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Xcellence in Decision-making through Enhanced Learning in Immersive Applications

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Executive Summary

The WP6 Evaluation reports are delivered in three parts. Part 1 (M12) and Part 2 (M24) consist of a preliminary series of evaluation reports on each of the application areas and associated trials. Part 3 (M36) will update the previous parts and presents an analysis of the final findings from the evaluations. This document is Part 1 of the evaluation reports.

This report describes the collaborative activities and interventions that have taken place in the first 12 months of the project and shows how they are supported by the Design and Evaluation Framework (D&E). The focus is on the processes that have underpinned the design and development activities. The report contains accounts and evaluations of the workshops and a description of the mediating technologies that have been used to support project collaboration and to progress the designs for the studies that will take place in year 2.

Two evaluations were conducted early in the project, as the D&E framework was being refined and tested. These were the evaluation of the Games Design workshop held in M3 and that of the Evaluation workshop held to scope out research questions and methods in M4. These two reports were used to illustrate the D&E framework in D12-6.2, but as the Games workshop forms the basis for ongoing evaluations described in this document, it is also included here in the section on Financial Capability. The D&E framework was also described in D12-6.2, however a summary is included here to place the subsequent descriptions in context.
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1 Introduction

1.1 Document Purpose and Scope

This deliverable D20-6.3 takes the form of an evolving report on the application areas and associated trials, delivered in three parts. Part 1 documents the design and development activities undertaken in the application areas in the first 12 months of the project. Part 2 will contain formative evaluations of the design and development activities, and of the study interventions. The evaluation team will undertake some of the evaluations but some will also be undertaken by the other project partners, with support and guidance from the central evaluation team. The evaluation team will also pool methods from the different approaches for evaluation and synthesis overarching findings from across the different studies. Part 3 will contain the final evaluation alongside a critical review of the effectiveness of the evaluation framework for participatory design and evaluation alongside a summary of the lessons learned along the way. This document contains Part 1 of the WP6 evaluation report.

The document is divided into the following sections:

- **Section 1 “Introduction”** provides a description of the structure and scope of this document.
- **Section 2 “xDelia Approach to Evaluation”** describes the participatory approach adopted by xDelia partners to the evaluation of the project, and summarises the Design and Evaluation framework created in WP6 to support this approach.
- **Section 3 “Financial Capability and Games”** describes the WP3 & WP4 activities initiated at the Games Design workshop in M3 and developed subsequently.
- **Section 4 “Traders and Investors”** reports on the collaborative activities that have evolved around the WP2 studies, focusing on the Sensors workshop in Karlsruhe in M8 and the WP2 Studies Meeting in Copenhagen in M9.
- **Section 5 “Workshops as Cooperative Inquiry”** locates the xDelia workshops in Cousins and Whitmore’s 3 dimensions of collaborative inquiry (Cousins and Whitmore, 1998).
- **Section 6 “The Role of Technology”** presents the project’s use of technologies to support interdisciplinary collaboration.
- **Appendix A “Baseline Interviews”** updates the initial findings from the baseline interviews, reported in D12_6.2, presenting themes arising from the finished analysis.
- **Appendix B “Workshop Guidelines”** reproduces the guidelines for running project workshops that have emerged from the workshop evaluations to date and that have been posted to the wiki for use by project partners.

1.2 List of Acronyms

<table>
<thead>
<tr>
<th>Acronym</th>
<th>Description</th>
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<tbody>
<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>DHPS</td>
<td>Dutch Household Panel Survey</td>
</tr>
</tbody>
</table>
2 xDelia Approach to Evaluation

xDelia is a complex project, building on the knowledge and skills of partners from across Europe. The expertise in trader and investor behaviour is shared between the Business School at the Open University and the Research Department at Saxo Bank in Copenhagen. The University of Bristol provides the expertise in individual financial capability. Two universities, FZI in Germany and RSM in the Netherlands deal with triggering and measuring emotional responses using a variety of bio sensors. The serious games expertise is located in BTH in Sweden and the project management is based in CIMNE in Barcelona with project evaluation activities coordinated from the OU in the UK.

The project has been split into work packages (WP) which broadly correspond to the different institutions involved in the project:

- WP1 - Project Management
- WP2 - Trading and Investment
- WP3 - Financial Capability
- WP4 - Cognitive Games
- WP5 - Wearable Sensors and Psychopsychology
- WP6 - Evaluation Framework and Studies
- WP7 - Dissemination and Exploitation

However the project activities span the work packages so it is not possible for each institution to work independently on their part of the project. For example WP2 is focused on the activities of traders and investors. The first step is to accurately identify the states of emotional arousal that are triggered during stressful periods. This requires that WP2 work closely with the bio-sensor and psychology experts from Germany and the Netherlands in WP5. Similarly, WP3 investigates how individuals approach the management of their finances, with a focus on young people. This research area offers more immediate potential for serious games, and thus requires that the WP2 experts work closely with the WP4 Games designers as well as with the other work packages.

The need for cooperation and collaboration does not end here. There are overlaps in the expertise between WP2 and WP3, and sharing knowledge and collaborating is likely to improve the outcomes. Equally, WP4 (the Games designers) and WP5 (the sensors) need to work together so that the Games designers understand the types of emotional arousal that it is possible to measure and the Sensor experts know what it is that the Games are trying to generate. Each interdisciplinary team will need to collaborate with all the other interdisciplinary teams on the project.
This interdisciplinarity and geographical distribution of the partners presents xDelia with some unique challenges. Part of the evaluative approach involves identifying these challenges and tracking and evaluating how they have been addressed during the project. As a first step to both identifying the challenges, and involving all partners in the participatory evaluative process, WP6 initiated a series of interviews with partners in order to create a baseline of partners’ perceptions of the project to answer WP6 RQ1: What are the different partners perceptions of for X-Delia and how well are these met? and RQ2: How do the different partners perceptions of X-Delia map to what the project actually achieves? Initial findings were reported in deliverable D12_6.2, and the more detailed analysis is included in Appendix A.

To address the challenges inherent in collaborating across a geographically distributed, interdisciplinary group, a design and evaluation team forms an integral part of the xDelia project. According to the DOW:

The objective of the evaluation framework, which can be understood as a space for stakeholder participation and partner consultation and involvement, is twofold. First, it seeks to establish a shared understanding of concepts, methods, and goals of the project. Second, it initially carries out and then coordinates continual formative evaluation of the research process and outcomes throughout the life of the project. (DOW, p26)

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. The Design and Evaluation (D&E) framework supports this process. The development of this framework is described in detail in deliverable D12-6.2, however its key features are summarised in this section in order to provide a context for the evaluations.

### 2.1 Theoretical Underpinnings

During the 1980s, stakeholder participation and engagement in evaluation and decision making was identified as important contributors to the success of evaluation (Shulha and Cousins, 1997). By the 1990s, the nature and extent of stakeholder participation was characterised by Cousins and Whitmore (1998) into two streams of participatory evaluation; Practical Participatory Evaluation (P-PE) and Transformative Participatory Evaluation (T-PE). P-PE approach encourages stakeholders to participate in all evaluation phases by promoting knowledge sharing and collaboration in the decision-making process:

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 xDelia maps onto the P-PE stream and 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 2.1 (reproduced from Cousins and Whitmore, 1998) illustrates these dimensions graphically.
This representation allows us to locate the evaluative processes in the three dimensional space of the figure and is applied to the interventions in Section 5.

2.2 Using the D&E Framework

The D&E framework is designed to facilitate the evaluation of project interventions and collaborations. It fulfils a dual function. On the one hand, it acts as a model for the design of effective project interventions, clarifying the interdependent relationship between the research questions, research interventions, the evaluation, and the mechanisms by which the findings from the evaluation are fed back into the project to inform future interventions. On the other, it acts as a lens through which to reflect on what happened during the intervention, supporting collaboration by involving the stakeholders as reflective evaluators and feeding the findings back into the project on an ongoing basis.

Project interventions take the following forms:

- Workshop Interventions: Involving all partners, workshops are hosted by the different partner institutions, and each workshop has a different goal although all share the overarching aim to further the development of a shared understanding between project partners.
• 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 the which physical responses are linked to known emotional responses triggered by particular stimuli.

At the time of writing, a number of workshop interventions had taken place. These are evaluated in the following sections. Workshops are one of three types:

i) Prototype development workshops
ii) Substantive, subject-orientated workshops
iii) Evaluation workshops.

Table 2-1 Classifies the workshop interventions discussed in this deliverable against the three types:

<table>
<thead>
<tr>
<th>Type i) Prototype Development Workshops</th>
<th>Type ii) Substantive Subject Orientated Workshops</th>
<th>Type iii) Evaluation Workshops</th>
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</thead>
<tbody>
<tr>
<td>WP3/WP4 Games Design Workshop</td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>WP6 Evaluation Workshop</td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>WP5 Sensors Workshop</td>
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<tr>
<td>WP2 Research Studies Workshop</td>
<td>X</td>
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Note that the WP6 Evaluation workshop was described in D12-6.2 and is not included here.

The D&E Framework has been developed progressively, as it has been applied to the workshop interventions. It may develop further in response to the evaluation requirements of the study interventions. In its current state, at M12, it consists of 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, and an evaluation layer intervention might include video of the workshop activities, interviews with the participations, pre and post questionnaires, debriefing sessions at the end of the workshop. Both design and evaluation activities formulate their research question in the left most 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. Figure 2.2 illustrates the D&E framework, highlighting the interdependent relationship between the design and evaluation sides of the framework in which each builds upon and feeds into the other.
The D&E Framework represents an iterative process, in which the evaluation findings also feed into the project over time. Figure 2.3 extends the D&E framework over time, showing how the analysis from earlier interventions shapes future interventions.
Section 3 and Section 4 illustrate how the D&E framework is being used to structure and evaluate project interventions. Section 5 takes the evaluation further, locating the xDelia participatory approach to evaluation within Cousins and Whitmore’s (1998) three dimensions of collaborative inquiry. Section 6 describes the technologies being used by xDelia project partners to support their research efforts. These technologies will be evaluated more fully in Part 2 of the Evaluation reports.

### 3 Financial Capability

This section describes the design and development activities that have been undertaken to develop ideas and plans for interventions related to WP3, WP4 and WP5.

1. Games Design Workshop – This was a prototype design workshop that was the first collaborative knowledge sharing event (M3) between the partners since the initial kick-off meeting in M1. It aimed to clarify issues of financial capability that needed to be addressed, and to give all partners an insight into the process of designing games through hands-on experience.

2. Dutch Household Panel Survey – This intervention is still in the planning stages, but was original mooted at the Evaluation workshop in M4 and subsequently developed further during discussions at the 6 month meeting. Collaborative activities are being coordinated by technologies described in Section 6.
3.1 Games Design Workshop

This section evaluates the Games Design Workshop, hosted by the games designers in Sweden in M3. The Games Design Workshop evaluation was used to illustrate the D&E framework in D12-6.2, and is summarised here. The workshop was a prototype development workshop (type i) that took place in to which all partners were invited and which representatives from each of the different disciplines attended. Section 2.2 lists the three types of workshops undertaken for the xDeila project.

3.1.1 Context for the Games Design Workshop

The goals of this 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 learner. 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.

3.1.2 Description of the Games Design Workshop

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, illustrated in Figure 3.1. 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 note, as illustrated in Figure 3.2. 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 RQs 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 RQ1: What are the different partners’ perceptions of for xDelia and how well are these met? The workshop interventions were audio and video recorded for later analysis.

### 3.1.3 Reflections on the Games Design Workshop

The D&E framework is reproduced in Figure 3.3, populated with the research questions and interventions from the Games Design Workshop.

![Figure 3.3 – Games Design Workshop Analysis Detail](image)

*Figure 3.3 shows the D&E framework populated with the project interventions for the Games workshop, linking up the RQs linked up the interventions, data collection, analysis and outcomes. The analysis and artefacts used in the workshop are all preserved in the project wiki*

#### 3.1.3.1 Framing the Workshop Tasks

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:

Participant1: “That noun, verb, and adjective should go with the instructions that we’ve just been talking about, because we know already that…..”

Participant2: “That this is where our focus lies”

Participant1: “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.

3.1.3.2 Post-Workshop Questionnaire

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, the WP6 Evaluation workshop held in M4, 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. The workshop findings were made available to the project via the wiki where the outcomes from the evaluation session were posted.

The Evaluation workshop is documented in an earlier deliverable, D12-6.2.

3.1.4 Discussion

The focus of the Games workshop was two-fold; to promote knowledge sharing between partners from different disciplines, and to brainstorm ideas for table-top games that might address issues of financial capability. This was the first workshop of its kind, and it enabled partners to get to know each other by working together on shared tasks, thereby generating familiarity that is essential for effective teamwork. It contributed to the project by giving partners an insight into the challenges faced by the games designers, and by providing a means by which partners could begin to learn about each others research domains, developing a shared understanding that will be essential to ensure successful project outcomes.

Following on from the Games Design workshop, WP4 have developed a game concept prototype which they presented at the 6 month meeting:
3.1.4.1 Game Concept Prototype 1 – First Person Shopper

This game prototype was created in order to provoke discussion about the types of games that would be suitable. It was presented to the partners during the 6 month meeting. Although the group concluded that this was not a games area that had much to offer xDelia, the presentation triggered a lively discussion about the types of games that would. It was decided to follow up by building a game around a small psychological test in to explore how games might represent a task in such a way that they would not contaminate the task nor the result. Such games are referred to as MicroGames.

3.1.4.2 MicroGames

As a result of feedback WP4 are looking to design MicroGames. These games are very small and simple in terms of the task, rules, goal, graphics etc. The findings from the MicroGames need to answer the following questions:

- Can we make computer games that do not contaminate a specific, well defined task?
- What factors influence the performance in games?
- How can we use a participatory approach to create computer games?
- What questions or difficulties arise from the game development itself?

Development work on the MicroGames is ongoing and supported by the collaborative technologies evaluated in Section 6. This work will be evaluated in Part 2 of the Evaluation Reports.

3.2 Dutch Household Panel Survey

Alongside the collaborative work with WP4, WP3 are working with WP5 produce and submit a Dutch Household Panel Survey (DHPS) to identify financial attitudes among a panel of 5000 households, 8000 people. The idea of using the DHPS to explore issues of financial capability was first proposed at the Evaluation workshop. These ideas were then developed further and are published on the wiki.

The study will involve administering three online questionnaires to a panel of 8000 Dutch households. These questionnaires will consist of:

- The Emotion Regulation Questionnaire (Gross and John, 2003)
- The brief COPE (Carver, 1997)
- The Financial Capability Questionnaire

The Financial Capability Questionnaire has been designed by xDelia partners using technology mediated collaboration as described in Section 6. It consists of questions derived from tested questionnaires from the UK (Financial Services Authority, 2006) and the Netherlands (Antonides et al., 2008), alongside new questions devised by the WP3 and WP6 researchers.

The aim of the DHPS study is to look at the relationship between emotion regulation traits and defensive coping styles with financial capability levels. After analysed the results from the first survey, follow up studies will be able to target specific participants who obtain specific scores for emotion regulation and defensive.
4 Traders and Investors

This section describes the collaborative project activities that have been undertaken to progress the Traders and Investors studies, linking in mainly to WP2 and WP5. Three activities are discussed:

1. Sensors Workshop – The Sensor workshop was held in Karlsruhe, Germany in M8. It was a type ii substantive, subject-orientated workshop designed to share information about the types of mobile and fixed bio sensor technologies available, what readings each technology could measure, the benefits and drawbacks of different technologies and different measurements, and examples of the sorts of behavioural-economic studies that had been conducted in a lab setting and the types of data we might expect.

2. WP2 Studies Workshop – This workshop was held in M9 and was held in order to progress the WP2 studies. This meeting was in the form of a substantive, subject-oriented workshop (type ii) which aimed to come up with definite titles for the main studies, timetables for the detailed design of each study, named contributors and leaders for the studies and commitment to draft out sections of the deliverable D9-2.3 in which the studies are described.

3. Ronneby Workshop – This workshop was held in M10. During the 6 month meeting and WP2 studies workshop, it became apparent that further collaborations were needed to ensure a shared understanding of the role that serious games could play in the project. The evaluation team were unable to attend this workshop, therefore the WP4 hosts actively participated in the evaluation by collecting video data of the activities. As this workshop was held only a month before Part 1 of the Evaluation Reports deliverable was written, the evaluation will be included in Part 2 of the Evaluation Reports.

Section 2.2 lists the three types of workshops undertaken for the xDeila project.

4.1 Sensors Workshop

The Sensors workshop was organised to coincide with the same six month project meeting in order to minimise costs both in terms of expenditure on travel and time. It was held in Karlsruhe, Germany in M8 was a type ii), substantive, subject oriented workshop. Two days were allocated, the first day was for the 6 month meeting and the second was for the sensor workshop.

4.1.1 Context for the Sensors Workshop

Although the two meetings had different goals, they were, in fact, complementary. At the six month meeting, representatives from each work package presented their work and what they had been doing to the others. These presentations prompted in depth discussions and knowledge sharing between the partners, and helped further the shared understanding of how to move forward in the different application areas. The sensor workshop focused in on the potential WP5 contributions to both the traders and investors studies, and the fincap studies. The goals of the sensors workshop were to develop the shared understanding among partners from all disciplines of:

- Psychophysiological Monitoring
  - Available technologies (commercial and self-developed)
  - Possibilities and constraints of sensor technology in psychophysiological studies
Physiological parameters (direct and derived), pro and cons

- Sensor technology in behavioral-economic studies
  - Framework and requirements
  - Overview about different kinds of studies
  - Examples of previous studies

Having reached a shared understanding of the potential of the sensors and the types of behavioural-economic studies that had been conducted in the past, the aim was to use this information to brainstorming possible studies for both WP2 and WP3.

### 4.1.2 Description of the Sensors Workshop

The workshop lasted one day. The morning was devoted to presentations and discussions, with space for a coffee break:

- Short Introduction to Emotions, introducing the partners to the types of signals that could be collected and how useful and/or practical they might be.
- Sensor Technology for Psychophysiological Measurements describing the types of technology that could be used to collect the data.
- Experimental Design for Physioeconomic Studies discussing the role of laboratory experimental design, and concluding that this should supplement rather than replace other field-based empirical techniques.
- Possibilities and Limitations of Neuroeconomic Studies described some of the neuro-economic game-based studies to give partners a flavour of lab-based experiments project (Figure 4.1).

These presentations were informative and engaging and generated a great deal of discussion between the partners. During the coffee break, these discussions continued in small groups. Although unstructured, these break-out sessions were very useful as they enabled more targeted information sharing. For example, during one such discussion, the question of mobile sensor monitoring came up and partners from the host institution were able to demonstrate a lightweight chest-strap prototype that broadcast data synchronously to a mobile phone (Figure 4.2).
After lunch, the practical demonstration of physio-economic studies started at which two volunteers were wired up to sensors that would measure their ECG and heartrate. They then sat either side of a screen so they could not see each other and played the Dutch Flower Auction game. A Dutch flower auction is one in which two bidders have to bid on a consignment of flowers. The starting price of the consignment is displayed on the screen in front of them. The price drops quickly. The first person to press the button wins the bid. The aim is to win the bidding and buy the flowers for the lowest possible price.

However, winning the bidding does not automatically mean you win the game. Each consignment of flowers has a price which is unknown at the time of the bidding. If the winning bid is above this price, then the winning bidder makes loss. If the winning bid is below the price, then the bidder makes a profit. The aim of the game is to maximise your profit. You can only make a profit if you bid, but you need to wait until the lowest possible price to make the bid and even then, you may have made a loss.

Both participants had sensors attached to their arms and the output was displayed on the big screen so all partners could see it (Figure 4.3). This was an effective way of demonstrating the “noise” that made the heartrate reading less useful. This also allowed partners to experience what it was like to wear these sensors, how comfortable or uncomfortable they were, how easy to apply and remove.

The workshop ended with a group discussion session to brainstorm possible studies for xDelia.
4.1.3 Reflections on the Sensors Workshop

The D&E framework is reproduced in Figure 3.3, populated with the questions and activities from the Sensor Workshop.

![Figure 4.4 – Sensors Workshop Analysis Detail](image)

The analysis is not yet complete and will be reported in Part 2 of the Evaluation reports. However, one evaluation outcome that was implemented immediately was the creation of the MOGGI group in order to enable WP4 to explore how they might replicate or otherwise build on the games experiments presented by WP5. Membership of this group was initial WP1, WP4 and WP6 with the aim of developing the WP4 games idea. However, as with all xDelia groups, membership is open to all and progressively other WP representatives joined this group. After the WP2 studies workshop in Copenhagen the following month, the MOGGI group was redeployed as a group looking at collaborative technologies. Two new groups were formed.

4.2 WP2 Studies Workshop in Copenhagen

In M9, WP2 organised meeting to progress the WP2 studies. This meeting took the form of a substantive, subject-oriented workshop (type ii). The activities were scheduled to last one day and achieve goals:

- Identify the main research questions
- Agree the titles and nature of main studies
• Agree a timetable for detailed design of each study
• Name the leader & contributors in each study
• Identify who will help to draft the deliverable D9-2.3 in which these studies are described

4.2.1 Context for the WP2 Studies Workshop

The organisation of the WP2 Studies Workshop drew on the experiences of the previous workshops. The goals and agenda for the meeting were shared in advance via the wiki and, after the meeting, a link was included to the main tangible output, the evolving deliverable D9-2.3, Specification of WP2 in-depth studies.

4.2.2 Description of the WP2 Studies Workshop

The meeting started with a group discussion at which titles were chosen for the main studies. After a coffee break, partners were split into interdisciplinary groups to work on the details of the main studies. Once lunch was over, the small groups reconvened for half an hour to write up their ideas and then the whole group gathered together to listen to the planned studies from the small groups and capture them in writing. At this stage, a provisional timetable for the studies was negotiated and the next steps planned.

4.2.3 Reflections on the WP2 Studies Workshop

The D&E framework is reproduced in Figure 4.6 populated with the questions and interventions from the WP2 Studies Workshop.
The partners were sub-divided into groups for the brainstorming sessions. A key goal for WP2 in this workshop was to get the WP2 exploratory studies defined, planned out with timelines and to obtain commitment from named partners to specific activities along those timelines. Therefore the composition of each group was carefully organised, with the WP2 researcher moving between the groups to participate in the discussions and offer the WP2 perspective where necessary. Each group had the task of coming up with a study, give it a title and plan it out with named responsibilities. These plans were then shared with the whole group during a whole group discussion at the end.

At the end of the workshop, Partners had agreed on a set of research questions:

- RQ1: Does emotion regulation strategy influence financial decision-making performance?
- RQ2: How much does emotion regulation influence financial decision-making performance compared with other key factors?
- RQ3: Can emotion regulation be improved through training, in ways which improve human performance?

Provisional timelines had been agreed and contributors recruited for the deliverable D9-6.3. Further research activities were planned, and as it was important to keep the communication going as these activities took place, it was agreed that further meetings be organised. However as it was impractical for partners to travel to all these meetings, collaborative technologies were used. These technologies are described in detail in Section 5.
Another outcome from this meeting was the creation of two subgroupings represented in two mailing lists experimental.studies@xdelia.org and games.experiments@xdelia.org. Currently these two groups are broadly aligned with the main application areas, the WP2 and WP5 collaboration on the experimental studies and the WP3 and WP4 collaboration on the experimental games.

During the round-up session at the end of the meeting, it emerged that the studies proposed by the WP4 Games group did not align with the research goals of WP2. During the discussions that followed, it was agreed that the WP4 colleagues at BTH had not had enough input from the WP2 team about how serious games could play into the Traders and Investors case. The initial Games design workshop had focused on the Financial Capability requirements, and since then there had been little collaborative activity focused around how serious games might play a part in the Traders and Investors case. It was decided that another collaborative workshop was needed in which the focus would be how the WP4 games could build on and support the WP2 and WP5 research activities around Traders and Investors.

A workshop intervention hosted by the WP4 group in Ronneby was therefore set up. The workshop was organised using the wiki, and planning meetings took place using Flashmeeting. Because some of the partners were unable to attend, this workshop was run as a mixed-mode workshop, with some partners attending in person, others via video-conferencing link. WP6 were unable to attend, so the WP4 hosts collected video and audio data on their behalf.

The aims of this workshop were:

- Discuss BTH contribution to xDelia and the cooperation between the work packages
- Use a participatory approach to game design and produce some micro ("task-based") games.

This workshop will be evaluated in Part 2 of the Evaluation reports.

### 4.2.4 Discussion

The WP2 Studies workshop was a tightly organised, highly focused collaboration with a clearly defined set of aims, as specified in the design layer. Timings were strictly adhered to and the group evaluation at the end pulled together all the strands to answer all the D&E Design Layer questions.

The Evaluation layer of the D&E framework for the WP2 Studies Workshop included a short session with all partners at the end of the workshop to collect and collate feedback on the effectiveness of the structure and activities. However, the short duration of this workshop (it lasted only one day), and the fact that some participants had early flights and therefore had to leave the workshop early left insufficient time for this planned WP6 data collection to take place.

However it was possible to do a short, informal, focus group evaluation with two of the participants. This helped tease out some of the underlying reasons behind the mismatch between the studies suggested by the WP4 Games Design group and the study goals of WP2. The focus group highlighted two problems:

1. The brainstorming groups originally comprised members from different work packages, however, subsequent movement between the groups during the brainstorming session resulted in one group consisting only of WP4 partners.
2. The level of English understanding is very high amongst the non-English-speaking partners, however comprehension difficulties can arise when the research domain under discussion is from a different discipline. In particular, the terminology used to express concepts in the
WP2 trading and investment domain can be difficult for non-native English speakers to grasp.

For future workshop interventions, care must be taken to ensure that when smaller groupings are assembled for brainstorming, no group consists only of members of one work package.

The language barrier is more challenging. WP6 are developing a shared project glossary to feed into WP6 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? This shared glossary will help, however a set of pages on the wiki is unlikely to be sufficient.

The Games design workshop had been followed by a web survey which had proved successful at eliciting both feedback and self-reports on learning gains. This approach would have worked at the WP2 Studies workshop and needs to be planned in for future evaluation layer interventions as a backup in case there is insufficient time at the end of a workshop for the planned evaluation activity.

The decision to organise an extra workshop at Ronneby in order to develop a shared understanding of the role of Games in WP2 is an example of how applying the D&E framework provides immediate evaluation feedback that has an impact on the project over time. Figure 4.7 illustrates this feedback mechanism graphically.

![Figure 4.7 – Evaluating findings triggering Project Interventions](image)

In this case, the group evaluation and knowledge sharing session at the end of the workshop highlighted a need for a further workshop intervention. The Ronneby Studies workshop was therefore organised. As the project proceeds, the benefits of participatory, formative evaluation will become more visible.
5 Workshops as Cooperative Inquiry

We have evaluated the xDelia workshops against Cousins and Whitmore’s (1998) three dimensions shown in Figure 2.1 and situated them as A1, B2, C2, which Cousins and Whitmore classify as “Cooperative Inquiry”. In cooperative inquiry “all those involved in the research are both co-researchers, whose thinking and decision making contribute to generating ideas, designing and managing the project, and drawing conclusion from the experience and also co-subjects, participating in the activity being researched” (Reason, 1994 p.326 quoted in Cousins and Whitmore, 1998).

Control of Evaluation Process (A1:Practitioner controlled – A2:Researcher controlled)
In both the Games and Sensors workshops, the control of evaluation process (dimension A) falls close to the A1 end. Practitioner control is provided through the wiki where all workshop participants have an input to the content and structure of the workshop both in advance (through the wiki) and during the event (through the discussions, brainstorming, participatory activities and evaluation tasks). During the Games 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.

In the Sensors workshop, the structure of the workshop was carefully planned, with a series of presentations in the morning followed by practical hands-on demonstration of the sensors in the afternoon. A great deal of dialogue took place during the morning presentations, with participants engaging with the presentations and developing their understandings of the potential of the technologies described via in-depths questions and group discussions.

The WP2 studies workshop was carefully organised to ensure that participants created the workshop outputs through their contributions to the brainstorming discussions.

Stakeholder selection for participation (B1:All legitimate groups – B2:Primary users)
Stakeholder selection for participation (dimension B) for all workshops on the xDelia project has fallen at B2 because they open to all partners (all legitimate groups), not just members of specific work packages (primary users). This is important because it would be easy for such a distributed and inter-disciplinary 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 (C1:Consultation – C2:Deep participation)
Depth of participation in the workshops falls close to C2, deep participation. In the Games workshop, 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. In the Sensors workshop, although the presentational format of the first half might suggest that it was more consultation than deep participation, the presenters invited comments and questions throughout and encouraged dialogue not just between presenter and audience, but between participants. The second half involved both the hosts and the participants in an experiential activity followed by a highly reflective assessment of the potential of the technologies and study methodologies available. In the WP2 Studies workshop, the outputs from the workshop (the titles, format and timelines for the studies) came from the participants.
6 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. Previous research identified an important mediating role for technological artefacts in guiding and framing a participatory design workshop (Conole, 2008, Scanlon et al., 2009).

6.1 WP6 Mediating Artefacts Research Questions

The WP6 RQs on technology were developed as an outcome from the evaluation layer of the Games Workshop. Initial evaluation questions for the first workshop (the Games Workshop described in Section 3.1) did not include a question about technology mediation because technology use was not foregrounded in the Design Layer questions which informed the Evaluation Layer questions. Subsequent analysis of the video, audio, and feedback survey data collected for the evaluation layer identified an important role played by mediating artefacts and this fed back into the Evaluation Questions via the “Reflection on and Utilisation of Results” link in the D&E Framework. In addition, two WP6 research questions that foregrounded the role of technology were formulated and discussed during the subsequent WP6 Design and Evaluation Workshop held in M4.

The two WP6 RQs that enquire into the role of technology are:

- RQ4: What mediating artefacts (the evaluation framework, communication mechanisms, workshops and project meetings, deliverables) are used in the project?
- 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?

This illustrates one of the ways that using the D&E framework as a model for project interventions integrates an evaluative perspective that ensures that all aspects of the intervention are interrogated effectively. Detailed over-the-shoulder data was available in the form of the video recordings collected for the evaluation layer to support this analysis which then fed into two WP6 RQs.

6.2 Range of Mediating Artefacts

To answer these WP6 RQs, technology use for project collaboration is being recorded and evaluated. This is an ongoing process and initial observations are recorded in the subsections. These can be expanded as the project progresses.

The range of mediating artefacts used in xDelia include:

- Email
- Wiki and the secure SVN repository
- xDelia Website
- DoodlePoll
- Web Conferencing
- Dropbox
Blogs  
Google Docs  
Google Wave  
Diigo  
Scrumworks

They are presented broadly in the order in which they have been adopted.

### 6.2.1 Email

Email is the main medium for communication between the project partners. It has advantages and disadvantages. One of the advantages that has been employed by the xDelia project is the use of email lists. There is a main email list all.partners@xdelia.org to which all project partners are members. However it is not always appropriate to email everyone, and selecting individual email addresses runs the risk that somebody who needs to be involved in a particular stream of communication may be missed.

Therefore a number of mailing lists have been created. These are documented on the wiki page called xDelia Mailing Lists along with the names of partners who are members of each list. You can go and add or remove your name from a list by editing the wiki page. The administrator will then amend the email list accordingly.

The email lists are:

- **dhps@xdelia.org** - for partners interested in the Dutch Household Panel Survey activities. This is a WP3/WP4 initiative
- **evaluation.framework@xdelia.org** - for communications related to the WP6 design and evaluation framework.
- **experimental.studies@xdelia.org** - for discussions relating to any experimental studies with the traders and investors, mostly WP2 and WP5.
- **games-experiments@xdelia.org** - for discussions around the use of games in the studies.
- **moggi@xdelia.org** - initially for WP4 Games discussions but has been re-directed to focus instead on use of technologies. Discussions range wide, not only around collaborative technologies such as diigo or google wave, but also can include iPhone applications that support sharing audio messages such that a record remains linked to the wiki for other partners to listen to.
- **wiki_core@xdelia.org** - for messages between the core team who are managing the development of the project wiki.

Usage of the different email lists varies as the project progresses, with lists becoming active and then falling into disuse. New lists can be created, and as in the case of the MOGGI list, the nature of the list focus can evolve.

### 6.2.2 Wiki

Over the first year of the project, we have seen interesting evidence about how technology can be used to support interdisciplinary collaboration. A shared, closed wiki was created at the start of the project to provide a central virtual location for collaboration and for the outputs from project collaborations. It was decided that the wiki should remain closed so that partners could share information freely without concerns over privacy and confidentiality, in view of the sensitivity of some of the data collected.
Workshops and meetings are coordinated via the wiki, with the workshop aims and agenda posted and space for discussions on the associated discussions page. Participants edit these pages collaboratively, contributing ideas and thoughts.

The Games Design workshop is a good example of this type of wiki collaboration. Workshop activities were mapped out by the 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:

Q1) Are we (xdelia colleagues) going to be joining in with the design process or observing it?
Financial Domain Expert 10:44, 6 May 2009
A1) You will be joining in with the design process. There is no point just to be observers.
Games Design Host 13:14, 6 May 2009
Q2) 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?
Financial Domain Expert 10:44, 6 May 2009
A2) 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.
Games Design Host 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 provides a good run-up space for partners to share references to literature and other sources of information relevant to the project. For example, in preparation for the various date-of-the-art deliverables, partners posted links to literature, websites and surveys for discussion and inclusion in the deliverable.

Partners also use the wiki to share their domain-specific knowledge for reflection and development by others. For example, prior to the Games workshop, 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.

The wiki is also used as a space for developing collaborative outputs. Actions and activities that take place as a result of a workshop are written up as separate wiki pages and linked to the workshop page and the deliverable project documents are developed first as wiki pages. This is particularly helpful for collaborative deliverable documents such as the WP2 D9-2.3 Specification of WP2 In Depth Studies. The goal of the WP2 Research Studies workshop in Copenhagen was to agree on the research questions and titles of the main studies, together with timelines and responsibilities for the tasks involved in the studies. One of the outputs was the deliverable D9-2.3. Project documents are stored both as wiki pages and, for delivery to the Project Officer, on a secure repository known as the SVN hosted by FZI.

The study titles and broad outlines were agreed during the Copenhagen workshop, described in Section 4.2. After the workshop partners from WP2 and WP5 took on responsibility for different
studies and these study plans were written up as sections in the D9-2.3 wiki page. The resultant deliverable demonstrates that the wiki worked as a collaboration space, however further evaluations, such as either interviews or web surveys, are needed to determine how effective it was.

Some partners have commented that the wiki can be cumbersome to use. For example, the search facility is not very efficient, and although the wiki supports collaborative contribution of content, these contributions can only be additions, modifications or deletions. If partners wish to discuss the wiki page development, there is an associated discussion page however such discussions are fairly linear and there is no easy way to link a comment on the discussion page with the text on the associated wiki page that it refers to. These drawbacks need to be investigated further. As a result, the wiki core group was formed of partners who had experience in and interest in wiki use, and who were prepared to help develop the wiki into a useful collaborative tool for the whole group.

Recently the wiki has been undergoing a re-design to make information easier to find. The xDelia wiki is a semantic wiki. Pages can be assigned categories such as Category:WP2, Category:Meeting. The home page is then populated automatically with links to pages with specific categories. Figure 6.1 shows the original wiki home page. However over time, the home page became overpopulated and thus finding information become much more difficult.

![Figure 6.1 – Wiki Home Page during Year 1](image)

As a result of feedback from partners, the wiki core group have initiated a wiki redesign, shown in Figure 6.2. This redesign aims to make it easier to navigate around the wiki. Partners can click on either the main page or the re-designed main page to begin their navigation around the wiki. We have installed google analytics on the wiki which will provide data on how partners are using wiki. This will inform the redesign and, together with feedback, enable us to tailor the wiki to suit the needs of the project.
Each time a wiki page is updated, a record is made kept in the page history. This allows the page to be rolled-back to a previous version if necessary. It also provides data on wiki usage which is important when evaluating the technology. However this tracks only changes, and does not record when partners look up information on the wiki. For this, Google Analytics are being used to track access pathways alongside the wiki’s own usage statistics which collect data on search terms. This will be supplemented by qualitative data collected from the partners through interviews or surveys.

Members of the wiki core group are also exploring the use of Diigo to annotate wiki pages. This is investigated in more detail in Section 6.2.10

6.2.3 xDeliaWebsite

The xDelia website presents a public face of the project. Once the xDelia blog is up and running and linked into the website, it will be updated to give an indication of progress and engage the wider research community.
Google Analytics is being used to collect data on website traffic.

### 6.2.4 DoodlePoll

This technology has proved extremely useful for scheduling events, whether they be physical meetings or distributed video conferences. A partner creates the doodlepoll and places a link on the wiki page that is being used to organise the event. Sometimes, the doodlepoll link is circulated to all partners to ensure that all know about it. An example doodle poll used to organise the Sensors workshop is reproduced in Figure 6.4.
6.2.5 Dropbox

Dropbox is a file sharing and synchronisation tool that allows users to keep copies of files in sync across multiple computers. To use Dropbox, you need to download a program to all the computers from which you wish to access your files. Your files display as a set of folders which are easy to browse and modify (Figure 6.5). You can invite others to share those files and the recent events tab alerts you to additions and changes. Use of Dropbox was initiated by the MOGGI group in M7. To some extent, its functionality duplicates that of the SVN, but access to shared files was felt to be easier. It remains to be evaluated, but it is not widely used in the project.

![Dropbox](image)

Figure 6.5 – Dropbox

6.2.6 Web Conferencing

It is not always practical or cost effective for partners to meet up in person at workshops. Therefore a number of virtual meetings have been held, and a mixed-mode workshop held in Ronneby at which some partners attended in person, some virtually via computer-link. Evaluation of the mixed-mode workshop will be documented in Part 2 of this report. Evaluation of the different modes of computer conferencing is underway and findings thus far described below.

So far, three methods of video-conferencing have been used:

- Flashmeeting
- Adobe Connect
- Skype
6.2.6.1 Flashmeeting

Flashmeeting discussions are all recorded and accessible via a unique URL. 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 6.6 – Flashmeeting

Figure 6.6 illustrates a typical Flashmeeting. The chat in Flashmeeting provides a useful backchannel and was used for sharing links out to other resources as they came up during the discussion. It also allows participants to contribute without interrupting the general flow of the conversation. One of the main characteristics of Flashmeeting is the fact that only one participant can speak at a time. This makes it very easy to trace the flow of ideas through the playback, but can feel a little artificial at the time.
Flashmeeting provides a simple playback facility, as shown in Figure 6.7. It is easy to find specific parts of the recording, because only one participant speaks at a time, and the duration of each participant’s conversation is illustrated, visually, along the timeline at the bottom.

6.2.6.2 Adobe Connect

Adobe Connect differs from flashmeeting in that all participants can speak at the same time if they so wish. This allows for a much more natural flow of conversation. However it resembles flashmeeting in that there is a little video window of each participant. As each participant speaks, the window is highlighted. There is a chat window and also a separate board for collaboratively working on a shared document. This shared document was an interesting of allowing participants to share thoughts about the studies. Different participants could add their contributions to the shared resources. Figure 6.8 shows the interface, with the chat window to the middle bottom and the shared document being created to the right.
6.2.6.3 Skype

Skype can be set to record conversations, but this is not the default setting. Records of skype meetings exist on the wiki in the form of notes. The advantage of Skype is that it is a familiar communication technology for many people, and it supports natural language communication with over-talking and interruptions. Also, a skype conversation can be initiated with no advance planning, unlike both Flashmeeting and Adobe Connect which need to be booked in advance. Its disadvantage is that even if the conversations are recorded, there is no detailed timeline to navigate by, as in Flashmeeting, and collaborative file sharing is not supported, unlike Adobe Connect. Although there is a chat interface, it is not as well integrated as in the other conferencing applications.

6.2.7 Blogs

WP6 are using a closed or “dark” blog for reflections and notes on the project. This blog was created as a means for sharing information with members of the WP6 team to keep them up-to-date on rapid xDelia project developments and give them the opportunity to give their feedback on activities via the comments. A sample post is included in Figure 6.9. However, the reflections documented in these posts will be used as data for the WP6 research questions, following the methodology used by Poth and Shulha:

Distinct aspects of the methodology including a reflective journal that documented the evaluator's decision-making process and critical episodes created a way to understand the circumstances surrounding shifts in the evaluator's behavior. (Poth and Shulha, 2008)
A collaborative xDelia blog is also being created to which partners are invited to post. This blog will be linked out from the project website and will offer a fast and dynamic way to disseminate information about the project to a wider audience.

### 6.2.8 Google Wave

Email is used heavily within the project. After one particularly active and near-synchronous email exchange, WP6 and WP1 partners decided to explore Google Wave as a tool for supporting collaborations of this kind.

Google Wave supports flexible synchronous and asynchronous communication. Two or more participants can engage in what is, effectively, a synchronous chat along the lines of MSN Messenger or Skype chat. However the chat line does not have to be linear. It is possible to go back to a previous post and edit it, or add a response. The response appears with the name and avatar of the person who wrote it. If two or more people edit a single post, all their names and avatars appear at the top.

This collective editing and contribution to a chat line or “wave” can be conducted synchronously or asynchronously. It is possible to replay a google wave step by step to trace the history of the changes and contributions. Figure 6.10 shows part of a google wave being replayed to show the editing history.

Google wave is still a new and relatively untested technology. However thus far, partners who are using it find that it is a useful tool for supporting remote collaborations. During a web conference, all attending partners can collaborate on the notes, ensuring that nothing gets missed. After the meeting, they can go back when they have time and tidy up the notes. The original text can be replayed to give a flavour of the meeting discussions or to check that nothing important has been deleted.

It is also easy to remain up-to-date with changes to the wave. There are extensions for the Google Chrome browser and the Firefox browser that notify you via a tiny icon whenever a wave you are participating in has been changed.
Figure 6.10 – Replaying a Google Wave

Figure 6.11 shows a tidied up Google Wave. This wave was initiated in the run up to the first Annual Project meeting to discuss and coordinate activities that needed to be completed by the end of M12. The original wave was a collection of collaborative notes from the participants. Progressively, as decisions were made and actions completed, sections of the wave were moved into the wiki and replaced, in the wave, with a hyperlink. For example, the FM links connect the wave to Flashmeeting recordings of planning discussions. The lower part of the wave has been updated to include a map of Barcelona where the meeting will take place.

Google wave also offers widgets to support the inclusion of a variety of media in a wave such as a video-conferencing, a voting widget, a link to doodle-poll. These will also be evaluated over the next year.
The main disadvantage of a google wave seems to be that currently, it does not offer an easy method of exporting the text to another format such as word. However it is possible to circumvent this drawback and cut and paste the text into the final record of the meeting on the wiki. A further drawback can be that a wave can get very large and cumbersome. However housekeeping active waves seems to mitigate against this.

6.2.9 Google Docs

Like Google Wave, Google Docs offers a way of collaborating and sharing documents that are changing rapidly and that require input from several people. Figure 6.12 shows a collaborative spreadsheet used to evaluate literature under review. Multiple authors can add in literature and comment on literature added by others as they review it.
6.2.10 Diigo

Diigo is a technology that allows you to annotate web pages in much the same way as you might annotate a WORD document. The wiki core group are exploring this technology as a way of making notes on wiki pages without actually changing their content, and sharing these observations with the wider group. An xDelia diigo group has been created for the project partners, and only members of that group can view the annotations. Evaluation of this tool is in the very early stages.

Figure 6.13 illustrates how Diigo has been used to comment on a page in the project wiki. As mentioned earlier in Section 6.2.1 although the wiki is being used as a collaborative work space by project partners, it does not support all the collaborative features necessary. In Figure 6.13, text that has an associated comment is highlighted, as it is in a commented WORD document. The little speech bubble contains the comment, referred to in Diigo as a “sticky”. To read a sticky, click on the little speech bubble. The stick displays as shown in Figure 6.13, with an additional box to allow more comments. Thus a comment dialogue can be conducted before a final change to the wiki page is implemented.
6.2.11 Scrumworks

Scrumworks is a project management tool that is being used by WP4. Partners from WP1 and WP6 have been invited to participate in the regular WP4 “scrum” and “sprints” to progress work on the games design, identifying and addressing problems as they occur.

Figure 6.13 – Diigo for Commenting an xDeila Wiki Page

Figure 6.14 – A WP4 Scrum Session
Links to recordings of the scrum sessions are placed in the associated Google Wave and, subsequently, in a wiki page.

### 6.2.12 Twitter and Cloudworks

Cloudworks is a Web 2.0 social application designed for sharing knowledge related to learning and teaching. Anyone can join, similar to a networking site such as Ning or Facebook, and create a cloud or a cloudscape. A cloud is, basically, an initial posting about a topic of interest which has relevance to learning and teaching. It can contain text description, links to resources or tools, summaries of presentations, questions for the community. A Cloudscape is a collection of related clouds.

An xDelia cloudscape has been set up and a few related clouds created within it. For example, a MOGGI cloud has been created to collect input on the potential of collaborative technologies, and an Interdisciplinarity cloud to collect comments on the sorts of challenges an interdisciplinary group such as xDelia might encounter. Thus far, these clouds have not generated any discussions from within the users of Cloudworks.

Twitter is a micro-blogging service that allows people to “tweet” status updates of up to 140 characters. When you sign up to a twitter account, you can browse for other twitter users who share similar interests and “follow” them. This means that their tweets appear in your home page. Links to websites and images can be included in the tweet. A range of tools have grown up around twitter. Tools such as Tweet Deck, which provide a non-browser interface to your twitter stream. Mobile feeds that allow you to access Twitter from your mobile, for example twitteriffic or twittelator or mobile tweet deck. Tweets may contain hash tags related to events of interest, for example a new product release: #ipad or #googlephone, an event: #haiti, or a project #olnet. It is then possible to filter those tweets that contain that hash tag. Feeds of twitter streams containing particular tags can be added to websites. Cloudscape supports twitter feeds. Figure 6.15 shows part of the xDelia cloudscape with the xDelia twitter feed displayed. This feed will display any twitter posts that are made by the xDelia twitter account, together with any other tweets that contain the text xDelia.

![Figure 6.15 – xDelia Cloudscape & Twitter Feed](image-url)
Until February 2010, twitter was not being used in the xDelia. Tensions had emerged around open technologies such as Twitter or Cloudworks and whether their use might lead to intellectual property issues relating to premature release of project findings. However, the term xDelia has recently been observed on Twitter. Therefore a twitter account xDelia has been created for the project. It is not being used much at present, but the potential is there to use it as a vehicle for disseminating news about xDelia to a wider audience.

6.3 Evaluation of Mediating Artefacts

Data collection for the evaluation of the use of mediating artefacts in the project is ongoing. A wide range of technologies is being trialled in the project, and methods for evaluating the more recently introduced technologies need to be decided. This research activity will take place over the next six months and will be included in Part 2 of the Evaluation Reports deliverable.

7 Discussion and Future Plans

Over the first year of the project, partners have tackled a steep learning curve in understanding each others’ research domains sufficiently well to be able to collaborate effectively on the project. They have addressed these challenges through knowledge sharing workshops and meetings, and by using a range of collaborative technologies both to manage and record their interactions, and also to work together to overcome the geographical and interdisciplinary distances that separate them. The close integration between the evaluation work packages and the other work packages has meant that the lessons learned at each stage of the collaborative process are fed back into the group. This feedback is shared with the group via the wiki, either as notes posted to the discussion page or on the wiki page associated with the intervention, or in the form of artifacts that can be used in future interventions. Over the next six months, WP6 will work on a set of evaluation tools with the other partners that will support the upcoming study interventions.

The participatory evaluation approach adopted by xDelia has demonstrated benefits to the project. Evaluation layer activities still take place even when the evaluation team cannot be present, with other partners participating in the data collection process on their behalf. This evaluation layer data benefits not only WP6 but has also been used to support the Design Layer evaluation. For example, both at the WP2 Studies workshop and the WP4 Games workshop, the evaluation data collected by WP6 was subsequently made available to partners in order to help them produce their outputs. In the WP2 studies workshop, the video recordings of the small-group brainstorming sessions provided a check-list for WP5 partners to follow when constructing their part of the D9-2.3 deliverable. In the WP4 Games workshop, the evaluation of the individual games and the whole group evaluation at the end was fed back to the WP4 designers to support their write-up of the table-top games prototypes.

Thus far in the project, the D&E framework has helped structure the collaborative project activities. As the workshop and meetings have taken place, tensions have emerged. The reflective evaluative approach has ensured that these tensions are addressed and corrective actions taken before they can become a problem. The D&E framework may well need to be developed further to articulate the enactment of actions resulting from the evaluations.

7.1 Outputs

During the first 12 months, WP6 have disseminated information about the project evaluation through a range of outputs. A poster (reproduced in Appendix C) and short-paper presentation was given at Ascilite in New Zealand in December 2009. A long paper has been accepted for presentation.
at the Network Learning Conference in Aalborg in May 2010. The xDelia project was showcased during the OU 30th Anniversary Open day on the large plasma screen in the Jennie Lee Building Nexus and the xDelia Design and Evaluation Framework poster was displayed at the Learning through Gaming stand at the OU Institute of Technology LearnAbout Fair in January 2010.

7.2 Next Steps

The D&E framework has yet to be used to evaluate study interventions. The first study intervention is expected in M13 for WP3 Traders case, and the D&E framework may need to evolve in order to act as a useful tool to support this. To facilitate this, the WP6 researcher will actively participate in the WP2 intervention, whilst collecting evaluation data. Thus participatory evaluation is a two-way process, with researchers acting as evaluators, and evaluators joining the research activities.

8 Appendix A: Baseline Interviews

The baseline interviews were structured around a series of seven questions designed to establish partners’ initial understanding of the project. The seven questions were:

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?

These questions aimed to uncover what the partners felt were the main aims of the project and how these related to their personal and institutional motivations. This provided detailed baseline data on the different stakeholder perspectives to answer WP6 Research Question 1: What are the different partners’ perceptions of xDelia and how well are these met?

It is hoped that these questions will assess how closely aligned the partners’ initial perceptions of the project are at the start, and identify any divergences before they have a chance to cause a problem later in the project. In addition, the baseline interviews form part of a longitudinal study to track how partners’ perceptions evolve over the duration of the project and how well they achieve their goals by the end of the project. This will answer WP6 Research Question 2: How do the different partners perceptions of xDelia map to what the project actually achieves?

The baseline interviews were conducted over a period of several months at the start of the xDelia project. Twelve partners were interviewed. These included both principle investigators who had been involved in the project from it’s inception together with researchers hired in to undertake the day-to-day running of the project. Table 8-1 details the number of interviews, how they were conducted and how long they lasted.

<table>
<thead>
<tr>
<th>Table 8-1 - Baseline Interview Timings and Setup</th>
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<tbody>
<tr>
<td><strong>Face-to-face</strong></td>
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<tr>
<td><strong>Partners</strong></td>
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<tr>
<td><strong>One-to-one interviews</strong></td>
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<td>Interviewee 6</td>
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<td>Interviewee 7</td>
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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 using Flashmeeting. Seven of the interviews were held face-to-face during a workshop held in month 3 of the project. Ideally, all of the interviews would have been conducted at around the same time. However several of the researchers hired to work on the various work packages did not join until later in the project, with start dates ranging from month 3 to month 9. These interviews had to be delayed until the interviewees had time to settle in and learn about the project.

The question of staff continuity may prove to be an issue when attempting to track the evolution of perceptions in a 3 year project as it is not possible to guarantee that all the same partners will be there throughout. For example, the full-time researchers were brought into the project progressively between month 2 and month 9. By month 6, one of the original interviewees had left the project, and by the end of the first year, one partner involved in the original bid had taken a 12 month sabbatical.

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 and availability, four of the subsequent interviews were recorded using Flashmeeting, and one was conducted via email. The interviews were transcribed and analysed qualitatively to identify emergent themes. These themes are represented graphically in Figure 8.1
Figure 8.1 – Baseline Interview Themes

The main themes that emerged from the baseline interviews (shown in Figure 1 as a blue circle with a T) were:

- Goals
- Indicators of Success
- Aspirations
- Motivation
- Interdisciplinarity
- Strengths
- Challenges

Subsidiary categories 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 in Figure 1. Learning is positioned at the bottom of the diagram to illustrate the fact that learning underpins the project. Interdisciplinarity is central and Strengths and Challenges for WTO opposing yet interconnected wings.

### 8.1 Goals

When asked what they thought was the overall goal of the project, all partners interviewed described the common goals of the project, as laid out in the description of work. For example:

*To study financial decisions and the role of emotions within financial decision making.* (Interviewee 8)

However as they went into more detail their perspective varied depending upon the work package each individual was involved with, for example:

#### 8.1.1 Sensor Goals

The WP5 Wearable Sensors and Psychopsychology perspective focused on the development and use of sensors that would accurately identify the emotional responses that might cause poor decision-making:

*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 algorithms that work on existing variable systems that could support traders.* (Interviewee 9)

#### 8.1.2 Games Goals

The WP4 Cognitive Games perspective centred on the creation and development of serious games that would improve people’s performance in making financial decisions:

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

*For me personally, it is all interesting to see where we can take games for instance, with neuro-sensors and mixing emotions.* (Interviewee 3)

#### 8.1.3 Personal and Institutional Goals

Personal goals emerged that related to the specific research focus of the partners, for example:
...to employ PhD students who can work more in devolving models of how games function cognitively (Interviewee 6)

The technology around the development of games can be everything from relatively simple software, two dimensional representations that are on a computer monitor to more intensive types of technology, such as either 3D animation, also even possibly even holographic animation or virtual reality devices, these kind of things, to even building actual hardware, new hardwares, that are interactive in some new way, even in some tactile sense or where they could be deployed in direct contact, physical contact with agents. (Interviewee 7)

Developing new methods and methodologies available was a domain-specific goal that emerged:

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)

A recurring category that was related to many of the main themes was that of reputation, obtained amongst other things through quality academic publications. This was seen not only as a project and institutional aim, but also as a key indicator of the success of the project.

8.2 Indicators of Success

Having identified the goals and aspirations of the project, an important question asked of the interviewees was What for you would be indicators of success? The answers were connected to both the goals and aspirations for the project and, again, tended to vary across the work packages:

8.2.1 Achieving the Project Goals

An obvious indicator of success included succeeding in the goals of the project, and having a measurable effect on behaviour of individuals making financial decisions.

And if we could affect, for example, financial institutions or regulated Government, consumer affairs, how to help normal consumers better to deal with their financial issues. (Interviewee 4)

If we can, on controlled laboratory experiments, show that we are able to recognise emotional states that should be induced by some kind of games or some kind of lab experiments so that we can get a high recognition rate of those states. (Interviewee 9)

If the games, or the interventions, lets call them, within the project could show that they are improving the behaviour of traders. (Interviewee 8)

8.2.2 Creating Playable Games

Further indicators of success included tangible outputs such as games that would be played after the end of the project.
To gain enough experience so that we would have enough credibility to think about starting up a company specialising in serious game development. (Interviewee 6)

And that we get a lot of finances out of selling that game (Interviewee 4)

Playable games could also be used to publicise the xDelia project, thereby contributing to the reputation:

Maybe developing some games that would get a stamp mark, say followed by an xDelia logo of some sort. (Interviewee 5)

8.2.3 Developing Reputation

Reputation was seen as an important measure of success, with evidence provided through academic publications and web presence:

Broader recognition externally. That the project’s getting known about, that we’re getting hits on the website, that people are talking about xDelia, that we’re seeing evidence of translation into peer-reviewed recognition, that is journal articles of conference proceedings etc. (Interviewee 12)

I am content to feel that we have increased our knowledge in the area of financial capability and that we have become prominent in the field. (Interviewee 1)

I really won’t consider this to have been a worthwhile project there’s a couple of publications at least in highly ranked journals (Interviewee 5)

And of course from a scientific point of view, if you find interesting results and are able to publish them in relevant journals (Interviewee 10)

8.2.4 Succeeding in Interdisciplinary Working

Making interdisciplinarity work effectively for the project also figured as an indicator of success, suggesting that creating and maintaining effective collaborations is regarded as important by the partners:

I think one indicator of success is to establish working relationships with people you haven’t worked with before but not just to produce the same thing you have done before but to somehow to see if there is some cross-fertilisation. (Interviewee 2)

8.2.5 Institutional indicators of success

Partners involved in the more experimental side of the project listed additional indicators of success relating to their institutional research domain interests:
Indicators of success, usually for us, are statistical values like sensitivity and predictivity, so mainly the quality of recognition algorithms that we develop during the project. (Interviewee 8)

Within our evaluation framework of course, we've listed a number of metrics. We've listed both the ways in which we're going to capture the data and also an indication of what that will give us. (Interviewee 12)

These subtle differences in the domain-related goals came out more clearly when partners described their personal and/or institutional motivation for working on the project.

8.3 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. When 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 rather than institutional motivation because they were relatively new to their institutions. Partners who had collaborated on the original bid tended to outline both institutional and personal motivations for involvement.

8.3.1 Institutional Motivation

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 by developing very many prototypes which add to things that we can use to publicise ourselves and gain some visibility. (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)

At an institutional level I’ve already mentioned our work on evaluation. We have a strong research strand in terms of design within the institute. (Interviewee 12)

8.3.2 Personal Motivation

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 see where we can take games for instance, with neuro-sensors and mixing emotions. (Interviewee 3)

8.3.3 Learning Motivation

Learning underpins the xDelia project, as shown in Figure 1. The fundamental goal of the project is not only to identify the effects of emotional bias on financial decision making, but also to address these problems; to enable people to learn how to manage their responses so that they make better decisions. This could be through serious games that use simulated realities to trigger emotional responses and teach people how to perform better through the game play. Alternatively, it may be by providing immediate sensor feedback to individuals to reveal their state of arousal so that they can be aware of times when their decision making abilities may be affected and learn strategies to deal with them.

Investors and traders kind of group together, but obviously one of the things in terms of learning is that they’re quite different. They have very tricky, difficult decisions to make, they’re learning very quickly, and emotions come in, and that’s very important in terms of how it impacts them, so it’s looking at games and its looking at how gaming and other technologies can support that. (Interviewee 12)

It also seems to me that there’s an interesting area that sits somewhere between learning and decision support, because we know some of the most successful ways of dealing with decision biases are to do with the way in which you change the environment in which people are making those decisions. And it seems to me you can do that in ways that mean that you not only improve the current decision making, but you help people learn differently about the ways in which they decide (Interviewee 5)

Interviewees also identified personal learning opportunities open to partners through working on the project. These learning opportunities included gaining experience in working on a European 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)

They also anticipated learning from the other members of the project. For example:

I’m very much used to either survey research or lab experimental work, but I’m not so familiar with methods such as in depth interviews with traders, for example. That’s not my kind of research method. (Interviewee 4)

Well, hopefully, in the end, people will learn to take better decisions, but on the way there we will learn a lot more about ourselves, people, humans, colleagues and economy, I guess, and also how to use the technology and sensors and making models. (Interviewee 3)
Organisational and practice-based learning are fundamental to the xDelia project as not only does technology-mediated learning through serious games underpin the project, but also interdisciplinary learning between partners is key to its success:

*The commission are looking for bids that are about integrating individual an organisational learning. I want to use some of the learning that’s coming out of this, and having got a successful bid, I keep looking back and looking at the bid and trying to understand what’s in there that’s helpful.* (Interviewee3)

### 8.3.4 Networking Motivation

Partners saw opportunities for developing research networks, both through working with the partners in other institutions, and also through using the research topic as a springboard to create networks of researchers who are not directly involved in the project, but who share an interest in it.

*And also to learning, learning experience, and building up community between the researchers, some more lasting project working (Interviewee 3)*

*In particular, one of the things that its enabling me to do is I’ve got the beginnings of a little research group now around this topic [...] I’ve now established a reasonably good network of people who share my interest [...] (Interviewee 5)*

### 8.4 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 unnecessarily 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 by way of 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.

#### 8.4.1 Personal and Institutional Aspirations

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)

In WP6, 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, with interdisciplinary learning and community building 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)*

### 8.5 Interdisciplinarity

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. Partner complementarity, in terms of expertise and disciplines, was highlighted:

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

These interdisciplinary relationships will evolve during the varied collaborative activities undertaken throughout the project.

8.6 Strengths

Interdisciplinarity was identified as one of the strengths of the project. In response to the question: What do you think are the strengths of the project? Interdisciplinarity was mentioned as a positive factor:

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

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)

8.6.1 Partner Complementarity as a Strength

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 confortium is also very good. (Interviewee 8)

8.6.2 Leading Edge Research Topic as a Strength

The importance and novelty 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 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)
8.6.3 Technology Strengths

Technology is fundamental to the xDelia project. Wearable sensors will detect and transmit data about states of emotional arousal. Software programs will interpret the raw data to produce meaningful representations of what is happening. Serious games technology will be used to trigger the emotional responses and a range of data capture technologies such as eye-trackers, video and audio may be used to supplement the sensory data collected. This range of technology use within the project itself was reflected in the interview responses:

*We’d like to understand how sensors would have to be built or integrated in order to use them as a permanent tool, especially for traders.* (Interviewee 8)

*To use psysio, or bio-signals, and try to put them together with the decision behaviour of people in auctions, for example, and that was the idea to bring such a research focus also in the project since we have financial traders who trade in auctions.* (Interviewee 10)

*Looking at the applications of gaming technologies and methods and sensor technologies, and in particular there’s a focus on emotion and emotional regulation etc.* (Interviewee 12)

*As I said, the ways in which you can use learning technologies is less as a self contained approach to learning that completely stands on its own, and then how can you put in supports alongside learning that may already go on to improve the quality of it or to help avoid adverse outcomes.* (Interviewee 5)

In addition to these research related uses, technology is also built into the organisational structure of the project. It is important for the impact of the project that it have a degree of external visibility via the web.

*Doing things via the web is extremely important. Having good websites. We have a new research group now, and one of the really important things there is to have a very strong visibility on the web.* (Interviewee 6)

This visibility does not have to be limited to a website in which text and image-based information are made available to people who browse to it. Visibility may also be enhanced through sharing the outputs of the project, for example making game prototypes available to a wider audience in an open way, and using modern social technologies such as blogs or twitter to broadcast the project as it progresses.

*In addition, if that software was made available as a website, using standard web statistics; google analytics, how many unique hits are we getting, what broader use are we seeing of the tool, are we seeing people Tweeting about it or it being kind of passed around more broadly.* (Interviewee 12)

Communication technologies are also key in a project of this kind, where partners are collaborating from geographically distributed locations. xDelia partners explore different communication technologies such as Flashmeeting and Adobe Connect.
8.7 Challenges

Partners were aware of a range of potential problems an interdisciplinary project of this nature is likely to meet.

8.7.1 Leading Edge Research Topic as a Challenge

When asked “What do you think might be some of the challenges of the project?” Many of the themes that had already been mentioned in a positive light recurred as potential challenges. For example, the uncharted nature of the research domain:

*Its hard to prove real effects, I think, because as I said there’s no clear basis or ground proof to compare it with. (Interviewee 8)*

This comment refers to the fact that working on a leading edge research topic, whilst contributing to the strengths of the project in terms of potential impact and timeliness, also presents considerable challenges because of its complexity which would make it difficult to reach a conclusion within the timeframe.

8.7.2 Research Design Challenges

The topic was also seen as presenting considerable research design challenges, particularly in creating studies that were feasible in the trading context, yet delivered valid data. For example, it is important when measuring bio-signals that the sensors be attached such that they take accurate readings, yet at the same time their presence must not interfere with the way the participant works.

*I think challenges for the design of the experiment. [...] the challenge to try to integrate the sensors that we need to get those signals into something which could be used in everyday life or in everyday trading because I think for traders in this work a tool that helps them should be something really easy to wear, very simple and not probably what we’re using in the experiments. (Interviewee 8)*

8.7.3 Challenges of Interdisciplinarity

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)

8.7.4 Communication Challenges

The challenges of communication relate to those of interdisciplinarity. The partners are separated by methodology, culture, language and geography. Clear and regular communication is key to the success of a project of this kind, and partners could see that this would present challenges.

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)

It’s 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 played by mediating artefacts in the work of a geographically distributed interdisciplinary project such as xDelia.

8.7.5 Technology Challenges

[discussion here of various communication and collaboration technologies we use]
Technology was identified both as a strength and as a challenge. The novel use of sensor and games technologies in the financial domain represents leading-edge research. However this presents methodological challenges:

What kind of ways the sensor technologies can be used methodologically, and I think it is more at a methodological level, is challenging. Putting together the gaming methodology with this kind of very specific subject-based area is quite a challenging thing, I think. (Interviewee 12)

In addition, the project has multiple technology-dependent goals. Not only are we trying to use technology to detect states or arousal and link them to emotions, we are also hoping to use technology to help people learn how to manage their emotional responses so that they can improve their financial performance:

So for me, there’s two main themes here. One is, what is going on here, can we use technology to get closer to that and to knowing a little bit better what’s going on
here? The other is, how can bring technology to bear on making decision makers more successful at whatever performance they’re looking for? (Interviewee 7)

Technology use within the project for communication and knowledge sharing, is not without its problems. Information is shared with all partners via a project wiki. However this presents challenges. There is a learning curve involved with any technology, and in a technology-rich project such as xDelia, this could easily result in overload for partners trying to get to grips with unfamiliar technology. Also, not all partners find the time to use the wiki on a regular basis. Indeed, the organisational structure of a project of this kind, consisting as it does of original bid partners who have many demands on their time and full-time researchers employed to work 100% on the xDelia project can lead to situations where partners are unable to find time to access the wiki and need to rely on colleagues to keep up-to-date.

I was not able to use it [the wiki] in the last weeks since I was too busy. But I hope that [new researcher] will use the wiki in more depth and with more engagement than I was able to. (Interviewee 10)

8.7.6 Time Challenges

Time was an 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.

8.7.7 Legal Challenges

Working in a sensitive area such as banking, where much of the data might be compromising were it to be released in the public domain, was seen as a challenge:

I think that data collection is the biggest problem so, to get some kind of information that we can compare or evaluate our algorithms with. This mainly depends on what kind of information we can get from the traders, from the trading there. It could be regulatory or legal challenges, whether they are allowed to give us data. (Interviewee 8)

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.

9 Appendix B: Workshop Guidelines

One of the outcomes of the analysis of the workshop evaluations a set of guidelines for hosting and running xDelia workshops was posted on the wiki. It is intended that this wiki page will develop as more inter-disciplinary collaborations are conducted. All xDelia partners are invited to add their own guidelines, or modify those given here, as this page is intended to act as an evolving and helpful project resource.

9.1 Before the Workshop

Useful tasks to undertake when planning the workshop

9.1.1 Planning and Scheduling

- Email attendees to obtain availability. Negotiate acceptable dates using a shared scheduling tool such as DoodlePoll.
- Create a wiki page (use this sample [[Workshop Template]]) containing:
  - List of attendees
  - Draft agenda with timings
  - Arrival and departure times and locations (to be completed by attendees)
  - Social section
- Email confirmed dates to all partners. Include a link in to the wiki page.

See [[Using the Workshop Template]] for instructions.

The text [[Workshop Template]] links to the wiki template for a workshop page and the text [[Using the Workshop Template]] links to a page of instructions.
9.1.2 Communication

The wiki is the central repository for records of communications between partners. Email is useful, but the threads can get fractured. When organising a workshop, direct participants to the wiki page where all updated information is stored. Encourage discussions about the planned agenda, content and outcomes through the wiki discussion pages. Then this information remains associated with the workshop wiki page and can feed into the outputs at the end.

9.1.3 Facilities

- Wireless internet access for all participants.

This is important so that partners can keep in touch with their own organisations and workload. It also enables them to look up references, examples, names etc on the internet as they are discussed during the workshop.

9.1.4 Timings

- Schedule regular breaks (no more than 2h without a break).
- Be clear about the start and end times so that people can book their travel.

9.2 During the Workshop

How the workshop is run will vary according to the aims of each, however some general guidelines have emerged from past workshops:

- Try not to work over the scheduled breaks. These social periods are important both to give participants a rest and for informal knowledge-sharing.
- When breaking out into sub-groups, try to ensure that no two partners from the same work package end up in the same group. This maximises the potential for interdisciplinary learning and knowledge building.

9.2.1 Recordings of the Event

- Audio and/or video recordings.
- Notes taken during the event.
  - Clerical support may be needed to take minutes.
  - You may want a round-up evaluation at the end during partners participate in a group discussion and at which notes are written up on a whiteboard or, if wifi available, entered directly to the wiki.
10 Appendix C: Dissemination Outputs

10.1 Ascilite Poster

Figure 10.1 – WP6 Ascilite Poster
11 References