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# Appendices

<table>
<thead>
<tr>
<th>Document Name</th>
<th>Date</th>
</tr>
</thead>
<tbody>
<tr>
<td>Appendix A. Research Methods</td>
<td>November 30, 2009</td>
</tr>
<tr>
<td>Appendix B. Baseline Interviews</td>
<td>November 30, 2009</td>
</tr>
<tr>
<td>Appendix C. References</td>
<td>November 30, 2009</td>
</tr>
</tbody>
</table>
Executive Summary

The principal objective of Work Package 6 is the development of a sound Design and Evaluation (D&E) framework within which Research and Technology Development (RTD) activities can be effectively organised and executed. The development and implementation of this framework are based on a formative and co-participatory approach in which stakeholders are involved at every stage of the design and evaluation. The D&E framework provides a vehicle to ensure that comprehensive, ongoing evaluation is built into all facets of the project, feeding the evaluation findings into the ongoing development activities of the project in a timely manner.

The D&E framework described in this document provides a structure to guide both ongoing formative evaluation of the X-Delia project and the specific local evaluations that will be conducted throughout the project as part of tasks T2.8 and T3.8. It is an outcome of task T6.2 and each iteration of the framework has been shared with the project partners for comment and feedback via the wiki. It aims to ensure that partners share a common understanding of the project goals and activities, and to promote consensus on research questions, methods and instruments to be used.

This document describes the evolution of the D&E framework over the first 9 months of the project. It starts with the theoretical underpinnings that inform the design of the D&E framework. It then illustrates the current iteration of the D&E framework (M9). The D&E framework is then applied to the Games Design workshop, held in M3 of the project to illustrate how it works in practice.

The D&E Framework is then applied to the Evaluation Workshop (T6.1), held in M4, the outputs of which included a set of Research Questions (RQs) and instruments (T6.3) together with a series of WP6 Evaluation studies (T6.2) that will answer the WP6 RQs. The different Work Package methods and instruments (T6.3) are presented in Appendix A.

Finally, the Evaluation findings and outputs to date are given, including the results of the analysis of the Baseline Interviews, conducted to provide data for the first two WP6 research questions.
Contents

1 INTRODUCTION .................................................................................................................. 8
  1.1 DOCUMENT PURPOSE AND SCOPE .............................................................................. 8
  1.2 LIST OF ACRONYMS .................................................................................................... 12

2 RATIONALE FOR FRAMEWORK .................................................................................. 13

3 THEORETICAL UNDERPINNINGS .............................................................................. 15
  3.1 PARTICIPATORY DESIGN AND EVALUATION ......................................................... 15
  3.2 LEARNING DESIGN .................................................................................................. 16
  3.3 UTILIZATION-FOCUSED EVALUATION .................................................................... 17

4 THE DESIGN AND EVALUATION FRAMEWORK .................................................. 19

5 THE D&E FRAMEWORK IN ACTION ...................................................................... 22
  5.1 THE GAMES DESIGN WORKSHOP ......................................................................... 22
    5.1.1 Games Workshop as Cooperative Inquiry .......................................................... 23
    5.1.2 Mediating Artefacts & the Role of Technology ..................................................... 24
    5.1.3 Task Framing ....................................................................................................... 26
    5.1.4 Post Workshop Reflection and Feedback .............................................................. 27
  5.2 THE EVALUATION WORKSHOP ............................................................................ 27
    5.2.1 Work Package 6 Research Questions .................................................................. 29
    5.2.2 Work Package 2 Research Questions .................................................................. 31
    5.2.3 Work Package 3 Research Questions .................................................................. 32
    5.2.4 Work Package 4 Research Questions .................................................................. 32
    5.2.5 Work Package 5 Research Questions .................................................................. 33

6 EVALUATION FINDINGS AND OUTPUTS ............................................................ 34
  6.1 FORMATIVE EVALUATION AND FEEDBACK ......................................................... 34
  6.2 DISSEMINATION OF FINDINGS ............................................................................... 34
  6.3 BASELINE INTERVIEW FINDINGS .......................................................................... 35
    6.3.1 Interdisciplinarity ................................................................................................ 37
    6.3.2 Strengths ............................................................................................................. 37
    6.3.3 Challenges .......................................................................................................... 38
    6.3.4 Motivation ........................................................................................................... 39
    6.3.5 Aspirations ......................................................................................................... 40
    6.3.6 Goals .................................................................................................................... 41
    6.3.7 Summary ............................................................................................................. 41

7 CONCLUSIONS ............................................................................................................ 43

8 APPENDIX A – RESEARCH METHODS ................................................................. 44
  8.1 RESEARCH METHODS ............................................................................................. 44
    8.1.1 Work Package 1 Methods .................................................................................. 44
    8.1.2 Work Package 2 Methods .................................................................................. 45
    8.1.3 Work Package 3 Methods .................................................................................. 45
    8.1.4 Work Package 4 Methods .................................................................................. 45
    8.1.5 Work Package 5 Methods .................................................................................. 46
    8.1.6 Work Package 6 Methods .................................................................................. 46

9 APPENDIX B - BASELINE INTERVIEWS ............................................................ 48

10 APPENDIX C – REFERENCES ............................................................................... 50
Tables

Table 5.1 - Work Package 6 Research Questions ................................................................. 29
Table 9.2 - Baseline Interview Timings and Setup ............................................................. 48

Figures

Figure 3.1 – Dimensions of Form in Collaborative Inquiry .................................................. 16
Figure 4.1 – First Iteration of the Design and Evaluation Framework .............................. 19
Figure 4.2 – Design and Evaluation Framework ................................................................. 20
Figure 4.3 – Design and Evaluation Framework over time ................................................ 21
Figure 5.1 – Games Design Workshop Analysis Detail ..................................................... 24
Figure 5.2 – Example Project Flashmeeting ................................................................. 25
Figure 5.3 – Evaluation Workshop Analysis Detail ......................................................... 28
Figure 6.1 – Design and Evaluation Poster ................................................................. 35
Figure 6.2 – Baseline Interview Themes ................................................................. 36
Figure 9.1 – Consent Form ......................................................................................... 49
1 Introduction

1.1 Document Purpose and Scope

The principal objective of this work package is the development of a sound Design and Evaluation framework within which research activities can be effectively organised and executed. The aim of this document is to describe the framework and work to date on how it has been iteratively developed. The framework is being applied to the project interventions on an ongoing basis throughout the project. The intention is that reflection on the formative evaluation feedback and use of the framework for project interventions will informed future iterations of the framework and hence it will be revised as necessary during the project. The initial goal of the framework is to ensure that all participants start from a common basis, of utmost importance in a multidisciplinary setting, and make use of the latest, post proposal developments in the different disciplinary areas.

One of the crucial factors for the success in any interdisciplinary project is to ensure that we harness the potential of the different disciplines and genuinely capitalise on the different approaches and methods brought by partners in the project from their different disciplinary perspectives. Workpackage 6 has an important role to play in terms of helping to facilitate the group to develop a shared and evolving understanding.

Evaluation both depends on and facilitates clear communications. Shared understandings emerge as evaluation logic pushes the senders of messages to be as specific as possible and challenges listeners to reflect on and feed back to senders what they think they've heard. (Patton, 2008 p162)

The Design and Evaluation framework provides a structured vehicle to ensure that comprehensive, ongoing evaluation is built into all facets of the project and that evaluation findings feed back into the ongoing development activities of the project in a timely manor. The approach taken will be to synthesise methods and facilitate the collaborative process.

The challenge of evaluation use epitomizes the more general challenge of knowledge use in our times. Our age – the Age of Information and Communications – has developed the capacity to generate, store, retrieve, transmit, and instantaneously communicate information. Our problem is keeping up with, sorting out, absorbing, and using information. Our technological capacity for gathering and computerizing information now far exceeds our human ability to process and make sense out of it all. We’re constantly faced with deciding what’s worth knowing versus what to ignore. (Patton, 2008 p5)

The document is divided into the following sections:

- **Section 1 “Introduction”** provides a description of the structure and scope of this document.
- **Section 2 “Rationale for Framework”** places the xDelta project in context, explaining why a robust evaluation framework is necessary.
- **Section**

D12-6.2 – Design and Evaluation Framework

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Theoretical Underpinnings” provides an overview of the theoretical approaches that underpin the evaluation strategy adopted in this project.

- Section 4 "
The Design and Evaluation Framework” describes the D&E framework and how it is used to support the project’s evaluation activities.

- **Section 5**
The D&E Framework in Action illustrates how the D&E framework has been used so far in the design and implementation of project interventions.

- **Section 6**

  "

  "

  “
Evaluation Findings and Outputs” lists the outputs from WP6.

1.2 List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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</thead>
<tbody>
<tr>
<td>APN</td>
<td>Associated Partners Network</td>
</tr>
<tr>
<td>B2C</td>
<td>Business to Consumer</td>
</tr>
<tr>
<td>BAS</td>
<td>Behavioural Activation System</td>
</tr>
<tr>
<td>BTH</td>
<td>Blekinge Tekniska Högskola – Game and Media Arts Laboratory</td>
</tr>
<tr>
<td>BIS</td>
<td>Behavioural Inhibition system</td>
</tr>
<tr>
<td>D&amp;E</td>
<td>Design and Evaluation</td>
</tr>
<tr>
<td>EC</td>
<td>European Commission</td>
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<tr>
<td>EEG</td>
<td>Electroencephalography</td>
</tr>
<tr>
<td>ECG</td>
<td>Electrocardiogram</td>
</tr>
<tr>
<td>EU</td>
<td>European Union</td>
</tr>
<tr>
<td>F2F</td>
<td>Face to Face</td>
</tr>
<tr>
<td>FRMI</td>
<td>Functional Magnetic Resonance Imaging</td>
</tr>
<tr>
<td>M1 to M9</td>
<td>Month 1 to Month 9 of the xDelia project</td>
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<tr>
<td>MBA</td>
<td>Master's degree in Business Administration</td>
</tr>
<tr>
<td>P-PE</td>
<td>Practical Participatory Evaluation</td>
</tr>
<tr>
<td>T-PE</td>
<td>Transformative Participatory Evaluation</td>
</tr>
<tr>
<td>PI</td>
<td>Principal Investigator</td>
</tr>
<tr>
<td>RTD</td>
<td>Research and Technology Development</td>
</tr>
<tr>
<td>URI</td>
<td>Universal Resource Identifier</td>
</tr>
<tr>
<td>WP</td>
<td>Work Package</td>
</tr>
</tbody>
</table>
2 Rationale for Framework

xDelia is a three-year interdisciplinary project that aims to use a combination of bio-sensors and serious games to identify and address the effect that emotional regulation has on financial decision-making. It focuses on three distinct groups of financial decision makers; traders, investors and private individuals. The project is complex and involves bringing together knowledge and expertise in several different fields from institutions based all around Europe. A team of experts in finance are looking into the activities of traders and investors, and experts in personal financial capability are driving research into the effects of emotional biases on individuals. Working with these teams are researchers in the field of serious games who understand how to design and programme games, researchers in sensor technology, who have experience in looking at the role of sensors, particularly in supporting medical applications, and cognitive neuro-scientists who have expertise in and access to a wide range of lab-based sensor equipment and behavioural studies.

There is overlap of expertise between some of the teams, which aids the development of a common understanding. The cognitive neuro-scientists have expertise in neuro-economics that provides shared understanding with the experts in the field of business finance. The bio-sensor team and the neuro-scientists share an insight into the different types of bio-feedback that can be used effectively to research emotional responses. However there are other areas where there is no shared understanding and where each of the specialist teams needs to learn from the other. For example, the games designers need to understand what types of financial decision-making processes that the games need to simulate for both trading and investment, and personal financial capability. What are the characteristics of a financially capable individual? What are the typical stressful decisions that a trader or investor makes and what is the context around them? The games team also need to understand what sort of feedback they can expect to get from the sensor data. Likewise, the financial experts need a basic understanding of the processes involved in designing games in order to provide the games designers with the sorts of information that will enable them to design useful games. They also need to understand what types of sensor readings can be collected and how they are collected and analysed, and the types of data this analysis will produce. For example, there is no point in using a finger clip to collect ECG readings from somebody who needs to use all their fingers to type.

An additional challenge arises from the geographical distribution of the teams. The cognitive neuro-scientists are based in the Netherlands, the bio-sensor team in Germany. The games designers are from Sweden, the specialists in business and individual finance are based in two universities in the UK and at a bank in Denmark, the study participants are distributed across several countries and the project management is co-ordinated from Spain. We have a complex and interdisciplinary network of individuals collaborating to achieve a shared goal. The network is bounded, including only those partners in the project, and effective collaboration requires that partners share their knowledge and expertise with each other and that they have a shared language with which to communicate. Thus partners have a dual role as both teachers and learners. In this context, the “teacher” role is about guiding and supporting others so that they understand enough about unfamiliar disciplines to create useful study interventions that build on the different expertises and research tools available. The “learner” role is about developing a shared understanding in order to collaborate effectively.

To address the challenges inherent in collaborating across such a diverse network, the Work Package 6 Evaluation team forms an integral part of the xDelia project. Unlike traditional summative evaluations that take place at the end of the project, the xDelia project has adopted a participatory, formative approach to facilitate the development of a shared understanding, deploying a range of technologies to support collaboration. To this end, a WP6 has developed a Design and Evaluation (D&E) framework. The D&E framework fulfils a dual function. On the one hand, it acts as a model for the design of effective project interventions, providing structure and support for good practice.
On the other, it acts as a lens through which to reflect on what happened during the intervention, involving the stakeholders as reflective evaluators and feeding the findings back into the project on an ongoing basis.

Project interventions take the following forms:

1. **Study Interventions**: These are research activities that aim to provide data for the research. For example, a pilot study that uses bio-sensors to identify which physical responses are linked to known emotional responses triggered by particular stimuli.

2. **Workshop Interventions and Meetings**: Involving all partners, workshops and meetings are hosted by the different partner institutions, and each has a different goal although all share the overarching aim to further the development of a shared understanding between project partners.

Both forms include an evaluation element. In addition, dedicated evaluation workshops are run in order to progress the overarching evaluation questions posed at the start of the project and revisited periodically.

An initial focus of the Design and Evaluation framework is the establishment of the overarching research questions (RQs) that will guide the project design, development and implementation activities in WP2-WP5, and the reconciliation of these RQs with the range of methods practised by the project stakeholders. A second focus for the framework is to expose the processes by which this reconciliation is achieved. This involves interrogating not only the outcomes of the project activities, but also the collaborative "sense making" processes that takes place in order to achieve those outcomes.
3 Theoretical Underpinnings

This Design and Evaluation framework is based on an approach that is intended to be participatory, iterative and useful – i.e. an ongoing formative evaluation that feeds into and informs the substantive project activities which will be taking place in work packages 2 – 5. The evaluation framework in terms of its philosophy and the approach adopted is informed by a number of theoretical perspectives.

- Participatory Design and Evaluation
- Learning Design
- Utilization-focused evaluation

These three theoretical perspectives address different aspects of the evaluative process. The participatory approach offers a social perspective on evaluation that will help engender engagement from stakeholders. Learning design provides us with a range of technological tools that will support that engagement by facilitating dialogue, reflection and knowledge creation and storage. Utilization-focused evaluation ensures that the evaluative outputs are useful.

3.1 Participatory Design and Evaluation

The design of the evaluation framework for an interdisciplinary project requires consensus between project partners on all aspects of the research process including research questions, methods and evaluation. Participatory Design offers a means to achieve this consensus by involving project partners in each stage of the design of the evaluation framework. Participatory Design is based on the premise that end users need to be actively engaged in the design process to ensure that it meets their needs (Namioka and Schuler, 1993, Poth and Shulha, 2008). In the context of an interdisciplinary research project, this translates into active involvement and collaboration of stakeholders in the development of RQs, research methodologies and methods used to answer those RQs. Participatory Design feeds into Participatory Evaluation in which partners engage with and collaborate in the evaluation process.

Participatory Design has been in use since the 1970s (Bodker et al., 1993 p70). When used to inform the design of technologies, it is an approach that takes into account both the context of use and the users. It represents a move away from computerisation of human skills, instead providing users with tools that are better suited to what they are trying to achieve, and the conditions within which they are working to achieve it. In order to do this, Participatory Design takes into account users’ perceptions and feeling about technology and conceptualises technology in context; as processes rather than products.

Evaluation research since the mid 1980s has identified stakeholder engagement in evaluation and decision making as important contributors to success (Cousins and Whitmore, 1998). Cousins and Whitmore identify two streams of participatory evaluation; Practical Participatory Evaluation (P-PE) and Transformative Participatory Evaluation (T-PE). The evaluation of the xDelia project aligns with the former, i.e. P-PE, because it aims to integrate multiple purposes into a single evaluation project engendering extensive participation in all phases of the evaluation from stakeholders through collaboration and sharing of knowledge and decision making:

The core premise of P-PE is that stakeholder participation in evaluation will enhance evaluation relevance, ownership, and thus utilization. (Cousins and Whitmore, 1998)
The evaluation approach taken in Work Package 6 is informed by the three dimensions of collaborative inquiry identified by Cousins and Whitmore; control of decision making, selection for participation and depth of participation (Cousins and Whitmore, 1998). Figure 3.1 (reproduced from Cousins and Whitmore, 1998) illustrates these dimensions graphically.

![Figure 3.1 – Dimensions of Form in Collaborative Inquiry](image)

This representation allows us to locate the evaluative processes in the three dimensional space of the figure and is used to categorise the activities undertaken in the Games Design Workshop, described in Section 5.1.

### 3.2 Learning design

Learning design represents a new research field that has emerged in recent years, partly in response to a desire to see better use of technologies to support learning. It is concerned with the development of tools, models and schema for supporting and making explicit design decisions in the creation of learning interventions/activities. One of its aims is to explore the impact that an increasingly ‘open’ technologically mediated learning environment will have on learning in the future, and to that end, a number of techniques and activities have been developed to facilitate a clearer understanding of the mediating effect that these technologies are having.

Learning Design as a term originated in the technical community and began to gain prominence around 2004, following the development of the educational mark-up language at the Open University.
of the Netherlands. Since then others have appropriated it in a much broader sense, shifting to the notion of 'Designing for Learning'. Cross and Conole (2008) provide a simple overview of the field. The focus of the research is to both better understand and represent design processes, along with developing tools and methods to help practitioners create better designs. A number of benefits of adopting a more formal and rigorous approach to design have been identified (Conole, 2009). In terms of the OULDI research work, we define learning design as:

A methodology for enabling teachers/designers to make more informed decisions in how they go about designing, which is pedagogically informed and makes effective use of appropriate resources and technologies. This includes the design of resources and individual learning activities right up to whole curriculum level design. A key principle is to help make the design process more explicit and shareable. Learning design as an area of research and development includes both gathering empirical evidence to better understand the design process as well as the development of a range of resource, tools and activities. (Conole, 2009).

We see ‘learning design’ as an all encompassing term to cover the process, representation, sharing and evaluation of designs from lower level activities right up to whole curriculum level designs.

Work Package 6 is building on the techniques developed by this Open University Learning Design Initiative, (OU, 2009) in order to support effective stakeholder involvement in the evaluative processes, particularly in the use of technology to support collaborative learning. Techniques that may be used include:

- Stakeholder design workshops. A set of activities to enable stakeholders to develop a collective design outline visually.
- Representing pedagogy - Use of visualisation tools, such as CompendiumLD tool (Brasher et al., 2008) to articulate a design.
- Brainstorming and refining research questions - Use of mind mapping to develop a shared, collective and evolving set of research questions.
- Design interviews. To elicit stakeholders design perceptions or to better understand teachers’ design processes (how do they design, where do they get ideas, how do they represent/share designs, how do they evaluate effectiveness?)
- ‘Cloudfests’. As a means of gathering rapid feedback on agile tool development, through iterative presentation (Conole and Culver, 2009a, Conole and Culver, 2009b)
- Design challenge workshop. “Design a short course in a day”, a workshop to rapidly prototype and design a course in which participants work in teams supported by resource stalls
- Evolving understanding. Working papers, and a project definition wiki

WP6 will draw on these examples to produce an array of techniques as appropriate. These will help both in terms of facilitating the design components of the project, but also can be applied more generally to articulate and represent project discourses and collaboration and to uncover underlying tensions and challenges.

### 3.3 Utilization-focused evaluation

Utilization-focused evaluation (Patton, 2008) is an approach to evaluation that is grounded in the precept that users are more likely to use evaluations if they understand and feel ownership of the evaluation process and findings; they are more likely to understand and feel ownership if they’ve been actively involved. The findings that emerge at the end of an evaluation process are obvious outputs, yet stakeholder engagement in the process use throughout the project leads to cognitive, attitudinal
and behaviour changes in individuals during the process which can also affect the findings as the project progresses. Patton (2008) identifies six process uses:

1. **Encouraging evaluative thinking**
   
   Incorporating evaluation into the project decision-making process, in which all stakeholders are also learners.

2. **Enhancing shared understandings**
   
   Shared understandings are especially important in an interdisciplinary project in which partners need to agree not only on expected results but also on the means with which those results will be accomplished.

3. **Intervention-oriented evaluation**
   
   In which data collection aimed at achieving the project outcomes also meets the evaluation information needs and where partners monitor their own progress.

4. **Instrumentation effects and reactivity**
   
   Using a variety of interventions, such as interviews and surveys, to encourage reflection such that participants learn from the interventions.

5. **Increasing engagement, self-determination and ownership**
   
   Ensuring engagement through participatory and collaborative evaluation.

6. **Program and organizational development**
   
   In which the effectiveness of the interventions will be examined in conjunction with the effectiveness of the organization in order to enhance understanding of the process. (Patton, 2008 p158)

The D&E framework will embed process uses 1 to 5 in its design and implementation. Use 6 is focused on organizational development and is not appropriate for the xDeila project and will therefore not be used.
4 The Design and Evaluation Framework

The D&E framework has been developed to support this collaborative and participatory evaluation process. This framework clarifies the interdependent relationship between the research questions, the research interventions, and the evaluation process. At the same time, it sets up the mechanisms by which the findings from the evaluation are fed back into the project to inform future interventions.

At the initial stakeholder meeting in Barcelona, the following draft D&E framework was proposed. Figure 4.1 shows this initial concept.

As the project progressed, and project interventions were undertaken, the D&E framework was used and adapted to provide a better tool to support the evaluative activities. Figure 4.2 shows the current iteration of the D&E framework, showing how it was developed in response to feedback and its application to early project interventions. The developed framework provides a better illustration of the relationship between the design and evaluation sides in which each builds upon and feeds into the other.
The Design and Evaluation Framework in Figure 4.2 is divided into two layers: a Design layer and an Evaluation layer. The Design layer represents the research questions, interventions, and analysis from the perspective of the research activity. A Design layer intervention might be a workshop to brainstorm the titles and methods, timelines, and partner responsibilities for preliminary research interventions. The Evaluation layer represents these same aspects from the evaluative perspective, in a sense a meta-reflective layer above the specific research focused, Design layer. Examples of activities within the Evaluation layer intervention might include video of the interventions, interviews with the participations, pre and post questionnaires, debriefing sessions, or focus groups. Both design and evaluation activities formulate their research question in the left-hand box, with the evaluation RQs guided, to some extent, by those of the Design layer. The intervention is then implemented in the centre box. Data is collected and analysed, and the analysis then feeds back into the interventions and research questions.

The Design and Evaluation framework represents an iterative process, in which the evaluation findings feed back into the project over time. Figure 4.3 extends the D&E framework over time, showing how the analysis from earlier interventions feeds into future interventions. Using the previous example, the outcomes from the Design layer analysis would be titles, methods, and timelines for studies. These would feed into the research questions and intervention design for those studies conducted at a later date.
The outcomes from the Evaluation layer relate to the specific evaluation research questions asked at the time. However, additional Evaluation layer questions are included that derive from the Design layer questions and interventions. These incorporate an evaluation of the format of the intervention and of the role played by technology in supporting the exchange of knowledge and the collaborative process, and these too feed into the design of future evaluations.
5 The D&E Framework in Action

An important goal of the D&E framework is to ensure that connections are made across the work packages to show how together they are developing a collective shared understanding. In addition, the products of the evaluation need to feed into the design decisions in a timely manner. The following two subsections show how a D&E framework has been applied to two project interventions; the Games Design workshop and the Design and Evaluation workshop. They illustrate how the findings from one intervention can feed into both the questions posed during that intervention, but also into the design of future interventions.

5.1 The Games Design Workshop

Project-wide collaboration was initiated in March 2009 at a kickoff meeting in Barcelona to which all partners were invited. Subsequently, in May 2009, a Games Workshop was held in Sweden to which all partners were invited. Its primary aim was to identify the types of games that would need to be produced and the key financial capability questions that should be addressed by the games. This goal was achieved by structuring the workshop so that the content was provided by the participants. The financial experts shared their knowledge about the issues of financial capability that the games needed to focus on. The games designers organised a hands-on workshop in which participants split into groups to brainstorm, design and prototype a game which they all subsequently evaluated, thereby learning something about the processes involved in games design. The D&E Framework provided a formative model to structure the evaluation activity (T6.4).

The goals of the workshop were to facilitate a shared understanding between the partners of the role that serious games could play in addressing problems of individual financial capability by asking the following questions:

Q1: What form of games do we want to develop further?
Q2: What concepts do we want to develop further?
Q3: What are the key questions in developing games to improve individual financial capability?

To be able to answer these questions, the Games Designers needed to acquire an understanding of the types of financial problems their games would have to address, thus situating them in the role of learners. However the flow of information needed to achieve the goals of the workshop was not one-way. The other partners also needed to appreciate the types of learning situation that could be effectively created through the use of serious games. They therefore needed to learn about the processes involved in designing games so that they could better appreciate the role that games might play in their studies. Thus all attending partners were both learners and teachers.

The workshop ran over two days and began with a series of presentations from relevant domain experts. The hosts briefly introduced the workshop, explaining how it would run and what everyone would be doing. This was followed by two presentations about the financial issues that needed to be addressed. These were “expert led” sessions, with the presenter talking through a series of concepts to the audience. However the setup was informal and participants engaged with the presenters to clarify and enlarge upon the financial issues being described.

The main workshop intervention involved splitting the participants up into interdisciplinary groups. The goal of each group was to spend the first day brainstorming games ideas that would address the issues of financial capability outlined during the first presentation. A computer-based brainstorming tool was provided to help trigger ideas and the activity was framed by instructions such as “Must be capable of being learned in 10 minutes” and “For 2 to 4 players”. After the morning brainstorming
session, the groups spent the afternoon selecting the best idea and putting together a playable prototype. Groups were provided with a range of non-technological artefacts such as die, paper, coloured post its, felt-tip pens, scissors, glue, tokens. The different expertises were spread as evenly as possible between the groups, with one games design student in each group to facilitate the brainstorming and prototyping process. Each group also had at least one person with expertise in either business or individual financial capability.

Having constructed three copies of the playable prototype, the participants then came together as a whole group to evaluate each game in turn. To this end, two participants played each game and the rest watched and took notes. Different participants played each game so everybody got the opportunity to evaluate. After playing the game prototypes, the participants gathered together as a whole group to fill in their individual game evaluation forms and discuss the evaluation. Each participant was given an evaluation form and the results were collated after the workshop on the wiki.

The Evaluation questions and interventions were designed to assess the effectiveness of the workshop. In addition, baseline interviews were conducted as part of the Evaluation work in order to identify a set of themes that could be interrogated, later on in the project, to answer the Evaluation Research Question 1: What are the different partners’ perceptions of/aspirations for xDelia and how well are these met? The findings from the baseline interviews are reported in Section 6.3 The workshop interventions were audio and video recorded for later analysis.

5.1.1 Games Workshop as Cooperative Inquiry

Assessing the Games design workshop against Cousins and Whitmore's (1998) three dimensions shown in Figure 3.1 situated it as A1, B2, C2, which Cousins and Whitmore classify as “Cooperative Inquiry”.

The control of evaluation process (dimension A) falls close to the A1 end. Practitioner control was provided through the wiki where all workshop participants had an input to the content and structure of the workshop both in advance (through the wiki) and during the event (through the interactive game design and evaluation tasks). During the workshop, evaluation was first conducted as a group, with each game being played by two participants under the gaze of the rest of the group. At the end of the day, participants had individual forms with which to score and give their feedback on the games and also a whole group evaluation session where each game was discussed and the evaluation captured in notes and on a whiteboard before being collated and posted on the wiki.

Stakeholder selection for participation (dimension B) was at B2 because the workshop was open to all partners (all legitimate groups), not just the Games Designers and the Financial Capability experts (primary users). This is important because it would be easy for such a distributed and interdisciplinary project to fracture into small sub-groups, with each group working on its own part of the project and losing a view of the coherent whole.

Depth of participation (dimension C) fell close to C2, deep participation, because the workshop content was constructed out of the different competencies of its participants, rather than provided by the organisers. The workshop merely provided the space within which the participants collaborated to create games ideas and evaluate them. The workshop outputs were collated after the event and shared through the wiki.

The D&E framework is reproduced in Figure 5.1, populated with the research questions and interventions from the Games Design Workshop.
Figure 5.1 – Games Design Workshop Analysis Detail

Figure 5.1 illustrates how the D&E framework provided a structure for the project interventions; ensuring that the questions linked up to appropriate interventions, data collection, analysis and outcomes. The analysis and artefacts used in the workshop are all preserved in the project wiki, and Section 5.1.2 discusses the effects of the mediating artefacts and the role played by the different technologies. The D&E Framework’s role as a reflective lens in which all stakeholders actively participate in the evaluative process is explored further in the remainder of this section.

5.1.2 Mediating Artefacts & the Role of Technology

One of the things we are interested in looking at through the D&E framework is the way in which technology mediates interactions across the project, and how the affordances of different technologies influence that mediation. We adopt a socio-cultural approach and focus on the Mediating Artefacts (Conole, 2008) that are used to guide the design and intervention activities. Previous research identified an important mediating role for technological artefacts in guiding and framing a Participatory Design workshop (Scanlon et al., 2009). However the initial evaluation research questions for the Games Workshop did not include a question about technology mediation because technology use was not foregrounded in the planning discussions. Subsequent analysis of the video and audio data identified an important part played by mediating artefacts and this fed back into the Evaluation Questions via the “Reflection on and Utilisation of Results” link. Detailed over-the-shoulder data was available in the form of the video recordings to support this analysis.

Prior to the workshop, we were already seeing some interesting evidence about how technology is used by project partners to support interdisciplinary collaboration. For example, Flashmeeting
discussions are held and recorded, accessible via a unique URI. Therefore, links to the different Flashmeeting recordings can be posted to the wiki alongside with notes from the meeting enabling all project partners to listen to the original discussion as well as reading the summary. Figure 5.2 shows a typical project Flashmeeting with an asynchronous chat window providing an additional back channel communication medium for sharing links and references, and adding to the conversation without interrupting the current speaker.

![Figure 5.2 – Example Project Flashmeeting](image)

Adobe Connect (similar to Flashmeeting, but purchased rather than free) has also been used by the partners who have it installed. Like Flashmeeting, links to the meeting records are posted to the wiki to ensure that all partners can keep up-to-date with discussions. Skype, by contrast, does not offer such an easy means to record dialogue, so any records of Skype meetings are interpreted through the person who took the notes. Although used one, Skype has not been adopted by partners.

Tensions have emerged around open technologies such as Twitter (Twitter, 2009) or Cloudworks (Conole and Culver, 2009b) and whether their use might lead to intellectual property issues relating to premature release of project findings. Some xDelia clouds have been created but it remains to be seen whether this technology will be adopted by the group.

The closed project wiki is not without issues. As it grows in size with the accumulated contributions of the project partners, it becomes increasingly complex and locating information becomes more difficult. Nevertheless, the wiki remains the central virtual location for collaboration and for the outputs from project collaborations. The Games Design workshop was coordinated using the wiki. The activities were mapped out by the workshop hosts using Compendium (KMI, 2009) and this map reproduced as a page on the wiki to give participants a graphical representation of how the workshop activities would achieve their aims. Practicalities, such as the agenda and hotel bookings were discussed in the wiki alongside more specific dialogues concerning the content and goals of the workshop. The wiki records of these dialogues show emerging patterns of team member interactions, illustrating how they are stating their positions and jointly co-constructing their
understandings of the planned activity. For example, the following quote represents a wiki dialogue between a finance domain expert planning to attend the workshop, and the Games Design expert hosting it:

1) are we (xDelia colleagues) going to be joining in with the design process or observing it?
   Participant1 10:44, 6 May 2009
   You will be joining in with the design process. There is no point just to be observers.
   Participant2 13:14, 6 May 2009
2) you mention that the games will be played by 2-3 players. I had envisioned a final product that could be played alone. Is the multiple player option just one part of the process or is it a different kind of solution? Participant1 :44, 6 May 2009
   It can be envisaged as a single player computer game, but then the prototype needs someone to play the part of the computer. Hence it becomes a 2 player prototype. Participant2 13:14, 6 May 2009

In this extract, the finance expert uses the wiki to develop her understanding and position in relation to the workshop, articulating her thinking and what she is looking for. These discussions were extensive and showed how the wiki acted a vehicle for partners to take an active part in preparing for the workshop, both in terms of understanding the goals of the design and Evaluation layers and in terms of sharing ideas and developing concepts to be explored further during the workshop.

The wiki provided a good run-up space (for those who were comfortable in it) for partners to prepare and develop a shared understanding of what the workshop was about. Partners shared their domain-specific knowledge for reflection and development by others. For example, the financial domain expert posted examples of the sorts of financial challenges students might be faced with. This led to a dialogue which included links out to related literature, thereby enriching the resources available for the workshop and providing a mechanism to help participants from the other partner domains to start thinking in terms of what the games would need to address.

### 5.1.3 Task Framing

The collaborative interventions conducted during the workshop were framed by paper instructions and guided by each group’s facilitator. Four different brainstorming methods were to be used, 30 minutes on each method. At the end, one idea was to be selected and developed into the prototype. However, the activity tended to overrun the time allocated. Group members needed time to read, discuss and agree on how to apply the task guidelines, for example Group 1 spent some time discussing how the first brainstorming technique would work:

Participant3: “That noun, verb, and adjective should go with the instructions that we’ve just been talking about, because we know already that….”
Participant4: “That is where our focus lies”
Participant3: “Yes, so the presenter just gave us some focus,
Facilitator: “Yes, that’s fine”

By the time they had come up with an idea for a game, Group 1 had spent 50 minutes on the first brainstorming technique. Brainstorming method 2 involved a computer application that displayed visual images and keywords designed to trigger creative ideas. Again, it took time for the group members to understand what was expected of them and how the application worked. They spent over an hour on this task. At the end of these two brainstorming activities, Group 1 had come up with two game ideas and they decided to combine the best elements of both to produce their prototype rather than overrun the time allocated for brainstorming.
5.1.4 Post Workshop Reflection and Feedback

Shortly after the event, a short questionnaire was circulated asking for feedback on the workshop. Interestingly, the financial experts who responded felt they had learned something about designing games and the games designers who responded felt they had learned something about financial capability. They were also asked to name three things they liked and three things they disliked about the workshop. Things they liked include: “Opportunity to work as a team”, “Seeing how we can work together and what we can expect from the project”, “Some fascinating outputs”, “Developing ideas about games”. There was some agreement about things they disliked; “Amateur brainstorming facilitation”, “Too many methods of brainstorming”, “A little time pressured” and “Little opportunity to talk with people not on my team”. These reflections were confirmed by the video data and reinforced the need to allow sufficient time for people to understand task instructions, and to get to grips with new technology.

These reflections and analysis of the video and audio data fed into the planning for the next workshop where more time was allocated for different activities, and clearly defined breaks for coffee and networking were built into the schedule to ensure that all participants could interact freely. This demonstrates the D&E framework in action, showing that it provides an effective lens on project activities as well as a mechanism for ongoing formative evaluation feedback and improvement. The workshop findings were made available to the project via the wiki where the outcomes from the evaluation session were posted.

5.2 The Evaluation Workshop

The next workshop, the WP6 Evaluation workshop (Task T6.1) was held in June, 2009 (M4) to which all partners were invited. It aimed to advance toward a shared understanding of the goals and key elements of the xDelia project by facilitating collaborative brainstorming between associated work packages to refine the initial research to link across the work packages.

At the initial kickoff meeting in Barcelona, the follow overarching research questions were agreed:

- What is the impact of emotion on success in financial decision-making?
- What are the key enablers and differences in financial decision-making styles and competences?
- What is better financial decision-making in the current financial times?
- What is the goal for young people’s development of financial capability?
- What goals are implicit in the design of the games?
- What are the proxies for any of this performance data?

A basic assumption of the project is that emotional regulation has an impact on financial decision making and the project seeks to explore whether techniques can be developed to improve financial decision making by improving emotional regulation. However we needed to establish this connection and in order to do so, we needed to agree on how the work packages will work together to achieve a common goal. A first step was to agree upon a set of research questions that were coherent across the work packages.

The WP6 Evaluation workshop (Task T6.1) was organized in order to refine this initial set of research questions (T6.3) and collate an associated set of research instruments an methods that would be appropriate to address the research questions. An additional objective was to achieve consensus on the D&E framework (T6.2) as it had evolved during the early months of the project. The framework provides the vehicle to ensure that comprehensive, ongoing evaluation is built into
all facets of the project and that evaluation findings feedback into the ongoing development activities of the project, and it was important that all partners understood and engaged with it.

Building on the evaluation of the previous Games Design workshop, the Evaluation workshop was organised via the wiki, with all partners able to view and discuss the agenda and contribute content and ideas in advance. The workshop began with a short introduction to the plans for the day, and then attendees split into smaller groups containing at least one representative from related work packages to brainstorm RQs and possible methods. Related work packages are those who will be working together on studies and who therefore needed to coordinate their RQs and methods. Figure 5.3 applies the D&E framework to the WP6 Design and Evaluation workshop interventions.

![Figure 5.3 – Evaluation Workshop Analysis Detail](image)
5.2.1 Work Package 6 Research Questions

During the WP6 Evaluation workshop, the Work Package 6 research questions (Table 5.1) were established.

<table>
<thead>
<tr>
<th>RQ1: What are the different partners perceptions of for X-Delia and how well are these met?</th>
<th>Data</th>
<th>Methods</th>
<th>Timelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Data collection was initiated at Games workshop at BTH with a series of audio recorded interviews with partners. To be followed by mid-project interviews to track progress, then end of project interviews to reflect on the success of the project</td>
<td>Qualitative analysis of audio-recorded baseline interviews using Nvivo to identify themes. Identified themes represented and elaborated graphically using CompendiumLD and shared with project partners. Comparative analysis of subsequent interviews. Supplemented by observational data, analysis of wiki contributions and study interventions.</td>
<td>Initial interviews completed May 09. Analysis of interviews completed September 09. Findings shared with partners during 6 month meeting and via wiki. Second set of interviews planned Yr2/3</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RQ2: How do the different partners perceptions of X-Delia map to what the project actually achieves?</th>
<th>Data</th>
<th>Methods</th>
<th>Timelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Meta-analysis of the four-monthly reports. Compare to RQ1 baseline data. Link point to WP1, analysis of project outputs and publications</td>
<td>Ongoing evaluation of project outputs alongside evolving themes from RQ1. Publication of findings on wiki to feed-back into project.</td>
<td>Ongoing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RQ3: What are the barriers and enablers to working in this interdisciplinary context; what works well and what doesn't?</th>
<th>Data</th>
<th>Methods</th>
<th>Timelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Initial baseline interviews, ongoing observation of project meetings, reflective blog, mid-point interviews.</td>
<td>Qualitative analysis of data from baseline interviews. Ongoing critical reflection and collection of partner-feedback during project activities (virtual &amp; F2F meetings, workshops, project interventions).</td>
<td>Ongoing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RQ4: What mediating artefacts (the evaluation framework, communication mechanisms, workshops and project meetings, deliverables) are used in the project?</th>
<th>Data</th>
<th>Methods</th>
<th>Timelines</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early review of use of artefacts, in particular the wiki and collaborative technologies, mid-point artefacts and document analysis, project-workshop</td>
<td>Qualitative analysis of the technology traces (async conversation threads, collaborative outputs) alongside the video-conferencing recordings, video recordings, audio recordings and notes taken at the time.</td>
<td>Ongoing</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>RQ5: How are we using technologies in the project for communication and collaboration and also in the research methods, and what is their impact on interdisciplinary collaboration?</th>
<th>Data</th>
<th>Methods</th>
<th>Timelines</th>
</tr>
</thead>
</table>
Interrogation of the above data, specifically looking at the technology aspects. Exploration of different collaborative technologies used to support virtual and face-to-face meetings. Analyse artefact use against a framework for technology mediation such as activity theory (Engeström et al., 1999, Kaptelinin and Nardi, 2006) alongside a theory for analysing distributed, networked agency such as expansive learning (Engeström, 2001) and/or collective intelligence. (Lévy, 1998).

| RQ6: What are the particular verbs, nouns, adjectives we want to investigate in relation to financial decision-making? How are we developing a shared vocabulary and understanding? |
|---|---|---|
| Data | Methods | Timelines |
| Develop a shared project glossary. | Identify terminology from initial baseline interviews and shared outputs on wiki. Encourage contributions to clarify domain-specific definitions from project partners. | Initial version created on project wiki. Partners contribute to evolving definitions over the life of the project. |

| RQ7: What insights are we gaining through the project on the emotional aspects of learning and the ways in which technologies are used? |
|---|---|---|
| Data | Methods | Timelines |
| Quarterly reports. Integration sessions at project meetings. | To be agreed | From March 2010 |

| RQ8: How are the design principles associated with the games translated into tangible learning outcomes? How do the design principle influence the ways in which the games are played? |
|---|---|---|
| Data | Methods | Timelines |
| Quarterly reports. Integration sessions at project meetings. | To be agreed | From March 2010 |

| RQ9: How are gaming practices being used in the trials? |
|---|---|---|
| Data | Methods | Timelines |
| Audio and video recordings of gaming practices. Reflective notes. | Analyse first Sweden games workshop using first draft of Design and Evaluation framework. Share findings with project partners. Video record and analyse gaming study interventions and outputs as they occur. | Games workshop analysis underway and initial findings presented for feedback during 6 month meeting. Future study interventions in planning. |

<p>| RQ10: What pedagogies are being used in the project, and how are they represented? Are there any specific models being used? What are the underlying pedagogical models associated with bio-feedback data and in what way do they support learning? Are any new learning innovations and pedagogical models emerging? |
|---|---|---|
| Data | Methods | Timelines |
| Video recordings of partner collaborations and data from interventions. | Emergent pedagogies identified during partner collaborative activities. Focus group later in project. | WP6 to trial out in-depth use of this at a couple of the first design and trial events to validate it and ensure WP2-5 are clear on how to do this. |</p>
<table>
<thead>
<tr>
<th>RQ11: How is xDelia disseminating the research findings?</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Data</strong></td>
</tr>
<tr>
<td>Project outputs. Interviews.</td>
</tr>
<tr>
<td>Project documents. Publications.</td>
</tr>
<tr>
<td>Web-statistics (such as website hit statistics, citation ratings)</td>
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### 5.2.2 Work Package 2 Research Questions

WP2 are looking into the effects of emotional regulation on the financial decision making of traders and investors. They will be liaising with partners from WP5 to collect sensor data on states of emotional arousal and with partners from WP4 in the design of games that will help address any biases identified. Their research questions therefore can to draw on a range of types of data. At the WP6 Evaluation workshop, a detailed and evolving set of research questions for WP2 was already available on the wiki. These are collated below, as they stood at the time this document was written.

1. Expert investors/traders have a greater focus on antecedent focused emotion regulation than response focused emotion regulation compared with novices
   - Can we distinguish novice from experienced traders. If so, how?
   - Can we distinguish between antecedent focused and response focused emotion regulation. If so, how?
     - What are questions to be asked in order to record investors' own perceptions?
     - There are existing questionnaires/measurements to use (e.g. Gross has developed some questions, we can use)
2. Expert investors/traders show greater emotion differentiation than novices
   - Similar detailed questions as above.
3. Expert investors/traders exhibit lower emotional arousal in the face of time pressure and critical market events
   - Similar as above. Hopefully easier than question above.
4. Are 1 to 3 selection or learning effects?
   - Three things are going on:
     - Personality traits (e.g. neuroticism: BIS vs. BAS personalities)
     - State (e.g. environmental constraints)
     - Learning (e.g. emotion regulation changes over time)
   - Is it possible / necessary to distinguish between experience / learning / training / deliberate practice?
     - What specifically does deliberate practice mean to SAXO bank?
5. Types of decision biases that we want to investigate:
   1. Overconfidence
   2. Loss aversion
   3. Herding
   4. Psychological accounting
   5. Miscalculation of probabilities
   6. Regret
   7. Overreaction
6. Identification of emotions / decision biases
   - Interview techniques / subjects own perceptions
5.2.3 Work Package 3 Research Questions

Work Package 3 is looking at issues of individual financial capability. They will be working with partners from WP5, using questionnaires and surveys to collect data from the 5000 members of the WP5 Household Panel to refine which issues of financial capability should be the focus. Section 8.1.5 contains more detail of the methods and instruments that WP5 bring to the project, including the Household Panel. WP3 will also be working with WP4 to design games that will help improve financial capability. The RQs that came out of the Evaluation Workshop are:

1. What would a financially capable young person look like?
2. How can psychology/behavioural economics help us to understand apparently low levels of financial capability?
3. What are the barriers/hurdles to becoming financially capable, are their circumstance/attitudes/ biases etc.?
4. How can learning technologies improve an individual’s capability?

5.2.4 Work Package 4 Research Questions

Work Package 4 will be working with WP2, WP3 and WP5, designing games that will provide data to help them answer their RQs. This gives WP4 potentially different serious game-play scenarios that they can use to feed into their own RQs, which are:

1. How can we transform decision-making schemas to game-play schemas and to game design?
2. What properties of the game are important for transfer?
3. What levels of fidelity (physical, functional and psychological) give the highest transfer rate?
4. Do different interaction techniques give equal transfer rate?
5. Which attributes of the user are important to look at when making educational serious games?
6. Does different personality types have equal learning from games and are there differences?
7. Can the two above overall questions be integrated into one model? That is; can we see a relation between personality, levels of fidelity and transfer.
8. Can we find tasks in the game that have high correlation with actual behaviour faced within the real task?

5.2.5 Work Package 5 Research Questions

Like WP4, Work Package 5 are working with WP2 and WP3 as well as WP4. The RQs for both WP4 and WP5 are dependent upon the decisions and questions asked by WP2 and WP3 and are as yet unrefined when this workshop was conducted. The latest WP5 RQs are:

1. Do different emotion regulation processes involve separate patterns of physiological reactivity?
2. Is re-appraisal associated with less risk aversion during a BART-task compared to individuals using suppression / controls?
3. Is re-appraisal associated with less risk aversion and reduced levels of negative emotions during a simple task (e.g., BART / Deal or No Deal) compared to individuals using suppression / controls?
4. Can an instruction on re-appraisal improve task performance during a BART / Deal or no Deal in high suppressor individuals?
5. Is it possible to link physiological arousal to decision biases in economic experiments?
6. Is it possible to change behaviour by influencing physiological arousal?
7. How can people be trained?
8. Are behavioural and physiological patterns linked to measures of emotion regulation?
9. Is it possible to change behaviour by instruction participants to regulate their emotion?
6 Evaluation Findings and Outputs

As described in previous sections, the D&E framework has proved a robust framework for structuring participatory, formative design and evaluation into the project interventions. One of the useful outcomes has been the identification of tensions as they arise within the project such that these can be addressed before they become too problematic. For example, at one meeting, during a group session in which partners were working out what role the sensors and serious games would have in the studies of emotional arousal for both WP2 and WP3, it became apparent that there was still an amount of work to be done on the different partners’ perceptions of the role of serious games. To address this tension, a sub-group was formed, consisting of a subset of project partners with the specific aim of clarifying this question. A series of virtual and physical workshops were put in place and publicised on the wiki. As these progressed, different partners joined the group to contribute their knowledge and expertise as needed. This activity is still ongoing.

6.1 Formative Evaluation and Feedback

The wiki provides a focal point for feeding back the evaluation findings to the wider group. In-progress evaluations are posted up as wiki pages for discussion, comment and contributions from the group. As these are finalised, the completed documents are posted on the SVN repository and a link to the document placed on the appropriate wiki page. Thus both the process and the product of the evaluation are available.

Using the wiki is not without problems. However these are being addressed as they arise. For example, it was identified that some partners were having difficulties entering and locating information, therefore a wiki core group was established to guide and drive improvements. Template pages have been created to make it easier create information, and a set of help pages created with explanations and examples of wiki syntax. Another problem emerged during Flashmeetings, when some partners raised the issue of not being aware when a page of interest has changed. Partners are now added to a list of wiki-users who will get an automated email whenever a change is made to pages they are interested in, particularly specific intervention-related wiki pages that are evolving frequently. Thus processes are being put in place to ensure that we are using technology to keep all partners abreast of project activities.

The findings from WP6 activities are also feed back to the group during project meetings, the first of which took place in M6. At this meeting, the D&E framework was presented to partners and this presentation was followed by an open discussion session in which partners could clarify their understanding of the process and add their suggestions or comments.

6.2 Dissemination of Findings

The D&E findings are shared with project partners on an ongoing basis both via the wiki and via presentation during the 6 monthly project meetings. Additional outputs have been disseminated via conferences and papers:

Ascilite Conference 2009 Auckland, New Zealand
Accepted: Poster and short 4-page paper presentation.
Citation format:
6.3 Baseline Interview Findings

The baseline interviews were designed to establish partners’ initial understanding of the project and in particular what to them was the main aim of the project. The interviews were also carried out to identify any striking differences so that they could be addressed, and to provide baseline data on different stakeholder perspectives. These baseline interview findings will be used in a longitudinal study that assesses how closely aligned the partners’ initial perceptions of the project are at the start of the project, how these perceptions evolve over the duration of the project and how well partners’ achieve their goals by the end of the project. This data will be used to answer two WP6 research questions:

- RQ1: What are the different partners perceptions of for X-Delia and how well are these met?
- RQ2: How do the different partners perceptions of X-Delia map to what the project actually achieves?

Baseline interviews were initiated at the Games Design Workshop, held in M3. Representatives from WP1 through WP6 were interviewed in a semi-formal interview and asked the following questions:

1. What is your role in xDelia?
2. What do you think the overall goal of xDelia is?
3. What is the relevance of the project to your own institution/your research interests?
4. What are your perceived aspiration for xDelia?
5. What for you would be indicators of success?
6. What do you think might be some of the challenges of the project?
7. What do you think are the strengths of the project?
The first seven interviews were conducted face-to-face with partners who were present during the Games Design workshop. For pragmatic reasons of geographical distance, four of the subsequent interviews were recorded using Flashmeeting, and one was conducted via email. Appendix B contains the interview details.

The interviews were transcribed and analysed qualitatively to identify emergent themes. These themes are represented graphically in Figure 6.2.

The main themes that emerged from the baseline interviews (shown in Figure 6.2 in blue) were:

- Interdisciplinarity
- Strengths
- Challenges
- Motivation
- Aspirations
- Goals

Subsidiary themes were also identified (represented as yellow bulbs), some of which were represented in two or more of the major themes. Thus the main and subsidiary themes can be linked up to form a network of issues as shown. The themes listed down the right-hand side stand for themes which were identified during the analysis, but which were not well represented in the data and did not fit into the emergent diagram. Appendix B contains detail about how the interviews were conducted.

Figure 6.2 – Baseline Interview Themes
6.3.1 Interdisciplinarity

As illustrated in Figure 6.2, interdisciplinarity emerged as a central theme, relating to several of the other themes. Overall, partners saw interdisciplinarity as a positive factor, offering opportunities for learning and for furthering research through collaboration:

*The strength of the project is also that it is interdisciplinary and so we can learn from the different areas what, yes, we have a lot to learn from each other and we will learn a lot from this project.* (Interviewee 3)

*One major strength of the project I think is that we have people from all different kinds of background so we have psychologists, we have people who are very good at finance so we have all the competencies, a lot of competencies, that we need.* (Interviewee 9)

*It gives us access to the expertise of six other institutions. In a sense we get to outsource this to six fantastic expert organisations, each at the height of their space of investigation.* (Interviewee 7)

They also saw the nature of the relationship between the project partners as an evolving one:

*To see this project as an interdisciplinary or first of all multidisciplinary research project which then becomes more interdisciplinary as we, as we go along.* (Interviewee 2)

This evolving relationship will be supported and, to some extent, formed by the collaborative project stakeholder interventions (T6.1) as they unfold during the project.

6.3.2 Strengths

As described above, interdisciplinarity was given as one of the strengths of the project. In response to the question: What do you think are the strengths of the project?, interdisciplinarity figured strongly:

*The challenges are as well the strengths of the project. We have a really good bunch of people together.* (Interviewee 10)

*One major strength of the project I think is that we have people from all different kinds of background so we have psychologists, we have people who are very good at finance so we have all the competencies, a lot of competencies, we need.* (Interviewee 9)

*I think the interdisciplinarity of the project is really a strength. Probably to add not only that we have partners from all those domains, I think that the quality of the consortium is also very good.* (Interviewee 8)

*The strength of the project is also that it is interdisciplinary and so we can learn from the different areas what, yes, we have a lot to learn from each other and we will learn a lot from this project.* (Interviewee 3)

The importance of the research domain was also seen as a strength of the project, especially when combined with the range of expertise of the partners assembled together for the project:

*It’s a very timely problem both in terms of the focus on the financial capability and also in terms of the serious games thing because that is also something that is experiencing a lot of interest at the moment.* (Interviewee 6)

*I think that’s what the diversity does, is it brings the opportunity for some really high quality outputs.* (Interviewee 5)
6.3.3 Challenges

However partners were not unaware of the likely problems an interdisciplinary project of this nature is likely to encounter. When asked “What do you think might be some of the challenges of the project?” Many of the themes that had already been mention in a positive light recurred as potential challenges. For example, the uncharted nature of the research domain:

> It’s hard to prove real effects, I think, because as I said there’s no clear basis or ground proof to compare it with. (Interviewee 9)

This comment refers to the fact that the project domain, whilst contributing to its strengths in terms of potential impact and timeliness, also presented considerable challenges in terms of complexity and being able to reach a conclusion within the timeframe.

The difficulties inherent in an interdisciplinary project also featured prominently in the list of potential challenges identified by partners:

> Another large challenge in my opinion is the diversity of the different partners and their different interests <...> different types of research approaches, like experimental approaches, like empirical approaches <...> and its not clear always how they work together and how the results or how the project work fits together. (Interviewee 10)

> There’s also an issue of people learning to work together ... for us as game developers, we can’t develop games that make sense unless people that are the application specialists work very closely with the game designers. (Interviewee 6)

> Some people have similar interests, or interests on similar dimensions but coming from different directions which is quite promising in the sense that these different directions are typically antagonistic in the literature. (Interviewee 2)

> One of the persistent challenges is having enough communication between people so they start to gain a common understanding with each other. It doesn’t always work by email. (Interviewee 6)

> Its a fairly risky process in the sense that we depend on one another that games will be developed, that we get access to investors, access to traders, access to regular people. So there are a lot of uncertainties. (Interviewee 4)

The references to the challenges of communication and collaboration and to the technologies used to support them highlights the role of WP6 in supporting the development of a shared understanding. These concerns are addressed in WP6 through RQ4: What mediating artefacts (the evaluation framework, communication mechanisms, workshops and project meetings, deliverables) are used in the project? and RQ5: How are we using technologies in the project for communication and collaboration and also in the research methods, and what is their impact on interdisciplinary collaboration?

Time was another element that caused concern as illustrated by these responses to the question asking what challenges were faced by the project:

> To me that is the goal which I think is extremely difficult to reach within three years, because it’s only three years and time is moving so fast. (Interviewee 4)

> It gives you the kind of false sense of the end being so far away that it doesn’t really matter, and the fact that during that time you know that all kind of stable things, like the economy, are really not stable and are all going to be changing. (Interviewee 1)
Never enough time to do everything you want to do. (Interviewee 1)

Ensuring that everything gets completed within the three-year timeframe was seen as a challenge, whilst at the same time, three years could seem such a long time that partners would develop a false sense of security.

Producing output that satisfy EU commission requirements was also identified as a challenge:

We could do what we consider to be very good work, and they could be quite critical of it, or we could do what we consider between ourselves as a very bad job and we could get quite good results. In some ways I see the deliverables in terms of what to me will count as really good outputs on this project as not necessarily and entirely the same as the stream of deliverables in terms of milestone reports on what we’ve achieved, explanations of what we’ve done in terms of the kind of language the commission want. I see them as two rather separate processes. They have a relationship, but they’re rather loosely coupled. (Interviewee 5)

These challenges are closely linked to the challenges of time; if too much time is spent on conforming to format requirements, then time that could usefully be spent on research is lost. The issue of document formatting has been addressed through the provision of report templates in WP1. The question of timescales was addressed during the WP6 Evaluation workshop, but it was felt that more collaborative interventions between partners was needed in order to design the initial studies before more definite timelines could be agreed to.

6.3.4 Motivation

When asked what their motivation for involvement in the project, partners were given the option of describing their institution’s motivation, their personal interest or both. At the time the baseline interviews were conducted, only a few contract researchers had been employed on the project. Their focus therefore tended to be on their personal motivation for involvement. Partners who had collaborated on the original bid tended to outline both institutional and personal motivations for involvement. Alongside the institutional goal of succeeding in using bio-sensors and serious games to identify and address the link between emotional regulation and financial decision, more general institutional motivations were identified such as:

Developing the profile of our research group by having good demonstrations of what we do. (Interviewee 6)

Another goal I have is getting great academic publications out as well. (Interviewee 5)

To create space where investors can be successful, thereby creating a space where the bank is going to be successful. (Interviewee 7)

A range of personal motivations for participating in the xDelia project emerged. These motivations tended to relate closely to the aims of the work package. For example, games designers were interested in producing games, bio-sensor researchers were interested in developing their understanding of the relationship between emotional states and bio-signals:

To study the psycho-physiological monitoring. (Interviewee 8)

To see if sensors can help to identify emotional states, stress levels, attention levels. (Interviewee 8)

To develop games prototypes to increase reputation and visibility of the group. (Interviewee 6)
To see where we can take games for instance, with neuro-sensors and mixing emotions. (Interviewee 3)

Partners also identified that personal learning opportunities were open to them through working on the project:

To have an excellent learning experience to see how European projects work, what kind of interesting avenues they present to researchers their institution. (Interviewee 4)

6.3.5 Aspirations

The wording of the question “What are your perceived aspirations for xDelia?” was a bad choice for use in an interview of non-native English speakers. The level of English language understanding amongst non-native English speakers involved in the xDelia project is extremely high, but the term “perceived aspirations” was overly complex and had to be explained on several occasions. It was also difficult to explain the distinction between “perceived aspirations” and “goals”. The distinction made during the interview was that perceived aspirations referred to “hopes” whereas goals referred to “specified, explicit aims of the project”. For example, a goal of the project might be to create effective serious games that address the issues of poor financial management amongst young people. A perceived aspiration might be to make a prototype game available via open-source, and to have that game taken up and modified by the open-source community and to see evidence that it is gaining in popularity. Perceived aspirations and project goals are not necessarily the same.

Several of the aspirations related to improved understanding of the research domain. This theoretical perspective varied according to domain. For example, in the serious games domain, aspirations included:

Deepening our understanding of how to build serious games for creating particular effects in players, having a more systematic methodology. (Interviewee 6)

Mathematical game theory has been applied very heavily in economics and developed in the context of complex economic systems. So I think that’s also a sort of theoretical connection which we can benefit from devolving more. (Interviewee 6)

In Work Package 6, aspirations were more closely tied to the evaluation framework and unravelling issues of interdisciplinarity and collaboration:

To see the design and evaluation framework being useful, and see evidence through the research, and then I can see that if do that, then we can use it in other areas as well and that could be useful in future projects and it could be a way of us getting a name for having developed this framework. At a broader level, I think the research questions are extremely challenging, they’re very broad ranging, they’re very innovative and it will be exciting to see to what extent those come through. I think, again going back to our particular stake, really trying to unpack a bit more about interdisciplinarity, how it works. (Interviewee 12)

Producing something tangible by the end of the project was a recurring theme:

Some actual games that were possibly played by real young people at the end of it. (Interviewee 1)

Applications that can be used directly in the current background, the current technology that we use. (Interviewee 7)

Also, it was seen as important that the project have a continuing impact:
Making a difference to practice in some sense. (Interviewee 5)

I hope that a lot of people from the outside world notice what we do and see some benefit in it. (Interviewee 11)

Some sort of spin-offs, maybe some people continuing doing one of the games or prototypes. (Interviewee 3)

Academic publications emerged again as an important measure of success, with interdisciplinary learning seen as something to aim for.

Assuming that we get top academic publications out of it at some point in time (Interviewee 4)

Having a good learning experience, and building up community between the researchers. (Interviewee 3)

6.3.6 Goals

All partners interviewed were fully conscious of the goals of the xDelia project:

*To study financial decisions and the role of emotions within financial decision making.*

(Interviewee 8)

However the perspective varied depending upon the work package the individual was involved with, for example:

A Work Package 5 (Sensors) perspective:

*To develop some kind of learning strategies and assistive learning tools to support people making financial decisions to do so better, so probably to understand what affects them [...] to lead them to make better financial decisions.* (Interviewee 8)

*To build a system that is better at emotion recognition, stress recognition and maybe develop algorityms that work on existing variable systems that could support traders.* (Interviewee 9)

A Work Package 4 (Serious Games) perspective:

*To try to create games to improve peoples’ confidence in financial decision making in the 3 application areas.* (Interviewee 6)

A Work Package 3 (individual financial capability) perspective:

*How committed biases and errors in judgment can influence your behaviour, that especially in financial capability, and how we can use games and sensors to provide that adequate feedback.* (Interviewee 2)

6.3.7 Summary

The themes identified during these early interviews form the basis for an evolving shared vocabulary established on the project wiki. Further interviews are planned later in the project to track whether and how the expectations identified at the start of the project have been realised. This data will be supplemented by observations, data collected from the wiki and outputs from the study interventions.
and will help to answer RQ1: What are the different partners perceptions of for X-Delia and how well are these met?
7 Conclusions

The initial D&E framework (T6.2) proposed during the kickoff meeting in Barcelona has been developed and refined in order to provide a useful mechanism for starting to scope the evaluations and RQs associated with interventions under Tasks T2.8 and T3.8. To date, it has been applied to two project stakeholder workshops, the Games Design workshop and the Evaluation Workshop (T6.1) and has demonstrated that it is a robust analytical framework for understanding the design and evaluation aspects of the project and for communicating these findings back to the partners. Its participatory approach to evaluation has encouraged stakeholders engagement with the process. Partners are appreciating the benefits of formative evaluation and becoming increasingly involved. For example, at an F2F workshops at which the D&E team were unable to be present, partners used the techniques demonstrated by WP6 during earlier interventions (audio, stills and video recording) to collect data for the Evaluation layer of the D&E framework.

This approach has helped to guide the formulation of the detailed project goals and activities by scaffolding the collaborative processes and providing a framework for planning and structuring project interventions. A worked up set of RQs and instruments (T6.3) formed the outputs of the Evaluation Workshop and a series of evaluation studies (T6.2) were initiated in order to answer the WP6 research questions.
8 Appendix A – Research Methods

8.1 Research Methods

During the Design and Evaluation workshop, partners shared their experiences of methodology and methods and discussed how these could be mapped to the research questions identified. These methods are summarised below.

8.1.1 Work Package 1 Methods

The main expertise flowing into the xDelia project from WP1 consists of simulation work. Since 2001 this consists of two main experiences.

The first project set out to explore the dynamics or risks of online markets, certain business to consumer (b2c) models, which were just emerging at that time. It asked how these models behaved in certain environments with a focus on simulation. It was difficult because the markets were just emerging at the time and therefore there was a lack of pre-existing data. A market study was conducted on online music markets to collect data on these markets to calibrate the models. Calibration meant collect large quantities of data, model it, then try to modify parameters to model the dynamics of this. Participatory assessment was the method used.

In model building phase, they conducted rapid prototyping. The Participatory Design meetings delivered ideas for the types of models that they might want to implement. Participants came up with ideas of business models to simulate and how to visualise the data. Developers came back and did rapid prototyping and developed the model. The results were then reviewed by a user panel reviewed the results, who evaluated them and fed their evaluation back into the process.

The aim was to simulate multi-agent processes. This is rooted in the idea that you simulate small processes as isolated entities that can behave on their own and communicate with each other. Out of that you create an artificial financial market with these little programs that model the behaviour of investors. The aim is to recreate the dynamics of either an observed market or test the design of price mechanisms. This project simulated a business model, equipping a simulated company with a particular business model and then look at the outcomes in terms of profits etc.

The second project involved financial crisis work. This was explored by means of user multi-agent simulation. Its focus was one particular nasty debate regarding the causes of the 1998 liquidity crisis. This involved a prominent hedge fund that was rescued. This debate was quite renown in the market, with some were saying that the culprit of this liquidity crisis were the risk management tools suggesting that the very tools that should prevent you from taking too many risks were actually responsible for the crisis.

In this second project, they tried to replicate this crisis using a multi-agent model in terms of hypothesis testing – one hypothesis said no it wasn’t caused by risk management tools. The other hypothesis said yes it was.

This method could be translated into the xDelia project. For example, in the case of investors, it is not clear what would happen. One possibility is to use the trading platform from Saxo bank in simulation mode and run games from Saxo. This experience could help design models in terms of official investor behaviour with the aim of creating games that they can play or that will either elicit data from them on how they make their decisions.
8.1.2 Work Package 2 Methods

WP2 methods experience includes in-depth work on the work and practice of traders which involves looking at the learning of traders, looking back over the data and checking for emotional responses. Over three years they carried out a research study 180 traders in 4 London city banks collecting personality and performance data, in-depth interviews with the traders and their managers, lasting between half and one hour.

WP2 have looked in particular at cognitive bias in the illusion of control. This is the tendency to believe we are more in control of events than we think we are.

They also designed a computer game where index changed frequently. Participants had three keys that may or may not effect the movement of that data point. These keys might raise or lower the index or increase its volatility, giving the participants the illusion of control of the index. They found an inverse relationship with trader performance. They also compared MBA students and traders and found very little difference in the illusion of control. This may be a self-protective illusion to protect their positive feelings.

WP2 expertise also includes in-depth experience in understanding traders. They have experience of a mixture of theoretical perspectives and methods – both qualitative and quasi-experimental. They also have a deep interest in the practice end of research, their practices and how to effect them. For example, antecedent focused emotion regulation is more successful than response based emotion regulation.

WP2 experience also includes researching investment clubs. This consisted of qualitative research in which the researcher sat in on monthly meetings and observed the decision making processes. This was followed up by a questionnaire based on quantitative data and hypothesis to help define the parameters that are important to investors in making their financial decisions. Very interesting biases were evident.

8.1.3 Work Package 3 Methods

WP3 conduct both qualitative and quantitative research, looking at financial capability and understand how to measure it and look at changes in peoples’ circumstances. They have developed a survey instrument on this and followed up with qualitative interviews two years later. They have also conducted a great deal of secondary analysis of original data set, assessing how different risks are managed by individuals. They have analysed qualitative data through in-depth interviews together with observational studies.

8.1.4 Work Package 4 Methods

Cognitive behavioural therapy is very applicable to X-Delia, WP4 can embed that into computer games, and also develop communities on the web.

WP4 also have experience in business systems, with methods that are relevant for gaming development. They have done a lot of field work and fed the data from interviews, observations etc into the creation of innovative prototypes which are then populated with real data. They have used think aloud, focus groups and interviews to gather a lot of information on how well the prototype worked, evaluating it in terms of the technology, how well it fits in the environment, value in the work place, and usability. They also have eye tracking facilities and psychometric measurements.

WP4 have conducted quantitative work including normal psychology tests etc, quantitative analysis of games immersion, psychophysical equipment, as well as qualitative interviews. They have used activity theory, rapid prototyping, using design rational for analysis.
8.1.5 Work Package 5 Methods

WP5 methods experience include online surveys and online field experiments. These may be with a general audience, however they also have a central panel of 5000 households with whom they can run repeated measurements. They could do an initial study in Autumn. This may be particularly useful for WP3. They can measure a wide variety of things and also come up with different tasks and see if the central panel respond differently to these tasks.

They also have facilities for conducting lab-based experiments with the general public. For example they could manipulate behaviour and see how people react. They can also hook up with ECG etc and see what is happening in the brain, coupled with neural and biological feedback and see if that effects outcomes. They also have a mobile laboratory.

Their FRMI experience offers very specific cases of relevance, interesting studies have been done using this in terms of managing pain relief. These could be repeated with different groups of people. They can invite lab based studies can do things with studies – undergraduates, graduate and MBA finance students (who are similar to investors) to take part in lab-based studies in which they simulate situations and measure the results..

One of the topics they are interested in is path dependence, that is to say how previous emotion affects future decisions; how persuasion/influence affects decisions and how the social environment and social norms affects an individual’s decisions. The social environment is very important and they feel that activity theory could be used as an approach here.

8.1.6 Work Package 6 Methods

WP6 have an evaluation research, cognitive science background including complex problem solving and the ways different forms of TEL might influence that. They have used a range of methods qualitative and quantitative, eye tracking, etc. They have also conducted experiments in which students used their own mobile phones to contribute data in the form of a spontaneous audio-diary. This provided useful data on their experiences with technology at the time, as it was happening.

WP6 also have experience in the Monty Hall dilemma simulation experiment. This is a famous problem in statistics. Participants have a game show host and three doors from which to choose. In the study, people were offered a simulation of this complex problem in which they had to work out what the best strategy was. WP6 found some nice methods of measuring collaboration using video to record people making decisions on what they should do. They also used pre and post tests, as well as post test interviews. They studied the balance between affective and cognitive issues in decision making.

In their studies, WP6 have used a range of technology to collect data, including mobile devices, for example, an application on a PDA which pops up and asks people to respond to a simple survey. When the PDA is subsequently connected to a computer for synchronisation, the data is automatically emailed to the researchers. They have used Flashmeeting for video conferencing interviews. They also have experience of using wikis and blogs and other technologies in both formal and informal learning contexts.

WP6 also have experience in the ethical dimensions of research and emphasised the need to develop a set of ethical guidelines for the project that take into account potential for harm, informed consent.

WP6 Methods
Data collection methods to be used for WP6

- Interviews with project manager at key points and also project partners
- Observation of selected workshops and trials
- Ongoing document analysis and mediating artefacts
- Focus groups at project team meetings
- [Evaluation template instruments – observation protocol and survey]

Other specific methods which might be used include
- Questionnaires
- Tracking
- Capturing shared communication and understanding
- Video and audio conferencing
- Reporting guidelines and templates for the trials to capture data for the evaluation
- Collaborative mindmaps
- Video capture
9 Appendix B - Baseline Interviews

The baseline interviews were conducted at the start of the xDelia project. Twelve partners were interviewed. For practical reasons of distance, timing and availability, partners were interviewed either individually or in groups of two or three, and either face-to-face, or remotely via Flashmeeting. Seven of the interviews were held at the Games Design Workshop, 5 after the workshop. Table 9.2 details the number of interviews, how they were conducted and how long they lasted.

| Table 9.2 - Baseline Interview Timings and Setup |
|----------------------------------|----------------------------------|
|                                  | Face-to-face                      |  |
|                                  | Partners | Duration | Partners | Duration |
| One-to-one interviews            | Interviewee 6 | 20 mins |  |
|                                  | Interviewee 7 | 1h 12m |  |
|                                  | Interviewee 12 | 17 mins |  |
| Group interviews with 2 interviewees | Interviewee 4 | 43 mins | Interviewee 8 | 37 mins |
|                                  | Interviewee 5 | 43 mins | Interviewee 9 |  |
|                                  | Interviewee 10 | 26 mins |  |
| Group interviews with 3 interviewees | Interviewee 1 | 38 mins |  |
|                                  | Interviewee 2 | 38 mins |  |
|                                  | Interviewee 3 | 38 mins |  |
|                                  | Interviewee 11 |  |  |

Interviewees were asked the following questions:

1. What is your role in xDelia?
2. What do you think the overall goal of xDelia is?
3. What is the relevance of the project to your own institution/your research interests?
4. What are your perceived aspiration for xDelia?
5. What for you would be indicators of success?
6. What do you think might be some of the challenges of the project?
7. What do you think are the strengths of the project?

Interviewees signed a consent form (Figure 9.1) in which it was stated that video, stills and audio data collected would be anonymised. A random identifier (Interviewee1 through 12, or Participant1 through 3) has been assigned to each partner who has been quoted in this deliverable, and these identifiers used in the text.
**Informed Consent form – Games Workshop**

**Introduction**

We shall be making video, stills and audio recordings during the Games Workshop on 12th and 13th May 2009. These recordings will be used to inform the design of the project evaluation framework.

**Confidentiality**

The information will be kept confidential. Data will be stored securely. The data may be written up and published however no reference will be made which could link you to the study.

**Contact Information**

If you have questions at any time about the study you may contact the researcher, Gill Clough, at [g.m.clough@open.ac.uk](mailto:g.m.clough@open.ac.uk).

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**Consent**

I have read the above information. I agree to participate in this study.

Participant’s name (please print)

Participant’s signature ____________________________ Date ____________

*Figure 9.1 – Consent Form*
10 Appendix C – References


