18:04:02	19 minutes 2 seconds
3.	18:30:00	19:07:06	37 minutes 6 seconds
4.	19:30:00	19:48:21	18 minutes 21 seconds

Table 6.10 Anger event times

It was possible with this evaluation to recover questionnaire feedback from the client and from the client's parents, as well as from T1 and T4. The client reported that she used the diary mostly at home. She labelled it as "very easy" to remember to record the diary because she received a daily SMS reminder. She found the diary interesting, particularly the layout. She thought the diary was helpful (where 5="very helpful" and 1="Very unhelpful") *"because it is on my phone and I got messages to remember to record the diary"*. She rated it as "easy" (where "Very Easy" = 5 and "Very Difficult" = 1): *"Just text what happened that day and recorded on my phone"*. She reported having sufficient privacy when recording an entry on the diary - *"Because I go to a quiet place in the house to record my diary"*. She was also satisfied with the level of security - *"Because only I had my own username and password to access my anger diary"*. She reported the website as "very interesting" (where "very interesting" = 5 and "very boring" = 1), mentioning the graphs on the website as particularly interesting. The website was "very helpful" - *"to see what was happening with my moods"*. She thought that mobile phone was the best (or at least preferred) method for recording anger events and said she would recommend it to other clients in similar situations.

The parents of this client reported that she found it "very easy" to remember to record her diary because of the reminder. They thought the diary was "interesting" to the client (where "very interesting" = 5 and "very boring" = 1): *"Very interesting to observe the pattern"*. They rated the diary was "Helpful" (where 5="very helpful" and 1="Very unhelpful"). They rated it as "Very Easy" for the client to use. They thought it provided sufficient security and privacy because of the password on the diary. Similar to the client, they thought the graphs were the best element of the website. They added - *"I think it is an excellent concept especially for teens and young people and anyone who is overwhelmed by too many words."*

T1 reported that the diary was very useful and that the data collected was very useful. Overall he believed the intervention with the diary went "very well". He believed that it gave the client a sense of competence because of the use of technology with which she had a lot of confidence.

T3, who had more professional experience with the anger diary, provided more detail of her use of the diary with the client. She reported that the client was "very interested" in the technology. She believed the reminders on the phone "assisted" the client. She added that *"the fact that they could 'journal' the experience without having to discuss it with anyone there... may have also been a therapeutic process."* The client "seemed to enjoy getting printouts and they were useful for the therapy sessions". This client had particularly supportive parents, and therapist 3 believed that they were a factor in the success of the

intervention: *“our client had very motivated parents....so I expect that there was pro-active support from the parents to do the recording”*. In relation to privacy, therapist 3 commented *“in relation to anger and conflict, clients are anxious regarding the privacy and confidentiality of hard copy- your system removes this as the password protects confidentiality.”*

T3 had recent experience of trying to use a paper anger diary with clients. The Anger Diary was a direct implementation of this diary. This gave therapist 3 a good perspective on the comparison of the two methods. She commented that she was *“encouraged that the friendliness and accessibility of the 'Anger Diary' system could be a more powerful way of gaining diary records than paper records”*. She summarised:

(The) client was particularly thorough in their use of the mood anger diary and this meant that a comprehensive log was maintained for interventions during sessions. I have worked for 20 years in the field and never got such recording compliance.

6.6. Discussion

This section discusses the design and evaluation of *MMD* system several perspectives. It discusses emerging issues from these evaluations and discusses the effectiveness of as a clinical tool for recording moods.

6.6.1. Usability, Engagement and Suitability of *MMD*

The compliance rate was the primary evaluation statistic for the clinical pilot. It can be used in conjunction with therapist feedback on the intervention to assess the appeal and success of *MMD*. Both the school and clinical studies provided evidence that compliance was higher with *MMD* than paper-based mood charting materials. Indeed the compliance rate for the clinical pilot, 55% was very close to the overall compliance rate from the school study, which was 58%. In the clinical pilots, even relatively low compliance rates for some clients of between 20%-35% were higher than expected compliance for paper charts.

No significant usability problems were encountered during the clinical pilot. Stage 1 usability evaluations were apparently successful at identifying usability issues. Stage 2 mainly helped to evaluate the appeal of the mood diary to peer users, to address whether the ‘capture now – analyse later’ model fit into their daily lives and to develop protocols for introducing the *MMD* to clients. In the clinical pilot, the level of compliance would that *MMD* fit successfully into clients’ lives outside of therapy. There seemed to be acceptance of the model. The use of clients’ personal mobile phones would seem to have been an important factor. It allowed clients to incorporate *MMD* into their lives. All therapists agreed that the mobile would be

their preferred method for recording moods. T1 reported that the use of the mobile phone helped engage client 1 in the task. For client 4 the use of the mobile phone was an important element. Client 8 found the anger diary particularly helpful because it was on her mobile phone. The use of the mobile phone may have provided clients with more control over their problem. Client 2 had previously not recorded mood entries himself, but was able to do so very effectively (75% compliance rate) using *MMD*. Mobile *MMD* tool appears to have provided sufficient privacy for clinical end-users. For example client 8 reported that she could go and complete the diary discreetly somewhere quiet in the house.

The desktop *MMD* appears to have fit into therapists' existing work practices. *MMD* was rated as "Very Easy" or "Easy" to use by all therapists. Therapists, two of whom had very little confidence using technology, were able to install and use *MMD* with no direct assistance.

Overall, these findings suggest that the concept of recording moods on clients' phones is feasible and can improve clients' compliance and potentially improve their engagement in therapeutic sessions. *MMD* was useful, usable and used by clients (and therapists) of various ages and with a wide range of mental health problems, in different clinical situations. Even in the clinical cases with low compliance relative to other clients, it is most likely higher than that which would be expected from paper charts. While no training was provided to clients at Stage 2 and Stage 3, both compliance rates were over 55%. *MMD* was well accepted by both clients and therapists.

6.6.2. Effectiveness of Multi-Stage Evaluations

A significant advantage of the two first stages of evaluation was that the procedures, protocols and data analysis techniques were pinned down before clinical pilots began. In the evaluation of the *MMD*, the school study raised a number of practical issues. For example, it became clear that it was important to develop fallback options in case the software did not work on a participant's phone which could result in them feeling left out. It also became clear, after the first two stages, that the manner in which the evaluation study would be presented to therapists and clients was critical. For example, when introducing the software to therapists interested in participating in trials, it would be important to make it clear that *MMD* would not draw the therapist into two-way communication with clients.

By the clinical stage, *MMD* had been evaluated with a large number of adolescents. Stage 2 provided justification to proceed to clinical pilots. This was particularly important with the evaluation of a mobile tool which was an unfamiliar element in traditional therapy. The school study provided good statistical data for the appeal and effectiveness of the mobile

software. It also provided confidence in the likely outcomes at the clinical stage of evaluation. This study was an important element in convincing therapists (often initially skeptical) to participate in evaluation. The favourable comparison of existing paper methods to the mobile phone approach, provided evidence to therapists that this new approach could be clinically effective. More importantly, it was clear from the study that *MMD* was a client-centred approach; most adolescents signalled their preference for mobile phone charting over paper. Stage 3 evaluations provided evidence that *MMD* was ready for clinical usage. Overall, compliance levels were very high. There were few usability errors that could have been avoided. The pilot provided feedback from clinical usage that allowed designers to make adjustments to make *MMD* more suitable to future clinical use. T1 gave feedback in his use of the *MMD* with several clients that *"in all cases, it added to it"*. Specifically, he reported that it *"helped engage clients on task and keep them focused."* He also reported that using *MMD* system, created the impression that therapy was *"modern and up-to-date"*.

6.6.3. Therapists personal use of the system

During evaluations, many therapists used the system personally and provided informal feedback to the designer. Some therapists tested the tool themselves and gave feedback because they did not have any suitable clients at the time. This helped provide feedback across different therapeutic practices and from various professional perspectives. Therapists who intended to use the system with clients tried it themselves in order to build up their confidence using it in clinical situations. It may be possible to formalize this process in order to provide more weight to the therapeutic suitability of a system. Involving therapists in formal reviews could also help to speed up the time taken to conduct evaluations.

6.6.4. Emerging Issues

Reminders

The SMS reminders were important in some cases, judging by mood entries times in comparison to reminder times. In the case of client 3, according to the therapist, it was key that she received the reminder on the same device they used to record their moods. Some clients did not use SMS reminders and yet their compliance was excellent. For others who did there was no significant relation between the reminder time and the time they recorded their mood entries.

Importance and potential of graph

The online graph, and the ability to print it out, was central to the success of the mood diary in clinical sessions: *“the printouts were very helpful.....the graph was really useful, it saved the therapist time entering it”*. T1 often printed the graph with the client at the very beginning of the session. He encouraged clients to share the printouts with parents and with collaborating psychiatrists. With the client’s permission, these printouts were used in team meetings when discussing client cases.

The evaluations of *Personal Investigator* underlined the importance of printouts in AMH. There is a legacy of paper in AMH. Therapists are still required write their case notes by hand, clients predominantly have to do their homework by hand.

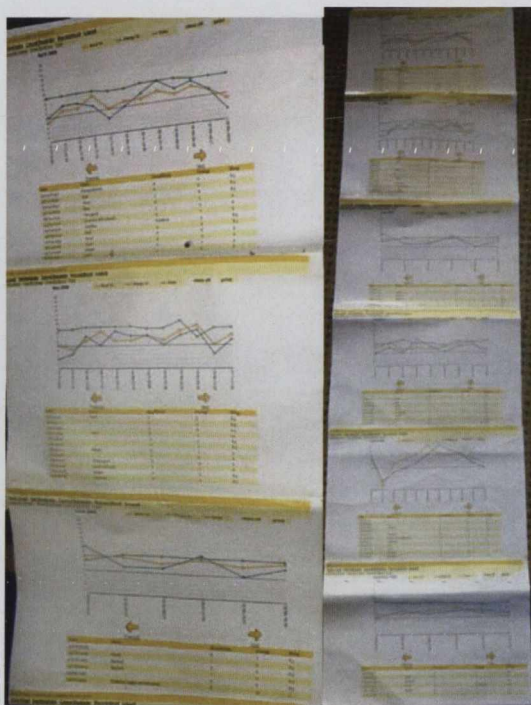


Figure 6.15 Graph Printouts

The paper printouts provided clients with tangible records of their moods. Most clients were comfortable showing their graph printouts to their parents. In some cases, they provided a stepping stone to discussing the client’s feelings with parents and helped parents see what was going on emotionally with their children. T1 sellotaped all of one client’s printed graphs together as a record of his mood history. This indicates that the desktop *MMD* could more explicitly support analysis. T1 suggested that more detailed analysis of the data be possible:

“With current client we could see how he had improved overall from April to May. It would be useful to compare the means from each month to show that he was improving a bit. I could see myself from the chart that he was improving by half or 1

mood point. Yes maybe we could add this to the printout as well, summary numbers for the week or month.”

He suggested that the average for each client across all variables be available on graphs. Several clients and parents suggested that they would have found weekly and monthly reports based on the graphed data useful. It was suggested by one therapist to provide basic graphs on the mobile phone. In situations where the client did not have mobile phone credit and consequently could not send mood information to the online system, it would be possible to use the handset as a shared device. Additionally, similar way to a weekly report, it may have the potential to provide the client with an overview of their status between sessions. This feature was added to the mobile *MMD* during the clinical pilot (**Figure 6.16**), although sufficient feedback has not been obtained to make any conclusions on its use.

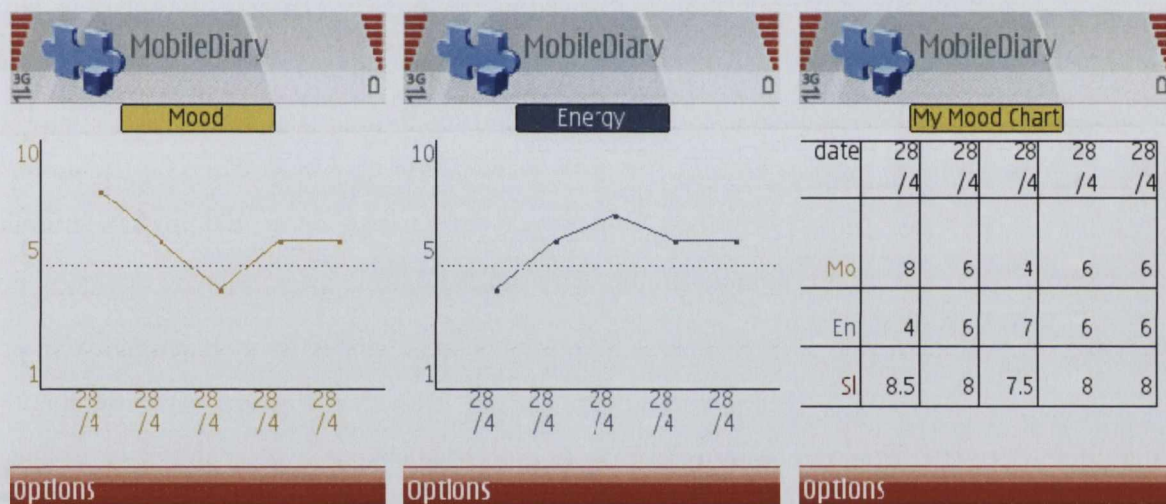


Figure 6.16 Graph screens added to the mobile *MMD*

Technology as an ice breaker

Sometimes simply introducing client-centred materials into a session can have a positive effect on the therapeutic alliance:

“Good ice breaker makes therapy a little less threatening. Young people not used to walking in and talking to a stranger about their problems.”

One therapist commented that introducing a mobile phone with his client was enough to break barriers down:

“I’m 56 – and appear old to most clients – for me to have something that they are comfortable with (mobile phones) opened up the conversation –they are comfortable

talking about their mobile phones - they do it with peers. Clients found it very engaging."

In the clinical pilot, the therapist's use of a technological tool in itself represented a step into the client's world. This supports earlier findings from *PI* that simply introducing the game into therapy was beneficial. It may have helped relax clients by using a medium in which they have a strong interest and in which they are often more expert than the therapists. For some clients the use of the mobile phone may have had the effect of making therapy (and the therapist) seem up-to-date and relevant.

Provide wide access

The evaluations of *MMD* underlined the importance of providing multiple access points, across different platforms, through which clients can engage with therapeutic services. Not every client will have a mobile phone or access to a computer. At Stage two, 5% of respondents would have preferred to use a paper chart. At stage three, one client declined to use the mobile phone because he said "*he did not like using his phone when he felt down*". Another did not want her mobile phone "*connected*" to therapy. Client 5 did not have mobile coverage in her area, but was able to use the desktop *MMD*.

It is important to provide multiple access points to clients engaged in therapeutic activities. This provides them with the opportunity to choose how they engage with therapeutic materials. A comprehensive charting system should provide clients with a choice of a paper, mobile phone and desktop mood chart.

Privacy and confidentiality

Some issues only emerged during the clinical pilot. This is particularly the case with issues related to privacy. Although several end-users were concerned about privacy during Stage 2 evaluations, this related exclusively to the need for a security PIN for mobile *MMD*.

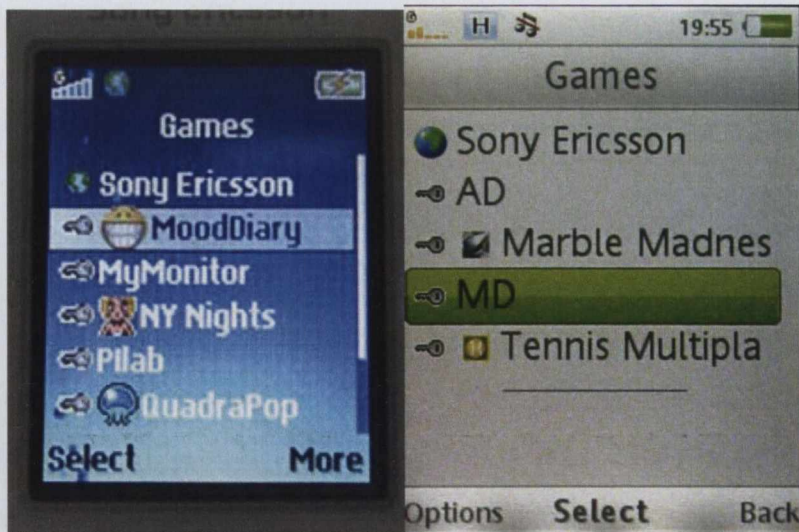


Figure 6.17 Original *MMD* screen vs. modified *MMD* screen

While the mobile phone seemed to provide sufficient privacy for clinical end-users, there were some issues at the early stages of the clinical pilot. Three therapists reported that some clients had a problem with the 'Mood Diary' title of the *MMD* tool on their phone and in fewer cases with the emoticon icon (see **Figure 6.17**). One therapist reported that: *"one 16 yr old would not install diary because her friends sometimes use her phone and she is afraid they will see application named 'mood diary'."* Two clients declined to use the mobile *MMD* because they were concerned about confidentiality on the phones: *"A very small group of clients were concerned about confidentiality. Young people hand each other their phones – clients were concerned they would notice something."*

Three participating therapists agreed that it was important to change the name of the tool to 'MD'; *"MD is important as opposed to MoodDiary."* *MMD* was accordingly modified to remove the emoticon icon and to shorten the title to 'MD', which was meaningful to clients but meaningless to peers. Once this change was made, no more privacy issues were reported. The design of the Anger Diary mirrored these changes.

This issue illustrates the need for therapeutic systems to provide clients with complete privacy. It should not be possible to decipher from the outside of a system what it is to be used for. This is particularly important for mobile therapeutic tools, since peers often share their phones with each other.

Potential of logging

The clinical pilot underlined the difficulty in receiving direct feedback from participating clients. While therapist feedback can go some way to providing the impact of the tool on the client and the intervention, other methods should be explored to supplement this

information. The use of application logging holds promise to providing client interaction information that would otherwise not be possible to capture. The clinical pilot provided an initial idea of the potential benefits of even relatively sparse logging information. In the limited logging of other client cases, even basic information like the time a mood was recorded and the time it was sent at can provide interesting information. In the future, mobile devices will be able to record more detailed interaction information without perceptible performance impact on the system. Future therapeutic systems should explore the potential of application logging.

Examine cases that do not work

Lessons can be learned from situations where the software did not work. Stage 3 evaluations involved some therapists who had clients who declined to use the diary.

For example, therapist 1 had a client who was ready to use the Mood Diary, but never got round to using it. Parental permission forms had been signed and the client was willing to use the diary. However, although an account had been setup, the client never made a single entry. On further investigation, T1 said that there were problems connecting to the mobile network at home and the client's home area had no broadband access in her local area. Exploring why *MMD* was not used in this instance identified a need to provide a range of mood charting options to clients (i.e. paper, mobile, online) and to provide additional methods for data transfer from client's mobile phone. If it were possible to transmit the data in the therapist's office, this would successfully overcome credit issues and network coverage. The client could record moods between sessions and then transfer them in a session.

Exploring further cases where the *MMD* was not used revealed useful information. For example, one therapist had identified a suitable client for the *MMD* but discovered his feelings for his phone changed when he was down and consequently declined to use the *MMD*.

"A 17 year old male I had earmarked didn't want to do it because he can't tolerate his phone when depressed."

A therapist had a female client aged 16 who was interested in using the mobile diary. However, she was very concerned that if someone looked into her phone "*into the games they'd see the mood diary*" – even if they could not get into it. T1 came across a similar problem with a 16 year old female client, who would not install the diary because her friends sometimes used her phone. She was afraid "*they might see an application named 'mood*

diary". As reported earlier, this information led directly to the immediate modification of the mobile *MMD*.

Importance of language

Some issues were identified which had not been encountered in the earlier stages. T1 experienced a difficulty in his work with client 2. Several entries on the desktop *MMD*, the client's diary entries were labelled 'empty'. The therapist was not sure if the client felt 'empty' or if it meant the client had not recorded a value for that element. The dilemma in this situation was to add a value in the text area for all entries where no entry was made. This could be a value like 'no entry' or just 'n/a'. This issue highlights the importance of language when giving textual feedback in mental health software. In such cases, words like 'empty' and 'blank' can have different meanings than they would in other areas. This instance underlines the importance of sensitivity when choosing the language used throughout the system. This is an example of an issue that is unlikely to emerge at earlier stages in the evaluation cycle.

6.7. Limitations and future work

The single greatest barrier to client participation in the clinical pilot was therapists' difficulty installing the mobile *MMD*. Many therapists found the installation intimidating and because of this never took part in clinical evaluations. This was one of the unavoidable drawbacks of using clients' phones. If mobile phones were provided to clients, it would have been possible to pre-load the handsets with the software. It could be possible to create a system for future systems which could install the software directly from the therapist's desktop computer. The advantage of this approach would be that it would not use the client's mobile phone credit.

Another limitation of *MMD* was that it provided no alternative to http for the transmission of mood information from the handset. Although, all java phones are supposed to support http transmission, this was not always the case. This could be due to the fact that many adolescent phones have been handed down from parents and siblings. Often adolescents are on a different mobile network, but never entered new HTTP settings on the handset. Although this did not occur in the clinical pilots, it could result in a situation where the client could not transmit mood information from the mobile phone. The solution would be to provide multiple options for the transfer of information from the mobile *MMD*. These would include Bluetooth, infrared and SMS transmission of content.

During the clinical pilot, various changes were either suggested by clients and therapists, or it became evident to the design team that they were necessary. These changes were implemented immediately. They included:

- Adding an average line to mood ratings
- Setting mood and energy on graph as default with an option for 'Sleep'
- Changed the title of the software on the phone from Mood Diary to MD
- Added graph on to phone
- Printing for older computers was standardized

Further suggested improvements that were not implemented but could be in a future version include:

- Allow the user to exit from anywhere in the mobile *MMD* at the press of the button.
- Sending moods in therapeutic session using Bluetooth [as an option]
- Provide the client with a weekly/monthly SMS report including summaries of their mood levels and statements to encourage the client to continue recording their mood.
- Allow clients to queue up variable reminders for different days of the week.

6.7.1. Limits to Multi-Stage Evaluations

Although the evaluation approach was largely successful in overcoming the restrictions facing the designer, in this instance there were certain elements that could be improved. Stage 1 and Stage 2 of evaluations, while useful, did not provide a thorough evaluation of the entire *MMD* system. This was because none of the participants had any incentive to view the entries they were recording. This meant that by Stage 3, the desktop *MMD* had only been evaluated with therapists and not with adolescent proxies. There is a need to develop some way of testing the entire system. It could be possible in future evaluations to adapt the therapeutic system slightly so that the entire system could be used meaningfully by peer users. Chapter 7 will present a case study of such a modified approach to evaluations.

Finally, while the clinical pilot of Stage 3 was successful, it was resource intensive, of unpredictable duration and took a long time. Future iterations should seek to identify any methods to speed up evaluations at this stage. For example, it may be possible to make more use of more formal critical reviews from therapists. This might encourage more therapists to use the system, but also provide more evidence and confidence in its therapeutic suitability.

6.7.2. An Extensible Diary System

I think the mood diary is a brilliant concept to assist in recording feelings and issues for clients. I think it could be adapted very easily for a wider range of issues/goals/progress charting. I would be interested in exploring this further in relation to CBT interventions.

T3

In principle, an adaptable *MMD* system, which allows therapists and clients to tailor charts to their own needs, is feasible. The evaluations of *MMD* confirmed that such a system could be useful. This supports Coyle et. al's recommendations for therapeutic systems to be adaptable (Coyle, Doherty, Sharry et al., 2007). In one clinical pilot, the therapist agreed with the client to use the mood diary to record elements other than sleep, energy and textual comments. Instead he had the client to record his level of worry in the morning (on a scale of 1-10) instead of energy, if he had a hard time instead of how much sleep he had, if he cried instead of recording his thoughts (on a scale of 1-10) and finally used the existing mood screen to record mood. For the 'cried' element he also recorded where he was when it occurred.

This points to a need for the diary to be easily modified by the therapist. This was a reoccurring theme. Several therapists highlighted the potential for a generic diary that would allow the therapist to alter which variables the diary monitored. T1's adaptation of *MMD* and T3's development and use of the Anger Diary signals a need for a more flexible diary system that could allow therapists to modify and create their own diaries. The development of the Anger Diary also demonstrated the potential to modify therapeutic systems once they have reached Stage 3 of development.

A generic chart would provide facilities for therapist and client to agree extra variables. It would expand the usefulness of the charts to a far wider range of mental health problems. They could be used for example to monitor anger outbursts, diabetic readings, study time, physical exercise, anxiety levels and so on. Deciding what they could decide between scales, text entry and other elements. This content would then be sent to the website for viewing.

7. Case Study: *My Mobile Story*

This chapter implements the *Client-Centred Design* approach set out in Chapter 5. It seeks to address some of the limitations of the evaluation process highlighted in Chapter 6. For example, the full system was not tested by users until the clinical trials and the clinical pilot was time intensive. The chapter describes the design of a system to support therapeutic storytelling. This case study also explores the suitability of a “capture now – analyse later” model in the design of another therapeutic system. *My Mobile Story* is designed to support clients in the collection of storytelling content on their mobile phones and the structuring of this content on a desktop computer.

The system in question aims to support emerging therapeutic practice. Specifically, it is intended to support a series of therapeutic approaches and because of this it is more open-ended than *Mobile Mood Diary*. The case study explores the use and the potential of multimedia content for AMH.

7.1. Personal Storytelling

7.1.1. Therapeutic Storytelling and Narrative Therapy

Many different forms of psychotherapy use storytelling (Rosen, 1982; Wigren, 1994). Indeed psychotherapy can be seen as the reconstruction of the clients’s view of themselves, their personal identify, by the re-telling of their personal story. Personal stories 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, 1990). 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 (White et al., 1990). Within a strengths-based approach to psychotherapy the process can be conceived as helping clients shift from initially self-limiting and problem focused accounts of their lives to more positive and strengths-oriented accounts that are more liberating and empowering (Sharry, 2001, 2004). For example, a person may begin psychotherapy by telling the story of how he became depressed and how this damages his life and end therapy with a ‘new’ story of how he has coped with the depression and how this leads to new possibilities in his life. Engaging children or adolescents to tell their story through direct dialogue is not straightforward and the

therapeutic process can become blocked. Whereas for adults dialogue is the favoured means of communication, children and adolescents often struggle to express themselves with words alone.

Recently, there has been some research into technology-based storytelling materials and tools for use in clinical settings. *Working Things Out* is a DVD collection of stories from young people who experienced mental health problems. It was designed to help other young people in similar situations (Brosnan et al., 2006). *Transforming Stories* is an online multimedia toolkit for clinical use with children and adolescents. The software provides a repository of 2D animations that clients can use with their therapists to tell a story. Clients can choose characters, props and emotional expressions to tell a story. Story templates are also provided. They are encouraged to build up a story through a series of scenes. The final animation can be viewed back, changed and shared with others (Brosnan et al., 2006).

Various studies have shown the benefits of computer games and virtual environments to encourage storytelling and personal narratives in educational settings. *MOOSE Crossing* (Bruckman, 1997), a text based virtual world, demonstrated that engaging children in writing interactive fiction could be extremely motivating. *Ghostwriter* (Robertson, 2001; Robertson et al., 2002) is an interactive virtual reality role-play game specifically designed to engage young people in educational drama and improve their story writing skills. Trials showed that young people were motivated by and remained focused on their tasks while playing the game. Players formed relationships with each other through the process. There were reported beneficial effects for self-esteem. A further study (Robertson et al., 2004) investigated storytelling skills with children as producers of computer games.

A workshop was conducted in which a group of adolescents were given the opportunity to build their own interactive 3D role-playing game. Using this graphical format, adolescents were able to create narratives, plotlines, characters and settings without being completely reliant on writing skills. Adolescents found the process engaging and rewarding and showed an ability to develop sophisticated game narratives.

7.1.2. Constructing Identities

Marina Umaschi Bers has coined the term *Identity Construction Environments* to describe the constructionist computer tools she has developed for exploring personal and moral values and personal identity within community environments (Bers, 2001; Bers et al., 2003). In *Zora*, a narrative based graphical virtual world, Bers investigated the use of constructed 3D communities as a tool for exploring personal identity in adolescents. All 3D objects created within *Zora* virtual communities have associated stories. *Zora* demonstrated the potential of

a constructionist 3D graphical world to engage and support adolescents in personal reflection, self-discovery and identity formation. The system demonstrated positive health care benefits in a pilot study in the Paediatric Dialysis Unit of Boston's Children's Hospital.

Lifelogging is the self-recording of a person's life, generally for personal use. Recently, it has been used to refer more specifically to recordings in digital formats. Lifelogs can consist of text, photographs, videos, sounds, geographical location information and biometric data, on their own or in combination.

Some individuals already use the mobile phone to document their life and their reflections. In their study of camera phone use in Japan, (Ito et al., 2005) have delineated the social use of the mobile phone's camera into the following categories: 1) personal archiving, which includes note taking and photos of everyday life, 2) "*intimate shared visual co-presence*", the providing a friend in a different location with a view of your present world by sending pictures to their mobile, and 3) the reporting of peer to peer news. Okabe writes: "*most photos taken by the camera phone are not sent or shown to others, but are captured more as a personal visual archive. Camera phones enable personal visual archiving and authoring, a street level everyday visual viewpoint*" (Okabe, 2004). According to Okabe, these types of photos only have meaning to the individual, "*a quality that makes them even more valuable as a resource for identity construction*" (Okabe, 2004). Consequently, they see the camera phone as a tool that can archive a "*personal trajectory or viewpoint of the world*", "*a new kind of everyday storytelling*" (Ito et al., 2005).

7.1.3. Improving Recall

Certain types of diaries have been shown to improve recall. (Eldridge et al., 1991) compared the use of text diaries to video diaries in terms of their ability to increase an individual's recall. They found that, while both methods improved recall, video diaries were more effective. (Hodges et al., 2006) have identified potential benefits to using personal visual diaries in healthcare, including their use in constructing personal stories, additional healthcare benefits for medical professionals and patients, and security benefits. (Vermuri et al., 2004) have provided initial evidence for the ability of audiotaped conversations to improve recall. (Carter et al., 2005) explored the potential of multimedia to support recall. Their study involved seven participants who collected photos, environmental sounds and tangible objects to recall an event. They reported that photographs were the most effective for supporting an individual's recall.

Microsoft Research has developed SenseCam, a digital camera worn around an individual's neck which automatically takes photographs throughout the day (Gemmell et al.). MyLifeBits

is a research project that makes use of the SenseCam as memory aid for Alzheimer sufferers. (Berry et al., 2007) have reported that the use of Sensecam pictures improved autobiographical memory for one patient with severe memory impairment. The subject had a greater recall of recent events after viewing Sensecam pictures, compared to recall when using only a written diary.

7.1.4. Social Closeness & Therapeutic Alliance

A digital therapeutic storytelling tool may help the development of the therapeutic alliance between client and therapist. (Allen et al., 2007) designed a digital Remnant Life Book for individuals with aphasia. Typically, a ring binder is used with pages of text, images and other artefacts. Sharing this book helped to create closeness between individuals. The aim of the digital book was to allow users to collect photographs, movies and sounds that they could share with others on a portable device. This digital version had several benefits. It made collection of content much easier and made the book itself more portable, and therefore easier to share: *“the ability to share personally meaningful photographs supports a wider range of communication goals, including social closeness , than systems that only support needs and wants”*(Allen et al., 2007).

7.2. *My Mobile Story*: supporting therapeutic storytelling

My Mobile Story aims to support elements of existing and emergent therapeutic practice. A mobile therapeutic storytelling system might facilitate identity construction through the client’s expression of their *“personal trajectory or viewpoint of the world”* as described by (Ito et al., 2005). In addition, the use of multimedia might support client’s recall of events between session. Finally, a shared therapeutic storytelling system might help to develop the therapeutic alliance by developing the *“social closeness”* reported by (Allen et al., 2007). (Oksman et al., 2004) have reported that mobile communication is an important means for young people in setting out their personal space.

As in the development of the *MMD*, the design team for this project was made up of the designer, a HCI specialist who was supervisor to this thesis, and a practicing therapist. This therapist formed part of the design team for the entire duration of the project. He attended design meetings and worked directly with designers.

7.3. Developing Ideas

7.3.1. Emergence from Practice

The initial opportunity for a mobile storytelling system emerged from discussions of current practice amongst several therapists about the informal use of technology in sessions. The mobile phone had begun to be introduced informally and spontaneously by clients as a personal storytelling tool in sessions. In most instances, this was a client-initiated act that led unintentionally to therapeutic conversations. A narrative therapist recalled a time one client was talking about her grandfather and spontaneously took her phone out and showed the therapist a photo of him. This therapist had begun to prompt other clients to use their phone to support discussions about family members. In another case, it was used to play a song the client liked to the therapist. The therapist and client then explored the lyrics of the song, and found them to be therapeutically useful.

Another emerging use of mobile phones in sessions was as a support to discussions to provide more detail or a direct insight into the client's life. A clinical psychologist reported that with several clients, they would be talking about something they liked or something from their life and the client would say "*oh I have it on my mobile*". It would usually be a photograph or a song that they liked.

Alongside this emergent use, *My Mobile Story* was intended to support existing therapeutic practice such as homework activities or personal artefact collection. In clinical sessions, a therapist sometimes asks the client to bring an artefact to a session. Some therapists interviewed reported regularly asking clients to bring artefacts, such as printed photographs of friends or family members, to sessions to be used in therapeutic activities. One therapist was working with a client who had found his father dead. He had asked the client bring in printed photos of himself and his father in happier times. A family therapist when dealing with families that were fighting would also sometimes ask them to bring in photos of happier times. *My Mobile Story* aimed to support this and other personal artefact collection.

The design team saw an opportunity to design a system which would support existing and emerging therapeutic practice in AMH. Clients' mobile phones could support the expression of a personal viewpoint and to share personally meaningful experiences. It was envisioned that *My Mobile Story* would allow clients to bring their therapists into their world. A successful system might have the potential to draw the client into personally meaningful conversations in order to talk about important issues and identify strengths, ultimately perhaps developing the therapeutic relationship.

7.3.2. Identifying Requirements

The initial requirement for the *My Mobile Story* was to provide clients with a space where they could send all their content and to which they alone would have access. The system would receive multimedia files (text, pictures, videos and sounds). This system would allow the client and therapist to view and structure their collected content into some therapeutically meaningful order. This system would need to be able to save and load stories from past sessions, to printout stories and to allow therapists and clients to set up a “mission” message. This message could provide the client with specific artifacts to collect or remind them to collect content.

A high-level design requirement was to provide maximum access for clients to this service. Based on the findings from *MMD*, it was considered important that between sessions *My Mobile Story* be accessible to clients on their mobile phones and on desktop computers.

7.3.3. Choice of technology

Clients’ mobile phones were deemed a suitable device for use to support therapeutic storytelling. Mobile devices are multimedia devices; today even the most basic mobile phone has a camera to record photos and videos, as well as microphones for voice recordings. According to (Jokela et al., 2008), because mobile phones are almost always with the user, this facilitates the capture of interesting events anywhere as they take place.



Figure 7.1 The composition of an MMS message

Multimedia messages were chosen as a medium for transmitting therapeutic content because most adolescents were already familiar with them and they are supported by the majority of phones. Additionally, they do not require therapists to install software which was a major obstacle to the use of the Mood Diary. Nokia’s Lifelog mobile tool manages the collection and transmission of multimedia files from the phone, but it only works on high-end phones. There has been research into the design of mobile phone editors for creating digital stories, see for example (Jokela et al., 2008; M. Frohlich et al., 2009). While this approach may have promise for future therapeutic systems, the principle of accessibility rules it out as option for

current clinical use. Many client phones would not be suitable for such a tool. However, most existing phones have basic in-built editors which allow users to create basic multimedia presentations on their phone and send them via MMS.

For the *Mobile Mood Diary*, it was important that it had a more appealing interface for recording, as well as monitoring past moods. The content for *My Mobile Story* was not considered to be as sensitive as mood information and would not require as strict security measures. It was also hoped that collecting the content itself (rich-media) would be sufficiently appealing to adolescents. Furthermore, some JAVA phones do not allow access to multimedia content recorded by the phone. The use of MMS messages allows users to directly reply to reminder messages that they are sent, making it more convenient to send content back to the website. A practical drawback of using multimedia messages is that it is currently an expensive medium for teenagers to use.

7.4. Development

In the beginning, the HCI specialist and MHP developed rough scenarios depicting how the software could be introduced in a session and how it could support existing therapeutic tasks. This had two purposes. Firstly it highlighted exactly what type of existing therapeutic activities the software could support. Secondly, it provided an idea of the type of functionality and features the software needed to have. Images of the proposed software were created to allow detailed discussion about the design and paper prototypes provided initial simple evaluation scenarios with the MHP. A rapid prototype of the desktop software was then built with the basic range of required functionality. During the building of the software, HCI specialists were consulted at various stages of the software construction.

7.4.1. Paper Prototyping

Paper prototyping of the *My Mobile Story* was used with the therapist on the design team to evaluate an early prototype and discuss design directions. This paper prototype was made up of sticky paper buttons which sat on top of a background screen (see **Figure 7.2**). These elements were easily moved around to allow the therapist to simulate interacting with a real system. This also allowed the therapist and researcher to dynamically alter the design when they were discussing possible changes. The evaluation took place on a table top in the therapist's office, where he usually used his computer with clients.

The therapist was asked to complete several tasks which were representative of how *My Mobile Story* might be used in clinical practice. For example, he was asked to vocalize how he

would bring a picture from the left pane into the book and create a text label for it. The same process was followed for other types of content, video, audio and text. The paper prototype facilitated a good but limited discussion between the designer and therapist about the graphical user interface.

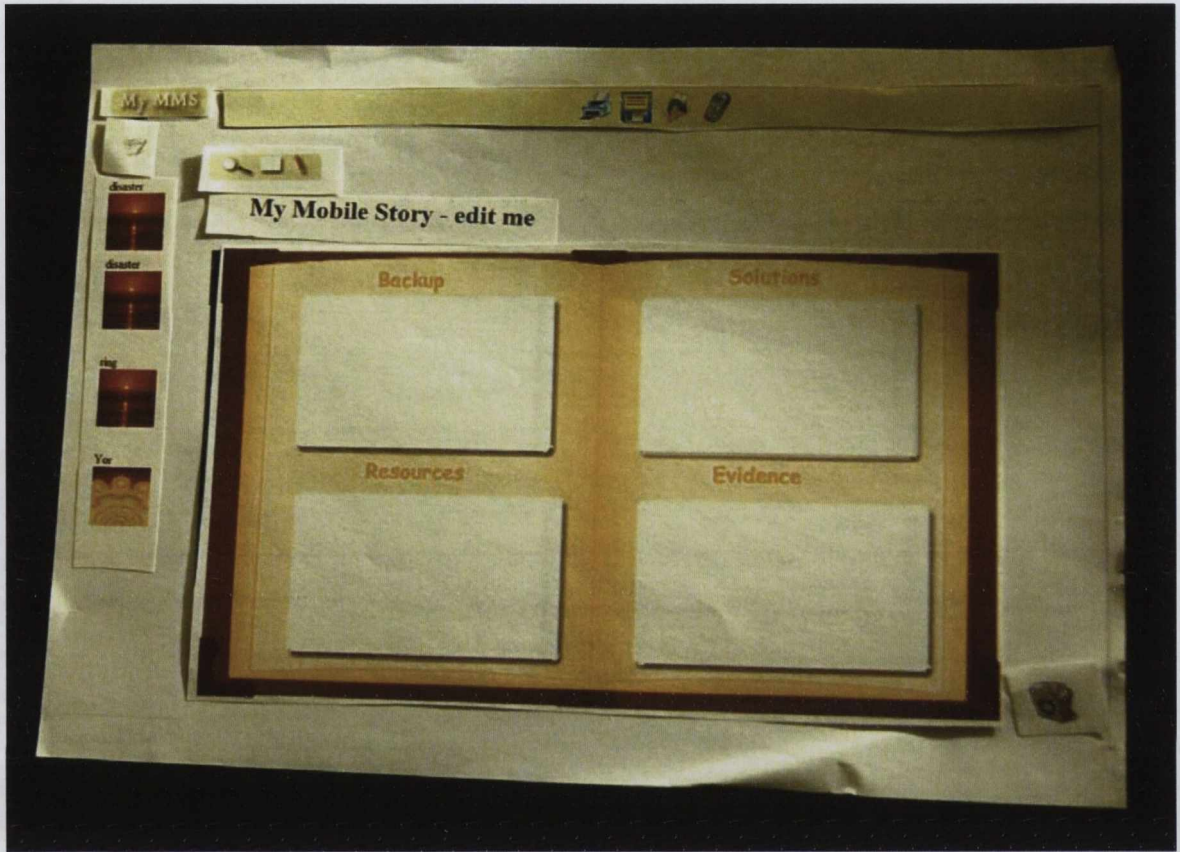


Figure 7.2 Paper prototyping the graphical user interface

7.4.2. Live prototyping

Once a working prototype was complete, an evaluation was undertaken with this therapist. The aim of this session was to evaluate how easily the therapist could use the system. A secondary aim was to develop some seed plans for other therapists. The session took place in the therapist's office using his computer. The designer set the therapist certain tasks, and could observe the therapist using the tool. Clicking on images was not immediately clear to this therapist. He initially tried dragging and dropping them over from the left pane to the right. He then tried clicking on them several times. He had substantial difficulties trying to resize images in the storytelling pane. He had no problem creating and using the labelling system to provide content with titles. Finally, this therapist found some of the names for the drop down therapeutic plans unclear. The findings from this evaluation were used to refine the software further until a fully functioning version was completed and ready for evaluation.

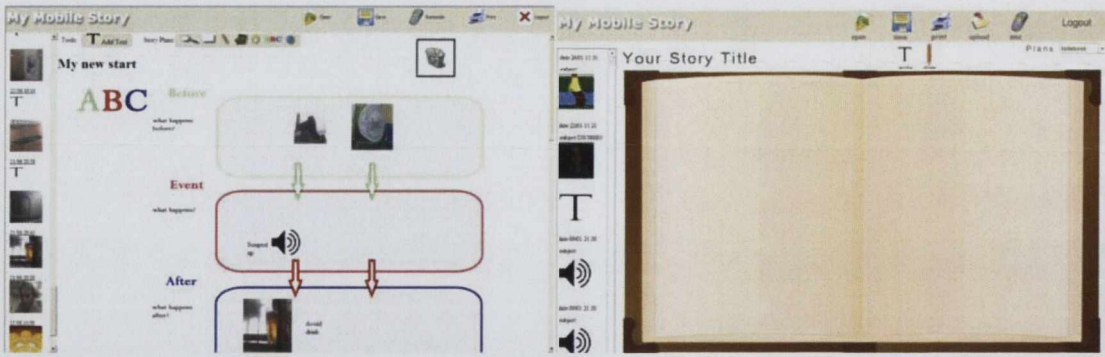


Figure 7.3 Interface changes in *My Mobile Story*

A second live-prototyping session was completed in order to identify any major outstanding issues around therapists incorporating and starting to use the system with clients. This was conducted with a different therapist to the previous session. It took place at the same time Stage 2 evaluations were being completed. The researcher visited the clinical psychologist in his office. The aim of this session was to observe him using the tool to establish if it was easy for him to accomplish basic tasks, discuss how it might fit into his practice and finally to work out a therapeutic plan with him based around his CBT practice. The therapist was given several tasks to complete while being observed. These included: 1) registering himself as a new user with the tool, 2) logging in, 3) sending a sample *My Mobile Story*, 4) creating a basic story. He had no significant difficulties with these tasks. There were technical problems running the video elements through his browser IE5, Windows NT. This therapist considered the capability to use video elements with his client crucial. Because it was not possible to upgrade his browser without upgrading his operating system, substantial backend changes were made to the tool— which ensured that the video elements worked consistently on his computer.

7.4.3. Role-playing.

Once a robust prototype had been developed, a half-day workshop was organized with six therapists to explore issues around introducing and using the software in clinical situations, as well as getting specific usability feedback from therapists about the tool. Unlike the role-plays for *MMD* system, this session took place in the designer's research building with a smaller group. Participants in this workshop were from a wide range of therapeutic backgrounds. They included two social workers, a psychiatrist, a psychologist, a social worker. This had the advantage of providing a wide scope of feedback for the designer's ideas, but the drawback of lack of corroboration from other therapists in similar situations. None of the therapists knew each other.

The workshop was based around discussions of how a storytelling tool might be used in therapy. These discussions were led by the designer. Details discussed included how to introduce such a tool to a client in a session and what type of tasks to set between sessions to increase the appeal and likelihood that they be completed.

Client

You are 15. You have felt depressed for as long as you can remember. Have been to psychologist before, but found them patronizing. You are interested in playing music and writing stories and find it helps.

Client

You are 13 and have been diagnosed with ADHD. You often feel sad and angry. You lose your temper quite regularly and are frustrated that you have to go to this clinic. You have tried other things in the past, but nothing has helped. However you find talking about your problems really helps.

Client

You are 14. You have problems sleeping which is affecting the way you feel about everything. Your father also has problems sleeping and keeps a mood diary. You don't like having to go to therapy but are prepared to give it a go.

Client

You are 12. You have been feeling depressed since you heard your grandfather was dying. You haven't been sleeping. This is your first session with a therapist and you are quite nervous. You are fearful that you will find it difficult to talk to a stranger about your problems.

Client

You are 15 and have been diagnosed with Aspergers Syndrome. You have found school difficult and have been bullied in the past. You like being creative and also like computer games a lot. You hope your therapist will be sympathetic.

Figure 7.4 My Mobile Story Roles

The six therapists were paired up and worked on shared computers. Four therapists used their own mobile phones and two were provided with phones for the workshop. Each group was given a role-play with a basic character description of a therapist and a client. They took turns practicing different approaches to introducing the tool to a client. They then registered a client account. The client character sent a sample first entry from their mobile. Each pair then created a story using this content and other content uploaded from the computer. This gave them the opportunity to explore the interface, and in particular, the therapeutic plans.

During this session, the designer was able to move from pair to pair observing the role-plays. It was possible to observe the therapists' first impressions of the software and their use of it while completing a basic task. The tool was still at an initial working prototype stage. Although it had most of its functionality, it was not too late to incorporate new ideas if necessary. After these role plays, the group got back together and discussed their impressions of the tool and potential difficulties they would envision using it with a client. A series of protocols were established for the use and introduction of the system.

Role-playing seemed to be a good measure of how the system at that point suited existing practice. Some therapists were unclear how they could incorporate it into their existing practice. It was agreed that the addition of more therapeutic plans might help with this issue. Changes identified at this stage involved some layout adjustments and the re-design of some icons that therapists found unclear. The protocol for registering new clients using the online tool was also streamlined and the initial starting page was made clearer.

This workshop was useful at this stage of development to get basic usability feedback from observing therapists using the software, but also to tackle significant issues around the critical element of introducing the software to clients in a clinical situation.

7.4.4. Description of *My Mobile Story*

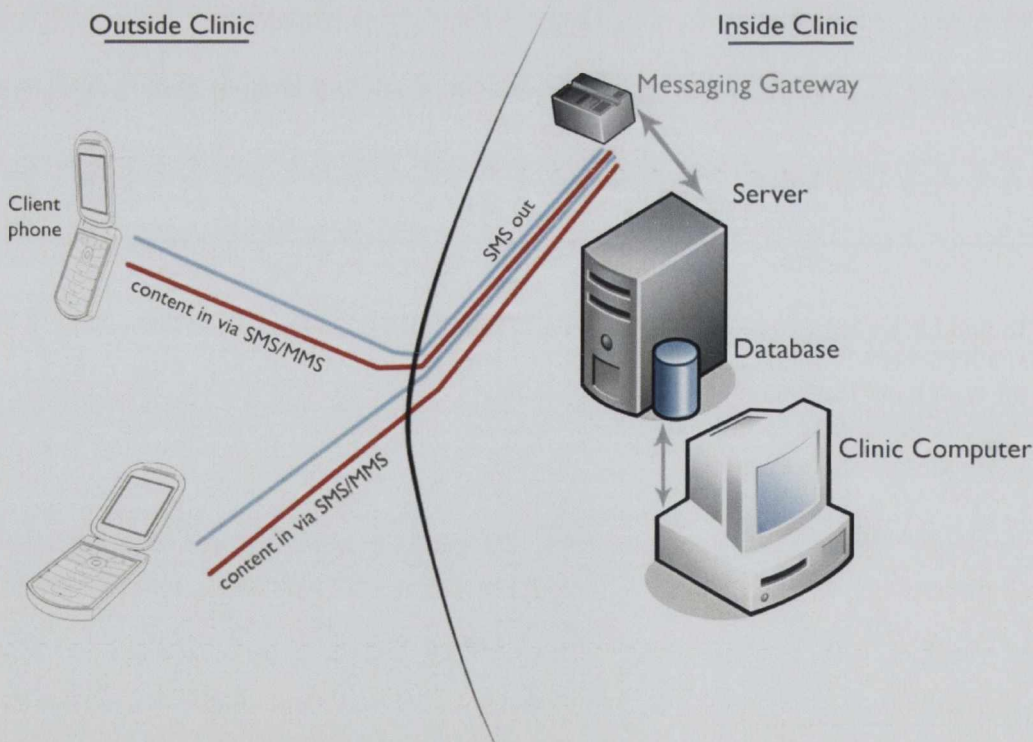


Figure 7.5 *My Mobile Story* architecture

My Mobile Story allows clients to send multimedia content from their phones to an online program. Using this program, they can view and structure this content with their therapist. Pictures can be moved around, re-sized and rotated. Sounds and videos can be played and moved around the screen. There is a drawing tool which can be used to decorate the client's story. There is a selection of pre-defined therapeutic plans that can be chosen from a drop-down list on the right. At the end of a session, the work can be saved to be continued at the next session or at home between sessions. SMS messages can be set up to send "missions" or reminders to the client's phone at a chosen time each day. Clients can also upload content from their computer. *My Mobile Story* also supports the printing of stories.

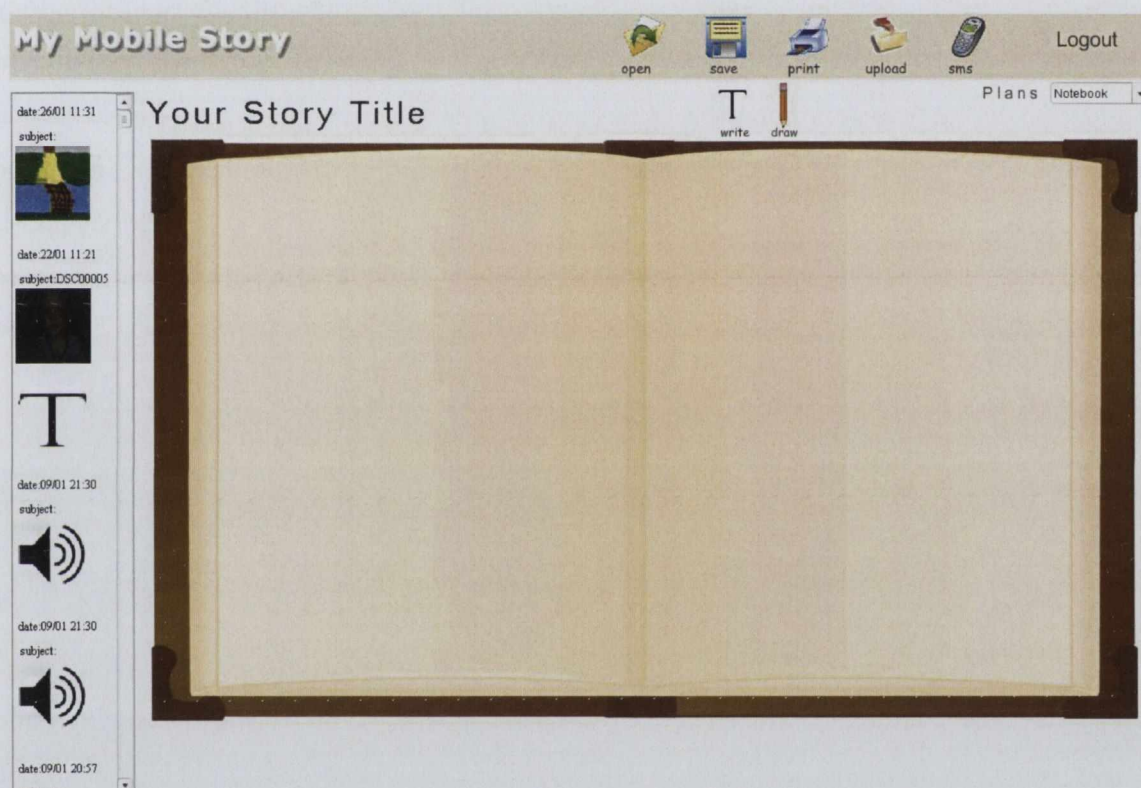


Figure 7.6 *My Mobile Story* online screen

Therapeutic Plans

One of the findings from *Mobile Mood Diary* evaluations was that therapeutic systems should be more extensible in order to facilitate greater adaptability to different therapeutic approaches. Coyle et al. have written more extensively on adaptability stating that therapeutic systems should 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 (Coyle, Doherty, Matthews et al., 2007; Matthews et al., 2008).

A frequent concern for many therapists with any new intervention, and particularly with technological interventions, is how to incorporate it into their current practice. For the *Mobile Mood Diary* this was not a problem as it already forms a part (in paper form) of certain forms of therapy. An open-ended therapeutic storytelling system would require therapists to put more time and effort into identifying ways to tailor the tool to their way of working. It would consequently reduce the numbers of therapists likely to use the system. In order to overcome this issue and to take account of the benefits of extensibility and adaptability, it was decided to provide seed stories covering accepted therapeutic techniques that most therapists would be familiar with. It was hoped that the use of therapeutic plans based on currently accepted therapeutic activities would help therapists envision how they could introduce and use the system with clients. Using therapeutic plans extends the range of the system by allowing the addition of any number of plans in the future. An additional benefit of using therapeutic plans was that they could provide clients with scaffolding in the construction of their storytelling. According to (Markopoulos et al., 2003), children find it difficult to plan their stories. It is hoped that the use of therapeutic plans might help structure clients' stories.

There were five therapeutic plans in the initial *My Mobile Story* system (see **Appendix E**):

A Detective Notebook: a solution-focussed plan based on the *Personal Investigator* game

ABC: antecedent, behaviour and consequence, a CBT technique for addressing client behaviour.

My Story: a general storytelling plan intended as an icebreaker between client and therapist that could help develop the therapeutic alliance, or that could be used in Life Story work or with clients with Asperger's Syndrome. This plan was based on an existing children's narrative worksheet (see **Figure 7.6**).

Treasure Island: a general goals and strengths work sheet that could be used by CBT or Solution Focussed therapists.

Schedule: a schedule-based work plan that clients and therapists could use to plan therapeutic programmes to help them deal with their problem.

Blank Plan: A blank plan of an open notebook was provided to allow therapists to re-create their own plans.

Missions

My Mobile Story, as a more open-ended tool based around therapeutic storytelling, required a significantly defined and engaging task to ensure that it was used. It allows the client and therapist to set up 'missions' to be sent to the client's mobile phone at selected times between therapeutic sessions. The client can then respond to these by collecting content and sending it back. The aim of using "missions" was to provide clients with a series of specific tasks. Otherwise, the design team thought that the task between sessions could suffer from a lack of specificity. The Mood Diary was a very specific task. *My Mobile Story* risked being too general to engage end users. It was decided to implement a reminder function to send "missions" to clients which could provide a therapeutic guide to collect a certain type of content, while also providing a structure or limit on the amount of content a client should collect. Finally, these "missions" could remind clients to complete the task.

My Mobile Story

open save print upload sms Logout

write draw

My Story

My Name: My Age:

My Family:	My Friends:

Three things I like to do best

Three things I'm good at

1) My favourite food

3) My favourite TV programme

date:28/10 13:54
subject: Bomb

date:28/10 13:53
subject: Its piran.

date:28/10 13:51
subject: sms

date:21/10 9:34
subject: Clo

Figure 7.7 'My Story' therapeutic plan

(Grant et al., 2007) developed a non-therapeutic mobile game, *MobiMissions*, for 16-18 year olds which required participants to complete 'missions' which involved taking pictures on a mobile phone. An example of a mission participants might have received was "Take 3 pictures representing success, and 3 representing failure".

The therapist on the team created template missions that could serve as examples to therapists when they were using the system. These examples were designed to complement current approaches. However, therapists were free to develop their own messages.

Uploading Content

My Mobile Story has an 'Upload' element which allows users to add content downloaded to their computers to their stories. This could be of use if the client did not send any content into their account between sessions. It is also in keeping with the aim to provide a choice of access points. Many adolescents keep music, pictures and videos on home computers. The 'Upload' function allows them to add this content to their story. Clients could login to their account and upload content from their home computers. During the development of *My Mobile Story*, several therapists reported using images downloaded from the Web to create stories for clients in Microsoft Word. *My Mobile Story* also supports this way of working.

Typical Scenario

In a typical scenario, a therapist would ask a client if he or she was interested in using their mobile to collect content to tell a story. If they agreed, they would register a new account. This involves registering a mobile number and choosing a secret PIN, which the client alone knows. Then the therapist gives the client a number to add to their contact list and calls it 'MMS'. They send all content to this number. Between sessions, the client can send any content that is relevant to this number. At the next session, the client can log in and view the collected content with the therapist. Depending on the plan they use, they can use the content to tell a story. They can use a text feature to label photographs, or to create whole paragraphs. Once completed, the story can be printed out.

An example of a therapeutic plan is a Solution Focused Therapy scenario based on the same detective metaphor as the *Personal Investigator* game. Between sessions, clients play the role of a detective looking for evidence. The client receives a different mission on their phone setting them a challenge.

Mission 1: Take a picture of something you're good at (Strengths)

Mission 2: Take a picture of something you would like to change (Goal)

Mission 3: Take a picture of something that could help you make the change (Resources)

Mission 4: Take a picture of supporters in your life who could help you make the change (Back-up)

At the next session, the client would log in and show the therapist what he had collected in the interim period. Using the therapeutic plan he can start constructing his story. During this process, therapeutic conversations might arise based on the content that the client recorded.

7.5. Multi-Stage Evaluation

The Multi-Stage Evaluation approach was modified for the assessment of *My Mobile Story*. The first stage focused on usability; the second stage tried to emulate the context the software would be used in as much as possible by running a trial with young people in a similar context to the intended end-users. **Section 6.8.1** identified limits to the Stage 2 evaluations of *MMD*. This iteration of Multi-Stage Evaluation developed an evaluation process at the second stage which would emulate as closely as possible the context in which the tool would function in clinical situations. In order to take advantage of therapists' willingness to personally use therapeutic systems and to provide additional therapeutic justification for the use of the tool, Stage 3 incorporated professional critical reviews alongside the clinical pilot.

7.5.1. Stage 1: Peer User Usability Trial

This usability study comprised of 10 self-selecting participants aged between 13 and 16 years old ($n=10$ mean = 14.375 years old, $sd = 1.03$ year). They were from an inner-city disadvantaged area attending an after-school computer workshop. There were 6 male and 4 female participants. All participants completed a computer ability questionnaire. Participants on average reported using a computer "Every 2-3 days" (mean=1.5 $sd=0.53$ where 1="Every day" and 5="Never"). On average, they reported using a computer at each sitting for 78 mins ($sd = 56$). They rated their general computer ability just above "OK" (mean = 2.5 $sd=0.70$ where 1="Very Experienced" and 5="Beginner"). They rated their ability to navigate around a computer with a keyboard and mouse as slightly above average (mean = 2.2, $sd = 0.78$ where 1 = "Very Experienced" and 5 = "Beginner"). When asked how confident they felt using a computer today, the average answer was confident (mean = 1.6 $sd = 0.69$ where 1="Very Confident" and 5="No Confidence").

Method

Participants subsequently completed a simple task with the software during which they were observed. They then completed a computer ability questionnaire and a questionnaire based on this task. The usability task involved participants completed a short usability task using a working prototype of the *My Mobile Story* software while being observed. Before the usability task, participants were informed that they were not being tested and that they were helping with testing of new software. They were told that any ideas or opinions they had would be of interest. On sitting down at the computer, but before opening the software, each participant was given a colour screenshot of the software and requested to move pictures,

sounds and labels from a pane on the right to the centre pane, in order to replicate the screenshot (see **Figure 7.8**).

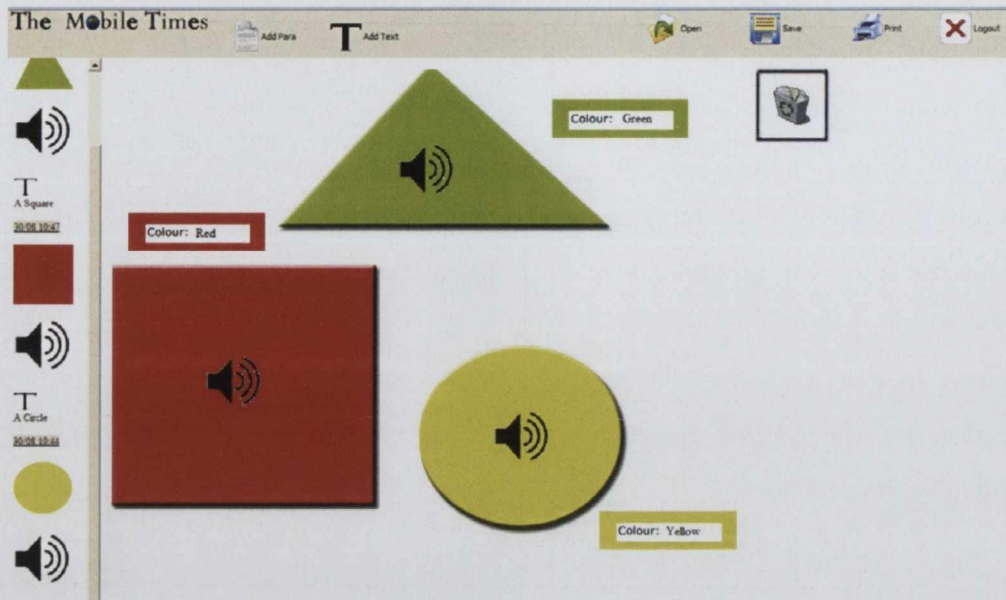


Figure 7.8 Usability task handout

They were given no other instruction. The task was designed to test the fundamental interaction techniques of *My Mobile Story*, to ensure that it was easy for young people to use. The user was presented with the homepage of the *My Mobile Story* website. They were given login details and were told to login and complete a certain task.

This task required them to click on a pane on the left and align the objects in the right layout pane. Three images had to be resized to fit into placeholders on the screen. Three sounds were voice clips of an actor speaking the names of each shape. The appropriate sound had to be placed on top of the appropriate shape. This ensured that the user had to be able to play the sounds in order to complete the task successfully. The user also had to work out how to add text labels in the boxes by each shape. Each user was given 10 minutes to complete this task. Each user completed the task alone. Participants were observed by a researcher who sat behind them to the right. No help was provided by the observer. Any difficulties experienced by the user were noted down by the observer on a task observation sheet.

Results

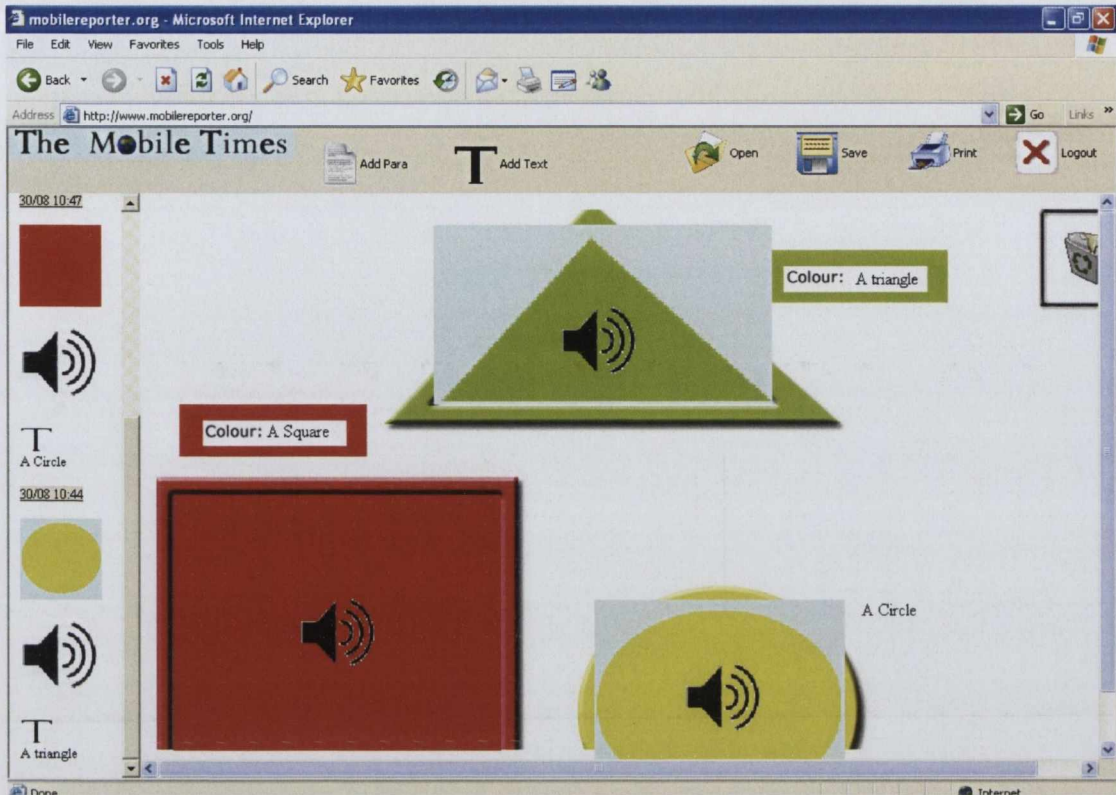


Figure 7.9 User A's completed task

Although each participant was given 10 minutes to complete the task, each one completed the task in 5 minutes or less. No participant experienced difficulties moving content from the left pane to the main body of the tool. 8 out of 10 participants managed to complete the task successfully (i.e. their finished screen closely resembled the sheet they were given). Two participants completed the task, but could not re-size the graphic. Re-sizing pictures caused problems for at least 4 of the participants. Re-sizing in the prototype required the user to hold the shift key down. This was one of several usability problems highlighted during this stage. Other usability problems related to initial difficulties playing sounds or editing text (both required double-clicking). While *My Mobile Story* had a recycle bin for users to delete content from their main canvas – several participants took no notice of it and simply dragged the content off-screen.

It is important to design questionnaires very carefully and even still with some participants it is necessary to help them complete the questionnaire. In the initial usability task at Stage 1, it was necessary for the researcher to go through the questionnaire with 1 participant. It is important not to make participants with low literacy skills feel that participating in the study is beyond them, particularly in front of peers. If they feel comfortable, it is easier to them to provide feedback. In some ways, there is a benefit to using a multi-modal system.

Appendix D). This system was a modification of *My Mobile Story*. This notion of modifying the tasks within a system is one that has been done before. In evaluations of a PDA appointment planner with aphasia participants, where it was unrealistic to have participants work with appointments with people and places they had never experienced before, researchers used familiar faces of famous people and famous places (Moffatt et al., 2004).

Method

Six self-selecting adolescents (3 male and 3 female) from a local youth club in inner-city Dublin were recruited. The only requirement for participation was that participants had MMS-enabled phones. No mobile phones were provided to participants for the duration of the evaluation. Participants ages ranged from 13 to 16 years old ($n=6$ mean = 14.6 years old, $sd = 1.19$ year). These same participants had completed the usability task at stage one. Participants on average reported using a computer "Every 2-3 days" (mean=1.5 $sd= 0.547$ where 1="Every day" and 5="Never"). On average, they reported that they used a computer at each sitting for 77 minutes (mean = 77.5 mins, $sd = 54$ mins). They rated their general computer ability slightly above "OK" (mean = 2.33 $sd=0.81$ where 1="Very Experienced" and 5="Beginner"). They rated their ability to navigate around a computer with a keyboard and mouse as above average (mean = 2.1, $sd = 0.75$ where 1 = "Very Experienced" and 5 = "Beginner"). When asked how confident they felt using a computer today, the average answer was confident (mean = 1.6 $sd = 0.81$ where 1="Very Confident" and 5="No Confidence").

A task was developed which would engage these participants in collecting content and give them reason to use the software in a similar way to its intended therapeutic usage. This task entailed participants collecting local stories using their mobile phones. They received a "mission" at the same time each day giving them a specific task and a checklist of content they needed to collect. Once collected, this content was sent back. The number which participants needed to return their collected content to was added to their contacts list under 'MMS' so they would not have to remember the number. At the following face-to-face session, participants were given time to structure their collected content into a news story using *My Mobile Story*. They were observed completing this task.

Participants were told that they would be reporters for the local area. They would receive one mission by SMS message on three subsequent days at 16:00 (after school). Each message would contain a "mission", which would have a check list of stories they would have to collect and send back within 24 hours. During this session, each participant's phone was loaded with 10 euros credit to send the MMS messages back during the week. They were also

told that if they completed the task, they would receive another 10 euros credit at the end of the evaluation.



Figure 7.11 Screenshot of one participant's completed story

Each day, over the next four days, the participants received an SMS message with a story brief or mission they were asked to collect content for (using images, sound, videos and text) and send them back. No reminders were sent to the participants to complete their missions and there was no contact with researchers during this time.

The following is representative of typical message mission message (for all three mission messages see **Appendices E**):

"We need a story on the most popular Christmas present. Ask 5 friends what they want for Christmas. Record 1 sound interview & 1 photograph.

Your time starts NOW!"

At the next session, researchers met up with participants in a computer lab. Each participant was given 30 minutes using the software to login to the website, construct one story from all the content they had collected and finally save their story. They were observed during this process and they saved their completed artefacts. At the end of this task, participants completed a task questionnaire covering their use of the software and their experience using their phone to collect content. The researcher also conducted brief interviews with participants in pairs.

Results

In total 18 mission messages were sent to 6 participants (3 each over 3 subsequent days). The average response percentage was 66%. In total 18 *My Mobile Story* messages were received, although the amount varied from user to user (mean = 3, sd 1.673320053). In total 12

missions received content back (mean= 2, sd = 0.894). Finally, a total of 34 content elements were received back, either in textual, photographic, video or audio format (mean = 5.666, sd = 2.250). Just under half of the content was textual (47%). The next highest content was audio (22%) and then pictures (19%) and finally videos (11%).

	Text	Pictures	Audio	Video	Total
User1	7	0	3	0	10
User2	1	2	2	2	7
User3	2	1	1	0	4
User4	2	3	0	1	6
User5	2	0	0	0	2
User6	3	1	2	1	7
Total	17	7	8	4	36

Table 7.6 Types of content submitted.

All six participants completed a story during the face-to-face session, during which they were observed. On completion of their story, they completed a two page questionnaire. When asked how easy or difficult it was to remember to send their story back participants on average found it easy to remember (mean = 2.333, sd = 0.816 where 1 = "Very Easy" and 5 = "Very Difficult"). On average, participants found it easy to compose an *MY MOBILE STORY* message (mean = 2.16, sd = 1.32 where 1 = "Very Easy" and 5 = "Very Difficult"). 5 of the participants had sent an MMS message before. One participant who had never sent one found it difficult to send messages. Participants found the website "Interesting" (mean = 1.83, sd = 0.75 where 1 = "Very Interesting" and 5 = "Very Boring) and also found it "Easy" to use (mean = 1.83, sd = 0.75 where 1 = "Very Easy" and 5 = "Very Difficult").

How do you feel physically?		
Exhausted 1	6.5 (<i>sd</i> = 1.22)	7 Full of energy
How did you feel mentally while completing the task?		
Completely confused 1	5.83(<i>sd</i> = 1.6)	7 Everything made sense
While completing this task, did you:		
Feel completely frustrated? 1	6 (<i>sd</i> = 1.26)	7 Always know what to do next?
Compared to what you expected, did this task go:		
Much slower 1	6.16(<i>sd</i> = 1.60)	7 Much faster

How confident are you that you completed the task correctly?		
Not at all confident 1	6.5 (<i>sd</i> = 0.54)	7 Very confident
How do you feel now that this task is over?		
Relieved 1	6 (<i>sd</i> = 1.26)	7 Eager for more
How did you feel about the appearance of the site?		
Very dissatisfied 1	4.5 (<i>sd</i> = 2.42)	7 Very satisfied

Table 7.7 Task Questionnaire

Participants completed a short questionnaire on their use of *My Mobile Story* to construct a story. When asked “physically how do you feel right now?” (on a 1-7 scale) after completing the task, most participants responded 6 (mean = 6.5, *sd* = 1.22, where 1 = “exhausted” and 7 = “full of energy”).

When asked “mentally how did you feel while working on the site?” most participants felt that everything made sense (mean = 5.83, *sd* = 1.60, where 1 = “completely confused” and 7 = “everything made sense”).

When asked how they felt while trying to complete the task, most felt that they always knew what to do next (mean = 6, *sd* = 1.26, where 1 = “completely frustrated” and 7 = “always know what to do next”).

On average participants felt that the task went quicker than expected (mean = 6.16, *sd* = 1.60, where 1 = “much slower” and 7 = “much faster”). Most participants felt that they completed the task correctly (mean = 6.5, *sd* = 0.54, where 1 = “not all confident” (completed the task correctly) and 7 = “very confident” (completed the task correctly). Most participants were eager for more, rather than relieved that the task had been completed (mean = 6, *sd* = 1.26, where 1 = “relieved the task is finished” and 7 = “eager for more”).

Finally, there was divergence about the appearance of the website. On average participants felt satisfied with the site’s appearance, although there was no agreement on this (mean = 4.5, *sd* = 2.4 where 1 = “very unsatisfied” and 7 = “very satisfied”).

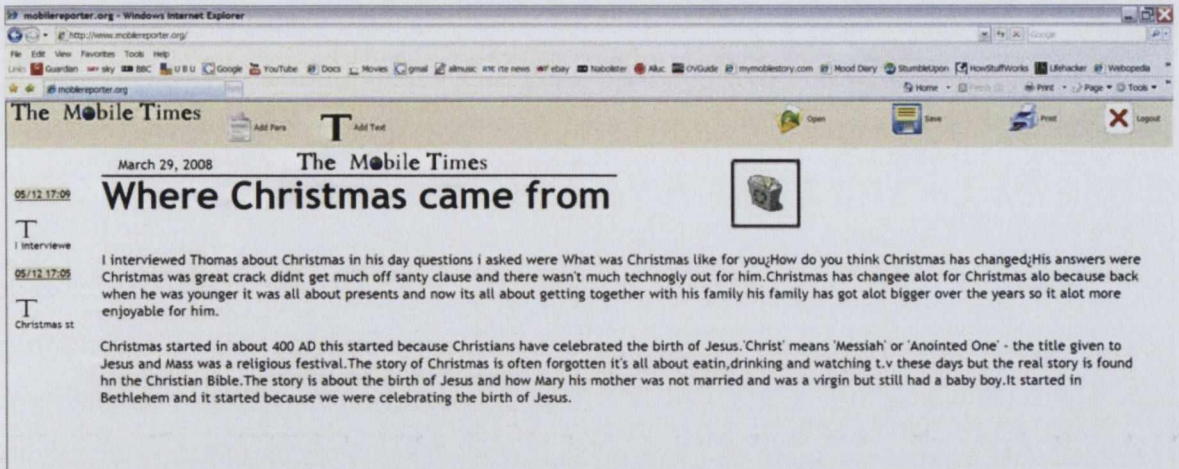


Figure 7.12 Screenshot of one participant's completed story

There were several changes made to the system as a result of this stage of evaluation. These included:

1. Provide a clearer way to delete content
2. Improve the appearance of the website
3. Text box selection should be easier

3 participants could not participate in Stage 2 evaluations because their phones did not support MMS messages. Because of the importance of inclusivity in the design of software for therapeutic use, it was considered important to overcome this by adding SMS message support to *My Mobile Story*. This would allow clients to send in written content into the website on the go regardless of the phone they had.

7.5.3. Stage 3: Clinical evaluation

My Mobile Story

Hello, welcome to My Mobile Story.

[To Login](#)

- To login and start using My Mobile Story please click [here](#)

[To Register](#)

- To register a new user please click [here](#)



Tell *your* story on the go!

Use pictures, sounds, video and thoughts recorded on your mobile to tell your story!



Figure 7.13 *My Mobile Story* login page

Feedback from the peer group study contributed to the final *My Mobile Story* system for the clinical pilot. By this stage, the system had been evaluated from a usability perspective and protocols for introducing the tool and its use had been developed.

Critical Reviews

Evaluations for *Mobile Mood Diary* took a long time to complete, which is a serious obstacle for research projects. With a view to addressing this issue, the evaluation of *My Mobile Story* was supplemented by expert reviews from therapists who used the system personally and provided a professional perspective on the effectiveness, the usability and therapeutic validity of the system before the clinical pilot. Therapists often wish to try therapeutic systems first before using them with clients. Therapists had already used the *Mobile Mood Diary* and provided informal feedback. The formalizing of this process was intended to provide more detailed feedback on the system from a therapeutic point of view before use with clients.

(Boyd-Graber et al., 2006) have previously identified the benefits of using expert reviews in order to overcome the difficulty of recruiting individuals with aphasia. In clinical evaluations with end-users, designers are reliant on therapists’ professional perspective on the impact of the technology on the therapeutic intervention. The use of critical reviews is intended to provide more detail on the potential uses of the system, the system’s usability (from a therapists’ perspective) and to supplement the role-playing work in identifying protocols for introducing and using *My Mobile Story*.

When completing the critical reviews, therapists where asked to place themselves in the position of a client using the tool over a minimum period of a week. Participants were required to register themselves on the website using the same instructions provided to therapists participating in the clinical pilot. They were also required to send in at least three SMS or MMS messages. Finally they were requested to create at least one story from the content they had sent in. In total, five therapists completed these evaluations. They subsequently completed a four page questionnaire on their use of the system.

Question	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I believe <i>My Mobile Story</i> could help young clients.	T1, T2, T3, T4, T5				
I needed to learn a lot of things		T1		T2, T3,	

before I could get going with <i>My Mobile Story</i> .				T4, T5	
I found the <i>My Mobile Story</i> website easy to use.		T2, T3, T4, T5	T1		
I think I would need help most times I used the <i>My Mobile Story</i> website.		T1		T5	T2, T3, T4
I believe that most clients would learn to use the website very quickly.	T2, T4	T1, T3	T5		
I found the mobile phone and the website worked well together.	T4	T1, T2, T3, T5			
Using the mobile phone could help increase client engagement between sessions.	T1, T3, T4	T2, T5			
<i>My Mobile Story</i> is ready for use with clients.	T3, T4	T2, T5	T1		

Table 7.8 Summary of therapist feedback

All therapists thought the system would be of use in clinical work with adolescent clients. They thought it would be useful between 10 and 18 years old. One therapist thought it may be useful with some younger clients under 10. Three therapists thought *My Mobile Story* would be “Very Helpful” for clients, the other “Helpful”. All therapists found it “Very Easy” or “Easy” to use, although some had problems initially with confidence using it. Therapists gave various reasons why they thought it would be of use. Most thought it would increase the likelihood that the client would complete tasks, activities between sessions, e.g. *“Because it gives them an instant way of recording inter-session thoughts, ideas, feelings.”* Three therapists suggested it would add to the client-therapist relationship, for example that it could *“Build rapport with young person by using methods of communication with which familiar and comfortable”*. All therapists thought it would increase engagement in therapy. One therapist commented that one of its principal strengths was that it personalized content for a therapeutic session and that it *“would raise the likelihood clients would continue in therapy”*.

One therapist thought it would be of use in therapy *"because it gives them an instant way of recording inter-session thoughts, ideas, feelings and because it is not paper-based it is less like school homework which often creates problems for compliance"*. This therapist thought that it would be of particular use for clients who find it difficult to express themselves in speech or writing. She thought the tool would be "helpful" for interventions with adolescents, although was concerned that therapists who had little confidence in technology would not be able to use the tool to its full potential. She reported that the tool was "OK" to use because of her *"technophobic tendencies"*. She thought an immediate technical support backup service would be of use for new users (or even an online training package). However, she said she would be comfortable using the tool with a client.

A Senior Social Worker reported that *"young people will be interested in using it (engagement), and would raise likelihood that they continue in therapy"*. She thought that it could be therapeutically beneficial if clients could share their stories with other clients.

Two therapists thought *My Mobile Story* might be of particular help for clients who had literacy difficulties. Three therapists reported that the use of multimedia would be helpful for engaging young people, who find it difficult to talk and express themselves, particularly in a 1-to-1 therapeutic setting. Three therapists raised concerns that mobile credit could be an issue, and that they may not want to *"use their credit texting their therapist"*.

All therapists said they would be comfortable introducing and using *My Mobile Story* with a client. They all recommended using it for CBT work like keeping a record of automatic thoughts, collecting evidence, identifying strengths and encouraging the completion of CBT homework activities. They all recommended using it for Life Story work with clients. One therapist thought it would be applicable for systemic approaches like family therapy and psychoanalytic approaches such as Cognitive Analytical Therapy.

Some future changes to the system were suggested. One therapist commented that she would have found an online training package useful and recommended developing one for a future version. Another therapist recommended having a bank of stories from other clients that could be viewed and adapted. Two therapists requested the ability to send rating scales to clients between sessions. Finally, one therapist recommended adapting the system to support the completion of family trees.

Clinical Pilot

My Mobile Story was made available to any therapist interested in evaluating it in clinics throughout the Republic of Ireland. All participants were requested to use the system for a

minimum of two therapeutic sessions. Because it was a clinical support tool, it was not suitable to put a limit on the use of the system. Where necessary, therapists offered clients credit to cover the costs of their participation. Only one client received mobile phone credit. Questionnaires were provided for therapists and clients. As with *Mobile Mood Diary* evaluations, it was not always possible to recover feedback from clients. Feedback was received from all therapists who used the system. These questionnaires were supplemented by short interviews (some face-to-face and some over the phone), and, in some case, by email feedback after each session.

To date, *My Mobile Story* has been used by four therapists with 5 clients attending mental health sessions with professional mental health services. The results are presented qualitatively through individual case studies and therapist feedback about the use and impact of *My Mobile Story*. There were no reported problems registering clients with the system. A total of 20 messages have been sent in, and 11 stories have been created to date. This number of messages may appear small, but is more significant when compared to equivalent artefacts that therapists ask clients to bring to sessions such as printed photographs or audio CDs. All therapists believed *My Mobile Story* added to the therapeutic intervention with their client. In 3 cases, therapists reported it being “Very Helpful” and in 2 cases “Helpful” (where 1= “Very Helpful” and 5= “Very Unhelpful”). All therapists found it “Very Easy” to use.

	Age	Gender	Mental Health Problem	Stories	Content	Therapeutic Plans
Client A	11	Female	Anger Management	3	2	SFT Detective Notebook
Client B	14	Male	Multiple	4	7	ABC, CBT Circle, SFT Notebook
Client C	14	Female	Social phobia		5	
Client D	14	Male	Anxiety problems	2	Online	Thought Triangle
Client E	10	Male	Emotional & Behavioural problems	2	3	Schedule (diary)

Table 7.9 Summary of content

Client A

This client was an 11 year old girl who had anger management issues. The client used the tool over a period of 2 weeks. Her intervention was shared between a senior psychologist (family therapist) and another psychologist.

This client used paper-based drawings of “*her evil twin*” to help her externalize her anger. This helped her tackle the problem. According to the client “*It’s good to have a picture of her in my head so I can fight her.*”

One of the benefits of the tool for this client was that it allowed her to work on the story in a session and at home. The therapist reported that the tool was used in three-way sessions with the client and the parents. The first half of the session, in which the tool was first used, was particularly intense. However, once they switched to using *My Mobile Story* on the computer, the mood of the entire session lifted. During this session, the client uploaded a picture to her account and created a story. After this session, and with the permission of the client, the therapist worked a little longer to create two further versions of the story for the following session.

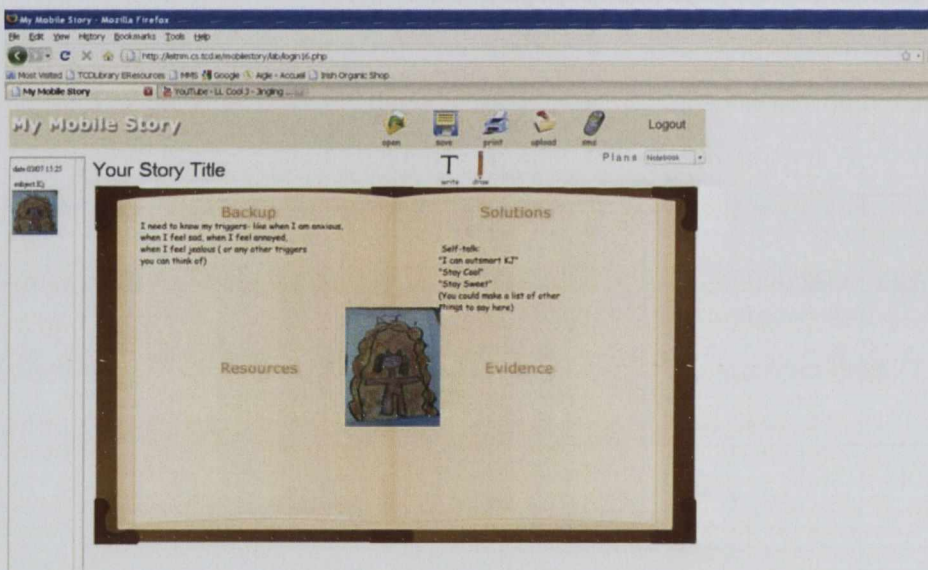


Figure 7.14 Screenshot of Client 1's story

According to the client, *My Mobile Story*, helped her record the story of her evil twin, using mobile photographs of her drawings and music, and other elements:

“It helps me to get to know KJ (evil twin) and to see how evil she is and what she’s doing to me and the family. It’s good because it’s my personal story and it’s private. I’m still working on it and when it’s finished I’ll show it to my family.”

In this case, *My Mobile Story* supplemented existing therapeutic practice, but allowed the client (and the therapist) to work on her stories between sessions.

My (Mobile) Story on their mobile was generally very positive despite severe complexity (in the case) at the start of referral. Therapist D

Client B

This therapist was a clinical psychologist who principally uses CBT approaches with adolescent clients. He was in his late 30s. The client was male and 14 years old. He had a long history of mental health difficulties, having attended the clinic off and on for the past seven years. He had specific difficulties with verbal comprehension. He was experiencing difficulty both at home and in school with regard to behaviour. He had problems with attention, poor concentration and being easily distracted. He also presented with difficulties with over-active and impulsive behaviour. In addition he had difficulties getting along with his peers and had low self-esteem. He met the criteria for Oppositional Defiant Disorder (ODD) and Post Traumatic Stress Disorder (PTSD). There were also concerns with regard to Attention Deficit Hyperactivity Disorder (ADHD). In addition C was presenting with problems with aggression and anger management. He attended this therapist in relation to anger management.

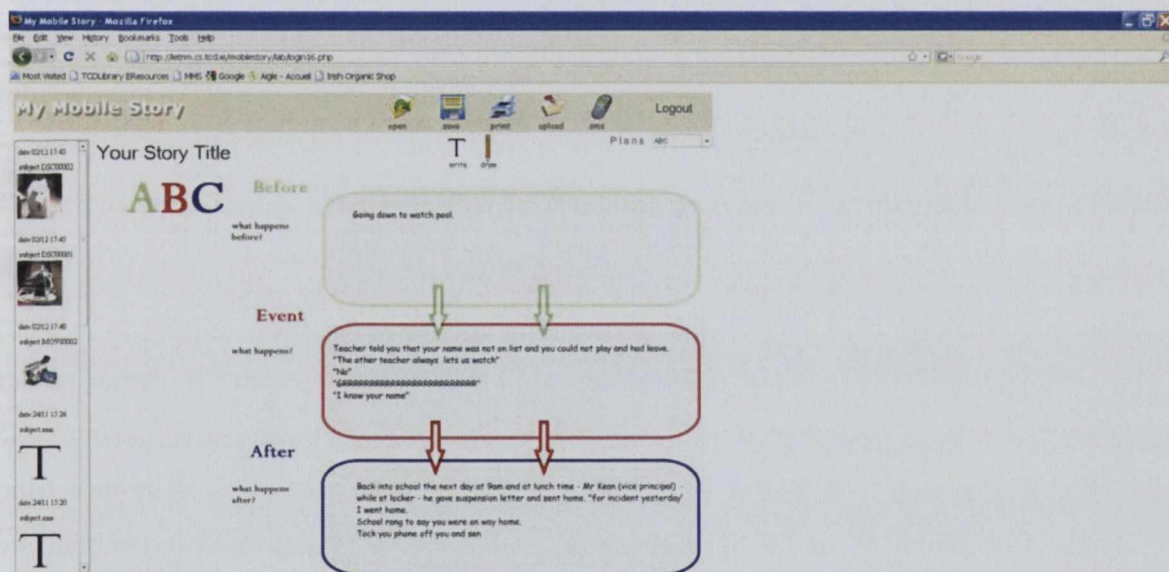


Figure 7.15 Client B's 'A-B-C' therapeutic plan

He had been difficult to engage in previous sessions. Much of the therapist's work was based around working with the client's mother in order to indirectly engage the client. The therapist saw his client every two weeks, although occasionally the client had missed past appointments. For the duration of the client's use of *My Mobile Story*, the client attended every session.

Prior to the trial, the designer met with this therapist in his clinic office and ran through a role play scenario based around introducing and using *My Mobile Story* with a client. The designer played the role of the client. This session lasted an hour in total. It gave the therapist confidence in how he could use the tool and how might introduce it to clients. It provided a means of allowing the therapist to raise several concerns and posing questions in the context of how the tool would be used, and using a method with which the therapist was comfortable.

The client used the tool over 8 weeks and sent in seven MMS messages. In the first session, the client did not have his phone with him, but therapist and client registered a new account anyway. The therapist looked away while the client entered his chosen PIN. They immediately used the tool, creating stories based around the client's current therapeutic intervention. They made use of the A-B-C (CBT) plan and the Circle plan (developed by a different therapist). They set up a reminder for 8.30am everyday. The reminder was "CALM & COOL". This therapist reported that using *My Mobile Story* "helped engage him and added some structure to session".

The client forgot his phone at the second session: "It was at home charging and he came from school". The therapist gave the client a "mission" to take pictures with his phone representing "My Life" for the next session. They used the website to review the previous week's work and uploaded some pictures, which they had downloaded from the Web to represent his anger issues. They set up a second reminder message to be sent to him every morning. At this stage, the therapist reported that "Sessions are going well and *My Mobile Story* is helping."

At the next session, the therapist reported that they were still "using and enjoying the *My Mobile Story*". He reported that the client was hard to engage, but he was making good progress. At this stage, *My Mobile Story* took the part of about 20-25% of a 1 hour session each week. According to the therapist "*My Mobile Story* has been important and helpful and we use to make therapeutic points or raise issues". At the fourth session, the client had taken two pictures using his phone, but had used all his credit before sending them in. This is the therapist's recollection of the event:

"We used this incident as part of therapy (sort of)- exploring importance of keeping promises and how his impulsive behaviour gets him into trouble. He said that he used all credit sending texts to friends and that if he had got 20 euro credit he would have free texts on meteor. A weak point. I felt that responsibility needed to rest with him about what he sent into My Mobile Story."

At the next session, the client had sent several messages and it “worked well”. The therapist and client set up one message each morning. They changed the message twice over the course of the intervention. The therapist reported that:

“We are using the text messaging and it is working well - he gets messages every day to help keep him motivated and try and manage his anger.”

The final message that they sent was *“Hi [Client’s name], remember to send texts, pictures and video clips to My Mobile Story (the dog, ice skating etc) - don’t forget!”* which was designed to remind him and encourage him to send content in.

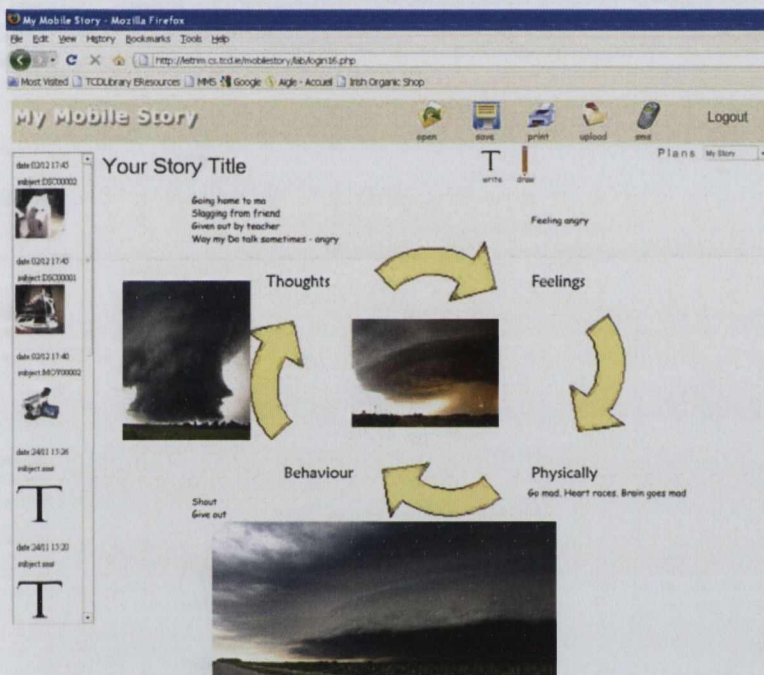


Figure 7.15 Client B’s ‘circle story’

This therapist found the therapeutic plans helpful. He used three plans, two of which had been contributed by other therapists participating in the clinical pilots. He believed they had *“wonderful potential for add ons”*. He also thought the ability to add pages (like a book) would be very good, so a client could build up a portfolio over time. This therapist felt that it would be nice if each exercise the client and therapist created could be saved to a tool bar so they could be seen at a glance.

Client C

The therapist for Client C was not technically proficient and had low confidence with technology, although he was considered the most technically adept therapist in his clinic: *“unlike the other therapists I would check my email every day”*. He described the problems

he had with incorporating technology in general into his practice: “you hit a wall, and get discouraged, plus haven’t got much time anyway”. He used *My Mobile Story* with a 14 year old girl suffering from social phobia. She was more computer literate than the therapist. She had experienced severe difficulties leaving her house. The therapist’s idea was to use *My Mobile Story* as a way of encouraging her to use her phone to record elements from her neighbourhood.

The therapist and client spent 10 minutes in the first session registering a new account and going through the different features of the tool. The client agreed to keep a daily diary regarding instances when she had been especially anxious, including her feelings and thoughts. She submitted sent these elements by SMS. However, initially she began using *My Mobile Story*, directly using her home computer:

“She hasn’t used her mobile phone for a while as the charger is broken. She is going to try to get a charger by our next session next Friday and then she can start using text messages, which she thinks will be easier.”

To date, Client C has submitted 11 SMS messages over a two month period, each reporting her feelings about situations that made her anxious. In session, the therapist and client used *My Mobile Story* to view and categorise her fears using a general plan. When completed they would print the plan without saving the story.

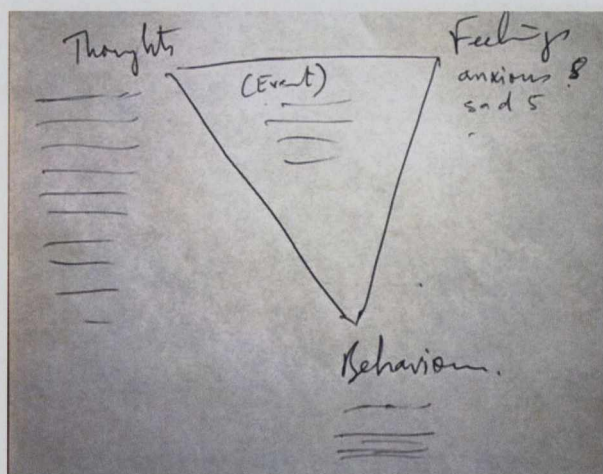


Figure 7.16 Thought Triangle sketch

Several weeks into this treatment, serious issues moved the intervention to other work. At this point the therapist is returning to *My Mobile Story* and is intending to “broaden it’s use to completing Thought Triangles and perhaps using drawing and photographs etc.” This therapist had previously tried using a paper-based “Thought Triangle” in sessions, but had experienced problems engaging clients in using it. The “Thought Triangle” is a CBT

technique based on the frequently used CBT Thought Diary. The therapist commented that he finds “*the triangle to be a more useful format, clearer and easier to understand the connections*”. It is based around identifying the connections between situations, thoughts, feeling and behaviour. In a meeting with this therapist in the clinic, he described his current approach to using the “Thought Triangle” with clients. He demonstrated how he would use it with a client by drawing an example on paper (see **Figure 7.16**). In order to accommodate this therapeutic approach into *My Mobile Story*, a specific therapeutic plan was incorporated into the tool. At present, both therapist and client are still using the system and consequently no completed evaluation data is available.

Client D & E

This therapist was a social worker and family therapist. He used *My Mobile Story* with two different clients over eight weeks. Client D was male, aged 14, who was refusing to attend school and had anxiety problems. He was living with both his parents. Client E was male, aged 10, and was experiencing emotional and behavioural difficulties at home. He had an older brother aged who was receiving medical treatment for cancer at the time. He was living with this brother and his mother. He had no contact with his father.

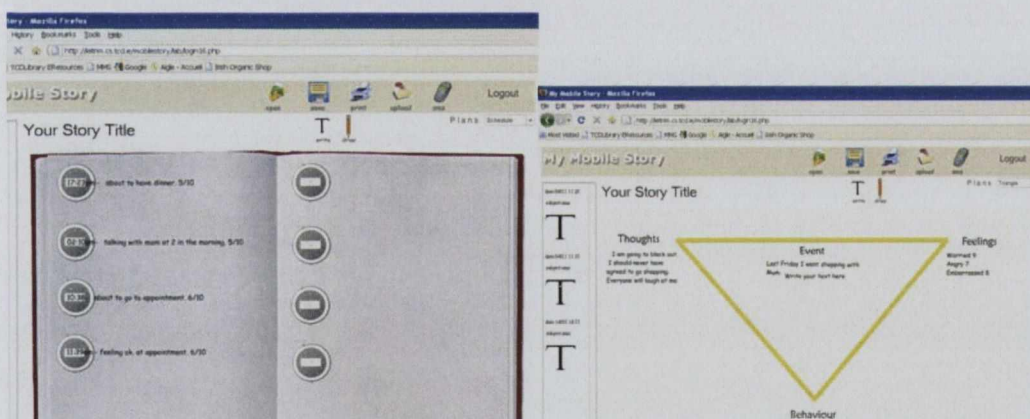


Figure 7.17 Client D & Client E stories

Both clients used the online system between sessions to work on their stories. Client D used the online system because he did not have a mobile phone. He worked on one story, developing it over several weeks. He used the Schedule Plan as a diary of his life but also as a reminder of future commitments. Client E used both the mobile and online elements. He sent three text messages into the system. He created two stories based on the Triangle Plan.

This therapist reported that *My Mobile Story* was “definitely helpful” for interventions with both clients; they both enjoyed using it and logged on at home to continue work between sessions:

“It can serve as a starting point for discussion in subsequent sessions. A discussion about which format to use (e.g. note/diary/island/ A-B-C) allows the client to feel more in control of the work...and this is a good thing.”

Both the therapist and the two clients were happy with *“the fact that only they, and not me or their parents – could log on to the site.”*

7.6. Discussion

This section discusses *My Mobile Story* from several perspectives. Firstly, it assesses the effectiveness of the system as a clinical tool for engaging adolescents in therapeutic storytelling in and between sessions. Secondly, it discusses any issues that are of interest during the evaluations. Finally, it addresses the effectiveness of the proposed design approach in the development of *My Mobile Story*.

7.6.1. Usability, Engagement and Suitability of *My Mobile Story*

The evaluations of *My Mobile Story* demonstrated that it is a suitable tool to support therapeutic storytelling in clinical situations. Stage 1, and to a lesser extent helped evaluate the system’s usability early on. Stage 2, while also helping to identify usability issues, provided added assurance of the effectiveness of *My Mobile Story*. No significant usability issues were encountered in the clinical pilots.

Stage 2 evaluated the appeal of *My Mobile Story* in ecologically valid settings, real world settings with real mobile phones, over one week with peer users. Participants’ response rate to mission messages was 66%, although it is important to emphasise that this was based on data from 6 participants. Feedback from participants indicated that they found the composition of MMS messages straightforward. This is supported by the compliance rate. Participants also reported the tool “easy” to use. This is supported by observations of their use. All participants were able to create a story using *My Mobile Story* without any assistance in a short space of time. This stage of evaluation identified further usability problems, in particular with video content.

Therapists who completed critical reviews reported that *My Mobile Story* was suitable for therapeutic use with clients. Stage 3 trials with clients supported these findings. All clients who agreed to use it engaged in therapeutic activities between sessions. All clients created at least one story in sessions with their therapists. Three clients used the online tool between

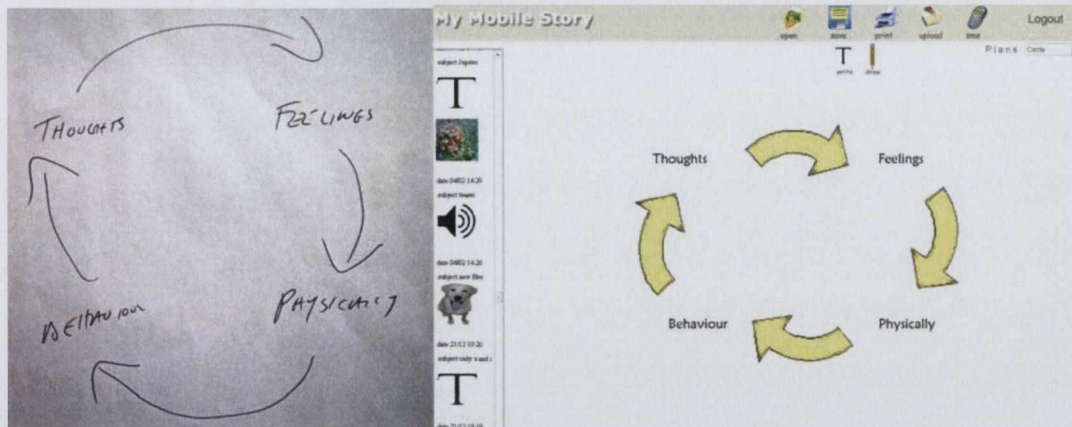


Figure 7.18 Thought Circle from sketch to plan

Personalise content

The original motivation for *My Mobile Story* was to “personalize” therapy, by allowing clients to express a personal viewpoint and share personally meaningful experiences through their mobile phone. All content collected from clients’ phones during both the clinical and peer-user evaluations was personal content from an individual’s perspective. For example, client C took two photographs, one of his dog and another of an ice skate. Both pictures represented things that had personal meaning for him. Client A used her phone to take a photograph of a picture she had drawn. Client C, who submitted only sms messages, described her feelings, where she was and what she was doing. One of the critical reviews touched on this:

“It personalizes the content for therapy session. Engagement - the young people will be interested in using it. Would raise likelihood that they continue in therapy.”

A clear benefit of facilitating the use of personal content is that it presents more opportunities for therapist and client to have personally meaningful conversations in a session. Because the client has control over access to his content and stories, he/she may feel more at ease.

Legacy of paper

My Mobile Story underlined the importance of supporting the legacy of paper in AMH. While *PI* highlighted the importance of providing printouts to clients as a record of their sessions (Coyle et al., 2005), *My Mobile Story* demonstrated the benefits of explicitly incorporating current paper-based methods into a therapeutic system. It provided a means to complement therapists’ current methods of working. An extensible *MMD* system could provide the same benefits by allowing therapist to incorporate their various paper-based charts.

The experience of Client A demonstrates the advantages of using paper. The client drew a detailed personal picture using colouring pencils. Although *My Mobile Story* supported drawing, it could not achieve the detail and feel of drawing on paper. The benefits of paper are that it is more tactile, more immediate and has more feel. Client A digitized her drawing by taking a photograph with her camera and sending it to her account.

The benefits of incorporating the legacy of paper in AMH include: 1) taking advantage of a significant amount of existing paper-based therapeutic materials, 2) providing therapists and clients with a record of their story, 3) providing therapists with a “way in” to the therapeutic system, 4) can take advantage of the immediacy and feel of paper and the reproducibility and benefits of digital format. There are advantages to making use of the legacy of paper in therapy, by incorporating paper-based materials into system.

Missions/ Reminders

Stage 2 evaluations provided initial evidence of the effectiveness of sending very precise “missions” to clients. Providing a specific task, may help motivate clients to complete tasks. In the clinical pilot, only two clients used the reminder function. Clients and therapist composed these messages together in a session. Client 2 used three different messages at different times as the focus of therapy changed. Initially, the reminder message was generally positive and non-specific: “COOL & CALM”. The last message was more specific: “Hi [*Client’s name*], remember to send texts, pictures and video clips to *My Mobile Story* (the dog, ice skating etc) - don't forget!”. During the week that this client had this reminder message he sent a picture of his dog, of an ice skate and a video of him ice skating. This would seem to indicate that reminder/mission messages should be more specific.

Because the therapeutic session is oriented around agreements between therapist and client, it was initially thought that there would be less need for a pre-defined bank of missions and that therapist and client could compose more personally relevant mission messages. Therapists were provided with specific mission messages for the SFT plan and it was recommended that missions for other plans be very specific. However, the system did not explicitly support the use of pre-defined messages. The incorporation of mission messages with therapeutic plans might increase the amount of content clients collect between sessions.

Currently messages are set for the same time each day, and the content of the message is the same. A therapist requested the ability to set up different mission messages for different days. A future version could queue missions up in advance and send a new mission out once a mission is completed by a client.

Multimedia Content

While *My Mobile Story* supports the use of text, photos, sound and videos – the clinical pilot saw a predominance of text submissions. Out of a total of 24 elements submitted by clients, over 70% were text-based, a further 25% of entries were picture-based (but their use was limited to two clients), 5% were video entries and there were no audio content submitted. Stage Two also had a large proportion of text-based submissions, but in general had a more balanced distribution of content. It is not immediately clear why there is this difference between the two stages, and it is difficult to make a judgement based on several cases. What is clear from the client case studies is that of the therapeutic plans that were used, the majority of them were online versions of existing paper-based charts. This may indicate that therapists were accustomed to using text-based content with these materials or that the charts were designed more for text than other media.

Recommendations

Based on lessons learned from *My Mobile Story* it is possible to provide some initial recommendations for therapeutic systems in and between sessions. It is recommended that such systems:

- Provide more explicit tasks between sessions (particularly in open ended task)
- Allow for range of content (e.g. pictures, videos etc.)
- Allow clinics to restrict the range of content if necessary
- Take advantage of the legacy of paper in AMH
- Allow clients to personalize the content for therapy
- Should be able to be adapted to therapists' preferred therapeutic approach

7.7. Limitations and future work

7.7.1. Ethical Concerns

The use of multimedia files raises privacy issues for therapeutic use. Hagen et al. have written about the concerns around privacy in relation to the use of photo and video captured data by HCI researchers in studies:

“those using such methods must negotiate the responsibilities of participants capture data, particularly those that might include photos or video, of indirect or involuntary participants who are not aware of the study”. (Hagen et al., 2006)

There has been much discussion about the inappropriate use of mobile phones in public places (Evans, 2009; Lawlink, 2006).

The use of multimedia content raises issues from a therapeutic perspective. The potential issue with therapeutic systems like *My Mobile Story*, which allows the client to capture content and present it in a session to a therapist is that it may breach the privacy of peers and parents. It is also possible that actions and events may be taken out of context and presented to the therapist. One therapist raised the potential issue where a client might record a violent domestic argument as a video clip and then show it to her therapist. This would place the therapist in a difficult position. While this situation did not occur in any of the evaluations of *My Mobile Story* and none of the therapists raised this as an issue in the critical reviews, it needs to be given consideration. It is worth pointing out that this risk exists already without systems which support this activity more explicitly. There is nothing stopping a client recording such an event on her phone and showing it to her therapist at present. Clinics would need to develop protocols in the event of such an occurrence, but it is an issue over and above the development of this system. As video and audio are probably the most susceptible to this type of misuse, one option would be to provide therapists with the possibility of restricting the types of content a client can send into the system. This way the client could allow the system to adapt based on the likelihood the therapist felt there was of such an event occurring.

7.7.2. Large-scale evaluations

Due to practical limitations, Stage 2 evaluations of *My Mobile Story* was of a smaller scale to the Stage 2 trial from the Mood Diary. Consequently, it was not possible to obtain statistically significant results. While critical reviews provided additional evidence for the suitability of *My Mobile Story*, results from peer user studies with statistical significance provide strong evidence for the effectiveness of a system. A challenge with a more open-ended tool like *My Mobile Story*, is that it can be difficult to evaluate the tool from this perspective since there was no compliance protocol for MMS message submissions.

7.7.3. Generality

As an open-ended system, *My Mobile Story* risks being too general and consequently making it difficult for therapists to identify how to incorporate it into their practice. The use of therapeutic plans, as discussed above, may be one way to address this issue. However, a proliferation of therapeutic plans could equally overwhelm therapists. The development of a

system which would allow for the submission of plans for multiple therapists would need to take this concern into consideration.

7.7.4. Usability Issues

There were a few usability issues with *My Mobile Story* that should be addressed before it goes to full clinical trials. These include:

- Deleting text boxes was unintuitive for some therapists and in some cases could result in loss of work
- Compatibility of the system across older browsers
- The 'Story' title element was rarely used

7.7.5. Future possibilities

The evaluations of *My Mobile Story* have identified extensions to *My Mobile Story* that would improve the system and potentially increase its therapeutic potential. These include:

Missions: Incorporate missions into the system in a similar way to therapeutic plans. It might be interesting to provide "drip feed" missions, where a new mission is provided to the client when one mission is submitted.

Improving the drawing tool: The drawing function was infrequently used. Some therapists requested this functionality early on in the design process, as they thought it would be potentially therapeutically useful. However, the degree of control it offered clients may have been insufficient to provide any useful input. Clients may have found it difficult to draw any detailed elements using a mouse. One therapist, who used MS Word to draw family trees, suggested that a future version of the system could support this activity, allowing the inclusion of pictures and other content. A future version of the system could support vector-based drawing which would allow the creation of structures like family trees, but would also provide clients with finer control over their drawings.

Scale elements: Some therapists requested the possibility to add scale elements to allow clients to rate how they are feeling and other elements.

Extensibility: Similar to *MMD*, *My Mobile Story* would benefit from allowing therapists to create, submit and share their own therapeutic plans.

Share stories: There may be benefits to allow clients, with the permission of their therapist, to allow other clients to view their stories.

8. Discussion

Chapter 3 identified the challenges involved in User-Centred Design in Adolescent Mental Health. The problems include ethical restrictions, the lack of access to adolescent end-users, time-intensive evaluations, lack of resources and finally, time-restricted therapists who may not have a competence in technology. *Client-Centred Design* was proposed to overcome these challenges. The CCD approach emerged from an analysis of the challenges in this domain, along with the relevant AMH literature, discussions and interviews with therapists and an analysis of similar UCD research. Chapter 4 proposed an interaction model for engaging adolescents in therapeutic activities both in and between sessions. Chapter 8 will assess the efficacy of Client-Centred Design, based on its use in the design of two therapeutic systems (*Mobile Mood Diary* (Chapter 6) and *My Mobile Story* (Chapter 7)). This chapter will also discuss the suitability of the “capture now-structure later” interaction model for engaging adolescents in therapeutic tasks. In conclusion, this chapter will suggest broad guidelines for future developments in the design of therapeutic systems.

8.1. Client-Centred Design

- how to evaluate?
- An approach has been suggested which builds on LCD – not evaluated yet, however effective in addressing issues in Chapter 2
- toolbox

This section concentrates on the extent to which design and evaluation techniques presented in Chapter 5 can successfully overcome the limitations in this domain. Learner-Centred Design provided an initial starting point for a suitable design approach in AMH. **Figure 8.1** provides an overview of Client-Centred Design. At each stage of the process, techniques are suggested to address the limitations. The approach follows a four-stage process of background analysis, idea generation, development and evaluation. It was used in the development of two therapeutic systems: *Mobile Mood Diary* was designed to meet an existing need, *My Mobile Story* met an emerging need. These two systems were evaluated in numerous ways and found to be effective, accepted and provisionally therapeutically suitable for clinical usage. Indeed, they are both still in clinical use. These two completed systems

support the proposition that *Client-Centred Design* can be judged be an appropriate approach to designing therapeutic systems for AMH.

Client Centred Design

Needs Analysis	
For clients	Literature Review, Therapist interviews Questionnaires
For therapists	Questionnaires, Contextual Interviews, Therapist on design team
Select Therapeutic Model	Solution Focussed Therapy Cognitive Behavioural Therapy etc.
Select Technology	Paper, Mobile phones, Desktop computers etc.
Prototype	Paper Prototyping Live demo prototyping Role playing
Core Application	Live prototype
Iterative Design	Highly iterative development process
Support Therapeutic Practice	Therapist on design team, Role Playing
Formative Evaluation	
<i>Usability</i>	Peer-user Usability Trial
<i>Engagement</i>	Peer-user Engagement Trial
<i>Suitability & Therapeutic Outcomes</i>	Critical Reviews Clinical pilot with client (end-users)
Summative Evaluation	Full Clinical Trial

Figure 8.1 Modified Client-Centred Design

Figure 8.2 provides a timeline of the *Client-Centred Design* process. It has been broken down into four distinct phases. The initial phase involves gathering background information and requirements for clients and therapists. This can take several months depending on the survey techniques used. Because this work was among the first of its kind, this stage required more in depth research. Phase 2 focuses on generating suitable ideas for clinical use. Phase 3 develops prototypes based on an agreed idea. Phase 4 involves four stages of evaluation, each testing a different aspect of the system. At the end of the four phases, the system should be ready to be evaluated in a full clinical trial.

Client-Centred Design Timeline

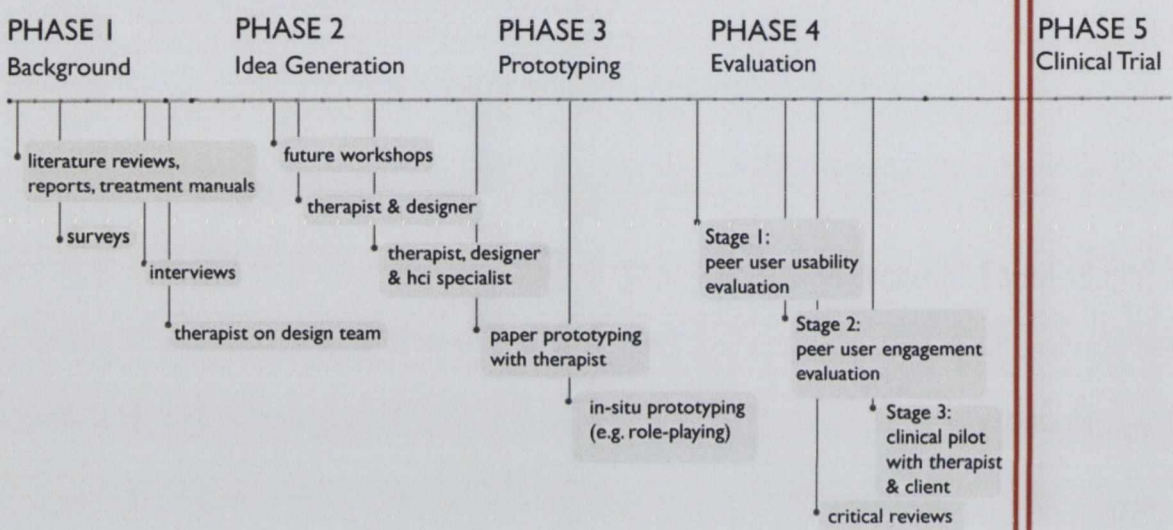


Figure 8.2 CCD Timeline

The following sections discuss the effectiveness of each technique used during the different phases of Client-Centred Design.

8.2. Background approach

Several techniques were used in the case studies to identify the context in which clients and therapists will use therapeutic systems.

8.2.1. Design Team Makeup

It has been recommended that systems development be undertaken by multidisciplinary teams (ISO 13407, 1999). (Gulliksen et al., 2003) have recommended that an experienced usability expert should be on the design team. The design team for this research consisted of the designer, a therapist and an experienced HCI specialist. This team formed the nucleus of the development of the system. Close collaboration was required in particular between the designer and therapist. Both parties were interested in ensuring the best outcome for the

client, but where the therapist focused on the overall therapeutic effectiveness of the intervention, the designer was concerned with designing the most effective software. The designer could clarify areas of his understanding by talking to the therapist. This close relationship between the two, built up in many small group meetings, facilitated a sharing of knowledge from each expert's domain. The designer needed to understand the sensitivity of AMH and to be able to characterize potential adolescent clients through conversation. The therapist provided the designer with insights into typical working practice.

At different stages of the design process, the HCI specialist was consulted to provide feedback on design ideas, early prototypes and usability issues. **Figure 8.3** provides an overview of the different participants in CCD and the extent of their involvement. The designer and design team therapist roles require the most commitment.

The therapist on the design team was essential in the development of ideas. *Personal Investigator* originated out of a discussion of current Solution-Focussed approaches and idea generating meetings with this therapist. While the ideas for *MMD* and *My Mobile Story* originated from other sources, the therapist was essential in developing the ideas and to providing feedback about the viability and aptness of design elements suggested by the designer or the HCI specialists.

The designer and therapist can both contribute to identifying areas where there is a clear need, and which technology might support; and to developing and appraising the initial design ideas.

Client-Centred Design Timeline

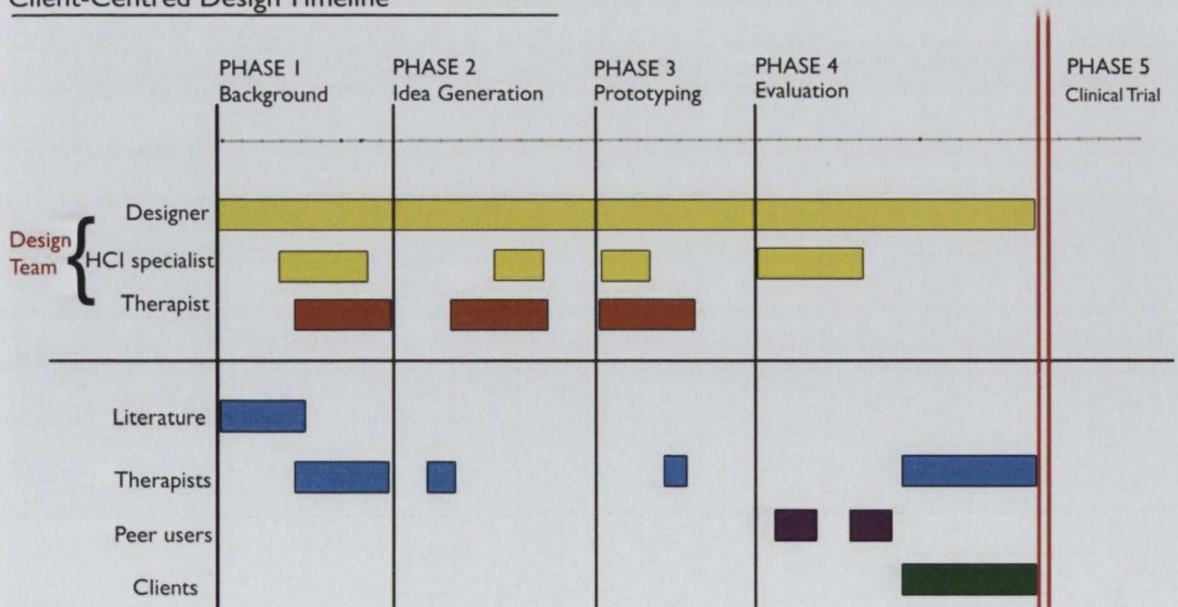


Figure 8.3 Participants in *Client-Centred Design* Process

Therapist on team

The therapist also provided the designer with a “way in” to the restricted world of AMH. The designer was able to make contact with a significant number of psychiatrists, psychologists, social workers etc. through the therapist. While the therapist provided a consistent sounding board through the entire design process, it is very important to seek input from other therapists, through individual meetings, future workshops and role-playing. Otherwise the designer can risk developing a system which fails to meet the needs of the larger group of mental health practitioners.

From the beginning of the design process, it is critical that there is a close working relationship between designer and therapist. This enables a cross-pollination of ideas and a sharing of knowledge, experience and expertise. By working with designers, therapists can enhance their own ability to understand technology and how it might support their therapeutic practice. It is the responsibility of the therapist to judge when it is appropriate to introduce software, for how long it should be used, and how it should be incorporated into the therapeutic process. Therapists can help develop the protocols, which are typically required in clinical settings, for the use and introduction of the technology in practice. Some decisions can only be made by a therapist. This development of protocols by the therapist can run parallel to the evaluation of the design and usability of the system.

(Boyd-Graber et al., 2006) reported benefits to designing with speech-and-language pathologists who were experts in dealing with aphasia: they were very familiar with the range of problems aphasic individuals can have, with the challenges of aphasia and the needs of users. In this research, the therapist, and involvement of other therapists at various stages throughout the design process, provided similar benefits. Mental health problems are numerous and multi-faceted and the designer was unfamiliar with many of them. Therapists provided the designer with details regarding how the problems would affect clients in their daily life but also in therapeutic sessions. Therapeutic approaches are incredibly varied – therapists explained to the designer the differences in approaches and how this was manifested in sessions. In addition to this, the involvement of therapists helped broaden the view of the designer regarding the importance of stakeholders in the client’s life. For example, the need to consider the role of parent’s was uncovered through various methods; in the surveys and in face-to-face sessions with therapists.

In their work in Assistive Design, discussed in **Section 4.3**, (Newell et al., 2003) recommend, where possible, to align research interests with domain experts. This gives practitioners the motivation (and reward) for their participation.

8.2.2. Literature

In the absence of first hand sources, research literature, mental health reports and therapist handbooks can provide designers with an overview of client likely characteristics, socio-economic background, typical mental health difficulties and so on. Good sources for this include the World Health Organization, the British Medical Association, National Institute for Clinical Excellence and in Ireland the Health Service Executive. Such sources helped provide grounding for the designer in the typical problems adolescents might have, their background, therapeutic approaches and a broad view of therapeutic practice.

8.2.3. Surveys

Surveys of therapists' use of technology and their attitude towards it provided a broad overview of potential issues and helped identify user requirements. A large postal survey was undertaken at the outset to provide a foundation for the following work. This was needed due to a dearth of other sources of information. A further survey was undertaken at a later stage of development primarily to provide information about therapists' use and attitudes toward mobile technology. Both surveys provided the designer with an idea of the level of clinical use of technology in Ireland. They also identified issues that would be important to address in the system design and when introducing the technology to therapists.

The development of each therapeutic system included surveying the attitudes and current practices of therapists in various clinics throughout Ireland. Questionnaires were used to this end. Phone and email interviews are emerging methods to collate contextual information in this area. They were used in both projects. The designer needs to decide which method is most effective depending on the objective of the interview and the therapist in question. Many therapists check their email account infrequently and can take significant time to reply to messages. For these therapists, phone interviews may be more reliable.

8.2.4. Interviews

In-situ interviews with a range of therapists provided the designer with an overview of the needs of therapists. This included a variety of work practices, physical environments, common therapeutic materials and perceptions toward technology. Interviews were an invaluable method to gain first hand experience of mental health settings. The benefits of workplace visits, as identified by Muller, were in evidence in these interviews (Muller, 2003; Muller et al., 1995).

8.3. Generating Ideas

From the designer's perspective, experiencing existing practice, albeit at second hand, was a useful method to generate new ideas. The initial idea for *My Mobile Story* originated from discussions on their current practice while visiting clinics.

Future Workshop

The *Future Workshop* was used as a way to develop ideas at an early stage of the development. This workshop took place in the designer's research building. This workshop involved a larger group of participants which included educationalists and computer scientists. This proved to be a promising format to generate ideas. Several promising ideas came out of this workshop; in particular the initial idea for *MMD*. While it is difficult to draw conclusions from the use of *Future Workshops* in this research, the results from the first workshop would indicate that the approach has promise in identifying broad ideas.

8.3.1. Prototyping

(Jones et al., 2005) contend that well-drawn interfaces might encourage less feedback. While rough paper prototyping was of use with the HCI specialist; it was of limited use in engaging the therapist in meaningful discussions about design issues. However, they had several other benefits. The engaged the therapist in discussions around how he would use the tool in a session and how it would impact his work practice. In the case of *MMD*, it helped to give him an idea of the workings of the system. It is important that these experiences of paper prototyping were limited to one therapist.

Paper prototyping in clinical settings

Paper prototyping in the design of *MMD* proved useful to establish common understanding and overall flow of tool. It was used in the development of both systems. It was used with the participating therapist and HCI specialist. Once a task was identified to support high-level storyboards can be designed, mapping how the tool will fit in with current treatments. As design progresses, subsequent prototypes are of increasingly higher quality. Paper prototypes are easy to manipulate on a shared space (for example, a table). This is particularly helpful to both therapist and researcher, because they can then have an open dialogue about the design. This leads to a more focused and detailed design.

The use of paper prototyping for *My Mobile Story* was useful to identify low level interaction issues, but also to get feedback on how the tool would fit into current practice. Paper prototyping helped the therapist realize that the tool risked being too open-ended. According

to him, it did not support a sufficiently specific task, which could have made it difficult for therapists to start using the tool. The idea to use therapeutic plans originated from this paper-prototyping session.

(Boyd-Graber et al., 2006) found that there were limitations using paper prototyping in usability evaluations with speech-and-language pathologists. Paper prototyping was not used with therapists in this research to evaluate usability, although it was used to this end with the HCI specialist. It is an open question whether therapists are suitable participants in evaluating usability for clients – especially given the often wide disparity in ages, technical ability and system preferences. In the case of *MMD*, paper prototypes were useful for communicating how a system might work and discussing how it would have an impact on work practice. In the development of *My Mobile Story*, it was a useful technique for ensuring the therapist could use the tool and generating ideas in the clinic related to how it would be used.

Because paper prototyping was used mainly with one therapist, it is not possible to make any firm conclusions about its suitability for work of this nature with other therapists. In the cases described herein, paper prototyping was beneficial to the designer who was able to receive feedback on the clarity and therapeutic validity of ideas at a preliminary stage.

Live prototyping in clinical settings

Once a particular design is chosen a working prototype is then developed. In some cases, several versions of the prototype can be developed. Three different working versions of the mobile client were developed for *MMD*.

Therapist's personal use of *MMD* emerged during the development process. It was generally used in that way during the latter stages of design. It could be an interesting method for the live prototyping of mobile tools at earlier stages of development. It could allow the designer to get a range of feedback from therapists remotely. Once a design was ready, it could be sent to therapists as an SMS link. This would enable therapists to use the tool personally and then provide feedback.

(Sa et al., 2008) recommend investing significant effort into creating realistic prototypes in order to identify more usability problems. They recommend that sketches of the screen in Lo-Fi prototyping should be drawn with the same size of the device's screen and similar fonts and components to the actual device should be used (Sa et al., 2006). They also recommend that the prototype should be created using rigid materials in order to be used in real-life settings. This research found that it was effective to use paper templates in the early stages of design and then move over to quick software mock-ups of the flow and structure of the

mobile tool. Using the mobile plug-in to Netbeans, software mock-ups of mobile devices with many screens and components can be built in a matter of minutes. They can be very easily then transferred onto a device or uploaded to a server and sent to a remote device as an SMS link. In this research, this was a more useful method to realise designs on real devices at a slightly later stage of development.

Role-Playing

Role-playing has been used at an initial stage of the design process for numerous reasons: to generate concepts (Kuutti et al., 2002; Vogiazou et al., 2007), to test design ideas on potential users (Salvador et al., 1999) and finally, as a technique for designers to increase empathy with users (Brandt et al., 2000). Chapter 5 identified role-playing as an approach that had promise for AMH because of its prominence in therapist training.

Types of role-plays used in this work

The use of role-playing in this thesis is different from how it has been used in other research. In this thesis, role-playing was used at a later stage of development. Live prototypes were used in role-playing for *MMD* and *My Mobile Story*. Role-playing was used to evaluate the suitability of these systems to the work practice of therapists.

In order to simulate the use of therapeutic systems, simple role cards were provided for each participant. These role cards contained basic character details. For the therapist role, this included information such as experience of technology, years of experience and attitude toward technology. For the client role, it included elements such as their name, age, mental health problem, mood and attitude to technology. These role cards were based on realistic client scenarios and were in a similar format as those used in actual practice (for example, as described by (Liddle et al., 1988)).

Two types of role-plays were used in this research:

1) In-situ role-plays

In-situ role-plays took place in a clinic with a team of therapists. Two therapists played the roles while the other therapists observed. The setting of a clinic provided a realistic simulation of actual practice; the use of a therapist's room and their mobile phone emphasised this. Perhaps as a result of this context, there was a positive and relaxed atmosphere during the role-playing sessions.

2) Workshop role-plays.

The workshop role-plays took place in a computer room in the researcher's building with therapists from different professional backgrounds. Therapists performed role-plays in pairs while the designer observed the groups. Upon completion, the groups united to discuss their progress.

The benefits of role-playing

The use of role-play in this research was promising in several respects. In-situ role-playing provided the therapists with a safe environment to clarify any issues. This is particularly important since many therapists can find it difficult and challenging to engage with technology. They may attribute any difficulties to their lack of technological ability. A technique that openly allows therapists to ask questions about technology is useful in this domain.

The use of role-playing helped to familiarise therapists with the tools. It also helped to increase their confidence in using these systems in clinical situations. The use of role-playing also provided an element of "*debugging*" the system (Simsarian, 2003). In this case, 'debugging' the clinical system meant identifying problems prior to clinical use and ensuring that it fit into therapists' existing work practices and match their technological ability. To some extent, role-playing helped evaluate the tools for clinical use. The designer was able to use feedback from these sessions to make modifications. Therapists were also able to voice their concerns regarding the system. For example, in-situ role-plays of *My Mobile Story* led one therapist to highlight a concern regarding the recording of sensitive information from parents or peers. Equally, the opportunity for therapists to have hands-on experience with the systems helped to ease other concerns. For example, a misunderstanding that the system would leave them on call outside of professional working hours.

From the designer's perspective, observing role-plays were valuable in helping to understand and evaluate how therapists would instinctively use the tool and how it might fit into existing work practices. They also provided more general insights into therapists' existing work practices.

Suggestions for future use of role-play in AMH

This research identified role-playing as a promising approach for future research. Because role-playing is commonly used in therapeutic training, the confidence shown by the therapists makes it an ideal approach for other stages of design. Future research might examine the use of role-plays with therapists to generate concepts or in developing prototypes.

An effective way to evaluate a prototype could be to have use two therapists who have never seen the system before role-play its use and introduction. This would not take much time and the designer could observe their use of the tools, in a realistic context. It has the added benefit (of training) that it trains the therapists how to use the system and they can pose more direct and relevant questions about the use of the tool afterward and give more specific and useful feedback.

Prototype in work environment

(Muller et al., 1995) has suggested that work place activities may be more tied to work practice. In this research, the use of prototyping and role-playing in clinics would seem to be an effective way of evaluating the suitability of prototypes for clinical use; particularly examining how they support current work practice. Therapists would seem to have been more at ease in activities that took place in their clinic.

8.3.2. Evaluation Methods

Participatory Design has been successfully modified by other researchers in different fields when there have been limits from the research environment (Allen et al., 2007; Davies et al., 2004; Moffatt et al., 2004; Wu et al., 2004). For example, in other areas where access to end-users is restricted, designers have used stakeholders to provide feedback and insights into the user's needs (Dawe, 2007). In evaluations, the designer had to rely on therapists as proxies to the designer and on peer users as proxies for the client user.

Data Collection

Section 3.2.2 discussed the limitations of applying traditional data collection techniques in AMH. Based on this analysis, questionnaires and application logging were deemed the most promising information gathering methods. It was recognized that therapists would have to administer questionnaires to clients acting as a proxy to the designer.

Feedback methods should provide clients with the opportunity to openly express their opinion about the software, as well as gathering information about their use of the software. Protocols for data collection should provide clients with privacy and anonymity when completing questionnaires. Therapists must give clients space to express their opinion. In order to allay client concerns that their therapist might read their questionnaires, it is advisable to seal them in envelopes once completed.

Therapists as proxies

The use of therapists to provide feedback to the designer on the impact of technology on the therapeutic intervention was effective in some respects and unpredictable in others. Despite providing clear feedback measures for both projects, compliance with these feedback procedures and the level of detail provided, varied according to therapist. It was extremely difficult to receive questionnaire feedback from clients – in only one case was questionnaire feedback received from a client. It was also very time intensive to gather feedback from therapists. Throughout these projects, it became clear that questionnaire feedback would have to be supplemented with other sources of feedback. Gradually, the designer began to supplement this data with structured telephone discussions or email updates. The benefits of this approach are that it can capture detail that it is difficult to elicit in questionnaires. The questionnaires used in this research usually ranged between two and four pages in length. Since many of the case studies had particularly different elements, there is the risk that the questionnaire feedback method risks missing useful information. Furthermore, because many of the clinical pilots took place over several weeks, there is the risk that by the time the therapist completes the questionnaire, much of the interesting details, particularly usability information, of the therapist's and client's use of technology will be lost. For this reason, it is recommended that questionnaire feedback forms are supplemented by telephone or email conversations during evaluation. In addition to this, because many therapists are not best placed to act as a proxy to the designer in terms of judging the system from a usability perspective, it is important to develop techniques which get the designer closer to the clinical situation. Having a quick telephone conversation shortly after a session can provide information that the therapist might otherwise forget or not deem important. Equally, email conversation can prove a convenient method to collect short snatches of clinical feedback that otherwise might be lost. The choice of which method to use depends on the therapist in question. In evaluations, some therapists were more comfortable talking for a few minutes on the phone – and were very unreliable in responding to email messages. Email communication suited one therapist in particular in the evaluation of *My Mobile Story*. He wrote a quick email to the designer after each session including any unusual elements.

Therapists are well placed to provide feedback on the impact of technology on the therapeutic intervention. Future work should seek to develop approaches to provide the designer with more detail on the client's use of technology from a usability perspective.

Application Logging

The use of application logging has promise for more extensive use in future therapeutic applications. In Stage 2 evaluations of *MMD*, data logging provided basic time-on-task data

that was otherwise not possible to obtain by other methods. While data logging was not used extensively in the clinical pilot, its use in one case study provided relatively low level interaction information on the client's use of the tool. Because *My Mobile Story* did not involve a mobile client, there was no possibility of using data logging for mobile use. It was possible to use timestamping of reminder messages and replies to make tentative interpretations of their importance. Both systems logged the use of the online element, recording information when the user logged in and logged out. The recording of this information should have been applied in a more cohesive manner. It was extremely time consuming to traverse large tracts of log data for potentially useful information. (Paternò et al., 2007) have highlighted the importance of considering visualisation for this reason.

Future uses of data logging should look at incorporating data logging into the early design of therapeutic systems in order to capture more detailed and readily interpreted information. For example, a future version of *My Mobile Story* could automatically detect the time and date of the first time a client or therapist logs in. Subsequent use of the system could be traced from this date. Snapshots could be recorded of the client's story as it was being created in order to provide a record of the construction process. It may be possible in the future to have time-delay screen capture of clinical use of systems. The use of different functionality could be tracked in order to provide feedback about useful and defunct elements of the system. The challenge will be to plan which information needs to be recorded in order to infer interesting information about use of the tool. It would also be useful to plan how the recorded information could be automatically presented by the system to the designer in a meaningful format, in order to save hours analysing data logs. (Paternò et al., 2007) have developed a tool for detailed mobile logging on PDA devices; they have developed an associated viewing tool which visualises the collected data in easily analysed ways.

The logging of client interactions holds some promise for providing the designer with contact-free interaction feedback. There is scope for exploring this technique in more depth. As mobile devices become more powerful, and if a system allows for a cost-free data transfer medium, it would be possible to record more fine grained interaction information which would provide more resolution on usability issues related to the software.

Critical Reviews

Section 7.6.3.1 described the use of critical therapist feedback to evaluate the suitability of *My Mobile Story*. This involved therapists using the systems themselves and providing detailed feedback from their professional perspective. The introduction of the critical reviews was based on formalising therapists' desire to use systems before clinical pilots. (Nivala et al.,

2005) have reported the effective use of experts to evaluate different map designs and assess based on certain criteria. These reviews were different to early stage expert reviews from HCI specialists and therapists. It involves therapists evaluating systems when they are nearly ready for clinical use, but more importantly requires the therapist to imagine themselves in the place of a client.

(Boyd-Graber et al., 2006) have used experts to review interfaces with varying degrees of success. While the use of therapists to provide professional feedback was used at earlier stages of the design in both case studies, critical reviews are intended for use with an almost complete tool which has already completed substantial evaluations. In the design of *My Mobile Story*, therapists' critical reviews of the system provided the confidence to proceed to clinical pilot with actual clients.

The potential benefits of using critical reviews are 1) to assess the therapeutic validity of the system in order provide further confidence in the clinical outcomes of the software, 2) to provide recommendations and establish protocols for introducing and using the system, 3) to increase therapists' confidence using the system, 4) to build up a network of evaluators, 5) provide feedback on the suitability of the system to the therapists' work practice and 6) to identify potential future uses of the system.

Multi-Stage Evaluations

In order to overcome the lack of direct access to clients, the strict ethical limits of clinical settings and the inappropriateness of presenting poor quality solutions in clinical situations, a multi-stage evaluation process was adopted in the development of the therapeutic systems described in this thesis. Evaluations with peer users were introduced in order to reduce the burden on clinical settings by evaluating usability and engagement beforehand. It was possible to complete the stages of evaluation with peer users relatively quickly. The use of peer users made an iterative design approach more feasible. It also provided a safer situation to fail in, allowing for more experimentation.

The youth club used in *MMD* Stage 1 evaluations and *My Mobile Story* Stage 1 and 2 evaluations proved a suitable setting to conduct trials. It was a convenient and relatively straightforward venue to recruit participants. It was a child-friendly space, where ethical guidelines were already in place.

Evaluating Usability

Stage 1 provided a controlled environment in order to focus aspects of the therapeutic system. These evaluations were much quicker and less resource-intensive than subsequent

stages. Both systems did not require as extensive ethical clearance as the other stages of evaluations. In both cases it, evaluations were completed in a single session and no follow up was necessary. These evaluations were primarily intended to provide usability feedback from peer users on a range of medium fidelity prototypes. The aim was to assess the initial appeal and usability of several designs in order to move forward with the development. It would have been ethically unsound and impractical to evaluate several versions of a system through clinical use. Because the subjects in Stage 1 and Stage 2 evaluations were less sensitive than client users, it facilitated more experimentation. For example, it was possible to test the mobile *MMD* without a PIN in Stage 2 evaluations.

Evaluating Engagement

Stages 2 and 3 helped demonstrate the ecological validity of both systems. The main goal of Stage 2 evaluations of both studies was to address the appeal of a high-fidelity prototype. Peer users were recruited for evaluations over a longer period than Stage 1. In both case studies, peer users used the tool in real settings on actual devices. Stage 2 was more exploratory than Stage 1, seeking to identify the effectiveness of the system in real-world settings. Compliance and engagement in both systems were very high. Further usability issues were identified at this stage, which meant the design could be refined further.

Evaluating Suitability

There are various methods suggested throughout this work which can give therapists and designers confidence in the outcomes of clinical pilots. Therapists are more likely to accept and use systems in clinical pilots that have strong supporting evidence. In order to increase the likelihood that the a system make it to clinical pilots, it is recommended that: 1) therapists are involved in developing ideas, 2) a therapist is on the design team, 3) strong results, like the statistically significant findings from *MMD* are available 4) critical reviews are used to evaluate the system prior to clinical usage.

It is clear from the evaluations that some elements of the *MMD* system can only be evaluated in clinical settings. Privacy was more important to clients than to participants in the school study. An illustration of this was that no participants in the school study reported the title of the mobile tool, 'Mood Diary', as a concern. The clinical pilot revealed that it was important to remove the application's smiley face icon and to shorten the title to MD instead of Mood Diary to provide some clients with a satisfactory level of privacy (see **Section 6.6.5**).

Clinical pilots are unpredictable. Unlike controlled research trials, whereby clients are randomly referred to a treatment measure, evaluations in real clinical settings are particularly

slow to get started. It can take a long time to recruit a suitable client. Ensuring consistency across an evaluation at the clinical pilot stage is extremely difficult. Obtaining consistent data is extremely difficult. Because of these and other issues, it is very difficult to suggest a recommended number of end users for this stage, as well as a period of time for evaluations. As the tool is being used in actual practice, it is impossible to stop evaluations after a certain period if a system is still under use. The number of participants at this stage will vary according to research resources and therapist and client availability. (Moffatt et al., 2004) in the evaluation of Phototalk with individuals with aphasia ran trials with two aphasic individuals over a month.

Multi-Stage Evaluation provided a process for evaluating *MMD* which did not require direct access to clients. The evaluation of *MMD* provides an illustration of the multi-stage prototyping methodology in action. This process provides the designer with a range of evaluation data that was not possible to obtain through other traditional methods (see **Section 4.2.2**). Furthermore, it brought up significant difficulties with the software and protocols in safe situations before introducing a modified version into a sensitive situation. Usability, appeal and protocols were all tested in situations where there was time and the possibility of failure. This enabled the software design to be refined so that it could be used with confidence in a clinical situation. The participation of the therapist on the design team and the use of peer end-users, provided the designer with a means to engage in an iterative design process when it would otherwise be impossible to do so.

One possible method to evaluate the effectiveness of the CCD approach is based on client use and acceptance of the systems. All participants in clinical stage completed the required use in trials (and many voluntarily used the system far longer than required) – and voluntarily used both systems.

8.3.3. Designing for whom?

This evaluation raised an interesting issue that in some situations the designer may need to prioritise the therapist or the client. For example, in the design of the *Mobile Mood Diary*, it was particularly important that the installation of the *MMD* was sufficiently clear and easy to use for therapists. Otherwise, clients would have never used the tool. Basic elements of any therapeutic system (both desktop and mobile systems) need to be clear, understandable and performable by therapists. There may be scope after this level to provide more advanced interaction elements aimed at clients. For the design of *My Mobile Story* it was important that registering a new account and setting up the client's mobile phone was straightforward

for most therapists. When it came to the choice of interaction techniques for manipulating content, there was a choice whether to implement the drag-and-drop style, favoured by the therapist in this evaluation, and by adults in general or to follow HCI research into which would indicate that point and click interactions are generally preferred by children between 9-13 (Inkpen, 2001). In this instance, it was decided to use point and click interaction because at this point it was envisioned that the client would be controlling the interaction.

Approaching evaluations with therapists and end-user clients in clinical situations

"I was surprised on our team by how few therapists availed of the service. Afraid of the technology. I photocopied and passed around some client charts in meetings and everyone thought it was very useful. However, few took it up even though I was willing to show them how to use it. Perhaps therapists need a buddy system (a therapist on each team with a strong competence in technology). The biggest difficult I think is getting therapists confident about using it."

Therapist 1

The greatest barrier to the uptake of the Mood Diary system was therapist's lack of technical confidence. In some cases, seeing colleagues use the system provided an incentive for therapists to use it. This was the case with the therapist who went on to participate in the design of the Anger Diary.

It can be useful to approach Stage 3 evaluations by explicitly incorporating clients as participants. One practitioner approached using software by telling the client that this was designed for other people like them and the people who designed it needed feedback about what worked and didn't. She found that they were more forthcoming. Also she reported that it got the therapist "off the hook" if there were any technical problems.

Summary of Client-Centred Design

The development of CCD aimed to address the specific challenges of working in AMH. **Figure 8.4** presents the challenges and the design solutions intended to overcome them. For example, therapist's fear of technology and their perceived need for training as identified in background research, were addressed by using role-plays of the system. The subsequent use of role-playing suggested broader benefits to the use of this technique that should be explored in future work. The most significant challenge to design in AMH is clearly the ethical restrictions and the related lack of direct access to end-users. Various techniques were used in this research to overcome this limitation.

Challenge	Design solution
domain constraints <ul style="list-style-type: none"> · costs · poor existing infrastructure · limited access to computers · ethical constraints · time intensive evaluations 	<ul style="list-style-type: none"> { low cost solutions design for existing hardware mobile access { peer-users critical reviews application logging
therapist <ul style="list-style-type: none"> · fear of technology · little concept of potential · time constraints 	<ul style="list-style-type: none"> { role-play personal use/critical reviews results from previous evaluations { paper prototypes future workshop { design for work between sessions support existing work practices design for easy entry
clients <ul style="list-style-type: none"> · lack of engagement · stigma · need for privacy 	<ul style="list-style-type: none"> short tasks with potential for longer engagement { client-centred materials provide discreet immediate access support control & confidentiality

Figure 8.4 CCD and design challenges

These included: incorporating a therapist as an integral member of the design team, evaluating other aspects of the system with peer users and the exploration of application logging to provide usability data from clinical pilots.

A framework was presented for evaluating therapeutic systems, which allowed for a modified form of iterative design. Two approaches were established which successfully bridged the division identified by Kaplan between traditional research and clinical practice. These approaches relied in one instance solely on therapist evaluations and in the other on the use of peer adolescent users and therapists acting as proxies for the designer and client in clinical pilots. The *Mood Diary* and *My Mobile Story* successfully evaluate these evaluation approaches. These two projects demonstrated that the *Client-Centred Design* approach is flexible enough that it can be modified according to the goals of the system, and budgetary and time limits.

8.4. In and between sessions

Chapter 4 identified contextual differences between interactions for clients in and between sessions. **Table 8.1** presents a high level guide to the types of interactions that are suitable in each environment. *MMD* and *My Mobile Story* were both designed with this guide in mind. Broadly, it is based on the expectation of less engagement and less focused attention between sessions.

	Inside sessions	Between sessions
Interactions:	Longer More focused Structured	Short Multiple
Design for:	Fewer competing elements, client unwilling partner	Privacy, security, wide access, personal mobile phones.
Engagement level :	Client's reticence Unwillingness to be there	Many competing elements, unlikely to engage in therapeutic activities
Emphasise:	Take pressure off face-to-face discussions, support therapeutic alliance Control, 3 rd space, printouts, security	Privacy, security, access & ease of use all more important, Higher levels of stigma
Type of tasks:	More focused, longer actions. Structuring thoughts and experiences. Discussion-based, cooperative and collaborative	Short interactions, capturing information like feelings and events, introspective

Table 8.10 Capture Now, Organise Later Table

8.4.1. Capture Now - Organise Later Interaction Model

Using this model helped engage adolescents who used *MMD* and *My Mobile Story* both in and between sessions. Both systems were based on an interaction model, similar to 'capture now – organise later' as implemented by Bedford-Roberts et al. (Bedford-Roberts et al., 1995). **Section 4.4.4** proposed that this model may be an effective way of engaging

adolescents in and between sessions, taking the two levels of engagement in account. In this research, clients' personal mobile phone was used as a device to capture information, and a desktop online tool to view and organise the information that was collected. This proved a suitable model to engage clients in therapeutic activities both in and between sessions. *MMD* was based on clients recording their moods once a day in interactions that lasted on average one minute. In a session, they spent between 10-30 minutes with therapists discussing and viewing charts based on their mood ratings. Similarly, *My Mobile Story* involved clients recording significant events or thoughts on the go in their lives. In the therapeutic session, more time was spent constructing stories.

While it is recommended to design for brief multiple interactions between session for adolescent clients, allowance should be made for clients who would like to engage in more detailed therapeutic work. Three clients used the online *My Mobile Story* between sessions to work on their stories. It is therefore important to support the possibility of engaging clients in more detailed interactions between sessions. Therapeutic systems for adults might expect that adult clients would engage in more complex tasks between sessions. Using brief tasks may be away to lead onto more in-depth tasks. For this reason, future systems should seek to incorporate, if suitable, the option for engaging clients in more detailed tasks between sessions.

In session, design for:

- Take focus off client and face-to-face conversation
- Client Control
- Facilitate Open Communication
- Ice breaker

Between session, design for:

- Discreet use
- Complete privacy
- Short interactions
- Potential for longer interactions

A successful implementation using a 'capture now-organise later' model may support the therapeutic process by: (1) creating content for use in a session, (2) engaging adolescents in beneficial therapeutic activities, (3) encouraging them to spend more time thinking about

therapeutic matters, (4) making therapeutic material more convenient and accessible, and (5) making it less daunting to engage in therapy.

8.4.2. The Choice of Technology

It is important to consider which type of technology to use for a particular therapeutic system. There may be advantages and disadvantages to choosing different media. For example, the decision to use a java tool for the *MMD* provided the designer with more opportunity to create a streamlined task, provide the user with privacy and security and to log the use of the tool. The drawback was that it required therapists to install the tool in a session. However, it was considered vital to provide the added security and privacy for recording mood and anger events. The mobile element of *My Mobile Story* was based on SMS/MMS messages, which overcame the installation issue and made the tool available to any client with a phone. On the other hand, it was not possible to design a streamlined interaction sequence for sending content to the online system or to have any influence over the appeal or usability of the mobile phone's interface. Because of this, it was important to develop a protocol for adding the *My Mobile Story* mobile number to clients' contacts on their mobile and for replying to mission messages sent to the client. From a practical point of view, while it is technically possible for the service to cover, in a convenient manner, the cost of information sent from clients' phones, it would be worth providing the option of Bluetooth to transfer information. This would be particularly useful should the client run out of credit or if they would prefer not to spend their credit on therapy

Client-friendly mobile device: The British Medical Association has recommended embedding AMH services with other services like general health in order to overcome stigma (BMA, 2006). This helps to disguise the reason for attending services. Based on a similar principle, it is recommended that systems used by clients between sessions provide them with discreet and easy access. In this research, the mobile phone would appear to have provided clients with similar cover when completing therapeutic activities.

Bridge to therapy: The potential for mobile devices to form bridges between formal care and informal care was identified in Chapter 3. (Bauer et al., 2003) have reported that the use of a PDA in the aftercare of bulimia nervosa patients helped to bridge the gap between inpatient and outpatient treatment. (Vavoula, Meek et al., 2006) have reported on the use of mobile devices to successfully bridge formal and informal learning. It can be argued that engaging in therapeutic activities while alone could be significant of this. For example, the composition in session of a reminder message between therapist and client and subsequent

daily reception of this message on the client's personal phone may have brought therapy, and the therapist, into the client's world.

The choice of a browser-based system for in-session use equally brought advantages and drawbacks. An online system takes into account therapists who use "hot desks". The room they use for a session can change from session to session. It also provides clients with the ability to login at home, which could be particularly useful for systems like *My Mobile Story*. A future model of interaction between sessions or in situations, where the client might not be able to make it to a physical clinic, could be to allow therapist and clients to collaborate through an online system. In one case of the *My Mobile Story* system, both the therapist and client worked on their story between sessions, although not at the same time.

The evaluations of both *MMD* and *My Mobile Story* underlined the importance of providing access to therapeutic materials across a range of platforms. In some cases, the client may not have access to a desktop computer; in others clients may not have sufficient network coverage in their area. Equally, some clients may prefer not to associate their phone with therapy. The online part of *MMD* provided the same functionality available to mobile *MMD* users. Clients could login and record their mood in brief interactions. The online *MMD* allowed clients to login and upload content from their computers to their account.

8.5. Design Recommendations

Paper & Technology: Where possible it is suggested that systems take advantage of existing aspects of the domain. For example, in the design of *PI*, *MMD* and *My Mobile Story* this has meant being particularly aware of the importance of paper-based materials in current therapeutic practice. It is proposed that a combination of technology and paper may have most promise at the moment. Paper has clear benefits – it is more tactile, more immediate and can be given to clients as a record of an intervention. In the example of the *MMD*, the charts were able to be taken into group meetings with psychiatrists and other therapists where there was no access to a computer. In *My Mobile Story*, one client case demonstrated the benefits by drawing a detailed picture on paper and then taking a picture of this drawing and uploading it to the online system. The technology can provide reliability, privacy, security, greater engagement and greater efficiency, e.g. saving admin time of entering paper mood charts. The use of therapeutic plans in *My Mobile Story* highlighted the potential benefits of incorporating the rich legacy of paper-based therapeutic materials in therapeutic practice.

Complement Work Practices: Any technology that is introduced needs to compliment a therapist's current practice, methods and not demand too much time in an already busy schedule. Small innovations are required to develop confidence in the possible benefits technology can offer. Equally, it is important to design for clients' existing lifestyles and preferred ways of engaging in therapeutic activities.

Adaptable Systems: Both *MMD* and *My Mobile Story* identified potential benefits from adaptable systems. For example, several therapists in evaluations commented that the diary would be much more useful if it could be modified to different needs. The use of therapeutic plans in *My Mobile Story* indicated possible advantages to allowing therapists to incorporate their existing materials into new tools. Both systems provided clients with an option of a reminder message. It was important that these reminder messages were easily adaptable by therapists (and clients) to the specific needs and motivations of each client.

Just as a therapist needs to choose the suitable therapeutic tool for a particular client, they may be benefits to allowing them to easily adapt a therapeutic system. Adaptable systems offer therapists the flexibility to adjust systems to meet the needs of given clients or client groups. While HCI researchers focus on the design and development of frameworks for delivering therapeutic content, mental health care researchers can adapt these systems for use in various interventions and evaluate their therapeutic benefits. (Coyle, Doherty, Matthews, & Sharry, 2007a; Matthews, Doherty, Coyle, & Sharry, 2008) have stated that technologies should ideally be adaptable to be of practical use in a broad range of interventions. The development of the Anger Diary, based on the development of the *Mobile Mood Diary*, demonstrated the potential to modify therapeutic systems once they have reached Stage 3 of development.

Accessibility: While it is proposed that systems to engage clients between sessions use mobile phones, it is recommended where possible to provide clients with alternatives, allowing them the choice of medium. (Kanis et al., 2007) have explored the use of technology to encourage mental wellness in general adult populations. They report on the advantages of providing a service across several platforms, the mobile phone and online. This approach provides users with a choice of technology that meets their preference and therapeutic needs and allows them to embed the service into their everyday practice. As mentioned previously, some clients may prefer paper materials to technological alternatives (Matthews et al., 2007). Both of the case studies presented here provided evidence to support this. It is proposed that, therapeutic systems should:

- Be accessible to as wide a number as possible

- Use clients mobile phones
- Provide client with choice of medium if possible

Practicality: In order to ensure that research findings carry over from research to clinical practice, as recommended by (Kazdin, 2003), this research has sought to embody a practical approach to the design of mental health systems. This has required a significant commitment in many aspects of the work. Technically it has meant designing for software that is suitable to as many mobile devices as possible – and for the low resolution, low processor speed, desktops in clinics, which often have slow Internet connections.

Control, privacy, security: Adolescence is a period where young people struggle with control over their environment. Most adolescent clients do not choose to attend therapeutic interventions. In order to encourage engagement in therapeutic activities it is important to provide clients with control over their use of therapeutic materials and complete privacy. Therapeutic systems should aim to create a safe non-judgemental space, where clients can invite therapists/ parents to join them.

The mobile tool should provide the client with complete privacy. It should not be possible for a peer or parent to infer the purpose of a therapeutic tool from the application's name, other application information or by trying to log in to the tool. This principle should guide the development of any therapeutic system. Designers should seek to provide clients with as much privacy as possible through all aspects of a system.

Section 2.4.1 highlighted therapists concerns relating to confidentiality and security of information - while secure systems can be built, it may be equally important to create a sense of security in the design.

Ethical Requirements: Design research must adhere to strict ethical requirements. To help in achieving these requirements, it is suggested that new systems be (1) based on accepted theoretical models of mental health care, (2) designed in full collaboration with therapists, (3) designed to integrate with existing working methods and (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 new system is thoroughly verified, (2) the therapeutic validity of systems is evaluated by therapists and (3) ethical clearance must be agreed for all proposed studies. Protocols should be provided for adolescents, therapists and parents/guardians regarding the use and scope of the system and particularly the future uses of client information.

9. Contributions and future work

Designing systems for use in AMH can be extremely challenging. Access and ethical constraints effectively make traditional User-Centred Design approaches unfeasible. The first challenge facing designers in AMH is how to design products which are useful, usable, engaging and therapeutically suitable. The second challenge is how to evaluate the usability of a system, especially when the introduction of an unusable system in a clinical setting might have serious consequences. Poor software solutions are potentially another barrier to effective treatment. Well-designed therapeutic systems may help improve client engagement in treatment and consequently lead to better therapeutic outcomes. Prior to this thesis, there was no established UCD process for designing and evaluating therapeutic systems in AMH.

This thesis has focused on designing computer systems for adolescent mental healthcare interventions in and between therapeutic sessions. Its main contribution is the development of a design process for designing and evaluating software in this area, and exploring its effectiveness through two case studies.

9.1. Summary

Chapter 2 highlighted the main challenges of working in AMH such as difficulties engaging adolescents, limited resources, lack of therapist training in technology and stigma. Certain limitations to the introduction of technology were highlighted.

Chapter 3 introduced User-Centred Design as a method to design software that meets users' needs and fits existing work practices. Significant limitations to undertaking UCD in AMH were identified. A summary of areas with similar constraints was provided and potentially useful techniques highlighted.

Chapter 4 distinguished between different levels of client engagement in and between therapeutic sessions. An interaction model 'capture now – analyse later' was proposed as a potentially suitable structure for addressing this disparity in engagement levels, but also to meet some of the challenges identified in Chapter 2.

Client-Centred Design was proposed in Chapter 5 to address the challenges in Chapter 3. The development of two therapeutic systems, implementing this design approach, was described in case study format (Chapter 6 & Chapter 7). Both systems were based on the interaction

model suggested in Chapter 3, which relied, outside sessions, on clients' mobile phones. The format of *Client-Centred Design* was modified for the second case study. These modifications were based on analysis of the effectiveness of the design approach in the first case study, and in consideration of inherent differences in the therapeutic system,

Chapter 8 discussed the impact this design approach had in the development of both systems, what techniques were effective, which ineffective, which require more research, and which areas provided interesting future avenues.

9.2. Client-Centred Design

The main contribution of this thesis is *Client-Centred Design* a series of tools to help designers maintain a UCD approach to the design of therapeutic systems for use in AMH (see **Figure 9.1**). This approach aims to keep both users' interests central throughout, despite the significant restrictions present in the area. It includes methods for designing software in AMH without the direct participation of client users and methods for the evaluation of software. It is a flexible model, which incorporates techniques from other areas in User-Centred Design, such as Participatory Design and Learner-Centred Design, as well as novel techniques. The findings from both case studies provide evidence to suggest that CCD can be effective in the design and evaluation of therapeutic systems for Adolescent Mental Health.

Multi-Stage Evaluation

A substantial contribution of this thesis is the 'multi-stage evaluation', which overcomes the inherent limitations in the area and maximises evaluation possibilities. Each stage has a different focus and purpose. The most detailed low-level usability evaluation takes place in the early stages of this process where there are fewer limitations to the methodologies available. At each subsequent stage, the evaluation and data collection possibilities become restricted as access and ethical limitations increase. At the end of this process, the system should have been stringently evaluated and can proceed, after minor revisions, to full scale clinical trials.

9.2.1. Therapeutic Software

Two therapeutic systems were successfully developed using Client-Centred Design. Both systems were accepted by therapists and clients and are currently still in use. They have been evaluated in real clinical settings involving actual end-users who had severe mental health problems without any reported significant usability problems. Clients engaged with the systems in and between sessions. The systems showed the benefits of using clients' personal

mobile phones as effective therapeutic tools. This approach can provide both discreet and convenient access to therapeutic activities. They also provided justification for the 'capture now – analyse later' model of interaction. This model engaged adolescent clients between sessions, and in structured tasks in therapeutic clinics.

My Mood Diary

The Mood Diary system improved client completion of mood charts and increased engagement in therapeutic interventions. The school study found that there was a significant difference in compliance rates in favour of the *Mobile Mood Diary* when compared to paper charts.

My Mobile Story

My Mobile Story explicitly supported existing informal uses of technology for therapeutic storytelling. It allowed therapists to incorporate their existing ways of working into a new medium.

9.3. Guidelines, protocols and recommendations

As the first work of its type in the area, this research has contributed to mapping out the broad design issues in the area. This included identifying important factors to consider when working in the area, protocols for the use and introduction of therapeutic systems in clinical situations and design recommendations for use in the design of future therapeutic systems.

Table 9.1 provides a set of design recommendations which emerged at different stages of this research. They are based on issues encountered and findings which emerge during the design of two therapeutic systems for engaging adolescent clients. They are particularly relevant to the design of therapeutic systems to engage adolescents in and between therapeutic sessions, but may be applied for the design of other therapeutic systems, for example the design of software for self-directed use by individuals with mental health problems.

Idea Generation

Future workshop: An inter-disciplinary group workshop away from the clinic may help generate new ideas for future systems.

Interviews: Can provide the designer with a "feel" for therapeutic work.

Surveys: Can provide an overview of the main attitudes and current uses of a particular technology amongst therapists with a view to identifying the most significant challenges in the area.

Therapist on design team: A therapist on the design team can provide a sounding board to design ideas at all stages of the design cycle.

Therapist Training

Install: Install process for software needs to be extremely straightforward for therapists.

Role-plays: Provide therapists with hands on experience with a system and allow them to clarify their understanding and allay fears.

Personal Use: using systems first themselves can improve their ability to envision design changes and build up their confidence.

Formal Training: Some therapists come aboard after seeing colleagues experience success with the system. Potentially a buddy system could assist therapists' with low confidence participate in evaluations.

Design

Active Response: Therapeutic systems that require clients to record elements should require an active response or at least record and display whether a response was an active or a default response.

Control: over sending content from phone, and access to their content.

Privacy: Provide discreet and easy access to therapeutic activities between sessions. Therapeutic systems should provide complete privacy to clients – therapeutic tools should be invisible to outsiders.

Personal Mobile Devices: Where possible, use personal mobile devices for therapeutic activities between sessions to improve engagement, save on costs and to take advantage of existing knowledge and hardware. Having a flexible reminder element to a system is important for some clients.

Accessibility: Provide clients with a choice of multiple access points to therapeutic materials (i.e. paper, mobile, online).

Extensibility System/ Adaptability: Therapeutic systems should be able to be adapted to therapists' preferred therapeutic approach but also to client's needs and problems.

Personalize content: Allow clients to personalise content for therapy

Engagement/ Client-centred materials: Use materials that are adolescent-centred (client-centred) and “to hand”.

Practical: Design for existing clinical practice to ensure that systems meet actual requirements and that evaluated systems can be incorporated immediately into broader practice.

Approaches: Apply design approaches which overcome the limitations of access, time intensive evaluations etc.

Take advantage of existing work practices: Be aware of existing work practices in order to incorporate them into the design of therapeutic systems (e.g. role-playing as part of evaluations, therapeutic plans and existing paper approaches).

Evaluation

Therapist as proxy: Therapist can act as proxy to clients in design of systems, and proxy to designer in clinical settings.

Involve peer users: The use of adolescent peers can help take burden off clinical setting and increase confidence in suitability of system for therapeutic use.

Application Logging: Implement application logging where possible to make up for lack of client feedback and direct observation of the use of therapeutic systems.

Ask for help with evaluations: Incorporate clients’ as participants in the evaluation process by asking them to help with evaluations. Telling them that their thoughts and feedback can improve the system for other young people may be empowering to them and make them more understanding of any technical difficulties.

Explore declined cases: Exploring cases where the tool was declined by clients can reveal useful information.

Language: The language used in all front end elements of a system should be well considered in light of possible misunderstandings and the stigma of AMH.

- Use language that client is familiar with
- Ensure language used is not stigmatising
- For systems that report emotional states, ensure that language is not ambiguous

Evaluate in actual clinical practice: Evaluate in existing practice to confirm the findings from previous evaluations and to reveal concerns unique to this user group.

9.4. Limitations

Because there was little existing HCI research in the area of AMH, this thesis has focused on the high-level issues of design work in the area. This section identifies limitations of the research presented in this thesis. The limitations of the systems developed during the course of this research have been discussed in previous sections (**Sections 3.2.3, 6.7 & 7.7**).

While client-centred design was effective in the development and initial evaluation of two systems described in this thesis, each aspect of the approach has not been evaluated comprehensively as a design approach. More research is required to identify the benefits of specific approaches in the design of therapeutic systems. For example, as discussed in **Section 8.3.1**, paper prototyping while of certain use in the design of both systems was only used with one therapist. It would be useful to examine the effectiveness of paper prototyping with a larger group of therapists.

A limitation of the clinical trials of both systems was the time evaluations took to complete. This was due to a large part to the sensitivity of the area and the client group. Choices made in the design of the study, namely to evaluate in actual clinical practice with presenting clients and using their personal mobile phones, had a further delaying effect on the evaluations. Future studies should seek to minimise these delays by providing therapists with some incentive to become involved in evaluations. This could involve partnering with therapists who have an interest in conducting research in this area, or a more traditional model of recruiting therapeutic researchers to systematically evaluate a system as part of their research. This may result in higher levels of feedback (e.g. recuperated questionnaires) from participating clients. Close collaboration of HCI research with therapeutic research has the potential to provide useful findings for both domains.

Furthermore, in order to increase client numbers, it may be necessary to experiment with providing mobile devices to clients for the duration of the study. This would have the benefit of saving the therapist the need to install software in a session and would reduce the development time for mobile software. The drawback, discussed earlier, could be that clients would be less familiar with how these phones worked. However, many phones such as Nokia and Sony Ericsson have begun to standardise their interfaces for their phones, so that young people may be familiar with how they work.

Another limitation of the clinical trials presented in this thesis is that the findings involve relatively low numbers of clients across a range of mental health disorders. This makes it difficult to generalise results to specific mental health problems. Further work is required to focus on the design and evaluation of systems for clients with specific mental health issues. Finally, while attempts were made to investigate the use of mobile systems between sessions by clients, much of what happened particularly between sessions, but also within sessions, was still vague. Therapists may not be best placed to provide feedback on interaction issues. More detailed methods are required to collect interaction information on the use of therapeutic systems by clients. For example, the use of mobile powerful mobile devices might help log more detailed low-level interaction information.

9.5. Future Work

Several potentially interesting future avenues of research have emerged during this research, some arising from the limitations set out in the previous section. Various techniques were identified as promising in this work. These include:

Prototyping: Exploring the potential of paper and live prototyping with a larger body of therapists would be beneficial. A combination of role-playing and/or the mobile paper cards used in *MMD* or the rapid live prototyping mobile technique could provide interesting information.

Future workshops: The vast disparity in perspectives between designers and therapists may have potential for innovative ideas and productive collaboration. The future workshop was useful in this research, but its effectiveness and its most suitable format in this domain requires further exploration.

Role-playing: As therapists are particularly comfortable with role-playing would seem to indicate interesting potential for use in different ways and at different stages during the design of therapeutic systems.

Application Logging: Future development should examine ways in which increased logging could be included in clinical pilots. The logging of client interactions might provide the designer with feedback on user interventions that can not be obtained through traditional methods. As mobile devices become more powerful, and more Wi-Fi compatible, it could be possible to record more fine-grained interaction information, thereby providing high resolution usability information.

Users: (Boyd-Graber et al., 2006) have used advocate users in the design of systems for individuals with aphasia in order to facilitate a *Participatory Design* approach. Advocate users in this study were individuals with aphasia who had a greater ability to communicate than other individuals with aphasia. Future research in AMH could examine the feasibility of a *Participatory Design* approach with adolescents who have recently overcome depression and may also have had experience attending professional mental health services. It might also be interesting to incorporate young adults with depression in the design process. It is an open question to what degree clients could contribute to the design process were they able to participate in it.

Differences between peer-users and clients: In order to build up a user profile of adolescents suffering with mental health problems, it could be interesting to explore the differences between peer-users and client end-users in more detail. This could include differences in interaction styles and preferences.

Therapists and clients: It could be interesting to explore the differences in interaction needs of therapist and clients. In certain cases it may be necessary to favour one user over the other – for instance since the therapist is the gateway to a client’s use of a system, it may be important that such features that require the therapist to introduce the system to the client e.g. installation or registering an account, be designed foremost to meet the therapist’s needs. Other aspects of the system may need to favour clients’ interaction preferences.

Broader mental health: Since *Client-Centred Design* addresses domain-wide challenges, it may have relevance for use with other sensitive groups in professional mental health, where the intervention of the designer may have a negative impact. For example, it could be interesting to assess the validity of *Client-Centred Design* for use in broader mental health with adults with serious mental problems who could not participate in design. It could be equally interesting to explore the suitability and potential of the “capture now-analyse later” model for use in broader mental health.

Future devices: The types of mobile devices widely available are changing rapidly. More modern devices allow for a wider-range of interactivity and more processing power. For example, the *iPhone* and similar devices allow for more subtle interactions which may have future implications for therapeutic systems. (Piper Jaffray, 2009) have reported that 8% of American teenagers already own an iPhone and that a further 22% are planning to buy one in the next six months. Furthermore, the possibility of easily incorporating GSR sensors or location sensors may have promise in AMH.

Other HCI areas: It could be interesting to explore the potential of other HCI areas in AMH. The use of tangible interfaces might have an impact on the therapeutic alliance or in how intuitive both end-users find a system to use. Removing the traditional desktop computer might have benefits. For example, the use of *My Mobile Story* on a shared tabletop workspace might engage clients through the ease and fun of interaction.

Other areas in mental health: It could be interesting to explore the suitability of *Client-Centred Design* and the interaction model in different therapeutic approaches such as Group therapy, Family therapy and Art therapy.

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Appendix A

This Appendix includes two surveys used in early requirements gathering as well as the structure used for contextual interviews with therapists.

1.1.1. Postal Questionnaire

Technology & Therapy questionnaire

We are a group of researchers and clinicians working on developing new ways of using technology and computers in therapeutic work with children and young people. We would be grateful if you complete this questionnaire to let us know what you think about the potential role of technology in your work. We would like to build up a community of interested people around this subject, so please supply your email address if you would like to hear about further developments. *Please feel free to copy this questionnaire and pass on to colleagues.* Thank you for your time.

Name:

Address:

Email address:

Profession/Background:

Years of experience:

1. How would you rate your level of experience with computers?

Expert	Experienced	OK	Inexperienced	Novice
--------	-------------	----	---------------	--------

2. Have you ever used, or do you use computers in professional training?

Yes	No
-----	----

If yes please describe how?

3. Do you use computers to help you manage or plan your work (e.g. filing client information)?

Yes	No
-----	----

If yes please describe how?

4. Do you ever use computers during sessions with a client?

Yes	No
-----	----

If yes please describe how?

5. Have you ever used email, instant messaging or any other form of computer mediated communication in your work with a client?

Yes	No
-----	----

If yes please describe how?

6. In what ways do you think computers can be of most benefit to therapists?

7. Would you be interested in attending a training course on using computers in therapeutic work?

Yes	No
-----	----

If yes please state what training would be most helpful.

If you have experience of working with adolescents or children or opinions on doing so please complete the following:

8. What therapeutic approaches do you most often use with adolescents or children?

9. Do you use tools such as board games, storybooks etc. to engage with adolescent or children clients?

Yes	No
-----	----

If yes please describe how?

10. Have you used computers in sessions with adolescents or children before?

Yes	No
-----	----

If yes please describe how?

11. Do you think computers could be useful in engaging adolescents or children?

Yes	No
-----	----

If yes please state how you think computers could be most useful.

12. Any other comments (please attach an extra page if necessary)

1.1.2. Sample Postal Survey Response

Technology & Therapy questionnaire

Media Lab Europe, Trinity College Dublin, University College Dublin &, Mater Hospital, Dublin

We are a group of researchers and clinicians working on developing new ways of using technology and computers in therapeutic work with children and young people. We would be grateful if you complete this questionnaire to let us know what you think about the potential role of technology in your work. We would like to build up a community of interested people around this subject, so please supply your email address if you would like to hear about further developments. *Please feel free to copy this questionnaire and pass to colleagues. We will collect these questionnaires in person.* Thank you for your time.

Name: XXXXXXXXXXXXX

Address: dept of child and adolescent psychiatry, mater hospital, dublin 7

Email address: XXXXXXXXXXXXXXX

Profession/Background: speech and language therapist

Years of experience: 29

1. How would you rate your level of experience with computers?

Expert	Experienced	OK	Inexperienced	Novice
--------	-------------	----	----------------------	--------

2. Have you ever used, or do you use computers in professional training?

Yes	No
-----	-----------

If yes please describe how?

3. Do you use computers to help you manage or plan your work (e.g. filing client information)?

Yes	No
------------	----

If yes please describe how? **Data collection system, pinpoint**

4. Do you ever use computers during sessions with a client?

Yes	No
------------	----

If yes please describe how?

Very limited: using boardmaker software to generate pictograms and software which allows clients to get visual feedback about voice pitch etc.

5. Have you ever used email, instant messaging or any other form of computer mediated communication in your work with a client?

Yes	No
------------	----

If yes please describe how?

Very limited, to communicate with parents of clients, with information, queries etc

6. In what ways do you think computers can be of most benefit to therapists?

Maybe development of software which can give feedback on a range of speech and language features, can personalise narratives, give protocols for social behaviour etc

7. Would you be interested in attending a training course on using computers in therapeutic work?

Yes	No
------------	----

If yes, please state what training would be most helpful.

Depending, I am a speech and language therapist, and maybe the content of the course would not suit my discipline, which may be more didactic in one sense but is, at the same time , one which requires learning to take place in a social context, in order to promote communication and social use of language.

If you have experience of working with adolescents or children or opinions on doing so please complete the following:

9. What therapeutic approaches do you most often use with adolescents or children?

9. Do you use tools such as board games, storybooks etc. to engage with adolescent or children clients?

Yes	No
------------	----

If yes please describe how?

To develop social skills and language and speech skills

10. Have you used computers in sessions with adolescents or children before?

Yes	No
-----	-----------

If yes please describe how?

11. Do you think computers could be useful in engaging adolescents or children?

Yes	No
------------	----

If yes, please state how you think computers could be most useful.

In interactive, problem-solving tasks, and in developing visual supports for social stories, narrative, etc

1.1.3. Postal Questionnaire Results Summary

N 32: Irish-based practitioners

Sample: mix of professions

Have you used computers in therapeutic sessions with adolescents or children before?		
YES: 7	NO: 25	NR: 0
cd-rom		
printing off pictures		
computer games		
library visits		
laptop for story lines, multiple choice outcomes		
designing games & categories		
kids design their own programmes for eating		

disorders and email them to me.		
---------------------------------	--	--

Have you ever used email, instant messaging or any other form of computer mediated communication in your work with clients?		
YES: 27	NO: 5	NR: 0
Texting appointment details to teenager Texting appointment messages to parents Text parents Communication about appointments Email about appointments.		

Do you think computers could be useful in your therapeutic work with children or adolescents?			
YES: 22	NO: 4	Unsure: 5	NR:1

How would you rate your level of experience with computers?					
Expert	Experienced	OK	Inexperienced	Novice	NR
1	6	20	4	0	1

Do you use computers outside of sessions (e.g. filing client information, using the Internet, playing computer games etc.)?		
YES: 29	NO: 2	NR: 1
What for? Administrative work. Filing reports Client information (Pinpoint) Communication (Word, Powerpoint, Email) Case Notes Internet 4 research Planning (making up programmes) Recording sessions Reports Statistics Information sheets for clients		

1.1.4. Trim Therapist Questionnaire

Please take your time and answer the questions honestly. Thank you for your time and effort helping with this evaluation.

My profession: _____

How long have you been doing this? _____

1. On average, 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
-----------	----------------	-------------	------------------------	------------------------	-------

Very Confident	Confident	Some Confidence	Little Confidence	No Confidence
----------------	-----------	-----------------	-------------------	---------------

2. *How confident do you feel about using a computer?*

3. *Do you use a computer for work?*

Yes	No
-----	----

If 'Yes' please say what for e.g. email, client work etc.

4. *How confident do you feel about using a mobile phone?*

Very Confident	Confident	Some Confidence	Little Confidence	No Confidence
----------------	-----------	-----------------	-------------------	---------------

A large, empty rectangular box with a thin black border, occupying the upper half of the page. It is intended for the user to write down their thoughts.

8. Write down any other thoughts you have!

1.1.5. Therapist Contextual Interviews

Checklist of fundamental questions:*Interviewee background*

1. What is your profession or training?
2. How long have you been working in this field?
3. Experience with computers? Email? Word? Excel?

Materials

4. What tools/materials do you use to engage with clients (who are difficult to engage, specifically adolescents)?
5. What is the goal of using tools or materials in therapy?

Day in the life

6. Please describe a typical day's work for you:
7. What did you do yesterday?
8. How do you start your day?

Relationships

9. What sort of relationships do you have with clients? Formal or informal?
10. What type of relationship do you think is ideal for working with adolescent clients?

Computers:

11. How do you use computers in your work?
12. Do computers ever play a role in a session with a client?
13. How do you think computers can be of most benefit to therapists?

Other?

1.1.6. Sample therapist interview transcript

Interviewee background

1. What is your profession or training?

Principal Speech and Language Therapist

2. How long have you been working in this field?

25 years. Now works mostly with 2-14 year olds.

Experience with computers? Email? Word? Excel?

Email with colleagues

Use Pinpoint software for client background and attendance records.

Combined use of this with handwritten reports:

Problems with handwritten reports:

Legibility

Access

Many therapists aren't comfortable with typing.

Materials

3. What tools/materials do you use to engage with clients (who are difficult to engage, specifically adolescents)?

Toys, pictures of objects. Boys and girls play with all toys (cooking, dolls etc.) up until the age of 4 at which point a division takes place. 'I shouldn't be playing with this'

4. What is the goal of using tools or materials in therapy?

Two phases for materials.

Assessment tools (Reynell, PLS)

Typically an assessment session takes 1 hour and a half, designed to identify the areas that need work. Tools used for assessment are different to those used for treatment.

Intervention programme is of course based upon assessment.

Therapy

Games and toys are used flexibly by the therapist to work on areas that they need to focus on. Therapist can make up games on the go.

Teach cause and effect. Pronunciation. Etc.

Day in the life

5. Please describe a typical day's work for you:
6. What did you do yesterday?
7. How do you start your day?
8. What do you do immediately after or before a session with a client?

Try and write up a session straight away but often has to leave it for some other time, preferably during the same week. Mary makes little notes and puts them on the client's folder with a paper clip, key words which she might note down while she works with the client or afterwards.

Relationships

9. What sort of relationships do you have with clients? Formal or informal?

Depends on the client

10. What type of relationship do you think is ideal for working with adolescent clients?

Playmate and teacher. No doubt about where the authority is.

Goal work on confidence. Amongst other things.

Role of the parent.

Parents will usually sit in on treatment, learning how to help their kids,

Almost taking on the role of therapist helper outside of therapy. Mary also works with parents using video recordings of them with their children.

Kids love seeing themselves on video.

Therapist has stickers 'Great Start' she gives to clients as a reward. [similar perhaps to how letter game could work]

Computers:

11. How do you use computers in your work?

12. Do computers ever play a role in a session with a client?

13. How do you think computers can be of most benefit to therapists?

Computers could increase the fun factor in therapy. Most kids play with them.

Game content, storyline, or more subtle content could influence kid. Therapist

And client could play together.

Therapeutic applications exist but don't have time to assess them and learn them.

Other?

Appendix B

This Appendix includes all the documentation related to Personal Investigator. It includes therapist and client questionnaires.

1.1.7. Therapist Clinical Questionnaire Personal Investigator

Thank you for using the Personal Investigator video game in your work. This is a final feedback form where you are asked to assess the overall value of having used Personal Investigator with several clients. We would appreciate any information and suggestions you might have to further this research.

Name: _____ Occupation _____

Date: _____

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.

Personal Investigator (PI) was easy to use as part of your therapeutic work

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please say what was easy or difficult

Playing Personal Investigator made it easier to engage with teenage clients.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Playing Personal Investigator helped to structure session into achievable tasks, which the clients could understand more easily.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Clients talked more as a result of playing Personal Investigator.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Playing Personal Investigator helped motivated clients to achieve their therapeutic goals.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Receiving visual rewards (e.g. keys) reinforces the clients' sense of achievement.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

The 3D environment was helpful.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Writing in the notebook was helpful.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Having a printed record of their answers was helpful

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Watching videos of other teenager's stories was helpful.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Listening to the dialogue was helpful.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Personal Investigator helped clients alter their perspective on their problems.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
-------------------	-------	---------------------	---------	----------------------	----------	----------------------

Please comment.

Personal Investigator successfully integrated Brief Solution Focused Therapy into a video game.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
----------------	-------	------------------	---------	-------------------	----------	-------------------

Please comment.

If Personal Investigator were developed as a clinical tool I would use it with further clients.

Strongly Agree	Agree	Agree Moderately	Neutral	Disagree Modestly	Disagree	Strongly Disagree
----------------	-------	------------------	---------	-------------------	----------	-------------------

Please comment.

Please also answer the following questions.

1. What did you find most useful about 'Personal Investigator'?
2. Overall, what problems do you think the game could help a person with?
3. Overall, which aspect of Personal Investigator works best in helping young people?
4. Overall, what could be improved to make Personal Investigator more effective and helpful?
5. Overall, what age range do you think the game is best suited to?

Thank you for your help.

1.1.8. Client Clinical Pilot Personal Investigator Questionnaire

Thank you for helping with this research. 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.

Please rate how helpful were the following aspects of PI

The 3D environment Very Helpful Helpful Not Sure Unhelpful Very Unhelpful

Any Comments:

Writing in the note book Very Helpful Helpful Not Sure Unhelpful
Very Unhelpful

Any Comments:

Watching the videos Very Helpful Helpful Not Sure Unhelpful
Very Unhelpful

Any Comments:

Listening to the dialogue Very Helpful Helpful Not Sure Unhelpful
Very Unhelpful

Any Comments:

Collecting the keys Very Helpful Helpful Not Sure Unhelpful Very Unhelpful

Any Comments:

Your answers to the following questions will also be very helpful.

What do you remember most about playing PI?

Is there anything you think that should be different in 'PI'?

What problems do you think the game could help a person with?

Thank you for you opinions they will be very helpful.

1.1.9. Consent form for clinical pilot

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.

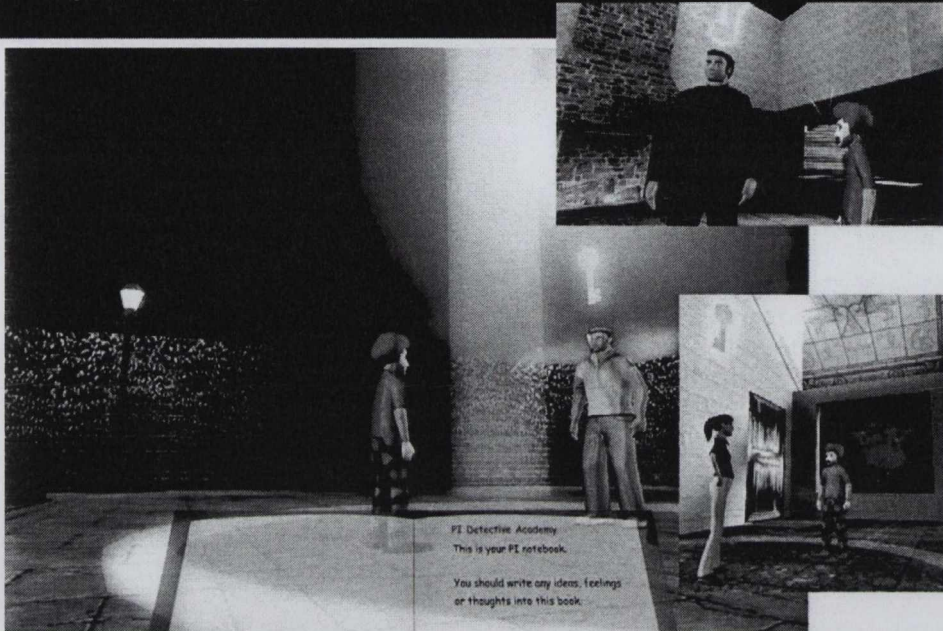
_____	_____	_____
Name	Date	Signature
_____	_____	_____
Name of Parent	Date	Signature
_____	_____	_____
Name of Parent	Date	Signature
_____	_____	_____
Doctor / Researcher	Date	Signature

1.1.10. Therapist Handout for Personal Investigator

Personal Investigator

David Coyle, Mark Matthews, Dr John Sharry, Dr Andy Nisbet.

- An online detective game, that implements Brief Solution Focused therapy.
- Designed to help therapists to engage with teenagers.
- Designed to help teenagers overcome mental health problems.



'Personal Investigator' centers on the development of an innovative 3D therapeutic detective game, targeted at engaging adolescents, suffering from depression, in a novel and dynamic way. Specifically, the user will be invited to become a detective or 'personal investigator' in the game and to hunt for clues to solving personal problems in their lives.

Using the solution-focused model of psychotherapy, adolescents will be invited to find clues to the solution such as clarifying goals, identifying 'exceptions', highlighting supports and hidden strengths and accessing resources. The adolescents will progress through the game by interacting with a 'virtual detective' who asks key questions regarding problems and potential solutions and who direct the users on how to progress to the next stage. It is predicted that the combination of goal orientated therapy within goal orientated games will firstly serve to attract and sustain the interest of adolescents and secondly to make learning about mental health enjoyable. Personal Investigator will be the first game to integrate an established psychotherapeutic approach into a novel and engaging online 3D game.

'Personal Investigator' is a collaboration between Media Lab Europe and Trinity College Dublin and is funded by the HEA.

For further information contact: davidc@medialabeurope.org mark@medialabeurope.org

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Appendix C

This appendix includes the questionnaire therapists were given at the future workshops and a sample of the role cards that were used in role-playing scenarios.

1.1.11. Future Workshop Questionnaire

Date: _____

Please take your time and answer the questions honestly. Thank you for your time and effort helping with this evaluation.

My profession: _____

How long have you been doing this? _____

General Survey

1. On average, 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
-----------	----------------	-------------	------------------------	------------------------	-------

2. How confident do you feel about using a computer?

Very Confident	Confident	Some Confidence	Little Confidence	No Confidence
----------------	-----------	-----------------	-------------------	---------------

3. Do you use a computer for work?

Yes	No
-----	----

4. How confident do you feel about using a mobile phone?

If 'Yes' please say what for e.g. email, client work etc.

5. What do you think the advantages/disadvantages mobile phones may bring to mental health?

Very Confident	Confident	Some Confidence	Little Confidence	No Confidence
----------------	-----------	-----------------	-------------------	---------------

6. Have you ever used a mobile phone in your practice with a client?

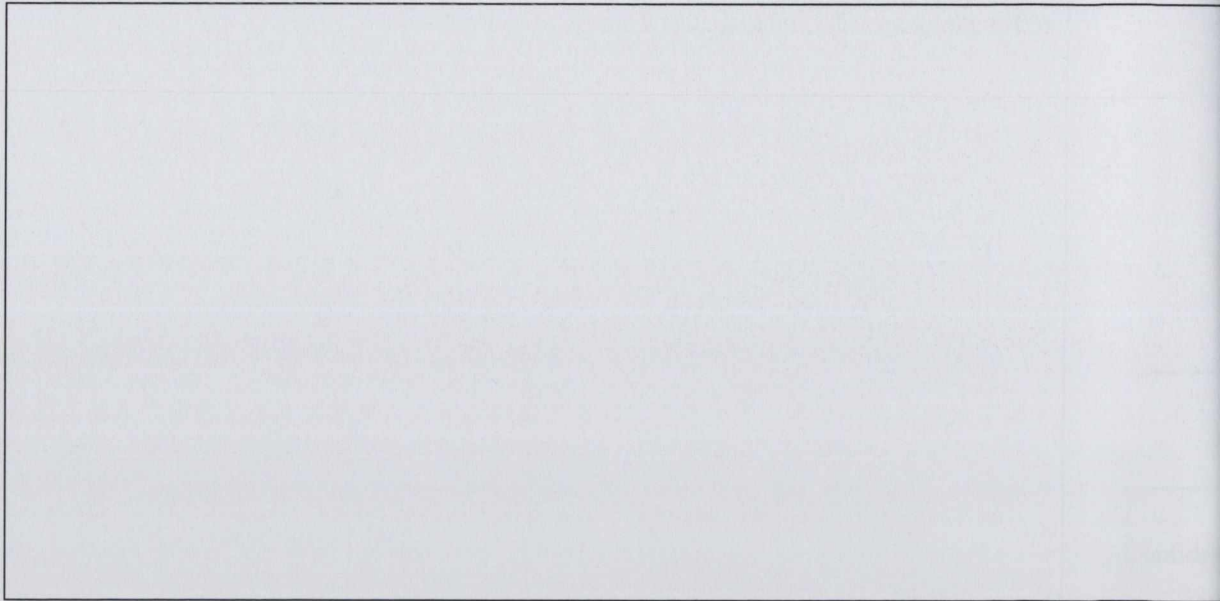
ile phone in your practice with a client?

Yes	No
-----	----

If 'Yes' please say what you have used if for:

7. What obstacles do you think there may be to introducing mobile phones in mental health settings?

8. Write down any other thoughts you have!



1.1.12. Role play cards

Client

You are 15. You have felt depressed for as long as you can remember. Have been to psychologist before, but found them patronizing. You are interested in playing music and writing stories and find it helps.

Client

You are 13 and have been diagnosed with ADHD. You often feel sad and angry. You lose your temper quite regularly and are frustrated that you have to go to this clinic. You have tried other things in the past, but nothing has helped. However you find talking about your problems really helps.

Client

You are 14. You have problems sleeping which is affecting the way you feel about everything. Your father also has problems sleeping and keeps a mood diary. You don't like having to go to therapy but are prepared to give it a go.

Client

You are 12. You have been feeling depressed since you heard your grandfather was dying. You haven't been sleeping. This is your first session with a therapist and you are quite nervous. You are fearful that you will find it difficult to talk to a stranger about your problems.

Client

You are 15 and have been diagnosed with Asperger's Syndrome. You have found school difficult and have been bullied in the past. You like being creative and also like computer games a lot. You hope your therapist will be sympathetic.

Appendix D

This appendix contains all the documentation in connection with the Mobile Mood Diary project. It includes ethics submissions, information sheets, questionnaires and permissions forms.

1.1.13. Mobile Mood Diary Ethics Submission

MATER MISERICORDIAE HOSPITAL RESEARCH ETHICS COMMITTEE

APPLICATION FOR THE APPROVAL OF A CLINICAL RESEARCH PROJECT

Narrative Summary

Study Title:

Monitoring mood by mobile phone - a comparative study.

Investigators: Prof Carol Fitzpatrick and Dr John Sharry

Project Summary and Rationale

Cognitive behavioural therapy (CBT) is an evidence-based treatment for a number of mental health disorders in children and adolescents. These include depressive and anxiety disorders, which are some of the most common disorders treated in Child and Adolescent Mental Health Services (CAMHS). Recent concerns about the use of antidepressant

medication in children and adolescents have led to increased interest in the development, use and evaluation of psychotherapy programmes, particularly CBT, for depressive disorders. The recently published National Institute of Clinical Excellence (NICE 2004) Guidelines on the management of depressive disorders in young people advise that CBT is the treatment of choice for depression in young people, except in cases where the depression is so severe that the young person is unable to engage in therapy.

'Mood monitoring' is an important component of CBT. This involves the young person recording their mood at regular intervals, to help them to recognise the factors which may be impacting on their mood and how they have managed at times when they have felt depressed. 'Mood monitoring' is traditionally done as a paper and pencil exercise which the young person is asked to complete on a daily basis, using a mood chart supplied by the therapist. Young people are notoriously poor at completing these charts or remembering to bring them to the next session.

This project aims to evaluate a novel way of monitoring mood using mobile phone technology. Software now exists which allows users to record their mood on their mobile phones, and also enables a 'reminder message' to be sent to the young person. This study will compare mobile phone 'mood monitoring' with the pencil and paper approach in adolescents in school and in clinical settings, to find out which approach is more effective in getting adolescents to record their mood.

This study follows on from a pilot study conducted in May which provided initial evidence for using mobile phones in this way. This study will overcome some of the limitations of the original study, which had a high percentage of female participants and limited numbers. This study will comprise an equal gender balance and larger subject numbers, helping provide more substantial evidence for the use of mobile phones in this way.

If monitoring mood by mobile phone is effective, it will have the potential for widespread application in therapy with young people, and will open up the area of use of the 'new technologies' in a therapeutic capacity.

Specific Objectives

The proposed research will determine whether young people from a school sample are more likely to complete a mood diary that is presented on a mobile phone than when a similar diary is presented as a paper chart. The long term objective is to explore the potential value of the mobile phone as an engagement tool in psychotherapy and the dissemination of mental health information.

Literature Overview:

Mental health professionals often experience difficulties engaging adolescent clients in therapeutic activities and this is especially the case between sessions when clients are asked to complete 'homework' activities which require them to prepare materials in advance of sessions or to chart their feelings between them (a, b). Typically there is a very low rate of task completion in these activities. This might be attributed to the use of outmoded materials or methods which are not concurrent with adolescent interests.

Research has shown that client-centred approaches to psychotherapy which engage the interests and strengths of clients are more likely to be successful (c). Technology such as computer games and mobile phones hold great appeal to adolescents and in previous work we have developed a 3-D computer game as a means of engaging adolescents in psychotherapy (d). The mobile phone network represents a promising client-centred platform, allowing access to adolescents' personal space and affording them persistent and continual access to therapeutic materials. Most importantly it takes advantage of an existent widespread network in use by adolescents and therefore requires no extra hardware costs. Using mobile phone text messages has been found as having the following benefits in the treatment of eating disorders (e)

- access to this technology is independent of space and time
- little temporal or monetary cost
- an interactive medium
- encourages patients to express themselves briefly and concisely
- allows patients to stay in contact with therapy
- helps bridge the gap between inpatient and outpatient treatment

Further research is required to determine whether these findings generalise to other areas of mental health and as to whether they stand up in comparison to traditional methods of therapeutic engagement. For example, 'mood diaries', often referred to as mood charts or mood charting, are generally used for adolescents with a range of difficulties from depression

to ADHD to anxiety problems. They provide a way to track a client's symptoms, behaviours and feelings on a daily basis. Generally, mood diaries are completed using 'pen and paper' methods on simple charts that are given to clients, though in practice it can be difficult to motivate adolescents to complete these.

Proposed system - Mobile mood diary

The proposed system centres on the development of a software version of a standardized mood diary for adolescent clients that can be installed on their mobile phones. The adolescents will be presented with an interactive screen into which they can rate their mood on a scale on one to ten, as well as key in a description of how they are feeling. The software can be set to remind the adolescent on a daily basis to complete the diary at an agreed time and all the information is stored on the phone for discussion with the therapist at a later date. This software aims to build upon the advantages of the mobile platform to establish whether this approach is more effective than traditional paper approaches

Research Method

The study will be conducted in six secondary schools who are currently participating in a mental health prevention programme through their Social, Personal and Health Education Programme. Three schools will be added to each of the two the research conditions below.

- 1) Pupils charting their daily mood using traditional pen and paper method on a mood chart.
- 2) Pupils charting their daily mood using interactive software that has been installed on their mobile phone.

Pupils using the mobile phone will be reimbursed the cost of downloading the software onto their phone. This will not exceed one euro per participant.

As part of an educational session on 'moods and emotions', pupils from the classes will be asked to complete a mood diary, (making a daily entry) over a period of two weeks and this will be reviewed in class as part of the programme.

Young people attending in second year in schools	
Group 1 – Mobile diary (n=50)	Group 2 – Paper diary (n = 50)
Software diaries installed on phones	Paper charts distributed
Review of diaries in class	Review of diaries in class
Measure rates of engagement	Measure rates of engagement
Feedback from young people	Feedback from young people

Data Collection

Data collection will contain of

- 1) Non-identifying personal information (age and gender) of each young person
- 2) The mood diaries inputted in the mobile phones or on paper
- 3) A brief satisfaction survey (Appendix C)

Data Analysis

By comparing the extent which the young people have completed the diaries (either on computer or on paper) and by analysing their satisfaction survey, we will be able to compare levels of engagement across the two groups and in particular to answer the following questions

- a. Have the young people using the mobile diary been more or less likely to complete the task and to make a diary entry each day?
- b. Have the young people using the mobile diary given more or less information than those using a chart?
- c. What were the benefits and limitations of each system as reported by the young people?

POTENTIAL BENEFITS OF THE RESEARCH

If monitoring mood by mobile phone is effective, it will have the potential for widespread application in therapy with young people, and will open up the area of use of the 'new technologies' in a therapeutic capacity.

The rate of youth suicide in young men in Ireland is extremely high. Untreated depressive disorders have been shown to be a factor in a significant proportion of young people who die by suicide. The broader focus of this project is to make treatment of depressive disorders by CBT more relevant and responsive to the needs of young people. This is in keeping with the goals of 'Quality and Fairness- A Health System for You (2001)'(f) , with its focus on better mental health for all young people, fair access, responsive and appropriate interventions, underpinned by a strong evidence-base.

The National Health Promotion Strategy 2000-2005 (g) emphasised that mental health is as important as physical health, and recommended a focus on youth health. This project addresses those goals.

This proposal also addresses the goals of the National Children's Strategy (2000) (h) by striving to ensure that 'children will receive quality supports and services to promote all aspects of their lives'. This project is an attempt to make therapeutic support more appealing and relevant to young people.

'Reach Out - The National Strategy for Action on Suicide Prevention' (2005) (i) detailed the importance of developing accessible, 'user-friendly' treatment programmes for adolescents with depression and / or self-harm. This project will help with that aim.

References

- a) U.S. Department of Health and Human Services (1999) Mental Health: A Report of the Surgeon General. Rockville, MD: U.S. Department of Health and Human Services, Substance Abuse and Mental Health Services Administration, Central for Mental Services, National Institute of Health, National Institute of Mental Health. Also www.surgeongeneral.gov/library/mentalhealth/home.html, accessed December 2004

- b) Offer, D., Howard, K. I., Schonert, K. A. and Ostrov, E. (1991). "To whom do adolescents turn for help? Differences between disturbed and non-disturbed adolescents." *Journal of the American Academy of Child and Adolescent Psychiatry* 30(4), pp. 623-630.
- c) Duncan, B.L., Hubble, M.L. and Miller, S.D. (1999), *The Heart and Soul of Change*. American Psychological Association, Washington, DC,
- d) Coyle, D., Matthews, M., Sharry, J., Nisbet, A. and Doherty, G. (2005) "Personal Investigator: A Therapeutic 3D Game for Adolescent Psychotherapy". *International Journal of Interactive Technology and Smart Education* 2(2) pp 73-88.
- e) Bauer, S., Percevic, R., Okon, E., Meerman, R. and Kordy, H. (2003). "Use of Text Messaging in the Aftercare of Patients with Bulimia Nervosa". In *European Eating Disorders Review*, 11, 279-290 (2003).
- (f) 'Quality and Fairness- A Health System for You' (2001). Government Publications Sales Office, Dublin. Department of Health and Children.
- (g) 'The National Health Promotion Strategy 2000 – 2005'. (2000). Government Publications Sales Office, Dublin. Department of Health and Children.
- (h) 'The National Children's Strategy' (2000). Government Publications Sales Office, Dublin.
- (i) 'Reach Out - The National Strategy for Action on Suicide Prevention' (2005). Government Publications Sales Office, Dublin.

MATER MISERICORDIAE HOSPITAL

RESEARCH ETHICS COMMITTEE

APPLICATION FOR THE APPROVAL OF A CLINICAL RESEARCH PROJECT

Reference Number

For secretarial use

- Please complete all sections of this form. Where a section is not relevant to the proposed research project, please write "N/A" in the space provided

- Cross-referencing of answers is not acceptable e.g. responses such as 'refer to protocol' or 'see above', must be avoided

- Sections must be completed legibly and preferably typewritten

- Please avoid the use of jargon wherever possible. If technical terms are to be used, please explain them. It must be remembered that there are lay members who will read your application

- Forms which have not been completed will not be passed to the Committee for appraisal

- On completion this form should be submitted to Ms. Sarah O'Neill, Administrator to the Research Ethics Committee, Mater Misericordiae Hospital, Dublin 7

1. **THE RESEARCH**

State clearly the title of the proposed research

Monitoring mood by mobile phone - a comparative study.

2 PROPOSED DURATION OF THE STUDY

- 1.1 Please state the proposed duration of the study and any extensions which might be envisioned
1 year

3 Investigators / Staffing of Research Project

- 3.1 Principal Investigator must be a consultant or head of faculty currently holding an appointment in the Mater Misericordiae Hospital
- 3.2 Please provide the following details of the Principal Investigator (i.e. the investigator who will take overall responsibility for the conduct of the research and to whom all correspondence from the Research Ethics Committee will be sent):
- NAME AND TITLE: Professor Carol Fitzpatrick.**
 - QUALIFICATIONS: MD, FRCPI, MRCPsych**
 - POST HELD: Consultant Child Psychiatrist / Professor of Child Psychiatry.**
 - DEPARTMENT/INSTITUTE: Department of Child and Family Psychiatry..**
 - ADDRESS: Mater Hospital, Dublin 7.**
 - TELEPHONE NUMBER: 8034793**
- 3.3 Please provide the following details for all other investigator(s) who will work on the research project (under the following headings):

- NAME AND TITLE: Dr. John Sharry**
- QUALIFICATIONS: D.Psych, MSc., BA (Mod.), CQSW.**
- POST HELD: Principal Social Worker.**
- DEPARTMENT/INSTITUTE: Dept. of Child and Family Psychiatry.**
- ADDRESS: Mater Hospital, Eccles St., Dublin 7.**
- TELEPHONE NUMBER: 8034793**

3.4 Please append an up-to-date C.V. for each investigator who will be involved in the conduct of the proposed study. In each case it should incorporate an outline of personal experience in:

- (i) the field of research
- (ii) the techniques which are involved in the conduct of the research
- (iii) details (brief) of any previous relevant research undertaken in the last five years

3.5 Where prior relevant experience is lacking in any individual who will be involved in the conduct of the research, please state who will act as supervisor and the arrangements made to provide adequate supervision

N/A

3.6 Is each Investigator a Registered Medical Practitioner?

YES NO

3.7 Confirm that each Investigator engaged in the research project is covered by Professional Indemnity Insurance in respect of their involvement

YES

3.8 Confirm that each person who will fulfil a function, either administratively or in the care of

the research subject, is an employee of the Hospital or has been approved for indemnity under the Hospitals Public Liability Insurance

YES

Only the above named people are authorised to carry out the procedures outlined in this protocol. any changes must be notified to the Research Ethics Committee for approval

4	NARRATIVE SUMMARY OF THE PROJECT
---	----------------------------------

- 4.1 Please append an outline of the proposed research (not more than two sides of an A4 sheet of paper) to include:
- (a) the purpose and objectives of the research
 - (b) information about the drug(s) / appliance(s) / method(s) of treatment or diagnosis/ question(s) / issues and / or hypothesis(es) to be used and / or tested in the research
 - (c) scientific background to the research including previous research carried out in the field / on the drug(s) / appliance(s) or on the methods, question(s) or hypothesis(es) in question
 - (d) value and need for the research. If this project or similar research, has been carried out previously, please state the justification for and benefit of its repetition
 - (e) design of the research and methodology to be adopted (i.e. randomised, placebo controlled, double blind etc)
 - (f) expected duration of the research / study / project

(g) how the data generated by the research will be analysed.

5 REGULATORY REQUIREMENTS

5.1 (a) Name the substance/preparation which is the subject of the proposed clinical trial

N/A

(b) name the company/organisation which produces this substance/preparation

N/A

(c) give the protocol number used by the company / organisation for this clinical trial

N/A

5.2 Indicate what phase of drug testing the trial represents:

Phase 1 Phase 2 Phase 3 Phase 4

N/A

5.3 Has IMB approval been obtained? (please attach IMB approval) YES NO

If IMB approval has not been sought, please explain why

N/A

5.4 Indicate the category under which IMB approval has been obtained:

- **Category 1 (Section 2 (2) of the Act)** is a clinical trial which involves a substance or preparation for which there is a product authorisation and where the conditions attaching to this product authorisation will be fully complied with in the clinical trial
- **Category 2 (Section 2 (3) of the Act)** is a clinical trial which involves a substance or preparation for which there is a product authorisation but where the purpose of the trial is to investigate a new use. The authorisation conditions relating to the dosage, form and levels must not exceed those set out in the product authorisation
- **Category 3 (Section 3 (1) of the Act)** is a clinical trial which involves new substances, new preparations of established substances, the use of a placebo, and all trials including human volunteer studies which do not fall under Categories 1 and 2

N/A

5.5 Give details of the pharmacology, dosage, toxicity and side effects of the substance / preparation

N/A

NOTE: For the protection of both the Investigator and the participant the list of side effects must be comprehensive and must also appear in full in the Patient Information Leaflet.

5.6 Is this preparation or substance being given with therapeutic intent? (Is the principal purpose of its administration to prevent disease/save life/restore the health/alleviate the condition or relieve the suffering of the patient – in contrast to testing a drug in normal controls or volunteers or giving a drug purely to study pharmacokinetics?)

N/A

 YES NO

If the answer is NO - patients who are unable to physically sign consent or unable to comprehend the nature, significance, and scope of the consent required, may not participate.

5.7 Does the organisation and performance of this clinical trial conform to GCP Guidelines?

YES NO

N/A

5.8 What is the proposed START date of this study? **April 2006**

NOTE: Any protocol specific procedures or evaluations which are carried out on participants, even though they are only performed to assess the eligibility of the participants for randomisation (i.e. prior to the patient receiving study medication), the study will be recognised as having commenced and as such, informed consent must have been obtained prior to the carrying out of those procedures or evaluations¹

5.9 5.9 Will the study begin within six days of obtaining patient informed consent? YES NO

N/A

(In order to comply with the Control of Clinical Trials Act 1987 and to allow for mature consideration by the participant, no study specific procedures can be conducted on a subject within a period of 6 days after the day the subject agreed to be a participant and signed and personally dated the consent form. If such a delay is not possible, then a request for a waiver of the 6-day rule may be requested from the IMB)

If YES, has a waiver of the 6-day rule been approved by the IMB? YES NO

(please attach a copy and indicate the reason why this was applied for)

5.10 Confirm that adverse events wheresoever occurring will be notified to the

¹ see also ICH/GCP 4.8.8, 5.18.4 (e), Section 9 of the Control of Clinical Trials Act, 1987

Principal Investigator, the IMB and Research Ethics Committee

✓ YES NO

6 RESEARCH DESIGN

6.1 In what location(s) will the proposed research project be carried out?

Six secondary schools in North Dublin within the catchment area of the Dept of Child and Family Psychiatry

6.2 Will all the procedures and tests involving research subjects which form part of the research protocol be carried out at the Mater Misericordiae Hospital? ✓ YES NO

If the answer is NO please explain.

6.3 (a) does the design of the study allow a statistically significant conclusion to be reached with the smallest possible exposure of participants? ✓ YES NO

(b) has statistical advice been sought? ✓ YES NO

6.4 Has the protocol been designed to conform to

(a) the principles of the Declaration of Helsinki (as amended)? ✓ YES NO
If not, please explain.

(b) Guidelines for Good Clinical Practice? ✓ YES NO

6.5 Please identify any ethical dilemma which you consider may arise within this research project

The study involves asking young people in schools to complete a project monitoring their mood either on a paper chart or using their mobile phone. There is a small chance that such an exercise may raise awareness about existing problems and cause the young people to wish to seek formal support. To address this arrangements will be made so the young people will be able to access support via the schools with the back up of the Dept of Child and Family Psychiatry if need be. This support structures already exist as part of a larger study (Working Things Out in the SPHE) already approved by the Ethics Committee of which the current study is a subset.

6.6 (a) What person or organisation devised this project?

Prof Carol Fitzpatrick/ Dr John Sharry

(b) has a detailed research protocol been drawn up? YES NO

(if YES, such documentation must be submitted to the Research Ethics Committee)

6.7 Has the Principal Investigator who will present this project to the Research Ethics Committee studied all the documentation drawn up for the project and will all the investigators study the documentation before the project begins? YES NO

6.8 Briefly describe the scientific rationale for the project:

Cognitive behavioural therapy (CBT) is an evidence-based treatment for a number of mental health disorders in children and adolescents. These include depressive and anxiety disorders, which are some of the most common disorders treated in Child and Adolescent Mental Health Services (CAMHS). Recent concerns about the use of antidepressant medication in children and adolescents have lead to increased interest in the development, use and evaluation of psychotherapy programmes, particularly CBT, for depressive disorders. The recently published National Institute of Clinical Excellence (NICE 2004) Guidelines on the management of depressive disorders in young people advise that CBT is the treatment of choice for depression in young people, except in cases where the depression is so severe that the young person is unable to engage in therapy.

'Mood monitoring' is an important component of CBT. This involves the young person recording their mood at regular intervals, to help them to recognise the factors which may be impacting on their mood and how they have managed at times when they have felt depressed. 'Mood monitoring' is traditionally done as a paper and pencil exercise which the

young person is asked to complete on a daily basis, using a mood chart supplied by the therapist. Young people are notoriously poor at completing these charts or remembering to bring them to the next session.

This project aims to evaluate a novel way of monitoring mood using mobile phone technology. Software now exists which allows users to record their mood on their mobile phones, and also enables a 'reminder message' to be sent to the young person. This study will compare mobile phone 'mood monitoring' with the pencil and paper approach in adolescents in school and in clinical settings, to find out which approach is more effective in getting adolescents to record their mood.

This study follows on from a pilot study conducted in May which provided initial evidence for using mobile phones in this way. This study will overcome some of the limitations of the original study, which had a high percentage of female participants and limited numbers. This study will comprise an equal gender balance and larger subject numbers, helping provide more substantial evidence for the use of mobile phones in this way.

If monitoring mood by mobile phone is effective, it will have the potential for widespread application in therapy with young people, and will open up the area of use of the 'new technologies' in a therapeutic capacity.

6.8 How many participants from this centre do you expect to recruit?

Participants will be drawn from three schools in the Northside of Dublin

6.9 Please state whether this is a multi centre trial and if so indicate the overall number of participants

100

7.1 What is the nature and extent of the medical examination that participants are to undergo before participating in this project?

N/A

7.2 How will the health of the participants be monitored during and after the study?

N/A

7.3 Will the participants undergo independent medical examinations, before, during or after the study?

YES

NO

7.4 Please state whether the project includes procedures which: (tick as appropriate)

(a) are physically invasive

(b) involve the taking of bodily samples

(c) involve the administration of doses of radiation

7.5 Please outline the procedures involved above under the following headings:

(a) the dosage and route of administration of the drug(s) used in and under research

(b) other substances and/or appliances to be administered/used, and the method of administration or use

(c) measures and samples to be taken

(d) tests to be performed

(e) the use of questionnaires, visual aids or the administration of psychological tests.

The project will be evaluated

7.6 Please specify:

- (a) which procedure(s) may cause pain, discomfort, distress or inconvenience to a participant and the likely extent of it

N/A

- (b) any particular requirements or abstentions which will be imposed upon the participant, (e.g. multiple visits, abstention from alcohol etc.)

N/A

7.7 Where samples will be taken please state:

- (a) what type of samples

N/A

- (b) the amount and frequency of them

N/A

- (c) whether the sample(s) would be taken as part of the normal patient care or specifically for the purpose of research

N/A

- (d) if a sample would be taken as part of the usual patient care – will the amount taken be any greater due to the participation of the subject in the research?

N/A

8 RISKS AND HAZARDS

8.1 If a placebo group is to be used, will the placebo group receive the best standard therapy?

YES

NO

- 8.3 Where the research involves the use of radioactive isotopes, please confirm that the dosage proposed to be used in the research has been approved by the Chief Medical Physicist and that the person(s) who will administer the dose is/are properly qualified and hold(s) the necessary certificates

9 RECRUITMENT/SELECTION OF PARTICIPANTS/CONSENT

- 9.1 Please state the following in relation to recruitment/selection of participants:

(a) method(s) for recruitment

(if by advertisement or circular to patients please append copy)

Young people from the selected schools will be invited to take part in the research project and those that are interested will be given an information sheet (see appendix A) outlining what will be involved. The information sheet will also be sent to the young person's parents along with a consent form, who will be given the opportunity to request that their child does not take part. (Consent Form – see appendix B).

(b) criteria for recruitment / selection of participants **See (a) above**

(c) exclusion criteria

None

(d) proposed inducements / rewards, monetary or otherwise offered to participants

None

(e) are women of childbearing potential included?

✓ YES

NO

(f) does the nature of the study justify involving women of childbearing potential?

✓ YES NO

(g) if the answer is YES does the protocol 'Patient Information Leaflet' warn the participant of the risks of a study drug/research procedure on a fetus and the need to avoid pregnancy?

N / A YES NO

9.2 Please state whether participants belong to any of the following groups:

Pregnant / nursing mothers

The elderly

Mentally incompetent adults

Emergencies

Unconscious patients

Children under 18 years of age

Students

Prisoners

9.3 Please state what special or additional arrangements, if any, will be applied, particularly in information and consent procedures, to safeguard the interests of such participants

Parents will be informed of the project in writing and given the option that their child does not take part

9.4 Please explain why it is necessary to conduct the research in such participants

and whether the required data could be obtained by any other means

It is good practice to trial all new psychological methods and the collection of self-report measures via standardised questionnaires, rating scales and qualitative interviews is standard practice.

9.5 Please outline the procedure which will be adopted in order to ensure that each person whom it is proposed to recruit to the study will be made aware of the matters listed

below: **See Patient Information Leaflet.**

- (a) the objectives of the study
 - (b) the manner in which any substance or preparation is to be administered
 - (c) the risks, including psychological stress, and any discomfort involved, and the possible side effects of the study
 - (d) whether or not a placebo is to be administered.
 - (e) the way placebo-controlled or randomised studies operate and what this means to the participant (*unless very good reason for not putting the participant on notice e.g. because it would undermine the study*)
 - (f) alternative forms of treatment
 - (g) potential benefits to patient/society
 - (h) availability of compensation for injury
 - (i) an invitation to the participant to ask questions if he/she so desires
 - (j) the right of the participant to withdraw from the study at any time
- 9.6 Having been made aware of the above, please indicate whether or not the participant will be afforded at least **6 days** after signing the consent form (to comply with Section 9 of the Control of Clinical Trials Act, 1987) YES NO
- 9.7 Have you submitted to the Research Ethics Committee, with this form, a Patient Information Leaflet and Consent Form prepared by a sponsor or other external group, or a **Patient Information Leaflet** and **Consent Form** based on the Research Ethics Committee's prototype (see appendix A) to be given to each participant?

9.8 What criteria are to be used to ensure that the identity of each participant remains confidential?

Data will be entered using only coded information.

10	FINANCIAL ASPECTS
----	-------------------

10.1 What are the cost / resource implications of this study? Please elucidate

The study will be carried out by researchers already employed within The Dept. of Child and Family Psychiatry, Mater Hospital and one PhD student from Dept of Computer Science TCD. There are no substantial cost implications.

10.2 Is this study initiated / sponsored by a pharmaceutical or other industrial company?

If YES state the name of the company

YES

NO

10.3 Is the cost of running the trial / research study covered in total by the sponsor?

N/A

YES

NO

10.4 Fully specify any financial or other direct interest to you or your department arising from this study

(a) investigator **N / A**

(b) department **N / A**

(c) other **N / A**

10.5 Will payment of expenses be made to the participants? YES NO
 If YES – how much?

10.6 Will a reward over and above expenses be made to participants? YES NO
 If YES – how much?

10.7 Will this project increase work / cost to any other group? YES NO
 If YES – obtain and include details of cost and signatures as indicated below:

Please detail all costs under the following headings:

Department

Head of Department

Approval Signature

Pathology

Radiology

Nuclear Medicine
Pharmacy
Any other
Staff	
Nursing
Medical Salaries
Portering
Medical Records
Secretariat
Any other

Please consult the Finance Department for assistance in providing costing if required.

10.8 Have all tests for this study been discussed with the relevant departments? **N / A**

YES

NO

10.9 Has the Mater Misericordiae Hospital Finance Department approved all costs? **N / A**

YES

NO

Agreed:..... Date:

General Manager, Finance, Mater Misericordiae Hospital

Please note: ONLY APPLICATION FORMS THAT HAVE BEEN APPROVED **AND** SIGNED BY THE GENERAL MANAGER OF FINANCE WILL BE ACCEPTED BY THE RESEARCH ETHICS COMMITTEE

11 INSURANCE / INDEMNITY ARRANGEMENTS

11.1 If the clinical trial is sponsored by a pharmaceutical company please confirm that the sponsor has agreed to accept the Hospital standard Indemnity Form (and append a signed copy)

N / A

YES

NO

If the standard Indemnity Form has not been signed please explain why

11.2 If there is no sponsor for the clinical trial please specify the insurance arrangement in place and furnish appropriate certification **N / A**

11.3 If the research is sponsored by a pharmaceutical company, has that company agreed to abide by the current ABPI Clinical Trials Compensation Guidelines?

N / A

YES

NO

If NO, please state what arrangements or insurance are/is in place (if any) to compensate a participant in the event of personal injury or death arising out of participation in the research

If none, please say so

12 CONFIDENTIALITY AND DATA PROTECTION

12.1 Please state what measures will be taken to protect the confidentiality of subject's data
(i.e. arising out of the research)

Completed questionnaires will be coded and contain no identifying information. Analysis of the data will be limited to themes and statistical results so there is no possibility of personal recognition.

12.2 Who will have control of data generated by the research? **The investigators and the researchers.**

Where will it be stored, in what format, where and for how long? **See 12.1**

12.3 Does the research and any consequent publications entail the use of photographs or videos?

YES

NO

If YES, please include patient authority in the Consent Form.

See Consent Form enclosed

12.4 If the research involves only access to medical records will consent from patients be obtained?

N / A YES

NO

If NO, how can such access be justified and how will the confidentiality of the patient be guaranteed?

I confirm that the information provided in this Application Form is correct.

I understand that I must undertake to submit an **Annual Report** on the anniversary of the Research Ethics Committee approval with details of the number of participants who have been recruited, the number who have completed the study and details of any adverse events.

Signed.....Principal Investigator.....Date

Signed.....Investigator.....Date

Please submit **twelve copies** of this form to: Ms Sarah O'Neill,

Administrator, Ethics Committee, Mater Misericordiae Hospital, Dublin 7

Telephone: 01-8032971 Fax: 8034777

APPLICATION DOCUMENT CHECKLIST

(to be returned with application form)

TICK CLEARLY "YES", "NO" OR "NOT APPLICABLE" TO EVERY QUESTION

- | | | | | |
|-----|--|-------|----|-------|
| 1. | Application Form | ✓ YES | NO | |
| 2. | Hospital Application Fee | YES | | ✓ N/A |
| 3. | Protocol | ✓ YES | NO | N/A |
| 4. | Narrative Summary | ✓ YES | NO | |
| 5. | IMB Approval | YES | NO | ✓ N/A |
| 6. | Consent Form | ✓ YES | NO | |
| 7. | Patient Information Leaflet | ✓ YES | NO | |
| 8. | Sponsors Indemnity | YES | NO | ✓ N/A |
| 9. | Insurance Certificate | YES | NO | ✓ N/A |
| 10. | Copy of letter of notification to patient's GP (on headed notepaper) | YES | NO | ✓ N/A |

11. Principal Investigator's up-to-date Curriculum Vitae

YES NO

12. Any questionnaire which participant may be asked to complete

YES NO

13. Any advertisement or circular used in recruitment

YES NO N/A

14. Have you enclosed twelve copies of ***all*** the above documents

YES NO

Please send all the above to:

Ms XXXXXXXXXXXX Administrator, Ethics Committee, Mater Misericordiae Hospital, Dublin 7

Signed Investigator

Date

1.1.14. Stage 2: School Study Parental Consent Form

PARENT'S CONSENT FORM

Title *of* *Study:*

Monitoring mood by mobile phone - a comparative study.

Parents Name:

Child's Name:

Name of Researcher and Telephone Number: Dr. John Sharry, 01 803 4793

I confirm that I have read and understood the Information Leaflet dated 27/2/2006 and understand what my son or daughter's involvement will be. I have discussed the situation with my son or daughter and I have had had time to consider whether I want my child to take part in this study.

I understand that my permission for my child to take part is voluntary, (that I have a choice as to whether he/she participates) and that I am free to withdraw at any time without my child's education being affected.

Please tick

I agree for my son/ daughter to take part in the above study

I don't agree for my son/ daughter to take part in the above study []

.....
 Name of Parent (in block letters) Date Signature

.....
 Name of Pupil Date Signature

.....
 Researcher Date Signature

1.1.15. Stage 2: School Parental Information Leaflet

Parent Information Leaflet 27/02/2006

Monitoring mood by mobile phone - a comparative study.

Dear Parent,

In partnership with a number of schools, a research team at the Mater Hospital are looking to research and develop better ways of providing positive mental health information and support to young people. In particular we are interested in seeing whether the mobile phone is a good way of engaging young people and we have developed a mobile diary that young people can use as a means of recording their daily mood and energy levels. We are now

asking a number of young people from schools in North Dublin to help us test and evaluate the diary and to let us know if it might be useful for young people.

Why has my son or daughter been invited to take part?

All young people in schools taking part in the 'Working Things Out through SPHE' project (a programme to teach young people healthy skills for coping with difficult life situations, which you will already received information about) are being asked to take part this study. Taking part is purely voluntary and deciding not to take part will in no way affect your son or daughter's education.

What happens if I take part?

If your son or daughter takes part, he/she will be invited to record their daily mood on a chart over a period of two weeks either on a mobile phone or on a paper diary. At the end of the two weeks we will collect the diary from your son or daughter and ask them to complete a short survey on how they felt completing it. The goal of the research is to compare the use of a paper chart with using a mobile phone so we can see which works best for young people.

Confidentiality

Please note no personal or identifying information will be collected from your son or daughter and the results will be completely anonymous. The results of the study may be published in educational and health academic journals, but will not include any identifying information about the pupils. This research study has been approved by the Mater Misericordiae Hospital Research Ethics Committee.

Further Information

This research is being conducted to so as to better inform professionals about working with young people. We very much hope that you will agree to your son or daughter's participate in the research. If you require any assistance or have any questions about the research study, please feel free to contact Dr John Sharry at the Mater Hospital 01 803 4793.

Yours Sincerely

Dr John Sharry, Mater Hospital

School Principal

1.1.16. Stage 2: Mood Diary School Questionnaire

Mood Diary Survey

Thank you for helping us and taking a few moments to give us your opinion!

My age is: _____ years _____ months

I am: female • male •

1. How often did you use your Mood Diary?

Never	Rarely	Sometimes	Often	Very Often
-------	--------	-----------	-------	------------

2. Where did you mostly use your Mood Diary?

In School	At home	On the go	Other(please say where) :
-----------	---------	-----------	---------------------------

3. On average, how long did it take you to record a complete mood entry?

Under 1 minute	1-2 minutes	2-3 minutes	3-5 minutes	Longer than 5 minutes
----------------	-------------	-------------	-------------	-----------------------

4. How easy or difficult did you find it to REMEMBER to record your mood?

Very Easy	Easy	OK	Difficult	Very Difficult
-----------	------	----	-----------	----------------

Please write down how you found it easy or difficult:

5. Did you find it easy or difficult to USE your Mood Diary?

Very Easy	Easy	OK	Difficult	Very Difficult
-----------	------	----	-----------	----------------

Please write down how you found it easy or difficult:

6. Did you find the Mood Diary helpful?

Yes	No
-----	----

Please explain why.

7. Did you have enough privacy when you were RECORDING your mood?

Yes	No
-----	----

8. Were you satisfied that your Mood Diary was SAFE and PRIVATE only to you?

Yes	No
-----	----

If 'No' please say why.

9. How would you improve the Mood Diary for other young people to use?

10. Which method do you think would be best for recording your moods?

Paper	Mobile Phone
-------	--------------

Please say why.

11. Finally, please write down any other thoughts you have about the Mood Diary.

Procedure for audio recording of research subjects interviews: School Study

Date:

May

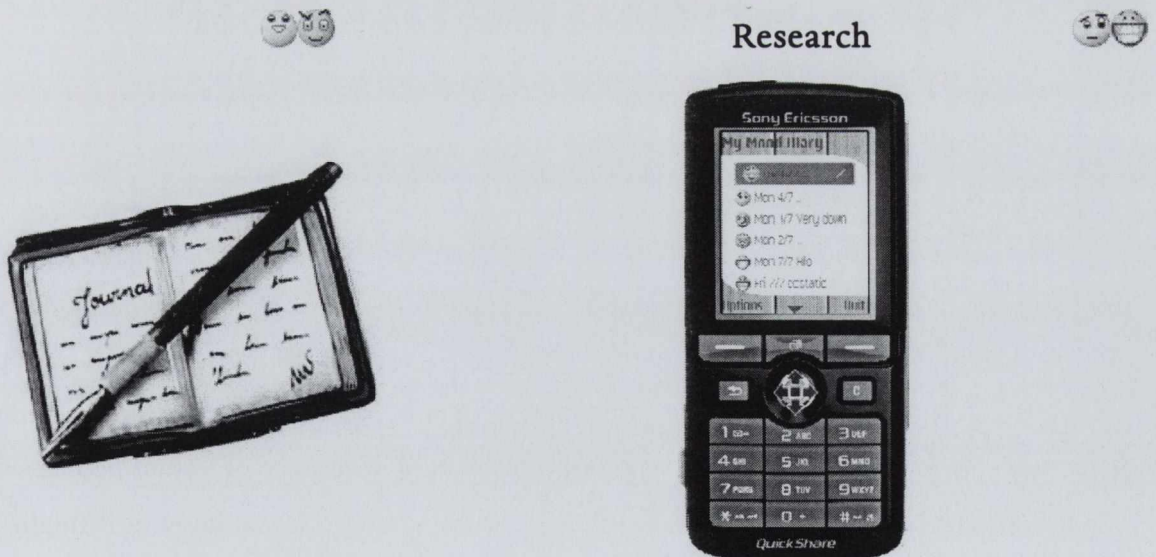
2006

We may ask participants for a short interview at the end of the testing period. In order for us to represent their thoughts accurately, we will record the interview on tape with a Dictaphone. These audio recordings will then be transcribed.

The recordings will be used for educational and research purposes only, and all participants will remain anonymous - they will be referred to as 'Subject A', 'Subject B' etc. Mark Matthews will be the only researcher who will have access to these recordings, and they will be destroyed after the interviews have been transcribed.

If there are any issues concerning these interviews, please feel free to contact Mark Matthews by email mark.matthews@cs.tcd.ie or by telephone 0861524921.

1.1.17. Stage 2: General Information Sheet



Mental health is one of the most important health issues in the world today. This research is examining new and innovative ways to help young people to cope with difficulties. The results will be of great use to those suffering from depression.

We are looking at the potential of using mobile phones in adolescent therapy. Mobile phones provide a unique entry point to the private world of an adolescent. This project is focussing on using the mobile phone to record mood diaries. Mood diaries are used to keep a record of a person's moods and have been shown to be therapeutically effective when completed regularly. Paper diaries are the most popular method currently available, but we have developed a Mobile Mood Diary, which runs on a mobile phone. We are researching whether the paper or phone method is more convenient to use. This is the first time such research has been undertaken anywhere in the world.

This is a collaborative project between the Mater Hospital and Trinity College Dublin.

Contact: Mark Matthews

1.1.18. Stage 3: Parental Information Sheet

Parent Information Leaflet 6/11/2006

Monitoring mood by mobile phone - a comparative study.

Dear Parent,

The research team at the Mater Hospital are looking to research and develop better ways of providing positive mental health information and support to young people. In particular we are interested in seeing whether the mobile phone is a good way of engaging young people and we have developed a mobile diary that young people can use as a means of recording their daily mood and energy levels. We are now asking a number of young people who attend the Mater Hospital to test and evaluate the diary and to let us know if it might be useful as a tool for young people attending the service.

Taking part is purely voluntary and deciding not to take part will in no way affect the service your son or daughter receives from the Mater Hospital.

What happens if I take part?

If your son or daughter takes part, he/she will be invited to record their daily mood on a chart over a period of two weeks either on a mobile phone or on a paper diary. There will be no communication between the young people and researchers over this period. At the end of the two weeks we will collect the diary from your son or daughter and ask them to complete a short survey how they felt at the completion of the research study. The goal of the research is to compare the use of a paper chart with using a mobile phone so we can see which works best for young people.

Confidentiality

Please note no personal or identifying information will be collected from your son or daughter and the results will be completely anonymous. The results of the study may be published in educational and health academic journals, but will not include any identifying information about the young people who took part. This research study has been approved by the Mater Misericordiae Hospital Research Ethics Committee.

Further Information

This research is being conducted to so as to better inform professionals about working with young people. We very much hope that you will agree to your son or daughter's participation in the research. If you require any assistance or have any questions about the research study, please feel free to contact Dr John Sharry at the Mater Hospital 01 803 4793.

Yours Sincerely

John Sharry, Principal Social Worker

Mater Child and Adolescent Mental Health Service

1.1.19.Stage 3: Therapist Handout



Mobile Phone Therapy
Engaging adolescents in therapy through mobile phones
www.mymoodchart.com

Using the Mood Diary with a client

1. Introduce the idea of recording moods with the young person.
2. Install the Mood diary with the young person in a session.
or
Give them the instruction sheet and have them do it before the next session.
3. Record the first mood with the young person in a session.
4. Tell the young person to try to record at least one mood a day.
5. Once at least one mood has been recorded, the young person can access them from the website (www.mymoodchart.com). The same secure login details (username and pin) give the young person access to the website.

www.mymoodchart.com

The screenshot displays the mymoodchart.com website. At the top, there is a navigation bar with links for Home, About Us, Contact Us, and Help. Below this is a login section with a header 'Log In' and two input fields: 'Username' and 'Pin', followed by a 'Log In' button. The main content area is divided into three columns. The left column, titled 'Mood Diary', shows a line graph with a y-axis ranging from 1 to 10 and an x-axis with dates from 1/1/07 to 1/10/07. The middle column, titled 'Mood Diary Instructions', features a document icon and a brief introduction to the mood diary. The right column, titled 'Mood Diary Help', includes a clock icon and a 'Help' button.

If you need any help

email me: mark.matthews@cs.tcd.ie
phone me: 086 1524921



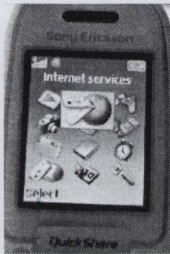
Mobile Phone Therapy

Engaging adolescents in therapy through mobile phones

www.mymoodchart.com

Downloading Mood Diary

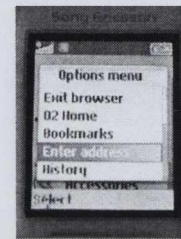
You need to have Java, the Internet, and credit. The following steps, or similar steps on your phone, will download and install the Mood Diary on your phone.



1. Go to the Internet on your phone.



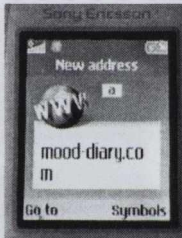
2. From here, choose 'Enter address' or 'Go to address'.



3. Choose 'Enter address'.



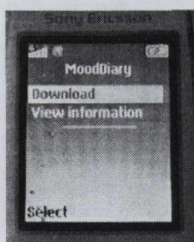
4. Choose 'New address'.



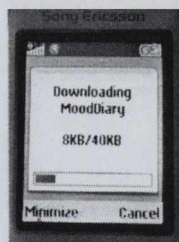
5. Text in 'mood-diary.com' and choose 'Go to'.



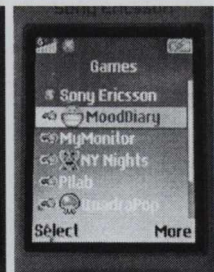
6. This brings you to the website. Choose 'Select'.



7. Choose 'Download' and wait while Mood Diary downloads to your phone.



8. To start Mood Diary, go to Games or Applications and Select MoodDiary.



For any problems installing the Mood diary email: mooddiary@cs.tcd.ie





Mobile Phone Therapy


Engaging adolescents in therapy through mobile phones


www.mymoodchart.com




Recording your mood

1.  Find the Mood Diary on your phone. It's usually in Games or Applications.

2.  Start the Mood Diary.

3.  Choose a private username and pin. If you have a mobile pin, use this!

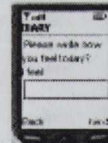
4.  This brings you to the Welcome screen. Choose Record!

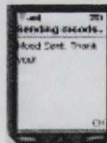
5.    Use the keys 4 + 6 to change the number for mood, energy and sleep up or down. When you are done choose 'Next'.

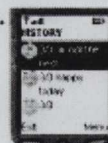

mood

energy

sleep

6.  This is the diary section. You can record your thoughts or anything you feel like. When you're done choose 'Next'.

7.  Your moods are sent to the website. If you have no credit this will not work. Don't worry, it'll work next time.

8.   This brings you to the HISTORY screen. From here you can see all your previous moods. You can choose one to get more details or you can close Mood Diary by choosing EXIT.

If you have any problems with the Mood Diary please email: mooddiary@cs.tcd.ie

1.1.20. Stage 3: Client Mood Diary Questionnaire

Username _____ (name used in mobile Mood Diary) Date: _____

My date of birth is ___/___/___ (day/month/year)

I am: female • male •

Please take your time. Be completely honest. Tick the boxes that you agree with. Give as much information as you can. Thank you for your time and help.

Your Mood Diary Survey

Yes	No
-----	----

1. *Would you recommend the Mood Diary to a friend?*

2. *Where did you mostly use your Mood Diary?*

In school • At home • On the go • Somewhere else • (where: _____)

3. *How easy or difficult was it to REMEMBER to record your mood?*

Very Easy	Easy	OK	Difficult	Very Difficult
What was easy?			What was difficult?	

4. *How easy or difficult was the Mood Diary to use?*

	Very Easy	Easy	OK	Difficult	Very Difficult
5. <i>How helpful or</i>	What was easy?			What was difficult?	

unhelpful were the questions in the Mood Diary?

	Very Helpful	Helpful	OK	Unhelpful	Very Unhelpful
6. <i>Did you</i>	What was helpful?			What was unhelpful?	

write your own tips?

Yes	No
-----	----

7. *How helpful or unhelpful were the mobile tips?*

	Very Helpful	Helpful	OK	Unhelpful	Very Unhelpful
8. <i>How interesting</i>	What was helpful?			What was difficult?	

or boring was the website?

Very Interesting	Interesting	OK	Boring	Very Boring
What was interesting?			What was boring?	

9. How easy or difficult was the website to use?

Very Easy	Easy	OK	Difficult	Very Difficult
What was easy?			What was difficult?	

10. How would you improve the Mood Diary for other young people to use?

11. Which way would be better for recording moods?

Paper	Mobile Phone
-------	--------------

12. Write down any other thoughts you have!

1.1.21. Therapist Mood Diary Questionnaire: Clinical Pilot

Date: _____

Please take your time and answer the questions honestly. Thank you for your time and effort helping with this evaluation.

Practitioner Survey

1. How interesting or boring did your client find the Mood Diary?

Very Interesting	Interesting	OK	Boring	Very Boring
What was interesting?			What was difficult?	

2. Was this method helpful to this intervention?

Yes	No
-----	----

Please say why.

3. How helpful or unhelpful were the questions in the Mood Diary for this client?

Very Helpful	Helpful	OK	Unhelpful	Very Unhelpful
What was helpful?			What was unhelpful?	

4. What affect did the Mood Diary have on this intervention?

5. What affect did the website have on this intervention?

6. How helpful or unhelpful was the website for you?

Very Helpful	Helpful	OK	Unhelpful	Very Unhelpful
What was helpful?			What was unhelpful?	

How easy or difficult was the website to use for you?

Very Easy	Easy	OK	Difficult	Very Difficult
What was easy?			What was difficult?	

7. How helpful or unhelpful was the website for your client?

Very Helpful	Helpful	OK	Unhelpful	Very Unhelpful
What was helpful?			What was difficult?	

8. Please write any other useful information about your use of the technology?

9. Please write any other useful information about your client's use of the technology?

--

10. Which way would be better for recording moods?

Paper	Mobile Phone
-------	--------------

11. Write down any other thoughts you have!

--

Appendix E

This appendix contains all the documentation related to the My Mobile Story project.

1.1.22. Stage 1: Participant Computer Ability Questionnaire

Clubhouse Computer Questionnaire

Date: _____

Id: _____

Age: _____ Years _____ Months

Computer Skills

How often do you use a computer? Please tick the closest option.

Every day

Every 2 – 3 days

Once a week

More than once a month

Less than once a month

Never

How long do you spend on average using a computer each time?

How would you rate your level of experience with computers?

Very Experienced	Experienced	OK	Inexperienced	Beginner
---------------------	-------------	----	---------------	----------

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 around a computer?

Very Experienced	Experienced	OK	Inexperienced	Beginner
---------------------	-------------	----	---------------	----------

What do you use a computer for? (E.g. Email, Internet, Multi-Media, Computer Games etc.)

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	OK	Inexperienced	Beginner
---------------------	-------------	----	---------------	----------

Attitude to technology – (e.g. computers, mobile phones, computer consoles) ?

Which of the following programs have you ever used before?

Microsoft Word Yes No How often? _____

Microsoft Excel	Yes	No	How often? _____
Microsoft PowerPoint	Yes	No	How often? _____
Adobe Photoshop	Yes	No	How often? _____
Flash	Yes	No	How often? _____
Internet Explorer	Yes	No	How often? _____
Bebo	Yes	No	How often? _____

Thanks for your time and your help!

1.1.23. Stage 1: User Usability Questionnaire

Clubhouse Task Questionnaire

Date: _____

Id: _____

Physically, how do you feel right now?

exhausted	1	2	3	4	5	6	7	full of energy
-----------	---	---	---	---	---	---	---	----------------

Mentally, how did you feel while working on the site?

completely confused	1	2	3	4	5	6	7	everything made sense
------------------------	---	---	---	---	---	---	---	--------------------------

While completing this task, did you:

feel completely frustrated	1	2	3	4	5	6	7	always know what to do next
-------------------------------	---	---	---	---	---	---	---	--------------------------------

Compared to what you expected, did this task go:

much slower	1	2	3	4	5	6	7	much faster
-------------	---	---	---	---	---	---	---	-------------

How confident are you completed the task correctly?

not at all confident	1	2	3	4	5	6	7	very confident
-------------------------	---	---	---	---	---	---	---	----------------

How do you feel now that this task is over?

relieved	1	2	3	4	5	6	7	eager for more
----------	---	---	---	---	---	---	---	----------------

How did you feel about the appearance of the site?

very unsatisfied	1	2	3	4	5	6	7	very satisfied
------------------	---	---	---	---	---	---	---	----------------

1.1.24. Stage 2: Participant Questionnaire

Mobile Reporter questions & opinions

Id card: _____

1. *How easy or difficult was it to REMEMBER to send in your story?*

Very Easy	Easy	OK	Difficult	Very Difficult
Why?				

2. *How easy or difficult was it to write and send an MMS?*

Very Easy	Easy	OK	Difficult	Very Difficult
Why?				

3. *How interesting or boring was the website?*

Very Interesting	Interesting	OK	Boring	Very Boring
What was interesting?		What was boring?		

4. *How easy or difficult was the website to use?*

Very Easy	Easy	OK	Difficult	Very Difficult
What was easy?		What was difficult?		

5. *How would you improve the website for other young people to use?*

**6. Write
down
any other
thoughts
you have!**

Tick
the box
that
you
most
agree
with.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I thought the layout was clear.					
I think the website was too difficult.					
I found the website easy to use.					
I think I would need help most times I used the website.					
I found the different tools worked well together.					
I thought the website was too confusing.					

I imagine that most people would learn to use the website very quickly.					
I think the website caused me to make mistakes.					
I could write my own stories using this website without help.					
I needed to learn a lot of things before I could get going.					

1.1.25. Stage 2: Parent Information Sheet

Parent Information Leaflet 21/08/06

My Mobile Story – a research study

Dear Parent/Guardian,

A research team in Trinity College Dublin is researching better ways to allow young people to use their mobile phones to tell stories. In particular we are interested in seeing whether the mobile phone is a good way of engaging young people. We have developed a program which allows young people to use their mobile phone to create stories. We are now asking a number of young people from the area to help us test and evaluate the program and to let us know if it might be useful for young people.

Why has my son or daughter been invited to take part?

All young people we have asked to participate have been selected based on their knowledge of technology and familiarity with mobile phones. Taking part is purely voluntary.

What happens if I take part?

If your son or daughter takes part, he/she will be invited to use his/her mobile phone to create stories over a period of two weeks. At the end of the two weeks we will ask them to complete a short survey on their thoughts on using the program. The goal of the research is to evaluate our program to see if it is effective for use with young people. Participants will be reimbursed for any phone credit used in connection with the evaluation study.

Confidentiality

Please note no personal or identifying information will be collected from your son or daughter and the results will be completely anonymous. The results of the study may be published in educational and health academic journals, but will not include any identifying information about the pupils.

Yours Sincerely,

Mark Matthews,
Trinity College Dublin
Coordinator

Ciarán McGuinness
SWICN Computer Clubhouse

Parental Consent Form: Stage 2

----- Permission Form -----

Signature of Parent or Legal Guardian

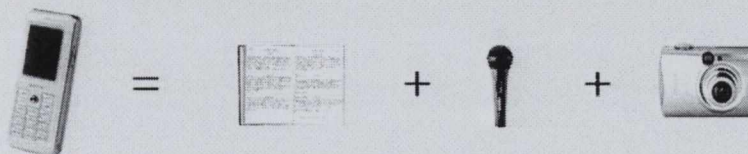
Date

1.1.26. Stage 2: Participant Information Sheet



You are part of a team of four Roving Reporters working for The Mobile Times. Every day all four reporters will be sent a story to get for the paper. Race against the clock to get the story and send it in before the deadline. The best story will make the front page and might win you the Top Reporter prize at the end of the week.

Remember in these Modern Times words are not enough - we need pictures, sounds and words. Your mobile is the ultimate Reporter's tool - use it as microphone to record sounds, as a camera to get exciting pictures and as a notepad to record your thoughts.



Watch - Listen - Observe - Note - Smell - Record

Get the Story!

1.1.27. Stage 2: Missions participants received

1. What's your favourite colour? Record sound why you like it.

Photograph 4 things in your area with that colour. Text why you like it.

What's your favourite colour? What does it sound like? Photo 4 things in your area with that colour. How would you describe it to a blind person? Your time starts NOW!

2. Find out what's the most popular game in the area. Ask 10 people you know and text the results. Record 1 sound and 1 photo of it being played. Your time starts NOW!

3. We need to get a story on the most popular Christmas present. Ask 5 friends what they want for Christmas. Record 1 sound interview and 1 photograph.

Your time starts NOW!

We need a story on the most popular Christmas present. Ask 5 friends what they want for Christmas. Record 1 sound interview & 1 photograph.

Your time starts NOW!

4. Interview someone who is at least 20 years older than u. Find out what Christmas was like when they were ur age. What sounds they heard? What games they played? Your time starts NOW!

5. Find 5 different types of creatures in the Liberties. Record sounds, pictures and text them in. e.g. dogs, people, ants and so on.

1.1.28. Stage 2: Sample Participant Stories

The screenshot displays a mobile website interface for 'The Mobile Times' on March 29, 2008. The browser is identified as 'Windows Internet Explorer'. The page features a top navigation bar with 'The Mobile Times' logo and a 'T Add Text' button. Below the navigation bar, the date 'March 29, 2008' is shown. The main content area is divided into two sections. The first section is titled 'Where Christmas came from' and includes a small image of a Christmas tree. The text below the title discusses the history of Christmas, mentioning Thomas and the birth of Jesus. The second section is titled 'Ice Skating' and includes a small image of a person ice skating. The text below the title discusses ice skating in Smithfield Liffey Valley. The sidebar on the left contains a list of timestamps and icons, including a speaker icon and a 'T' icon. The bottom of the page shows the browser's status bar with 'Internet' and '100%' zoom level.

The Mobile Times
 March 29, 2008

Where Christmas came from

09/12 17:09
 T Interview
 09/12 17:09
 T Christmas st

I interviewed Thomas about Christmas in his day questions i asked were What was Christmas like for you?How do you think Christmas has changed?His answers were Christmas was great crack didnt get much off santy clause and there wasn't much technogly out for him.Christmas has changee alot for Christmas alo because back when he was younger it was all about presents and now its all about getting together with his family his family has got alot bigger over the years so it alot more enjoyable for him.

Christmas started in about 400 AD this started because Christians have celebrated the birth of Jesus.'Christ' means 'Messiah' or 'Anointed One' - the title given to Jesus and Mass was a religious festival.The story of Christmas is often forgotten it's all about eatin,drinking and watching t.v these days but the real story is found hn the Christian Bible.The story is about the birth of Jesus and how Mary his mother was not married and was a virgin but still had a baby boy.It started in Bethlehem and it started because we were celebrating the birth of Jesus.

The Mobile Times
 March 29, 2008

Ice Skating

19/12 12:42
 19/12 12:41
 18/12 11:32
 T U on go ice
 T Louise kyle
 18/12 11:32
 18/12 11:32

U cn go ice skating in smithfield liffey valley and the rds. it costs 11 euro per child and 14 euro 4 an adult mms2 I interviewed kelly she likes ice skating because she is good at it and it is over on the 13 of january

Louise kyle simone kelly on the ice x
 last christmas xxxxxxx
 louise singing rudolph the red nose reindear

The Mobile Times

March 29, 2008 The Mobile Times

HIS IS ALL ABOUT JOKES

22/11 21:04
T
Best Joke
[Speaker icon]

22/11 21:03
T
Best Joke
[Speaker icon]

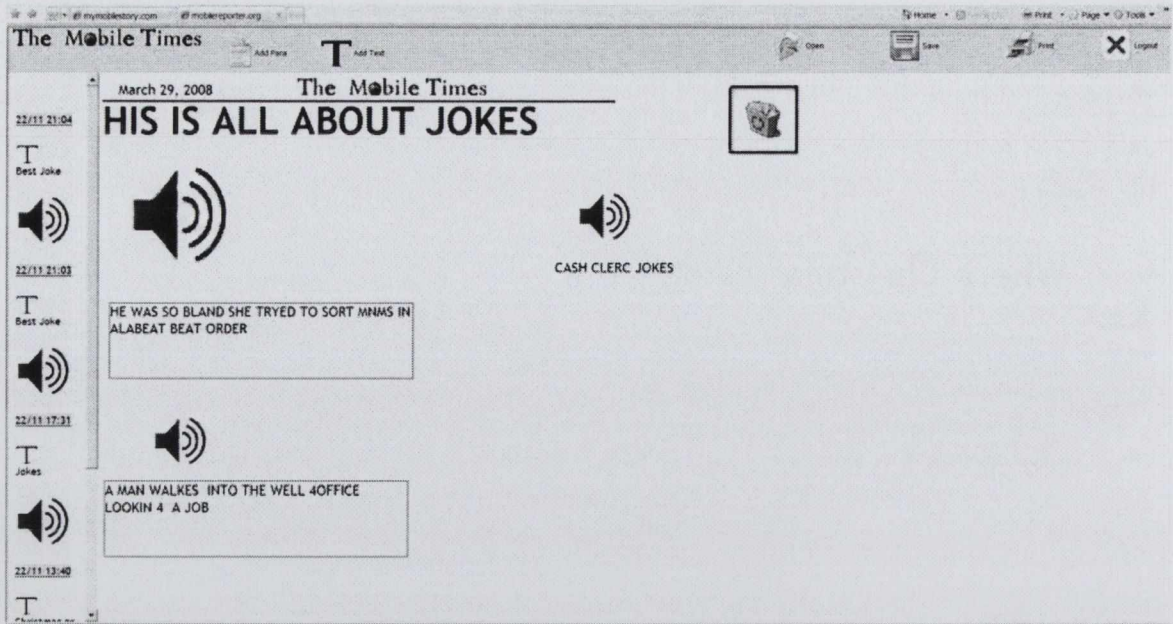
22/11 17:31
T
Jokes
[Speaker icon]

22/11 13:40
T
[Speaker icon]

HE WAS SO BLAND SHE TRIED TO SORT MNAMS IN ALABEAT BEAT ORDER

CASH CLERC JOKES

A MAN WALKES INTO THE WELL 4OFFICE LOOKIN 4 A JOB



The Mobile Times

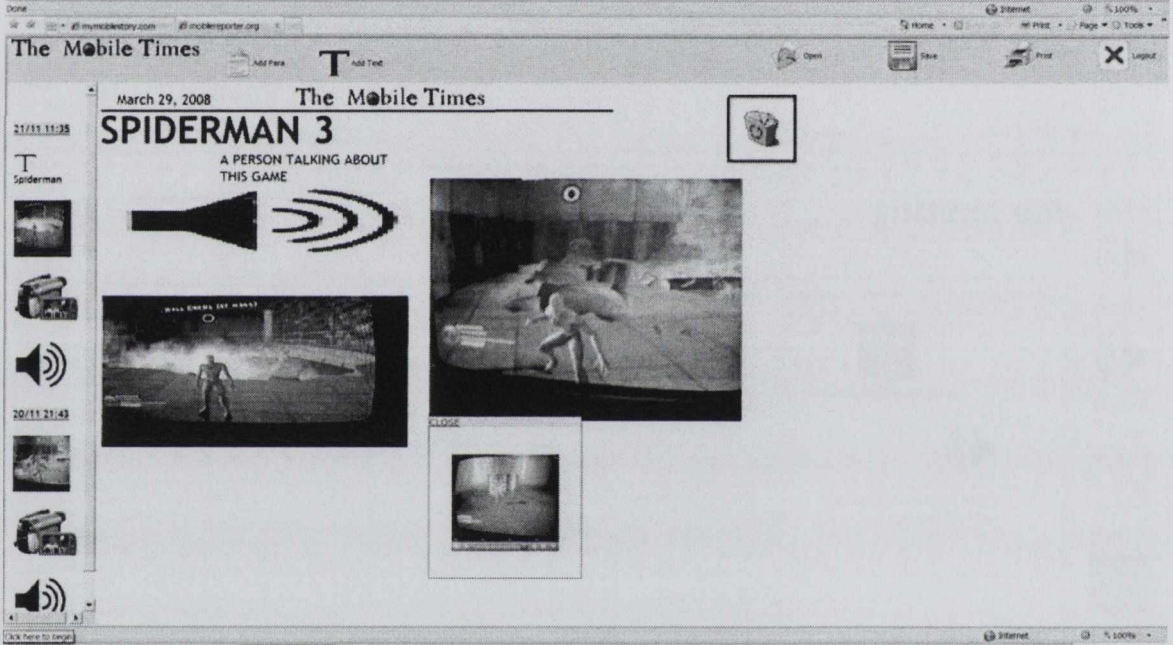
March 29, 2008 The Mobile Times

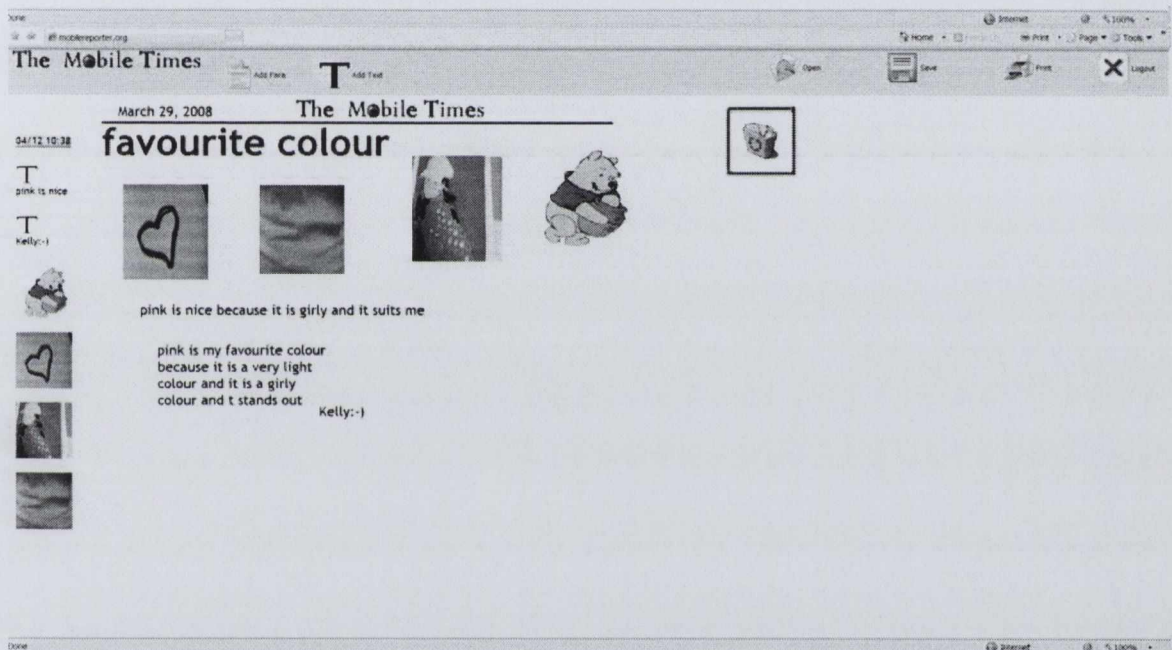
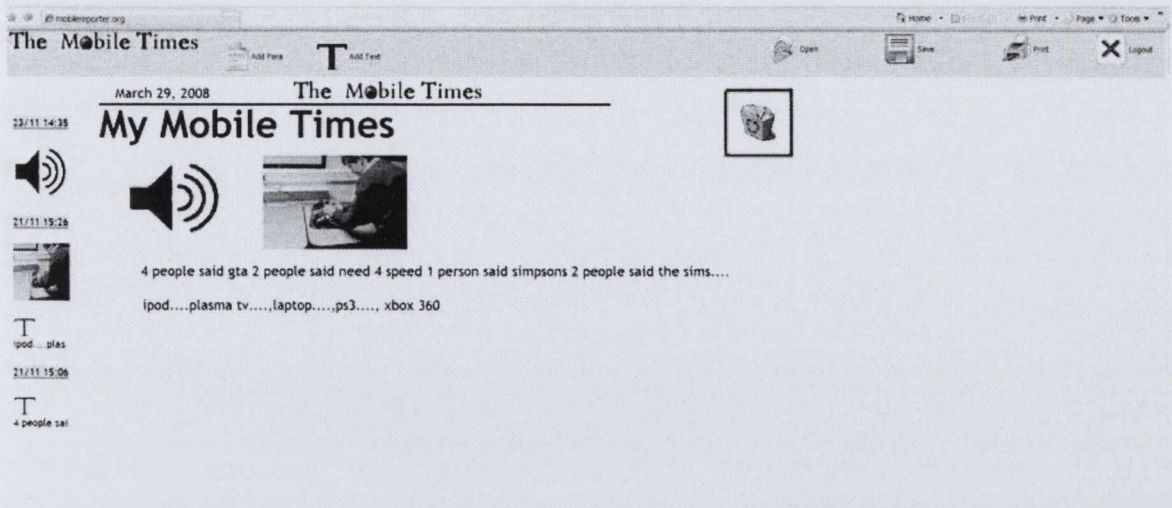
SPIDERMAN 3

A PERSON TALKING ABOUT THIS GAME

21/11 11:38
T
Spiderman
[Speaker icon]

20/11 21:43
[Speaker icon]





1.1.29. Stage 3: Therapist Critical Review Questionnaire

Critical Review of My Mobile Story

Name: _____	Date: _____
Clinic: _____	

Thank you for your time and effort helping with this evaluation. Please take your time and answer the questions.

1. Do you think this tool would be of use with clients attending mental health services?

Yes	No
-----	----

Please say why.

1b. If Yes, for what age range do you think it is best suited?

2. How helpful or unhelpful would this tool be for interventions with adolescents?

Very Helpful	Helpful	OK	Unhelpful	Very Unhelpful
What would be helpful?			What would be unhelpful?	

3. How easy or difficult was it for you to use My Mobile Story?

Very Easy	Easy	OK	Difficult	Very Difficult
What was easy?			What was difficult?	

4. Would you feel comfortable introducing My Mobile Story to a client?

Yes	No
-----	----

Page 1/3

5. How would you recommend introducing My Mobile Story to a client?

6. What types of therapeutic approaches and activities do you think this tool is best suited to?

7. Please write down any immediate changes that you think should be made to My Mobile Story before it is used with clients?

8. In the long term, how would you improve My Mobile Story for both clients and practitioners?

9. Please write any other thoughts you have in the box provided?

Please turn to the final page

Page 2/3

The statements below relate to your professional opinion of My Mobile Story.

Please mark an **X** in the box that most closely reflects your views.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I believe My Mobile Story could help young clients.					
I needed to learn a lot of things before I could get going with My Mobile Story.					
I found the My Mobile Story website easy to use.					
I think I would need help most times I used the My Mobile Story website.					
I believe that most clients would learn to use the website very quickly.					

<p>I found the mobile phone and the website worked well together.</p>					
<p>Using the mobile phone could help increase client engagement between sessions.</p>					
<p>My Mobile Story is ready for use with clients.</p>					

Thank you for your opinions. They will be very helpful!

1.1.30. Stage 3: Client Satisfaction Questionnaire

<i>I am _____ years and _____ months old.</i>	Date: _____
I am: female • male •	

Thank you for your time and help. Please take your time. Be completely honest. Give as much information as you can.

1. *Would you recommend the My Mobile Story to a friend?*

Yes	No
-----	----

2. *How easy or difficult was it to **REMEMBER** to send in your story?*

Very Easy	Easy	OK	Difficult	Very Difficult
What was easy?			What was difficult?	

3. *How easy or difficult was it to write and send an MMS on your mobile phone?*

Very Easy	Easy	OK	Difficult	Very Difficult
What was easy?			What was difficult?	

4. *How interesting or boring was the My Mobile Story website?*

Very Interesting	Interesting	OK	Boring	Very Boring
What was interesting?			What was boring?	

Very Easy	Easy	OK	Difficult	Very Difficult
What was easy?			What was difficult?	

5. *How easy or difficult was the website to use?*

6. *How would you improve the website for other young people to use?*

7. *Write down any other thoughts you have!*

Please write an **X** in the box that you **MOST** agree with.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
--	-------------------	-------	---------	----------	----------------------

<p>I thought My Mobile Story was helpful.</p>					
<p>I needed to learn a lot of things before I could get going.</p>					
<p>I found the website difficult to use.</p>					
<p>I thought the website layout was clear.</p>					
<p>I think I would need help most times I used the website.</p>					
<p>I could write my own stories using the website without help.</p>					
<p>I think that most young people would learn to use the website very quickly.</p>					
<p>I found it difficult to remember to send my content from my mobile phone.</p>					

I found it difficult to send messages from my mobile phone.					
I found the mobile and the website worked well together.					

Thank you for your opinions. They will be very helpful!

1.1.31. Stage 3: Therapist Information Sheet

My Mobile Story



Tell your story on the go!

Collect pictures, words, sounds and videos on your mobile to tell your story.



1. Register client as a new user on the website:

- i. Go to www.mymobilestory.com
- ii. Choose Register
- iii. Enter the client's mobile number and have them enter a **secret** pin
(This pin should be memorable like your mobile pin)

2. Once registered your client can send sms & mms messages from their mobile to 087 *** ** **

- i. All messages appear on the website
- ii. Have the client enter this number as a new contact in their mobile called 'MMS'

3. Logging into the website:

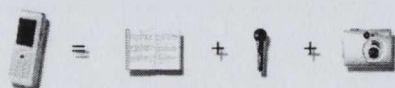
- i. Go to www.mymobilstory.com
- ii. Click on the 'here' link under Login
- iii. The client enters their mobile number and their **secret** pin
- iv. This loads the website
- v. All messages sent in appear on the left hand side.

4. On the website you can:

- i. View the mobile content and resize, label and move it around
- ii. Enter text
- iii. Draw
- iv. Play sounds and music
- v. Print the result
- vi. Set a reminder to be sent to the client's phone

If you have any questions please email mark.matthews@cs.tcd.ie or phone me at 086 152 4921

www.mymobilstory.com



1.1.32. Stage 3: Parent information Sheet

My Mobile Story

Tell your story on the go!

Collect pictures, words, sounds and videos on your mobile to tell your story.



Parent Information Leaflet 05/05/2008

Mobile Storytelling – a new approach to therapeutic storytelling

Dear Parent,

The research team at the Mater Hospital is researching better ways to provide positive mental health information and support to young people. In particular we are interested in seeing whether the mobile phone is a good way of engaging young people. We have developed a mobile tool that young people can use as a means of recording thoughts and events in their daily lives. We are now asking a number of young people to help with this research and evaluate this tool to let us know if it might be useful as a tool for other young people in similar situations.

Taking part is purely voluntary and completely anonymous. Deciding not to take part will in no way affect the service your son or daughter receives from the service.

What happens if I take part?

If your son or daughter takes part, he/she will be invited to use the storytelling tool over a period of two weeks. There will be no communication between the young people and researchers over this period. At the end of the two weeks, your son or daughter will be asked to complete a short survey, giving their thoughts and opinions about the tool. The goal of the research is to compare this new approach to therapeutic storytelling with current methods to see which works best for young people.

Confidentiality

Please note no personal or identifying information will be collected from your son or daughter and the results will be completely anonymous. The results of the study may be published in educational and health academic journals, but will not include any identifying information about the young people who took part. All costs related to participation (i.e. mobile phone credit) are covered by the Mater Hospital.

Further Information

This research is being conducted to better inform professionals about working with young people. We very much hope that you will agree to your son or daughter's participation in the research. If you require any assistance or have any questions about the research study, please feel free to contact Dr John Sharry at the Mater Hospital 01 803 4793.

Yours Sincerely

John Sharry, Principal Social Worker

Mater Child and Adolescent Mental Health Service

1.1.33. Stage 3: Parental Consent Form

PARENT'S CONSENT FORM

Title of Study: **Mobile Storytelling – a new approach to therapeutic storytelling**

Parents Name:

Child's Name:

Name of Researcher and Telephone Number: Dr. John Sharry, 01 803 4793

I confirm that I have read and understood the Information Leaflet and understand what my son or daughter's involvement will be. I have discussed the situation with my son or daughter and I have had had time to consider whether I want my child to take part in this study.

I understand that my permission for my child to take part is voluntary, (that I have a choice as to whether he/she participates) and that I am free to withdraw at any time without my child's education being affected.

Please tick

I agree for my son/ daughter to take part in the above study

I don't agree for my son/ daughter to take part in the above study

.....
Name of Parent (in block letters) Date Signature

.....

.....

Name of Young Person

Date

Signature

.....

.....

.....

Researcher

Date

Signature

1.1.34. Stage3: Therapist Clinical Pilot Questionnaire

Date: _____
 Name: _____
 Clinic: _____

Thank you for your time and effort helping with this evaluation. Please take your time and answer the questions.

1. *Do you think this tool would be of use with adolescents?*

Yes	No
-----	----

Please say why.

2. *How helpful or unhelpful would this tool be for interventions with adolescents?*

Very Helpful	Helpful	OK	Unhelpful	Very Unhelpful
What would be helpful?			What would be unhelpful?	

3. *What effect did My Mobile Story have on the client-therapist relationship?*

4. *What effect did the client using their mobile phone have on this intervention?*

Page 1/4

5. *How interesting or boring did your client find My Mobile Story?*

Very Interesting	Interesting	OK	Boring	Very Boring
What was interesting?			What was boring?	

6. *How helpful or unhelpful was My Mobile Story for your client?*

Very Helpful	Helpful	OK	Unhelpful	Very Unhelpful
What was helpful?			What was difficult?	

7. *How easy or difficult was My Mobile Story to you to use?*

Very Easy	Easy	OK	Difficult	Very Difficult
What was easy?			What was difficult?	

8. How would you improve My Mobile Story for both clients and practitioners?

9. Please write any other useful information about your client's use of the technology?

10. Write down any other thoughts you have.

The statements below relate to your use of My Mobile Story with your client. Please write an **X** in the box that you **MOST** agree with.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I found it difficult to introduce My Mobile Story to my client.					
I believe My Mobile Story could help young clients.					
I needed to learn a lot of things before I could get going with My Mobile Story.					
I found the My Mobile Story website easy to use.					
I think I would need help most times I used the My Mobile Story website.					
I imagine that most clients would learn to use the website very quickly.					

<p>I found the mobile phone and the website worked well together for my client.</p>					
<p>Using the mobile phone helped increase my client's engagement between sessions.</p>					
<p>My client had difficulty sending content using their phones.</p>					
<p>Overall, I think My Mobile Story was beneficial to this intervention.</p>					

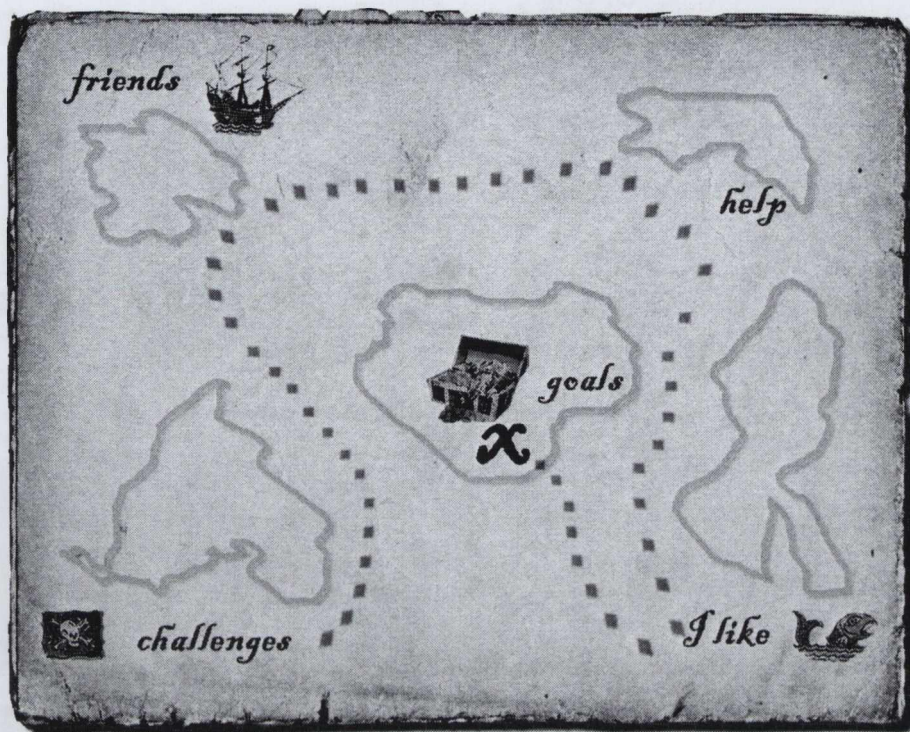
The statements below relate to your professional opinion of My Mobile Story for general usage. Please mark an **X** in the box that most closely reflects your views.

	Strongly Agree	Agree	Neutral	Disagree	Strongly Disagree
I believe My Mobile Story could help young clients.					
I needed to learn a lot of things before I could get going with My Mobile Story.					
I found the My Mobile Story website easy to use.					
I think I would need help most times I used the My Mobile Story website.					
I believe that most clients would learn to use the website very quickly.					
Using the mobile phone could help increase client engagement between sessions.					

My Mobile Story is ready for use with clients.					

Thank you for your opinions. They will be very helpful!

1.1.35. Stage 3: Therapeutic Plans



ABC

Before

Empty rounded rectangular box for 'Before'.

Event

Empty rounded rectangular box for 'Event'.

After

Empty rounded rectangular box for 'After'.

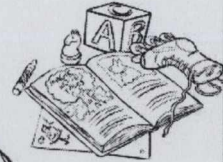
My Story

My Name: My Age:



My Family:	My Friends:

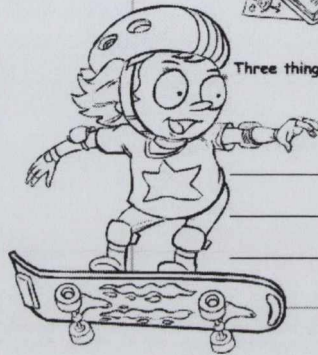
Three things I like to do best



Three favourite things

1) My favourite food

Three things I'm good at



3) My favourite TV programme

2) My favourite sport

