



**Integrated Project on Pervasive Gaming
FP6 - 004457**

WorkPackage WP14: *Showcase – Boxed Pervasive Games*

**Deliverable D14.3: Game Design Description, Integrated
Game *Interference***



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EXECUTIVE SUMMARY

Interference is a game produced to show how the two boxes from the IPerG boxed pervasive games work package can be used together. This game was implemented during November 2007- January 2008. It is planned to be staged five times total before IPerG ends, and will continue to tour post IPerG.

Interference is a four hour long mystery game with a dark theme centered around a family conflict. The players take on the role of technicians who are tasked with repairing the failing Internet and telecoms system in an area. But while doing so, the players uncover that the real reasons to the failure are not just technical, but have their roots in a family conflict of the owner of Danske Data, the company operating the network. Eventually, they are faced with a difficult choice with no easy answer.

The players use mobile augmented reality, GPS and a special-built music sensitive doll to interact with the environment. They also meet with actors clad in masks who carry the storyline forward, and communicate with them over mobile phones. The game is game-mastered from Gamecreator which makes it highly adaptable to the player's activities and pace.

Interference was implemented in a few months (November – January 2007) including hardware development. Despite this extremely rapid development, *Interference* has already been staged twice with flawless technology and is being re-staged in Düsseldorf by an external group of Media students, only two weeks after it was staged in Stockholm. This development and staging process shows that IPerG now has managed to create tools and technology that support rapid development and re-staging of pervasive games, even including game-specific hardware.

This deliverable addresses the design and implementation of *Interference*.

Purpose of this Document

The purpose of this document is to provide a through description of the *Interference* game designed based on a predefined IPerG game design description template. The target audience is primarily the European game designer community. The document is to be made publicly available on the IPerG website.

Deliverable Identification Sheet

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Abstract (for dissemination)	<p><i>Interference</i> is a game produced to show how the two boxes from the IPerG boxed pervasive games work package can be used together.</p> <p><i>Interference</i> is a four hour long mystery game with a dark theme centered around a family conflict. The players use mobile augmented reality, GPS and a special-built music sensitive doll to interact with the environment. They also meet with actors clad in masks who carry the storyline forward, and communicate with them over mobile phones. The game is game-mastered from Gamecreator which makes it highly adaptable to the player's activities and pace.</p>
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1 INTRODUCTION

Interference is a game produced to show how the two boxes from the IPerG boxed pervasive games work package can be used together. This game was implemented during November 2007- January 2008. It is planned to be staged five times total before IPerG ends, and will continue to tour post IPerG.

Interference is a four hour long mystery game playable by four to eight players. The game theme is centered on a family conflict. The players take on the role of technicians who are tasked with repairing the failing Internet and telecoms system in an area. But while doing so, the players uncover that the real reasons to the failure are not just technical, but have their roots in a family conflict of the owner of Danske Data, the company operating the network. Eventually, they are faced with a difficult choice with no easy answer.

Interference has deliberately been designed as a pervasive game which is distinctly set apart from the real world. The players are dressed up in overalls that distinctly mark them as players and all actors wear masks. Interaction always uses devices that are easily identified as part of the game, including phones that are handed out for the game duration. Finally, although the players have to scout out the area as part of the game, the boundaries of the game area are set in advance and those boundaries are communicated to the players. The intention with this design is to make the game approachable also by people who know nothing, or very little, about pervasive games.

The game uses mobile augmented reality, GPS, and a special-built music sensitive doll to hide game content in the physical world. Players communicate and meet with actors who carry the storyline forward. These actors are clad in masks to make them easily distinguishable in the real world.

The game is semi-automatic. Most game content is coded and automatic, but the game master can at any time modify the result of player activities through Gamecreator. Some functions are manually controlled by the game master. This is the first game in IPerG that implements a complete and yet semi-automatic game engine, and from this perspective very interesting.

Interference was implemented in a few months (November – January 2007) including hardware development. Despite this extremely rapid development, *Interference* has already been staged twice with flawless technology functionality, and is being re-staged in Düsseldorf by an external group of Media students, only two weeks after it was staged in Stockholm. The development and staging process of *Interference* prove that IPerG now has managed to create tools and technology that support rapid development and re-staging of pervasive games, even including game-specific hardware.

1.1 Full Credits for *Interference*

Interference game design: John Paul Bichard and Annika Waern

Writer - Creative Director: John Paul Bichard

Technical director: Annika Waern

Producer: Emil Boss

Interference actors, Kista staging:

Matilda - Anna-Karin Linder,

Catrina – Andie Nordgren,

Kung – Karl Bergström

Interference game graphics: Johan Lindh

Masks by: Hamask

Recording and sound: Jonas Söderberg

Gamecreator design and implementation: Staffan Jonsson, Daniel Sundström and Henrik Berggren

PART system: Karl-Petter Åkesson, Pär Hansson, and Olof Ståhl

Magic Lens system: Irma Lindt and Richard Wetzel

Doll hardware and programming: Peter Ljungstrand

Game scripting: Annika Waern and Richard Wetzel

Hardware design and implementation: Peter Ljungstrand

Website design and implementation: Urban Ninja and Staffan Jonsson

Interference Düsseldorf staging: Linda Breitlauch with students at MDH
<http://www.mediadesign.de/>

1.2 The Process – The Interference Development Cycle

The Interference game was designed in a fairly traditional way, similar to that employed in traditional games industry. The game design process was initiated at a workshop carried out in June 2007 with participants from the box team and the creative director. During this workshop, the core gameplay mechanisms were identified and a theme and rough game structure was constructed. With this as the starting point, the game designers worked on the design in several iterations with feedback from the development and programming team.

The story line was then developed by the creative director over the summer and fall of 2007. This development was partly integrated with the location box game *Crash*, as the location box game uses some of the same characters and the storyline of this game forms a background to the *Interference* game. In parallel, the doll specification was developed and partly implemented.

The final game design was settled in November 2007 in a set of workshops with the game designers and the producer. The doll technology was integrated towards the PART system in December 2007 and the interaction model was finalised through a set of feedback sessions with the game designers during January 2008. The game was scripted during December 2007 and January 2008, also in a couple of iterations to accommodate for slight modifications to the game design.

The game was testrun in mid January with an invited focus group. Both the implementation and the actor scripts were slightly modified based on the feedback from this test group. The first real staging was on January 31st, in Kista, Stockholm. The frequent and rapid iterations of both the interaction model for the hardware and the

actual game scripts were necessary in creating a good overall experience. Some of these iterations happened very late in the project, as a result of the trial stagings. The reason why this could successfully be done without loss of stability was the stability and versatility of the tools used in the project, the PART platform and the Gamecreator authoring and orchestration tool.

1.3 The Doll

The hardware that makes up the doll is divided in three separate modules. One module provides positioning, one detection of RFID tags and the last module detects notes played on a flute. This module also provides feedback to the user.

The GPS communication used is the standard implementation of GPS in the location box. The GPS module is an off-the shelf Bluetooth GPS unit placed inside the doll.

The RFID tag reader is the same as in the standard location box. The difference is that the hardware is now placed inside the doll instead of in a glove. The RFID reader was originally planned to have a function in the game, but has been made obsolete in the iterated game design.

Inside the doll, there is also a Bluetooth radio circuit. This is connected both to the RFID reader and to a tone detection circuit. The Bluetooth circuit is the same as in the location box glove.

This tone detection circuit has been newly designed for this game. It is implemented as 8 PLLs (phase locking loops). A PLL is a electronic circuit that self-resonate at a certain frequency. The 8 PLLs are feed with the signal from a built-in microphone and connected to a BasicX BX24 microcontroller. The microcontroller detects when each of the 8 PLLs self-resonate. The microcontroller is also able to turn on and off one red, one yellow, and five white LED. These are controlled both locally and through remote feedback from the server according to the interaction model specified in [appendix A](#).

Software

The communication protocol for GPS and RFID modules follows the standard specification for the location box.

To control the tone playing and remote feedback to the doll, the PIMP process on the mobile phone has been extended with an interaction protocol according to [appendix A](#). This protocol is divided into the protocol between a custom-designed doll and the phone, and an XML-based protocol between the phone and Gamecreator which specifies the events and actuations that are possible for the doll.

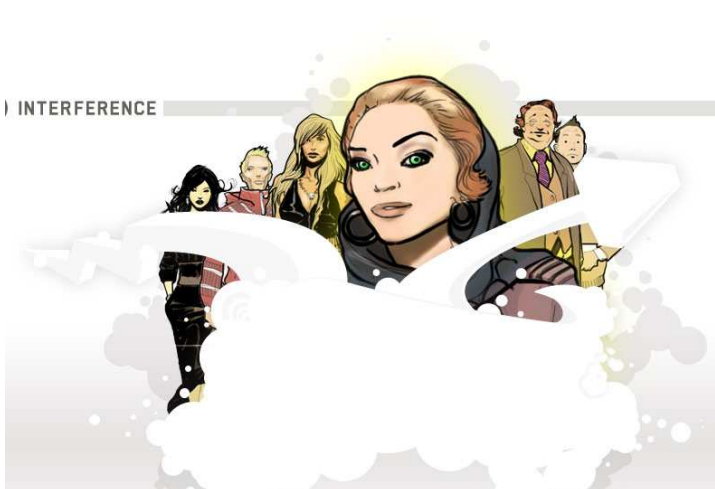
2 GAME DESIGN OVERVIEW

Features	Interference Game Design
Research Goals	<p>Interference is a concept demonstrator showing that</p> <ul style="list-style-type: none"> - It is possible to use both boxes together in one and the same game - It is possible to significantly shorten the game development time using authoring and orchestrations tools (Gamecreator) - It is possible to integrate custom-built interaction devices without developing a completely new system

Design Goals	<p>The Interference is designed to be a demonstration game for pervasive games, targeting an adult audience with little or no previous experience with play in the real world.</p> <ul style="list-style-type: none"> • To demonstrate integration, use both AR and Location box • Use Gamecreator and PIMP/PART to integrate custom-built technology • Demonstrate a range of pervasive game design concepts and different play modes; • 'Gamist', tech-oriented gaming with little human involvement • Story-driven gaming with locations as mood setters • Meet and interact with real people in game (however, little or no emphasis on role-play or ARG) • Re-stageable demonstration game for 6-10 participants • Duration 3-5 hours
Game Setting	<p>The players enter the game as expert engineers recruited to Danske Data. The company has created its success from providing fast, reliable and secure internet to affordable prices. Now, the services have broken down in the area where the game is staged, and the players are tasked with finding out what has happened, and fix the problem as soon as possible. The situation is extremely critical for the company and the players are recruited by the CEO himself, Kung Danske, as outside experts, to solve the issue.</p>
Game Area	<p>The game is intended to be stageable in several places. It is initially planned to be staged in Dusseldorf (Germany) and Kista (Stockholm, Sweden).</p> <p>The game requires an area of approximately 2 KM diameter, which should provide both a living area and a work area. Some game locations need to be in public areas where people pass, others should be more private or at least offer opportunities for private gameplay. The game is mostly played outdoors, but some locations are supposed to be indoors. The game should start in an office space that represents the head quarters of Danske Data.</p>
Genre	Pervasive Adventure Game
Target Group	<p>The game targets adult (18 years or older) players with no previous experience of pervasive games. It primarily targets people who do not define themselves as “gamers”. It is a bonus if the game also can attract ‘gamers’.</p> <p>Selected Target Group</p> <p>The participants are recruited through an open advertisement on the Internet and a Facebook meeting. A press release is sent out in advance. If the event gets over subscribed, players are selected to get a spread in gender and age. Players with no previous experience of IPerG games are preferred.</p> <p>Reasons for selecting Target Group</p> <p>.Interference is intended to be a game that is understandable to people with no previous experience of pervasive games. It is important to test the game with older players, as it requires the players to move over quite large areas in darkness and under uncertain weather conditions.</p>
Game Dimension (scale)	<ul style="list-style-type: none"> - The game is timed to take approximately 3.5 hours total and split into distinct phases which are individually timed. - The game area should be approximately 2 km large in diameter. It needs to be slightly propped; the AR markers need to be carefully placed to enable the players to trace the in-game network and the briefing area needs to be propped to look like the head quarters for Danske Data. - The game includes four to eight player roles, based on the technology handed out to the players. As the player group is not expected to split up during the game, this is also the optimum number of players – more players will make the group dynamics difficult.

Core Features	<p>The game features three types of technology supported play:</p> <ul style="list-style-type: none"> - Tracing the network. Using AR devices, the players are able to plot out invisible lines in the landscape and identify the gates where interference occurs. - Uncovering memories. Using the dolls and the phones, the players are able to retrieve memories from the memory gates. - Closing the gates. Using the dolls and the flute (and the phones) the gates can be closed off and the interference removed. The result is visible also on the AR devices. <p>The doll is a custom-built technology-enhanced game artifact. All other technology used in the game is standard technology from the two boxes.</p> <p>The game also features role-played interaction with the three core characters (Kung, Matilda and Catrina). To make these distinct in-game characters, identifiable in the real world and recognizable in video clips, these wear masks that have been designed specifically for this game.</p>			
Pervasive Aspects	<p>The game is spatially expanded both through its usage of ‘physical/virtual’ overlays. The in-game ‘Internet’ is represented as invisible lines in the landscape, visible only through the AR devices. The players are asked to plot these on a map by the clues provided on the devices. The memory wells are located by GPS. Memory traces are only found in the vicinity of these wells. Furthermore, the players do not know in advance where the game is located, but find out through tracing the network lines and locating the memory wells. This achieves spatial expansion in the same way as in treasure hunt games.</p> <p>The game is also expanded in particular through placing game play in public areas. Initially, the game offers secretive game play: the interaction model for the AR devices offers an opportunity for fairly private game play and the first meetings with the core characters are placed in private or non-public locations. Towards the end of the game, gameplay goes much more public. The act of playing a flute to a doll in public space is ‘suspended’ gameplay; spectators will see what the players do but not understand the effects of it. The final meeting with Catrina and Matilda will also take place in semi-public space.</p>			
Other innovation in game design	<p>One of the core design ideas with Interference is to move away from Alternate Reality into a game that is much more contained while still pervasive. This means that game characters, objects and spaces should be easily identified as such.</p> <ul style="list-style-type: none"> - The actors wear masks. When the players meet these characters in the real world, they can directly see that they belong to the game. Players and actors might also be dressed up to be easily recognized as participants. - The physical game objects are all easily recognized as game objects and consist of the AR markers, the doll, and the flute. - Interactions are physical but symbolic rather than indexical. For example to be able to plot a network line on the map, the players must move their AR devices around an AR marker to see the direction of the line. When the players play the flute to the doll, they must play the correct melody associated to the gate where they are located. <p>Game mastering is done primarily through the actors in the roles of Kung, Catrina and Matilda. During the technology-supported game activities, the players are in constant contact with Kung and Matilda through mobile phones and they provide instructions and hints. Also, the transfer between the phases is done through interaction with the actors who hands out new technology and instructs the players in the use of it. These game progression phases also provide possibilities to jump forward in the game if time runs out. For example, if the players have been unable to trace the network during the first and second phases, Catrina can correct their map or give them a complete map before the closing of the gates.</p>			
Play Modes	The game offers multiple play modes.			
	Roleplay	Tracing the network	Searching Memories	Closing the Gates

	When meeting and interaction with the in-game characters, the players are encouraged to role play	The network is traced through looking at the glyphs with the AR device and mapping the direction of the displayed lines on a map.	When the players visit a gate, the system will automatically trigger sound and video output to the media phones.	Play the correct melody on the flute in front of the doll at a gate. The gate closes and the memories cease to be sent from this gate. The view of the gate in the AR device also change.
	Spectators			
	<p>The game largely uses a suspenseful performative style. The players are dressed up in clothes that allow by-standers to guess that they are participating in some kind of game or event. As the players move around in a group and use strange devices in public space, by-standers are able to conclude that they are gaming. The activity of playing a flute to a doll is particularly strange.</p> <p>The effects of the player activities is however kept secret, as it is only visible and audible on the players' mobile devices.</p> <p>The players are not encouraged to interact with by-standers, and the actors in the game are clearly identified through their masks.</p>			
Game objectives	<p>The game is split into three phases with different objectives.</p> <ul style="list-style-type: none"> - During the first phase, the players are equipped only with the AR device and asked to trace the network lines in the landscape and try to find out where it is broken. - During the second phase, the players are equipped with the AR device, the doll, and the phones. Their objective is still to trace the network, but also to understand why the baby is ill and if it can be cured. - During the third phase, the players are equipped with the AR device, the doll, the phones and the flute. Their objective is to close the gates and by so also fix the network and cure the baby. However, as this means that Kung will die they might choose to not close the gates at all. 			
Game World	The game world is more or less our contemporary world, with the addition of Danske Data and Kung's family as described in the background story.			

<p>Graphic Design Theme</p>	 <p>The design theme is set by the design of the central game characters.. There is also a musical theme that is used at the web site and during the introduction to the game. The same musical theme is used for the melodies that can close the gates.</p>
<p>Game Play</p>	<p>Before the game starts, the players are gathered in a room to dress up in overalls. They are also given functional roles in the game depending on which equipment they will get.</p> <ul style="list-style-type: none"> - The communicators are three persons who will get the media phones, and one person who will get a phone with stored phone numbers for Kung and Catrina. - The tracker is the person who will be entrusted with the Magic Lens device. - The navigator is equipped with a map. - The technician is equipped with the food pack and the flash lights. - The team leader is not equipped with anything particular from start. <p>The game is then started. The lights are dimmed, the theme music is started and a short introductory text is read out loud.</p> <p>The first thing that happens in the game is that the players meet a technician who hands them the Magic Lens device and the four communication phones. He or she provides an in-game explanation of the first task (map out the network) and instructs the players in the use of the technology and the map. The players then get to meet Kung and Catrina who introduce the storyline.</p> <p>Phase 1. During the first phase, the players primarily use the Magic Lens device. They use it to scout out the 'new' network which according to the game storyline is not working properly. During this phase, players will sometimes get phone calls from the actor playing Kung Kung queries them a bit on their progress, can tip them off on potential places to check out, and in general encourages them. Towards the end of the phase, they also get a phone call from Catrina who tells them to go looking for Matilda, as she seems to be the person who has caused the problem.</p> <p>Meeting with Matilda. When the players meet Matilda she is confused and upset. They have to calm her down a bit to get any information out of her. Eventually, she will give them the doll and her own phone, telling them that it might help them in their quest. She will also hand them a map that she has stolen from Kung.</p> <p>Phase 2. During the second phase, the players are equipped with the doll and with mobile phones. They use these to scout out the 'old' network. They can continue to use the AR devices at glyphs, as this will help them understand the relationship between the gates and the old network. The old network is detectable only outdoors. The players that carry media phones and the doll carrier will get sound and video messages to their phones when they enter gates. Their objective is to find as much information on the back story as possible during this phase; they need not find all. The players are still contacted by Kung, who is still encouraging them. During this phase, the game master should keep increasing the health status of the Doll to signify that the baby is getting worse all the time.</p>

	<p>Meeting Catrina. When Catrina finds out that the players have got a doll, she gets upset. She tells them to come and meet them at a specific location (the same as for the ending scene). She hands them the flute and tells them to play it to the doll at the gates.</p> <p>Phase 3. This is the culmination phase of the game. One player is entrusted with the flute, and the players are instructed to close the gates by playing the flute to them. They are also given the ‘magic melody’ which will close the gates.</p> <p>While the players are closing the gates, the baby’s health status improves, but at the same time Kung gets worse. He calls them to congratulate them on their success in fixing the network, but the players hear that he gets more and more ill with each call. The players can see that the baby is getting better through watching the health status shown with the doll. Kung’s health status is only known to them through phone calls (from Catrina and Kung).</p> <p>The status of a gate controls the function of the AR and GPS functions:</p> <ul style="list-style-type: none"> - If the players enter a closed gate, the AR models is changed so that ‘glows’ will disappear and only the straight line network will show. - If the players enter a closed gate, the phones do not play sounds or show video. <p>The doll’s health status is always shown on the doll and is independent of the gate status.</p>
<p>Physical Design</p>	<div> </div> <p>This photo shows the design of the masks and the doll. The black eye of the doll contains the health LED. The five LED that give feedback on the status of gates are visible as a line of dots placed below the heart on the doll body.</p>
<p>Background Story</p>	<p>Kung Danske. During his university years, Kung was a leftist activist with a slightly anarchistic slant. He left the activist movements to work the system from the ‘inside’, forming a highly successful multinational company. Kung has made himself a character on the political scene, speaking in particular against all political regulation of Intellectual Property. Kung Danske was severely injured in a car crash about one year ago. During the police investigation, it was discovered that the crash was staged as a coverup for a ritual torture, in which one of Kung’s ribs were removed. The experience has left Kung physically and mentally broken.</p> <p>Xada. The first wife of Kung is a Syrian immigrant from the middle east, the first woman from her family to study at the university. She has maintained her leftist/anarchist views and is now working as a journalist stationed in the middle east. She is currently in prison in one of the more repressive countries and in a bad condition. Kung and Xada broke up when he formed his company, but got back together in secret about two years ago and have a new child together. Xada is the mother of Matilda and not present in the game (she is possibly in prison in the middle east).</p> <p>Danske Data. Providing high bandwidth and reliable and secure connectivity, voice and data over the same channels, it markets itself as selling ‘Private Internet’ and has rapidly gathered market shares.</p> <p>Matilda was brought up under fairly strong ‘hippie’ ideas, but she has kept close affinity with her father. When Xada was put in prison, Kung Danske entrusted the new child in her care to keep Catrina in the dark about his renewed relationship with Xada. Matilda takes over care of her brother to get closer to her father, but as she feels abandoned by him she decides to shake him up a bit. She built <i>the doll</i>, substituting Kung in a woodoo ritual to disturb the Internet provided by Danske Data. But the consequences are catastrophic: she can’t undo the effect and the baby gets seriously ill.</p> <p>The doll drains health from the baby. It contains some blood and hair from the baby, and is able to relay traces and memories stored in ‘the ancient wells’. It also reflects the baby’s health.</p> <p>The flute represents power and control: together with the doll the players are able to control the</p>

	<p>gates to some extent and close them off from the Internet. When grown up, the baby will be able to use the flute to its full potential, controlling the energy and information available from the ancient wells. Unknown to the players, the flute was manufactured by Catrina from Kung's lost rib.</p>
<p>Story progression in the game</p>	<p>The players enter the game as technical engineers recruited to Danske Data. The company has created its success from providing fast, reliable and secure internet to affordable prices. Now, the services have broken down in the area where the game is staged, and the players are tasked with finding out what has happened, and fix the problem as soon as possible. The situation is extremely critical for the company as their reliability has been the main source of their success and the causes of the current breakdown are completely mysterious. The players are secretly recruited by the CEO himself, Kung Danske, as outside experts, to solve the issue.</p> <p>During their initial investigation of the problem, the players start to suspect that the source of the problem lies in Kung's own family. They meet Matilda, his daughter from a previous marriage who claims that it might be her fault, and that she has fiddled with magic involving her brother (Kung's baby son) that has caused the breakdown and as a side effect also made her brother very ill. To investigate this further, the players use magic means to trace memory gates in the landscape. These gates have caused the interference that has broken the Internet services, and they wells also provide information about the back story seen from the perspective of Matilda. During this process, Catrina gets aware of the player's ability to access the memory wells, and understands that by using her magic flute, the players may actually be able to close them again and fix the problem. But there is a price to pay for fiddling with magic: a death. Towards the end of the game, the players are faced with two choices, each of them with no certain outcome. Out of Kung and the Baby, the players get to choose who dies – and by this also choose whether the internet is fixed. By handing the flute over to Catrina or Matilda, the players decide the faith of the Internet, of Kung, and of the Baby.</p>
<p>Game Characters</p>	<p>Interference is based on a rich back ground story and a set of carefully developed characters. The intention is to offer opportunities for immersion into the storyline and role-play to the players. The story line uses two themes in parallel: a personal conflict in a complex family, and a political conflict regarding the future of the information society. Not all of the background story need necessarily come across through the game, however it is all available to the actors and game managers.</p> <p>The central characters have been developed as 'interesting stereotypes', that is, they should not immediately be classifiable as good or bad, but still recognizable to the players so that they quickly can build a relationship towards them. The players should be able to sympathize with all of the characters, either because of their personality or because of their view of the world.</p>

3 TECHNOLOGY & DEVICES USED

Features	Interference Game Design
Overall Software Architecture	<p>The game is implemented using both the AR box and the Location box. The game engine is run centrally in Gamecreator. The Magic Lens and Location boxes use however very different strategies to interface towards Gamecreator.</p> <p>The Magic Lens devices act as ‘thick clients. They maintain rules and 3D models locally at runtime, and poll Gamecreator about the status of gates.</p> <p>The PART system runs a game server that interfaces towards Gamecreator in a stateless way. It relays communication between Gamecreator and clients. The clients act as ‘thin’ clients, relaying event information to Gamecreator and receiving media output messages from Gamecreator.</p>
Device Specification	<p>The magic lens device is implemented on the Sony Vaio UX 280P Micro PC. It is connected to the internet through a built-in GPRS card, or alternatively through a USB 3G modem.</p> <p>The doll contains an embedded microcontroller (BasicX BX24), a RFID reader chip (IB technology Micro RWD MF) and a Bluetooth (Ezurio BISM) chip.</p> <p>The GPS device is an off-the shelf product (Holux GPSlim236). The game uses two of them, one hidden inside the doll.</p> <p>The GPS and doll communicates with Gamecreator through a generic game client installed at four Sony Ericsson K800 phones.</p>
Interaction Specification	<p>Magic Lens Interaction: When looking at an AR glyph, the players see a 3D model of a ‘network line’ in the real world. At some places, they see crosses between lines and blue and yellow nodes. They need to plot the direction of these lines on a map to figure out how the network is layed out. At some places, the nodes are yellow and emit a strange glow. These are the gate nodes. When the gates are closed, the AR model is changed so that the glow does not show.</p> <p>GPS Interaction: When coming close to an open gate, the players that carry media phones and the doll carrier will get sound and video messages to their phones.</p> <p>Flute and Doll Interaction: When the players come close to an open gate, a yellow LED on the doll lights up. The doll gives feedback on whether the right melody is being played through five ‘note LED’. When a note has been played, the same yellow LED starts to flash on the doll. If it was the right note, a white LED lights up slightly later. If it was the wrong note, nothing more happens. When all ‘note LED’ have lit up, the LED line flashes a couple of times and goes dark. This signifies that the gate has been successfully closed. Technically, the gate will close <i>only when the players leave its location</i>.</p> <p>A detailed specification on how this model is implemented is contained in Appendix A.</p>
Remote Synchronisation of AR devices	<p>The Magic Lens devices will regularly poll the status of the Gate status of all gate locations through the standard Gamecreator XML API.</p>

APPENDIX A: INTERACTION PROTOCOL FOR THE DOLL IMPLEMENTATION

What does the player do	What happens	Tech involved	Event to GC	Actuation from GC
<i>Magic Lens interactions</i>				
1. The MagicLens carrier reads a glyph close to or at an open gate	An AR image is shown on the device.	UltraMobile	Poll property state for the closest gate.	Property value 0 = gate open 5 = gate closed
2. The MagicLens carrier reads a glyph close to or at a closed gate.	If the gate is closed, only an AR image is displayed.	UltraMobile	Poll property state for the closest gate	Property value 0 = gate open 5 = gate closed
<i>GPS interactions</i>				
3. The player who carries the doll enters into a game location close to an open node.	1) A media asset is sent to all players carrying media phones. 2) The doll's health status is updated	GPS tracks the players's location. One of the players are equipped with a GPS from start. One is also hidden inside the phone.	OnLocation(Location)	Each of the 'media phone' carriers and the doll carrier might get one of play sound / play video To the doll carrier: Show (integer) value of health property of the baby object, where health is an integer between 0 and 100.
5. The game master modifies the	-	-	-	-

health status of the Doll at random occasions				
<i>Flute + doll interactions</i>				
6. A player who carries the doll enters a gate location.	The yellow led lights up.	GPS tracks the players's location. One of the players are equipped with a GPS from start. One is also hidden inside the phone.	OnLocation event for a gate location.	To the doll carrier: Show (integer) gatestatus = 1.
7. The player who carries the flute plays a note	A new LED starts to flash while a note is successfully recognized. It lights up permanently if Gamecreator confirms that it was the right note.	Sound recognition in the doll recognizes a limited set of notes. LEDs used both for local and remote feedback.	OnItem(Note)	To the doll carrier: Show (integer) "gatestatus", a value between 1 and 5.
8. The player who carries the flute plays a new note	A new LED starts to flash while a note is successfully recognized. If it is wrong, it will stay dark after the note has been played.	Sound recognition in the doll recognizes a limited set of notes. LEDs used for local and remote feedback.	OnItem(Note)	To the doll carrier: Show (integer) gatestatus=N, N being the same gate status as before the note was played.
9. The player plays the flute when not in a Gate location.	--	--	OnItem(Note)	-- (Gamecreator sends no respons if it is not currently recognizing any melody.)

10. The player who carries the flute has played the full melody correctly.	All LED flash briefly and then go dark.	--	--	
11. The player who carries the doll LEAVES the location of a successfully closed gate.	The doll's health status is updated.	GPS, Doll	OffLocation(Location)	To the doll carrier: Show value of "health" and value of "gatestate"=0.

3.1.1 Additional XML formats for the interaction between Gamecreator and the devices.

Property value actuations:

```

<actuations>
  <actuation>
    <id>45</id>
    <person_id>1</person_id>
    <device_id>4</device_id>

    <action>
      <type>Action::ShowPropertyValue</type>
      <property_id>2</property_id>
      <property_value>Stella Polaris</property_value>
      <gameobject_type>Location</gameobject_type>
      <gameobject_id>1</gameobject_id>
    </action>

  </actuation>
</actuations>

```

The property values used are Gatestatus, which is an integer restricted to a value between 1 and 5, and Health, which is an integer restricted to a value between 0 and 100 in 10 steps.

3.1.2 Protocol for the interaction between the PIMP client and the doll.

The note commands follow the following simple structure. Each command is based on two bytes. The first byte is always the character ‘n’ (ASCII value 110 or 0x6E). The second byte is the value of the detected tone, any of the characters c,d,e,f,g,a,h (99 or 0x63, 100 or 0x64, 101 or 0x65, 102 or 0x66, 103 or 0x67, 97 or 0x61, 107 or 0x68). Each command is followed by a carriage return line feed sequence (CRLF or the hexadecimal values 0x0D and 0x0A). E.g. “nc” is transmitted when tone C is detected, and the byte sequence is: 0x6E, 0x63, 0x0D, 0x0A.

The commands received for controlling the LEDs follows a very similar structure. The command to **illuminate the red LED** (displaying the health status of the doll) is three bytes long. The first byte is always the character ‘h’ (ASCII value 104 or 0x68) which is followed by two bytes each representing high and low nibble of the character representation of a byte. The end of the sequence is the same as for tones, CRLF ending. E.g. “h64” is transmitted to illuminate the white led at 100%. 64 is the hexadecimal representation of 100. The byte sequence will be 0x68, 0x36, 0x34, 0x0D, 0x0A. The **command to illuminate the yellow and white LEDs** (which give feedback on playing the flute) is only three bytes long. The first byte is always ‘g’ (ASCII value 103 or 0x67) which is followed by a two bytes representing the hexadecimal character representation of a byte. This byte is interpreted as a bitmap for the 5 yellow and white LEDs. Bit 0 represent the status of the first LED (the yellow LED) and bit 4 the last LED. If the bit is set to 0 the LED will not be illuminated. A bit set to 1 will illuminate the corresponding LED. The three most significant bits are ignored. The end of the sequence is the same as in tone example, CRLF ending. E.g to illuminate the two first LEDs issue the following command, “g03” is sent. The byte sequence will be 0x67, 0x30, 0x33, 0x0D, 0x0A.

The microcontroller in the doll controls the local feedback of the doll.

- When a note is played that the doll can recognize, the yellow LED starts flashing. The flashing only continues for as long as the note is being played.
- The health status of the doll is shown not only through the intensity of the red LED but also as a pulse. The pulse is quicker at high health levels, and slower at low health levels.

APPENDIX B: ACTOR SCRIPT

General points

Kista has been hit by a dramatic and catastrophic failure of all networks and network based services.

Kung Danske, CEO of Danske Data has determined that the interference is coming from his network infrastructure.

Kung has a baby boy and a daughter called Matilda.

Kung has a partner called Catrina (Madame Death) who is his business partner.

The players have been called in as network specialists to try to uncover the source of the interference.

As the players explore the network, they will uncover a number of gates: points of interference on the network. These gates are the source of the network failure.

The gates are points of contact between two networks: the contemporary data and communications network and an ancient network that holds natural energies and fragments of peoples memories. The combination of the 2 networks is powerful but erratic and must be manipulated or kept separate.

The players will discover through Matilda and Catrina that they can close the gates using the doll and a flute that Catrina has made out of Kung's rib.

As the gates are closed, Kung becomes weaker, the baby stronger again.

Background

Matilda has opened a gate using a ritual doll (something like a voodoo doll, using hair, nails and a little blood from her baby brother). The doll draws power from the baby to keep the gates open. As the gates are closed so the baby gets stronger. Left unchecked the gates will spread on the network, drawing more power from the baby and from their own combined energies.

Kung has had his rib removed as part of a ritual to control the gates – the rib draws energy from Kung when it is used so as the gates are closed Kung deteriorates.

Catrina has been managing the opening of the gates – subtly. The baby, when adult will be able to manipulate the gates under the direction of Catrina.

10 second summary of roles:

(Catrina represents rationality, security, control, amoral power - Kung represents the hypocritical nature of capitalism where benevolence goes hand in hand with exploitation - Matilda represents chaos, naivety, anarchy: the search for identity in a flawed society)

Motivations and concepts that underpin the game.

The power relationship between the male and female characters is as follows:

- Female characters are cast in the leading roles: strong but flawed:
 - Catrina is powerful, ruthless, representing a rational and overriding desire for power – she is also pragmatic and patient
 - Matilda is young, impressionable, a little naïve but focused on a 'better world'. Anarchistic and a little erratic, she is also coming to terms with her role as a second generation Muslim in Scandinavian society. Matilda is looking after her baby brother and has a strained relationship with her father – she loves him but hates his values even though she does benefit from his position.
- Male characters are weaker, dependent on the female roles, taking big symbolic roles but not capable of affecting their fate.
 - Kung is a benevolent, slightly cheesy businessman. He is very successful in business terms, is a hardcore capitalist but wants to see less control of personal data as an institutional tool. Where he has succeeded in business, he has failed in his relationship with Matilda and the baby's mother and has an awkward relationship with Matilda. Kung is the classic victim.

Introduction – player briefing

Engineer:

We have put together some highly experimental technology that may help you in your task. It is unstable and should be treated with care. (expand)

Note – Matilda phone will be the video and doll comm phone and will be handed out by Matilda with the doll

Scene 1 -Danske Data

Presentation room in which Kung and Catrina welcome the players, both are concerned, the disaster is weighing heavy on them. Catrina is quite as concerned as Kung. Kung is not well, he is wearing a sling on his right arm – he speaks a little out of

breath having recently recovered from a serious chest injury (his rib was removed but the players must not know this as yet)

Catrina

Good afternoon. My name is Catrina Da Terume, I am vice president of Danske Data. This is Kung Danske, President and CEO. We have invited you here to help us with a catastrophe that has hit Kista.

Nine days ago we started getting reports of disruption to the mobile network we operate, since then the disruption has spread reaching critical failure. Our engineers have tried to trace the fault but have failed. We have provided you with specialist equipment that you have been briefed about.

We have provided you with specialist equipment that you have been briefed about.

(Bit about the nodes)

Kung

We wouldn't normally get involved in structural issues but this is highly sensitive. You need to discover the source of this interference immediately and repair the network. Our engineers have traced some of the network so you will find markers throughout the affected area but they have failed to find the cause. I will be in constant contact with you. This equipment is highly experimental and must not fall into anyone else's hands. Tell me if anything malfunctions. Good luck.

Catrina holds back as Kung leaves:

Catrina

Please be patient with Mr Danske – he is recovering from a serious chest injury and shouldn't be out of bed.

One last thing. We have had a security breach which is very troubling. Someone has hacked our server and removed important files associated with this investigate. I will let you know if we uncover anything. And no need to trouble Mr Danske about it.

I don't have to tell you how serious this is. We will be keeping a close eye on your progress and will do all we can to assist your efforts.

Don't let us down.

Scene 2 - Exploring the network

(Kung and Catrina keep in close contact with the players asking them what is going on and offering bits of advice)

Kung encourages the players and keeps them comfortable:

You found more lines! Excellent! Be careful with plotting their directions, we really need to get this mapped down fully and accurately.

I seem to remember that several nodes can be present along one of the data lines.

You're lost? O.K, let's see if we can pinpoint your position. I'll get back to you.

(After this, we call the runner – or he calls us – and we get a fix on where they are to get them back on track. Catrina will be the one who calls back.)

Catrina probes them, especially if they have problems:

Be careful with that equipment, I don't know how stable it is. Remember that it's only a prototype.

Try to use it in secret. We really don't want Ericsson to get to know about this tech.

O.k, so we've checked your position and you are way off the map. Go towards the Kista centre – you should be able to see the tower (or whatever). Get back and get to work!

(Finally, after about 40 minutes)

Listen, I just got a report in, it's from the system logs. It looks like the hacker is Kung's daughter Matilda. Keep a look out for her and try to figure out what she's been up to!

3.1.3 Scene 3 - The Doll

Matilda is walking slowly, confused, dazed, in an another world of her own – she kinda knows she has caused a disaster , her brother is sick, her memories are confused.

Matilda:

Matilda State 1 – confused – disorientated

Who are you??? You're working for my father aren't you. What are you doing?

If the players ask

I'm Matilda... I'm Kung's daughter... (quietly) how do you know my name?

My baby brother, he's so sick...everything is broken... what have I done?

(if they ask about the map)

I'm not sure...

Matilda State 2 – *when the players have comforted her, she feels a little more together*

I have done something terrible.... I don't know what to do ... I only meant to cause a bit of trouble... now my brother's sick and nothing is working... you mustn't tell my father.

I made this doll... it has opened something up some kind of gate... now everything is broken, people are dying.... what have i done?

its stealing my mind and hurting my baby brother... look at it's eye it gets brighter as my baby brother gets sicker...

Perhaps you can fix things with the doll. You have to do something, hurry it's getting stronger.

Gives the phone to the players

Take my phone, it's showing me my memories, you have to do something, I can't stand it.

Gives the map to the players

you might need this....

I didn't mean to do all this you know.

Matilda stays with the players until they reach the first gate and a video memory appears:

Ohhh noooo..., it's happening again, we must be near a gate but I don't remember one being here – you have to hurry

Scene 3b: Hunting the memories

The length of this scene depends on how fast the first phase went. Players go around and scout out memories. It can be very short.

Catrina contacts them to see if they've found Matilda. If they tell her about the doll:

A doll? Why would she do that? (start probing the function of the doll)

Oh... I think I am beginning to understand... Did she call those spots Gates? Foolish girl, she is way out of her depth. Is the baby ok? Has she said anything about her baby brother?

We need to meet. Keep Kung out of this please. I think I have something that can solve the problem.

If they call Kung and tell him stuff, he needs to just answer

Oh dear, why would she do such a thing. I'm not such a bad father am I... perhaps I am... just do whatever you need to help her...

Catrina knows what to do. If only I was well enough we'd get sorted out in no time.

3.1.4 Scene 4 - The Magic Flute

Where Catrina catches up with the players – she is distracted, intense, concerned – things are not going according to her plans.

Catrina

This is serious, Matilda is way out of her depth. The baby is in grave danger. What I'm telling you now is not common knowledge, not even Kung knows fully about this. There is an ancient network that is fed by dreams, by natural energies that exists in parallel with our data networks. In making this doll, and goodness knows what she did to her baby brother to make it, she has opened up a gate between these networks. The network is feeding from her brother.

(As an aside and somewhat distracted)

The time is not right for this to happen).

(Snaps back to the players and guides them to using the flute with the doll – optionally Catrina will follow them to the first gate and show them how to close it)

I have this flute. It is a powerful artifact that may work with the doll to close the gates. Go now to one of the gates and play this simple melody to the doll. 4317.

If I am right then the gates can be closed, but hurry

(If the players ask about the flute)

I cannot tell you that.... You have your chance to repair the network now and save Kung's child.

Go, you don't have much time, I must get back to Kung but call me if you need me.

As the gates shut

Kung #1

We are getting some response on the network, not much but the interference seems to be slightly weaker. *(cough)* We will keep you posted.

Kung #2

Whatever you are doing it seems to be having some affect. We are at one third network strength.

(Coughs terribly)

Excuse me I have to go and lay down. Keep up the good work.

Kung #3 (much weaker)

We have some traffic flow in the network, still faint but it appears you are bringing things under control – excellent work.

Matilda

(disorientated)

What are you doing?.. my brother is changing... his eyes... his eyes are changing...
(click)

Kung #4

You're doing well... (out of breath) Keep going... (terrible cough) I have to pass you over to Catrina, my chest....

Catrina #5

We are reading 84% network strength, excellent progress. We can see from your outputs that there is one remaining gate. I will come and meet you there. I'm worried about Kung, he is very sick but refuses to be taken to hospital, as the network is improving, he is getting worse.

Scene 5- Showdown

Matilda

My father is close to death, I know what I have done but he doesn't deserve this. Leave the last gate open. I'm scared, I know I have unlocked something that cant be controlled properly but the world is too ordered, a little chaos cant be so bad.

Do you really want our lives to be controlled by the likes of her (points to Catrina)

I feel so sorry for my brother, he's only a baby but he has some terrible power. Someone with his powers will never lead a free life... give me the doll and flute so I can lock this last gate open for good.

I made this happen, it is for me to put things right...

Catrina

Matilda is a fool, don't be fooled by her naïve charm, she doesn't understand the importance of order. The baby is very special, he must not be allowed to perish. Kung is a kind old fool but it is time for him to move over.

Think of the power that can be controlled by the new king. I ask you to spare the child not just out of compassion but also out of a respect for progress, control... for a more secure future. I know you will make the right choice.

Now hand me the doll and flute so i can close the last gate .

Epilogue

both actors remove their mask – one player reads out the epilogue

Catrina's monologue

(if the last gate is closed)

(the baby is fine, Kung perishes)

And so life goes on, for most of us. The networks are restored, your busy lives can be resumed and all is well in the world. We mourn the loss of a kind but foolish old dane and celebrate the new King. You have made a wise choice, the child will lead us into a more controlled future. There is no use for the doll, the flute so I return you fathers rib to you Matilda.

Matilda's monologue

(if the last gate is left locked open)

(Kung starts to recover, the baby will remain sick)

You have made your choice, my father lives, for which I am grateful. My baby brother has changed, he is broken, but he will never be what others wanted him to be. Neither life could have been his own. You chose to leave the gate open, to allow the old and new to collide. Perhaps it's not so bad that you leave behind you some chaos.

Video and Audio Scripts

Matilda

M Who the fuck does that Catrina think she is, the witch. I hate her. Why dad ,why? Why did he leave mum for her?

M Why me? Why do i have to look after the little freak. Why couldn't they have had an abortion? All that bullshit about a woman's body and choices, and now this... I'm never ever have kids.

M I knew there was something weird about him, the little freak, he gives me the creeps. I bet mum was fucked by a devil or something... Oh that's not funny... ah whatever. Haha I'll call him The Omen... what do you think about that little freak. Omen!

M Ok, stay still you little freak, just a little blood, a few nail clippings, and some of your lovely black hair. Shit this is like some freaky fairy story. And... there, finished. What do you think of that freak? A lovely new doll for you to play with.

M OOOh cool, this doll is wild, now lets see what it can do. Now they can't ignore me. Damn that baby why is he crying so much I only just fed him. OMG what was that...

M Ok dolly it's our turn to do something serious, Mum, I know the shit you had to put up with since you came from Syria. I won't let you down, it can't just be about power and money and networks. They never understood you but they are going to understand me.

M Why do I always have to spoil things, He's not such a bad dad but he just doesn't see me. Why would I want to go the the opera – and in Milan!!! --- I don't want his money, can't he see that?

M Right then, the Login page now what was the password - pavillon82 – what the hell does that mean? Ok Disaster management, now where is it – Interference – got it - and *delete* ha!!!

Catrina

C Matilda I am not your stepmother and you are no longer a child. You will treat your father... and me... with respect - do you understand me? Your father may accept your behaviour but i do not. I will not tolerate your outbursts.

C I like you Matilda, you have spirit. --- You know I care very much for you and your father – and that adorable baby brother of yours. I know it is a big responsibility to look after your brother but you must understand that your father and I are extremely busy people. If there is anything you need, call me on my mobile.

C Matilda, you have to understand that when you use our home computer, you simply cant browse wherever you want. We keep close track of all incoming and outgoing traffic, and so do others. We cannot afford to have outsiders knowing our business. You have responsibilities now that you should not take lightly.

C I'm afraid your father has been involved in a serious accident Matilda. Sit down. It's not critical but he is quite poorly and you will not be able to see him for a few days. I will come and stay with you for a while until we know exactly how things are.

Kung

K This is a commercial decision – we have to lose at least 20 from the lab...wait I'll call you back.. Ah Matilda I'm so glad you could make it here today, I have a little something for you, - surprise...

K Catrina and I have been talking dear and we think it's about time you got a proper job. Nothing too hard, just a few days a week in the purchasing department. We're only thinking about your future you know. We can get a nanny in to help you out.

K It's your mother dear, I'm afraid you won't be able to see her for some time. Don't worry, there's nothing *really* wrong with her but she just wont be around for a while. I will try to arrange for you to phone her once a week. Oh i wish she wouldn't get herself tangled up in these things. Promise me you won't turn out like your mother Matilda.

K But Matilda, people change. When I met your mother, she was struggling with her family. A young Syrian girl in the 70s had none of your opportunities. I know you have a history darling but really, do you have to wear that headscarf?